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The Effects of Explosive Strength Applied to Footballers on Some Physical and Physiological Parameters

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Abstract

It is aimed to investigate the effects of explosive strength training on aerobic capacity, anaerobic capacity, blood pressure, resting heart rate and shooting speed.

The aim of this study was to investigate the explosive strength training on some physical and physiological parameters. The study included 38 volunteer 1st and 2nd amateur league footballers aged 18-25 years. Aerobic capacities of the players were measured by shuttle run test and Anaerobic power measurement by vertical jump test. After calculating the vertical jump value of the athletes anaerobic strength; calculated using the Lewis Nomogram using vertical jump and body weight values. The shooting speed of the players was determined by speed pocket radar equipment In the study, different strength training (station training method) and football-specific technical and tactical training programs were applied to the research group for 8 weeks, 3 days a week. only technical and tactical training programs were applied to the control group. The parameters were taken twice before and after the 8-week study. In order to determine the differences between the pre-test and post-test results, The Wilcoxon test, one of the nonparametric tests, was used to, Mann Whitney U-test analysis was used to compare the pre-test and post-test values between the groups. The significance level of the study was accepted as $p < 0.05$. Significant difference in shooting speed was found as a result of the signed ranks test comparing the pre-test and post-test measurements of the research group participants ($p<0,05$). Significant differences between the measurements of aerobic power, anaerobic power were found as a result of the signed ranks test comparing the pre-test and post-test values of the control group participants ($p<0,05$). After the Mann-Whitney U test, where the posttest measurement values of the experimental and control group participants were compared, there was a significant difference between the groups in aerobic power values, and this difference was found to be in favor of the experimental group participants ($p < 0.05$). As a result, it can be said that explosive strength training applied to amateur football players between the ages of 18 - 25 increases the shooting speed.

Keywords: Football, Training, Explosive Strength, Shooting Speed

Introduction and Purpose

The desire of the countries to introduce themselves and make themselves accepted through football has led to the development of the science of training along with the science of sports. In today's football, motoric features have gained great importance. In order to achieve success, the necessity of developing the motoric features as planned and targeted has emerged (Açıkada,1991(1); Bangsbo,1996(5);Özmen1998(29).

Research on the physical aspect of football found that the player ran 10,000 meters during a match, of which approximately 4,000 meters were walking, 3,000 meters is a light tempo run, 2,000 meters is a fast tempo run, 2,000 meters is a fast tempo run, 1,000 meters is a very fast sprint run (Garganta,1993(20); Konter,1997(26); Günay,2001(22)).

Improving overall strength; it serves to improve the entire organism to a superior level in order to perform its task in the best way, to develop the proportional development of all motor features and organs, and to provide the basis for special force preparation. Their basis is the preparation of the respiratory system to the highest capacity, the development of the heart and circulatory system for the highest efficiency, the superior energy consumption and mobility of the skeletal and muscular system, and the ability to provide adequate efficiency in terms of muscle nerve. (Sans, 1994(31); Günay, 2001;(22)).

Explosive strength-quickness is the ability to perform motorized actions as soon as possible (Konter, 1997(26)). In other words, explosive strength is the ability to overcome the resistance of the nervous muscular system with the greatest possible contraction rate (Eski T.,(19)). Intense training, similar to

explosive strength training, activates more nerve equipment, incorporating most motor units and muscle fibers, and increasing the transmission rate of motor nerves (Bompa, 2001 (6)).

Erol (18) determined that explosive strength training on male basketball players aged 16-18 were also effective in general force development and stated that explosive strength exercises could be applied as a valid method. (Erol 1992). Thus, explosive strength training has taken its place in the resources as a training program that can be used both in the small, young categories and in the wide phase of the training. explosive strength studies generally improve explosive force, jump force, combined (serially) tapping force, tensile force, throwing force, reaction force and sprint force.

Shooting speed (The kicking velocity) is directly related to the range of motion of the joints forming the shooting force. Because the agonist muscles responsible for movement can be stretched at the beginning of the movement in accordance with the wide joint movement. As the stretched muscle has more contraction force, the sufficient flexibility of the antagonist muscles will allow the movement to occur easily and reach the maximum degree of joint movement. As the number of muscle fibers involved in movement and therefore the sarcomere number will be greater during wide joint movement, the contraction force will increase. This will increase the shooting speed (Kepoğlu vd. 2001 (23).

Material - Method

Measurement Methods and Tests

Weightandheight

Theheight (m) of the subjects was measured using an anthropometric set (Holtain brand with 1 mm accuracy), barefeet, feet flat on the ground, heels adjacent, knees taut and body upright. Body weight (kg) was measured with scales.

Resting heartbeats, Blood pressure

Number of Resting Heart Beats: After resting the athletes in a supine position for 10 minutes, thenumber of heartbeatsfor 15 seconds was determined and multiplied by 4 to calculate the number of resting heartbeats. Blood pressure measurements were performed using a Nimo Aneroid Stethoscope. Blood pressure measurements were made andr ecorded according to the instructions of the device.

Aerobiccapacity, Anaerobicpower

Aerobic capacity shuttle run test was performed by using shuttle run sound from computer and Anaerobic power measurement was performed by using vertical jump test meter and chalk in Denizli Gymand Sports Provincial Directorate sports halland recorded.

Vertical Jumping and Anaerobic Power: After calculating the vertical jump value of the athletes, anaerobic power; calculated using the Lewis Nomogram using vertical jump and body weight values.

$P = (\sqrt{4.9}\ (Weight)\ \sqrt{D^n})$

P = Power - D^n= Vertical Jump Distance (m) (Günay 2006 (21)

Shots peed

The Net Playz Multi Sport Hands Free Speed Radar Gun Kit is used in the shooting speed measurement. Footballers were asked to hit the ball with the kick-off (on foot) technique. Footballers were given 4 shot in total in 2 pre-tests and 2 strokes in total and the best value was included in the study.

Participants

The subjects participated in the study consisted of 38 volunteer male football players aged 18-25 years who did not have any health problems playing football in the 1st and 2nd Amateur league in Denizli. The groups were divided into two groups as Research Group (DG) (19 people) and Control Group (KG) (19 people).

Table 1. *Research group training program (Full Rest: Heart rate 90 beats/min.fall)*

No	Drills	Exerciseintensity	Number of repetitions	Number of Sets	Weight Intensity	Rest	Exercise Duration
1	Squat	%40-60	6-10	3-4	30-60 kg	Each working. Break 30s Rest. Set Break 2-5 min *Full Rest.	3 Set 30 dk 4 Set 40 dk
2	Pull Over	%40-60	6-10	3-4	15 kg	Each working. Break 30s Rest. Set Break 2-5 min *Full Rest.	3 Set 30 dk 4 Set 40 dk
3	Bench Pres	%40-60	6-10	3-4	30 kg	Each working. Break 30s Rest. Set Break 2-5 min *Full Rest..	3 Set 30 dk 4 Set 40 dk
4	Standing barbell press	%40-60	6-10	3-4	15-35 kg	Each working. Break 30s Rest. Set Break 2-5 min *Full Rest.	3 Set 30 dk 4 Set 40 dk
5	Half squat	%40-60	6-10	3-4	40-80 kg	Each working. Break 30s Rest. Set Break 2-5 min *Full Rest.	3 Set 30 dk 4 Set 40 dk
6	Barbell Calf Raise	%40-60	6-10	3-4	20 kg	Each working. Break 30s Rest. Set Break 2-5 min *Full Rest.	3 Set 30 dk 4 Set 40 dk
7	Push pres	%40-60	6-10	3-4	25 kg	Each working. Break 30s Rest. Set Break 2-5 min *Full Rest.	3 Set 30 dk 4 Set 40 dk
8	Dumbbell clean	%40-60	6-10	3-4	30 kg	Each working. Break 30s Rest. Set Break 2-5 min *Full Rest.	3 Set 30 dk 4 Set 40 dk
9	Dumbbell Step Ups	%40-60	6-10	3-4	30 kg	Each working. Break 30s Rest. Set Break 2-5 min *Full Rest.	3 Set 30 dk 4 Set 40 dk
10	Shuttle with medicine ball	%40-60	6-10	3-4	30 kg	Each working. Break 30s Rest. Set Break 2-5 min *Full Rest.	3 Set 30 dk 4 Set 40 dk
11	Lying leg curl	%40-60	6-10	3-4	30 kg	Each working. Break 30s Rest. Set Break 2-5 min *Full Rest.	3 Set 30 dk 4 Set 40 dk

Data Analysis

The data obtained in the study were recorded regularly during the applied measurements. The data obtained in the study were recorded regularly during the tests performed by participants. The recorded data were transferred to SPSS 22.0 package program and the necessary statistical operations were applied. Descriptive information of the experimental and control groups were formed in the form of arithmetic mean, standard deviation, minimum and maximum values.

Normality tests of the groups were performed; In order to determine the difference between the pre-test and post-test results of the groups within themselves, Wilcoxon test which is one of the nonparametric tests used, also Mann Whitney U-test analysis was used to compare the pre-test and post-test values between the groups. The significance level of the study was p <0,05

Findings

Table 1. *Descriptive statistics of physical characteristics and test measurements of the experimental and control group participants*

Applications	Variable	Experimental group					Control group				
		N	$\bar{x}$	S	Min.	Maks.	N	$\bar{x}$	S	Min.	Maks.
PRE-TEST	Age (years)	14	21,14	2,21	18	25	14	21,79	2,16	18	25
	Length (m)	14	1,76	0,04	1,67	1,80	14	1,77	0,04	1,72	1,84
	Weight (kg)	14	77,64	5,80	66	85	14	77,39	3,35	71	83
	Resting Heart Rate	14	72,57	6,77	64	84	14	71,71	5,08	64	80
	Great Blood Pressure	14	117,86	8,02	100	130	14	115,71	7,56	100	130
	Small Blood Pressure	14	74,29	10,16	60	100	14	72,14	8,93	50	90
	Aerobic Power	14	46,36	4,13	39,90	53,70	14	39,41	3,08	33,60	42,90
	Anaerobic Power	14	1138,62	99,53	1001,57	1340,84	14	1134,45	73,29	1021,57	1250,43
	Shot Speed	14	86,43	9,47	71	105	14	86	8,53	70	97
POST-TEST	Age (years)	14	21,14	2,21	18	25	14	21,79	2,16	18	25
	Length (m)	14	1,76	0,04	1,67	1,80	14	1,77	0,04	1,69	1,84
	Weight (kg)	14	77,50	4,99	69	83	14	78,35	3,07	75	84
	Resting Heart Rate	14	70,14	4,40	64	76	14	69,14	4,82	60	76
	Systolic	14	119,29	7,30	110	130	14	115	6,50	110	130
	Diastolic	14	73,57	9,29	60	90	14	75	7,60	60	90

	Aerobic Power	14	47,67	4,08	41,10	54,30	14	41,09	3,60	36	46,10
	Anaerobic Power	14	1156,14	81,95	1047,11	1346,14	14	1184,40	58,55	1093,90	1304,57
	Shot Speed	14	90,50	6,90	82	104	14	88,71	7,90	76	101

Table 2. *Signed ranks test comparing pre-test and post-test measurement values of the experimental group participants*

Variable	Paired group	N	$\bar{x}$	S	Z	P
Resting Heart Rate	Pre-test	14	72,57	6,77	-1,895	0,06
	Post-Test	14	70,14	4,40		
Systolic	Pre-test	14	117,86	8,02	-0,707	0,48
	Post-Test	14	119,29	7,30		
Diastolic	Pre-test	14	74,29	10,16	-0,447	0,66
	Post-Test	14	73,57	9,29		
Aerobic Power	Pre-test	14	46,36	4,13	-2,397	0,28
	Post-Test	14	47,67	4,08		
Anaerobic Power	Pre-test	14	1138,62	99,53		
	Post-Test	14	1156,14	81,95	-1,083	0,28
	Post-Test	14	45,64	5,06		
Shot Speed	Pre-test	14	86,43	9,47	-2,012	0,04*
	Post-Test	14	90,50	6,90		

*P<0,05

Table 2. shows the comparison of the pre-test and post-test measurement values of the experimental group participants on the paired groups. It was found that there was a significant difference between the groups in the Shoot Speed of the participants and this difference was in favor of the post-test measurement (p<0,05). In other test measurements, there was no significant difference between the measurements.

Table 3. *Signed ranks test comparing pre-test and post-test measurement values of the experimental group participants*

Variable	Paired group	N	$\bar{x}$	S	Z	P
Resting Heart Rate	Pre-test	14	71,71	5,08	-1,979	0,05
	Post-Test	14	69,14	4,82		
Systolic	Pre-test	14	115,71	7,56	-0,378	0,71
	Post-Test	14	115,00	6,50		
Diastolic	Pre-test	14	72,14	8,93	-1,633	0,10
	Post-Test	14	75	7,60		
Aerobic Power	Pre-test	14	39,41	3,08	-2,755	0,01*
	Post-Test	14	41,09	3,60		
Anaerobic Power	Pre-test	14	1134,45	73,29		
	Post-Test	14	1184,40	58,55	-3,296	0,00*
	Post-Test	14	46,71	3,47		
Shot Speed	Pre-test	14	86	8,53	-1,733	0,08
	Post-Test	14	88,71	7,90		

*P<0,05

Table 3 shows the comparison of the pre-test and post-test measurement values of the control group participants on the paired groups. It was found that there was a significant difference between the measurements of the aerobic power and anaerobic power of the participants, and this difference was in favor of the posttest measurement in all test groups (p<0,05). In other test measurements, there was no significant difference between the measurements.

Table 4. *Mann-Whitney U test comparing pre-test measurement values of experimental and control group participants.*

Variable	Group	N	Mean Rank	Total Rank	Z	P
Resting Heart Rate	Experimental	14	14,82	207,50	-0,211	0,83
	Control	14	14,18	198,50		
Systolic	Experimental	14	15,64	219	-0,811	0,42
	Control	14	13,36	187		
Diastolic	Experimental	14	15,11	211,50	-0,430	0,67
	Control	14	13,89	194,50		
Aerobic Power	Experimental	14	20,46	286,50	-3,844	0,00*
	Control	14	8,54	119,50		
Anaerobic Power	Experimental	14	14,64	205	-0,092	0,93
	Control	14	14,36	201		
Shot Speed	Control	14	13,82	193,50	-0,115	0,91
	Experimental	14	14,32	200,50		
	Control	14	14,68	205,50		

*P<0,05

Table 4 shows the comparison of experimental and control group participants' pretest measurement values. It was found that the aerobic power values of the participants were also significant differences between the groups, and this difference was in favor of the experimental group participants (p<0,05). In other test measurements, there was no significant difference between the measurements.

Table 5. *Mann-Whitney U test comparing post-test measurement values of experimental and control group participants.*

Variable	Group	N	Mean Rank	Total Rank	Z	P
Resting Heart Rate	Experimental	14	15,29	214	-0,521	0,60
	Control	14	13,71	192		
Systolic	Experimental	14	16,79	235	-1,604	0,11
	Control	14	12,21	171		

Diastolic	Experimental	14	14	196	-0,344	0,73
	Control	14	15	210		
Aerobic Power	Experimental	14	19,50	273	-3,223	0,00*
	Control	14	9,50	133		
Anaerobic Power	Experimental	14	12,57	176		
	Control	14	16,43	230	-1,241	0,22
Shot Speed	Control	14	16	224		
	Experimental	14	15,50	217	-0,644	0,52
	Control	14	13,50	189		

*P<0,05

Table 4 shows the comparison of experimental and control group participants' post-test measurement values. .It was found that the aerobic power values of the participants were also significant differences between the groups, and this difference was in favor of the experimental group participants (p<0,05). In other test measurements, there was no significant difference **between the measurements.**

Discussion and Result

Resting Heart Rate, Systolic blood pressure, Diastolic blood pressure

Günay and Ergül (17) did not observe a statistically significant improvement in resting heart rate values in P <0,05 level as a result of their research on physical and physiological developments on elite and non-elite female volleyball players between the ages of 20-22. Cengizhan and Günay (10) in their study observed a significant decrease in resting heart rate rhythm, systolic and diastolic blood pressure values of the explosive strength exercises and strength endurance exercises groups. Significant decreases in blood pressure and resting pulse can be attributed to the chronic effects of training on the circulatory system and are similar to the literature.

Aerobic

In some studies, strong and high intensity training, dynamic exercises (eg.; squatting, weighted CMJ, falling jump and sprinting) have been reported to rapidly increase an individual's ability to endure (Eduardo vd. 2015(15). Other similar studies have shown further improvement in VO2max values.

Çalışkan 2013 (12), In study applied to11-13 aged athletes, reported that experimental group's maximal aerobic power averages before training 43,37 ± 2,61 ml/kg dk, after training 46,99 ± 2,79 ml/kg dk (p <0.05), control group's maximal aerobic power averages before training 42,39 ± 2,20 ml/kg dk after training 45,27 ± 2,47 ml/kg dk (p <0.05), and that there was a statistically significant difference in the mean aerobic power differences between the participants before and after the training (p < 0,05). It was found that maximal aerobic power average of the experimental group was 3.71 ml / kg min and 3.19 ml / kg / min in the control group. It was stated that there was no statistically significant difference between the groups' maximal aerobic power averages before and after training (p > 0,05). In another study, The mean and standard deviation values of the research group's VO2max was calculated in pre-test as 44.55 ± 5.22 ml / kg / min, 48.49 ± 4.22 ml / kg / min in posttest measurements and these rates were considered statistically significant (p < 0,05).). (sayar 2018 (32).

Anaerobic

Arabacı (4), Çelik and Pulur (13), Erdoğan and Pulur (16), Erol and Sevim (18), Kilinc et al. (24), Taskin et al. (35) Polat et al. (30) found a significant increase in anaerobic power values in their studies.

In pliometric studies applied to male basketball players aged 14-16, Al-Ahmad (3) determined experimental group the vertical jump test values as statistically significant P<0,05 improvement compared to

the control group. Brown et al. (7), the results of their research on 26 male students aged 15 years they conducted, determined experimental group a 7.3 cm increase in vertical jump test values. This was seen as a statistically significant improvement in P <0,01 level.

After explosive strength exercises applied to the military student group of 18-19 years old, vertical jump values showed an improvement in P <0,01 significance level (28). Erol (36), After explosive strength training applied to the basketball players aged 16-18, mentioned there was a significant improvement in the vertical jump values of participants at P<0,01 level statistically.

There was a statistically significant improvement P <0,01 significance level in the vertical jump values of explosive strength trainings applied to the subjects by çimen (14). Kritpet (27) in 1988 applied strength training to 15 male athletes and showed significant improvements in squat and vertical jump values.

Shot Speed

In the Şengur (34) study, it was found that the average shooting speed of the players was 93.77 km / h in the pre-test and in the post-test 97.72 km / h after the vibration training. It was determined that football players' shooting speed increased significantly in the last test p<0,05. Kizilin (2016) (25) in his study found that acute vibration training improves shoot speed, In another study, it was found that vibration exercises significantly improved the shot speed and ball throwing values (Bunker, Rhea, Simons and Marin, 2011) (8). In a different study, Chih and Ying (2015) (11) concluded that whole-body vibration training improves shoot speed, movement speed, and jump performances. The results of the aforementioned studies support the improvement of the shooting speed of the exercises in our study. this may be related to the tonic vibration reflex in the muscle due to the increase in the activation of the primary endings of the muscle spindles by vibration training and this may result in an increase in the contractile strength (Cardinale ve Bosco, 2003) (9).

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State of Physical Fitness of the Students of Ukrainian Higher Educational Institutions

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Abstract

The article is devoted to the problem of increasing the level of physical fitness of the students of Ukraine. The role of physical education in the improvement of health, working capacity and the efficiency of the educational and future professional activity of students is shown in the article. The aim is to study the state of physical fitness of the students of a different gender at the different stages of study at higher educational institutions of Ukraine. The study was conducted at Zhytomyr National Agroecological University. 394 students (199 males, 195 females) of the 1st-4th years of study participated in the investigation. The research methods included the analysis and generalization of educational and methodical literature, pedagogical observation, testing; the methods of mathematical statistics. The assessment of the students' level of physical fitness was carried out according to the State tests and standards of the assessment of the Ukrainian population's physical fitness by the exercises characterizing the level of different physical qualities development, such as power, endurance, speed, agility, flexibility. It was found that the students of the 2nd year of study had the best level of physical fitness. Starting from the 2nd year, the rates of the improvement of the level of physical qualities of both male and female students are slowed

down and decreased by individual tests. In the senior years, there is a significant decrease in the level of physical fitness. It was found that the level of physical fitness of male students is higher than the female students. The conducted analysis gives grounds to assert that the state of physical fitness of both male and female students of the 1st-4th years of study can be considered unsatisfactory in general. Conclusions. The study of the state of physical fitness of students of Ukraine showed that the traditional system of physical education at higher education institutions was not fully able to provide the required level of physical fitness and working capacity of students for future professional activity and vital activity. This necessitates the search for efficient ways of the improvement of the traditional system of physical education at higher education institutions of Ukraine.
Keywords: physical fitness, physical education, physical qualities, students

1. Introduction

An important component of health, the basis of high performance and vitality, on which all the motor activity of a person is carried out, is the level of physical fitness [1, 2]. An increase in the level of physical fitness of students is one of the priority tasks of the departments of physical education in Ukrainian higher education institutions. At the same time, the departments of physical education and modern methods of physical training do not fully satisfy the natural biological need of students in physical activity [3, 4].

Among the main reasons for the low level of physical fitness and health of young students in Ukraine are the devaluation of the social prestige of a healthy lifestyle; underestimation of the social, health-improving and educational role of physical education and sports in the educational institutions; a low level of physical development and health of school graduates; the lack of sufficient interests, motives, and needs of students for traditional physical education classes; the lack of diversity in the means of physical education; insufficient health-promoting and training orientation of the forms and means of physical education; the conditions of study in modern educational institutions, characterized by an increase in the volume of education activity and low motor activity of students; the students' lifestyle [5, 6].

2. Literature Review

Physical fitness is an important characteristic of health status and an integral indicator of the physical activity of students [7]. The level of physical fitness of the student depends on the mastering of the means, forms and types of physical training, which are used during instructional and independent physical exercises. Using proper physical exercises and regulating the intensity of their performance, it is possible to purposefully influence the stimulation of all systems of an organism, increase the level of their functioning, ensuring a high level of physical fitness of students [8, 9, 10].

Physical fitness is the students' willingness to perform the physical activities required by the curriculum. It reveals the level of the development of physical qualities that has been achieved in the process of physical education. Physical fitness is the result of the students' physical activity, an integral indicator because all organs and systems of an organism come into contact during physical exercise [11, 12]. Physical fitness is considered not only as a function of the motor apparatus but also as the functioning of the whole organism [13]. The physical fitness of students is related to the level of physical health, but it cannot be stated definitely that a student who has a high level of physical health also has a high level of physical fitness. Therefore, the results of motor tests of the students with a "safe" level can serve as a model for the development of motor skills of the students with lower levels of physical health. It is obvious that physical fitness first should be focused on improving the health of students and only indirectly on the results of motor tests.

Many years of experience and research suggest that the physical fitness of the students of higher education institutions is laid in their early years, especially when studying at school [9]. The level of readiness of a university applicant, one's level of health will greatly affect the content and level of workload in physical education classes at higher education institutions and ultimately the level of physical fitness [14].

Determining the fitness level is important when recommending exercise regimen, selecting or creating wellness training programs, and evaluating the efficiency of the influence of certain physical activities on the organism [15]. The theory and methodology of physical education [7] offer many ways and means of

controlling the development of physical qualities, which can provide a rather high and reliable level of assessment of the students' physical fitness. There are many pedagogical, medical, biological and instrumental techniques [16, 17, 18] that allow determining the level of physical fitness of students clearly. At the same time, they are practically not used in the process of physical education to estimate the level of physical fitness of students but are used by teachers of higher educational institutions for scientific research in this field.

A rather efficient form of assessment of the level of physical fitness and the system of physical education of students was proven a module-rating system [3]. This system is today one of the most advanced systems of assessment of knowledge, abilities, state of physical fitness and independent work of students in the departments of physical education. It comprehensively, consistently and systematically provides an opportunity to evaluate the students' theoretical knowledge throughout the study period, the improvement of the tests in physical training from course to course in the practical section, reveals the content and structure of vocationally applied physical training, has criteria for assessing the students' independent work.

The analysis of special literature [2, 4, 9, 16, 19-21] showed that the existing methods of the organization of physical education do not provide the increase in physical fitness of a considerable part of students in the period of study in higher educational institutions. Well-timed and high-quality diagnostics of the current level of physical fitness of the students of various specialties have an important applied role. Therefore, it is extremely important to use new methodical approaches and innovative technologies for the express evaluation of the current level of physical fitness of students.

The aim of the article is to investigate the state of physical fitness of the students of different gender of higher education institutions of Ukraine at the different stages of the study.

3. Method

3.1. Participants

The assessment of the students' physical fitness was carried out at Zhytomyr National Agroecological University during the physical education process. The study involved 394 students of the 1st-4th years of the main educational department (199 males and 195 females) of the faculties of agroecology, economics, and agribusiness, veterinary medicine, the mechanization of agriculture.

3.2. Materials

The methods of research included the analysis and generalization of educational and methodical literature, which made it possible to find out the current state of physical fitness of students; pedagogical observation and testing that were used to diagnose the level of development of the students' physical qualities; the methods of mathematical statistics that were used for qualitative processing of the obtained data.

To test the level of physical fitness, control exercises from the State tests and standards of the assessment of the Ukrainian population's physical fitness were used [22].

The following tests were used to evaluate power qualities: 1) standing long jump; 2) push-ups; 3) pull-ups (males), hanging on the crossbar with bent arms (females); 4) sit-ups for 1 min from a position of lying on the back, hands on the nape, legs fixed. In order to evaluate the speed characteristics, the 100 m race was used. The shuttle running 4 x 9 m characterized the development of agility. The endurance assessment was exercised by the 3000 m (males) and 2000 m (female) race. The forward reach from a sitting position was used for the assessment of flexibility. Control tests and standards of assessment of the physical fitness of students (both males and females) are presented in Table 1.

3.3. Procedure

The procedure for calculating an individual grade of the students' physical fitness is shown in Table 2. The students' possible final grades in physical education, taking into account the results of 8 physical exercises, are in the range of 9-45 points. The evaluation scale of the results of the students' physical fitness testing is given in Table 3.

Table 1. *Tests and standards of assessment of the students' physical fitness*

Tests	Gender	Points / Standards				
		5	4	3	2	1
3000 m race, min, s	Male	12.00	13.05	14.30	15.40	16.30
2000 m race, min, s	Female	9.40	10.30	11.20	12.10	13.00
100 m race, s	Male	13.2	13.9	14.4	14.9	15.5
	Female	14.8	15.6	16.4	17.3	18.2
Standing long jump, cm	Male	260	241	224	207	190
	Female	210	196	184	172	160
Push-ups, times	Male	44	38	32	26	20
	Female	24	19	16	11	7
Pull-ups, times	Male	16	14	12	10	8
Hanging on the crossbar with bent arms, s	Female	21	17	13	9	5
Sit-ups for 1 min, times	Male	53	47	40	34	28
	Female	47	42	37	33	28
Shuttle running 4 x 9 m, s	Male	8.8	9.2	9.7	10.2	10.7
	Female	10.2	10.5	11.1	11.5	12.0
Forward reach, cm	Male	19	16	13	10	7
	Female	20	17	14	10	7

Table 2. *The procedure for calculating an individual grade of the students' physical fitness*

Test	Score	Test coefficient	Result taking into account the coefficient
3000 m race (males)	1–5	2	2–10
2000 m race (females)	1–5	2	2–10
100 m race	1–5	1	1–5
Standing long jump	1–5	1	1–5
Push-ups	1–5	1	1–5
Pull-ups (males)	1–5	1	1–5
Hanging on the crossbar with bent arms (females)	1–5	1	1–5
Sit-ups for 1 min	1–5	1	1–5
Shuttle running 4 x 9 m	1–5	1	1–5
Forward reach	1–5	1	1–5

Table 3. *The evaluation scale of the results of the students' physical fitness testing*

Points	The level of physical fitness	Qualitative assessment of the level of physical fitness
41–45	High	Excellent – «5»
32–40	Above the middle	Good – «4»
23–31	Middle	Satisfactory – «3»
14–22	Below the middle	Unsatisfactory – «2»
9–13	Low	Bad – «1»

During the academic year, students were specially trained to take tests. In the practical section of the program (physical training), the strategy of a differentiated approach to students was implemented. The content of the practical section included the means of physical training, which contribute to the improvement of the basic systems (cardiovascular, respiratory, musculoskeletal, muscular) of an organism,

meet the interests of students and do not need additional equipment, and their impact was quickly adjusted during the educational process. The content of the students' physical training provided the achievement of a certain level of the development of physical qualities, the acquisition of motor abilities and skills, which contribute to the successful combination of studying with physical education classes and allowed the students to adapt to the educational process and life activity successfully.

In the process of physical training, a wide range of traditional and innovative means and methods of physical education was used. The main means of the practical section were generally developing, professionally applied, sports, recovering, therapeutic, recreational, and preventive physical exercises. The exercises were performed according to certain methods, which allowed influencing the development of the individual physical qualities of students and comprehensive training. The exercises were also selected depending on the predominant motor skills, such as running, jumping, acrobatic, gymnastic, playing, etc.

4. Results and Discussion

The conducted analysis of the physical fitness of students showed that the levels of development of their physical qualities are not the same. Most students receive positive grades only after special training during physical education classes, attending additional classes in various physical training aimed at developing physical qualities. The level of the students' physical fitness is influenced by many factors, some of which are not directly dependent on the scientific and methodical support of the physical education process, the professional level of the teaching staff of the department, the material and technical support and equipment of the sports base of higher educational establishments and the state of sports and mass, health and physical activities. All factors that influence the students' level of physical fitness can be divided into two general groups: 1) the factors that a university applicant has or that have influenced one's life activity before entering a higher education institution (heredity, health, physical condition, abilities and skills, motivation and the level of interests, lifestyle); 2) a group of factors that directly affect a student while studying at a higher education institution (curriculum and standards, material and technical support, the level of requirements and assessment, psychological climate, the level of sports and mass work, teacher, lifestyle, education, environmental conditions). The level of influence of these factors is not definite and depends on the individual characteristics of students, teachers and many other factors that may arise in the process of physical training.

The students' insufficient level of physical fitness and lack of uptrend during the student life is caused by the low quality of physical education at both school and higher educational establishments, by the activation of bad habits of students, the lack of interest and persistent motivation for systematic physical exercises.

The analysis of the level of the physical fitness of both male (Table 4) and female (Table 5) students gives grounds to state that the level of physical fitness of the students of the 1st-4th years can be generally considered as unsatisfactory.

Concerning the endurance development (the 3000 m race), the male students of the 1st-4th years had an average level of the development of this physical quality that corresponded to the satisfactory grade. The students of the 2nd year of study were found to have the best level of endurance development, and the students of the 3rd year – the worst. The students had similar satisfactory indicators of the speed development (the 100 m race), but no significant differences were found between the students of the 1st-4th years. The results of students of the 1st year in the standing long jumps accounted for 220.5 cm that corresponded to the unsatisfactory grade and below the middle level of power qualities development. The 2nd, 3rd, and 4th-year students had a middle level of readiness in terms of this standard that generally corresponded to a satisfactory grade. The 4th-year students achieved the best result (227.1 cm). This indicated that meeting the same standard every year led to a better mastering of the jump technique. Satisfying the standard in push-ups, the students of the 2nd-4th years reached above the middle level of power readiness that corresponded to the good grade, only the freshmen received a satisfactory grade. The male students of all grades met the standard in pull-ups with an unsatisfactory grade; the students of the 2nd year showed the best result (11.5 times) that corresponded to below the average level. Complying with the standard in sit-ups for 1 min, the students of the 1st, 2nd and 4th years received a satisfactory grade, and

the students of the 3rd year received unsatisfactory. The students of the 1st year fulfilled the norms in 4 x 9 m shuttle running with an unsatisfactory grade. The males of all other years managed to achieve only a satisfactory grade. The assessment of flexibility (forward reach) revealed a very low level of its development. The 1st year students received a bad grade for the test and the students of all other years received an unsatisfactory grade (Table 4).

Table 4. *The level of the physical fitness of male students (n=199, X±m)*

Tests	The year of study			
	1st	2nd	3rd	4th
3000 m race, (min, s)	13.44.8 ± 1.15	13.33.9 ± 1.06	14.14.2 ± 0.54	14.05.3 ± 0.58
100 m race, (s)	14.16 ± 0.69	14.10 ± 0.73	14.10 ± 0.62	14.12 ± 0.62
Standing long jump (cm)	220.5 ± 21.54	225.5 ± 13.87	225.3 ± 17.47	227.1 ± 17.39
Push-ups (times)	36.2 ± 7.46	39.4 ± 7.26	38.2 ± 6.23	39.9 ± 5.36
Pull-ups (times)	10.2 ± 4.89	11.5 ± 3.03	10.2 ± 3.52	11.1 ± 3.15
Sit-ups for 1 min (times)	41.2 ± 7.26	42.1 ± 6.48	38.7 ± 10.49	40.9 ± 7.38
Shuttle running 4 x 9 m (s)	9.8 ± 0.58	9.6 ± 0.48	9.5 ± 0.50	9.4 ± 0.42
Forward reach (cm)	8.0 ± 6.80	10.9 ± 6.96	10.4 ± 6.32	10.5 ± 5.87

The female students' endurance development was assessed by the 2000 m race. The female students of all grades completed the test with an unsatisfactory grade; the best result was recorded in the 2nd year (11 min 38.6 s). The development of the speed of female students corresponded to a bad grade that means that this characteristic was at a low level of development. Similar results were obtained when performing standing long jump, where the assessment of the strength of the legs muscles of the students corresponded to the bad level. Only the 2nd-year female students received a satisfactory grade for push-ups, and the students of all other years – unsatisfactory (Table 3).

Table 5. *The level of the physical fitness of female students (n=195, X±m)*

Tests	The year of study			
	1st	2nd	3rd	4th
2000 m race, (min, s)	11.49.5 ± 1.13	11.38.6 ± 0.44	11.57.2 ± 0.48	12.08.5 ± 0.52
100 m race, (s)	17.98 ± 1.11	17.44 ± 0.99	17.51 ± 1.44	17.74 ± 1.23
Standing long jump (cm)	163.6 ± 11.83	170.3 ± 13.18	169.1 ± 11.16	172.0 ± 11.34
Push-ups (times)	12.3 ± 6.23	16.6 ± 5.60	13.0 ± 5.98	14.4 ± 6.08
Hanging on the crossbar with bent arms, (s)	11.2 ± 8.31	13.1 ± 5.64	10.6 ± 6.67	10.4 ± 6.00
Sit-ups for 1 min (times)	35.8 ± 7.61	38.7 ± 8.70	37.9 ± 7.18	38.4 ± 6.70
Shuttle running 4 x 9 m (s)	11.6 ± 0.57	10.9 ± 0.56	11.2 ± 0.54	11.1 ± 0.55
Forward reach (cm)	12.9 ± 6.08	14.8 ± 5.14	12.9 ± 6.50	12.6 ± 5.68

Performing hanging on the crossbar with bent arms confirmed that only the 2nd-year female students were able to get a satisfactory grade and the female students of all other years received an unsatisfactory grade. Only 1st-year female students received an unsatisfactory grade for sit-ups for 1 min, while other female students showed a middle level of the development of abdominal muscles. The female students' dexterity was assessed by the 4 x 9 m shuttle running. The 1st and the 3rd-year students received an unsatisfactory grade and the students of the 2nd and the 4th years completed the test with a satisfactory grade. The level of the flexibility development of female students was low because the female students of the 1st, 3rd and 4th years fulfilled the norm for an unsatisfactory grade, only the students of the 2nd year showed an average result of 14.9 cm, which was rated as satisfactory.

The analysis of the changes in the levels of development of the individual physical qualities of students showed that starting from the 2nd year, the rates of improvement of the level of physical qualities

of both male and female students were slowed down and decreased, according to individual tests. In general, in the 3rd and 4th year, there was a decrease in the level of physical fitness of both male and female students (Tables 6, 7).

Table 6. *The difference in the level of the physical qualities development of male students of the 1st-4th years*

Tests	The differences between the years of study					
	the 1st - the 2nd	the 1st - the 3rd	the 1st - the 4th	the 2nd - the 3rd	the 2nd - the 4th	the 3rd - the 4th
3000 m race, (min, s)	+ 10.9	– 29.4	– 20.5	– 40.2	– 31.3	+ 8.9
100 m race, (s)	+ 0.06	+ 0.06	+ 0.04	0.00	– 0.02	– 0.02
Standing long jump (cm)	+ 5.01	+ 4.82	+ 6.63	– 0.19	+ 1.62	+ 1.81
Push-ups (times)	+ 3.20	+ 2.06	+ 3.79	– 1.14	+ 0.59	+ 1.73
Pull-ups (times)	+ 1.32	0.00	+ 0.85	– 1.32	– 0.47	+ 0.85
Sit-ups for 1 min (times)	+ 0.91	– 2.53	– 0.28	– 3.44	– 1.19	+ 2.25
Shuttle running 4 x 9 m (s)	+ 0.24	+ 0.29	+ 0.43	+ 0.05	+ 0.19	+ 0.14
Forward reach (cm)	+ 2.92	+ 2.40	+ 2.49	– 0.52	– 0.43	+ 0.09

Note. «+» – positive changes, «–» – negative changes.

Table 7. *The difference in the level of the physical qualities development of female students of the 1st-4th years*

Tests	The differences between the year of study					
	the 1st - the 2nd	the 1st - the 3rd	the 1st - the 4th	the 2nd - the 3rd	the 2nd - the 4th	the 3rd - the 4th
2000 m race, (min, s)	+ 10.9	– 7.7	– 19.0	– 18.6	– 29.4	– 11.3
100 m race, (s)	+ 0.54	+ 0.47	+ 0.24	– 0.07	– 0.30	– 0.23
Standing long jump (cm)	+ 6.74	+ 5.51	+ 8.40	– 1.23	+ 1.66	+ 2.89
Push-ups (times)	+ 4.31	+ 0.74	+ 2.10	– 3.54	– 2.21	+ 1.36
Hanging on the crossbar with bent arms, (s)	+ 1.93	– 0.66	– 0.80	– 2.59	– 2.73	– 0.14
Sit-ups for 1 min (times)	+ 2.85	+ 2.17	+ 2.55	– 0.68	– 0.30	+ 0.38
Shuttle running 4 x 9 m (s)	+ 1.61	+ 0.40	+ 0.55	– 0.31	– 0.16	+ 0.15
Forward reach (cm)	+ 2.04	+ 0.08	– 0.24	– 1.96	– 2.28	– 0.32

Note. «+» – positive changes, «–» – negative changes.

The comparison of our research results with those of the other authors [4, 12, 17, 19] shows that a significant number of students' physical fitness indicators do not differ significantly and they are generally unsatisfactory. The data obtained confirm that such a state of development of physical qualities is peculiar to the majority of the students of higher educational institutions of different regions of Ukraine.

The results were analyzed on a five-point scale (5–1 points) as a level of physical fitness: a high level (5 points), above the middle (4 points), middle (3 points), below the middle (2 points) and low (1 point) (Tables 2, 3). There was introduced an additional very low level of physical fitness, which corresponded to zero grade, for the students who received less than 9 points (according to different scales, there is no such grade) for all tests in meeting the standard. The studies confirmed the need for such an assessment, since 1.9-4.3 % male students of different courses had the level of physical fitness that corresponded to less than 9 points for meeting eight standards (Table 8). The indicators of female students were even lower: 4.5-10.6 % female students received zero grade (Table 9).

Table 8. *Generalized indicators of the male students' distribution by the level of physical fitness (n=199, %)*

The year of study	Points (% of male students)						Total points	Quality point
	«5»	«4»	«3»	«2»	«1»	«0»		
1st	–	9.6	46.2	40.4	1.9	1.9	24.1	2.63
2nd	2.1	22.4	49.0	26.5	–	–	27.4	3.00

3rd	–	29.8	34.0	25.5	6.4	4.3	24.4	2.79
4th	2.1	23.4	51.1	17.0	4.3	2.1	26.2	2.96
Average data	1.0	21.0	45.1	27.7	3.1	2.1	25.5	2.84

Among the freshmen and 3rd-year male students, no students with a high level of physical fitness were found. In the 2nd and 4th years, there were 2.1 % of such students. During studying at a higher education institution, the number of students with above the middle level of physical fitness tended to increase in the 2nd, 3rd and 4th years. In the first year, their number was 9.6 % of the total number; it was two or three times increased in the senior years. The number of students with a middle level of physical fitness was the highest in the 4th year (51.1 %) and the lowest in the 3rd year (34.0 %). In the 1st year, it was 46.2 % there was a slight increase in the number of male students with a middle level of physical fitness (49.0 %) in the 2nd year. The number of male students with below the middle level of physical fitness accounted for 40.4 % in the 1st year; their number was decreased to 26.5 % in the 2nd year; to 25.5 % in the 3rd year; to 17.0 % in the 4th year. 3.8 % freshmen were defined to have bad and very bad levels of physical fitness; there were no such students in the 2nd year; this number was increased significantly to 10.7 % in the 3rd year; to 6.4 % in the 4th year. Thus, during four years of study at a higher education institution, the level of physical fitness of male students was increased in the 2nd year, and then it was slowed down and became lower, in comparison to the 2nd year. In the 4th year, there was a slight increase again. The highest level of the physical fitness of male students was observed in the 2nd year, and the lowest – in the 1st year (Table 8).

Table 9. *Generalized indicators of the female students' distribution by the level of physical fitness (n=195, %)*

The year of study	Points (% of male students)						Total points	Quality point
	«5»	«4»	«3»	«2»	«1»	«0»		
1st	–	2.1	20.8	41.6	29.2	6.3	16.9	1.83
2nd	–	4.5	50.1	38.6	2.3	4.5	21.9	2.48
3rd	4.3	12.8	10.6	38.3	23.4	10.6	19.0	2.08
4th	–	7.7	21.1	48.1	15.4	7.7	18.4	2.04
Average data	1.1	6.8	25.1	41.9	17.8	7.3	19.0	2.10

There were almost no female students with a high level of physical fitness during studying at a higher education institution, except for the third year, where 4.3 % such students were found. Only 2.1 % female students with above the middle level of physical fitness were found in the 1st year, 4.5 % in the 2nd year, 12.8 % in the 3rd year, and 7.7 % in the 4th year (Table 9). There were 20.8 % female students with a middle level of physical fitness in the 1st year, 50.1 % in the 2nd, 10.6 % in the 3rd, 21.1 % in the 4th. It was found 41.6 % female students with below the middle level of physical fitness in the 1st year, 38.6 % in the 2nd, 38.3 % in the 3rd, 48.1 % in the 4th. The students of the 1st (35.5%) and the 2nd year (6.8%) were defined to have the highest rate of low and very low levels of physical fitness.

The analysis of the obtained data shows that the level of fitness of male students is better than the one of female students. The male students gained 1.5-6.0 points for the tests in the 1st year, 2.3-6.6 points in the 2nd year, 2.0-5.3 points in the 3rd year, 2.1-5.6 points in the 4th year, indicating that that the level of development of individual physical qualities is disparate. The results of female students, were slightly lower, namely 1.0-4.3 points in the 1st year, 1.5-4.5 points in the 2nd year, 1.6-3.5 points in the 3rd year, 1.2-3.2 points in the 4th year.

Analyzing the indicators dynamics of the level of physical fitness of the students of different years of study, it can be noted that the number of students belonging to one or another level of physical fitness differs for various authors [1, 9, 18, 21], and in general, it characterizes a rather low level of physical fitness of students of Ukraine, especially female students. The number of female students with bad and very bad levels of physical fitness is 9.3 times higher than the number of males with the same level of physical fitness in the 1st year. There are a significant number of female students with this level of physical fitness in the 3rd and 4th years.

In general, the level of physical fitness of students (both males and females) is insufficient to improve health, increase physical and mental capacity, provide efficient training at a higher educational institution, and to improve the efficiency of future professional activity.

5. Conclusions

1. In order to optimize the definition and regulation of physical activity in the process of physical education at higher education institutions, the information on the state of physical fitness of students is important. Physical fitness is to some extent an indicator of the students' physical activity, an integral indicator of the functioning of organs and systems of the body. Through physical exercises and tests, a teacher can determine the level of functioning of certain systems of an organism that can directly affect the state of the physical fitness of a student.

2. On the one hand, physical education provides comprehensive and harmonious development of the student's physical qualities, and, on the other hand, it allows student to identify one's deficiencies in physical fitness and to eliminate them and prepare for the tests better in the next semester or year. A student gains points and receives a corresponding grade for the fulfillment of all requirements of the tests in the physical training. This allows determining the student's rating in the group, among the other students of the same year, and at the faculty.

3. A study of the level of physical fitness of students during studying at higher educational institutions indicates that the level of physical fitness of male students is higher than the one of female students. Both male and female students of the 1st year showed the worst level of development of physical qualities that indicates the unsatisfactory level of physical fitness. The students of the 2nd year were defined to have the best indicators of the level of physical fitness. The analysis of the results of physical fitness of students of Ukrainian higher education institutions confirmed a discrepancy between their physical fitness and future professional activity and viability.

4. The students' insufficient level of physical fitness and lack of uptrend during the student life is caused by the low quality of physical education at both school and higher educational institutions, by the activation of bad habits of student youth, the lack of interest and persistent motivation for systematic physical exercises. The low level of the physical fitness of students is accompanied by uncertainty in their actions, depression, adaptation discomfort, the deterioration of recovery processes during physical and mental activity, and satisfactory performance of the cardiovascular system that in general influences the student's studying activities negatively. The study of the state of physical fitness of students of Ukraine showed that the traditional system of physical education at higher education institutions is not able to provide the required level of physical fitness and capacity of students for future professional activity and viability.

The prospects for further research are aimed at the development of innovative technologies to improve the students' physical fitness during studying at higher educational institutions.

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Methodical System of Using Fitness Technologies in Physical Education of Students

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Abstract

The article substantiates the model of the methodical system of using modern fitness technologies in physical education of students which takes into account all the components of the pedagogical process: the purpose, objectives, principles, methods, forms, and means of the preparation of future specialists' personality who have perfect physical and health care competencies to apply fitness technologies in their own life. The methodical system is created on the basis of methodological, theoretical and practical concepts taking into account the humanistic, systemic, activity, personally oriented, innovative, cultural, and competency-based approaches. The model will contribute to the formation of the value-based attitudes of students to fitness technologies, the activation of students' physical activity, and the formation of healthy lifestyle.

Keywords: physical education, fitness technologies, methodical system, model,students

1. Introduction

The problem of applying fitness technologies in physical education classes requires the teachers of the Departments of Physical Education of the Higher Education Institutions (HEI) of Ukraine to adopt new

approaches and non-standard solutions to increase the efficiency of the educational process in physical education which depends directly on their scientific and philosophical, socio-political, subject and specific knowledge, skills, readiness for self-development and self-improvement [1, 2, 3, 4]. This necessitates the constant updating of scientific approaches to the use of fitness technologies in physical education classes, the search for optimal means of achieving the goal of the educational process in physical education that will ensure the harmonious, continuous and professional development of students, the formation of a healthy lifestyle [5, 6, 7, 8, 9]. The use of fitness technologies in physical education classes should be based on a modern methodology that allows conducting a systematic analysis of the educational process in physical education, conditions and factors that affect its effectiveness [10, 11, 12, 13, 14]. The functioning of the methodical system of using fitness technologies is conditioned by a number of new factors created in physical education by the new requirements for educational programs of specialists training, including 1) the elimination of the physical education discipline as compulsory in the curriculum of a HEI; 2) the need to preserve and improve the level of health and fitness of modern youth; 3) the creation of a new physical and health care environment in the educational process of the HEI of Ukraine. All this conditioned the modernization and creation of a new methodical system for the use of fitness technologies which should preserve a sufficient level of physical fitness and health of students in the HEI of Ukraine and ensure their readiness for future professional activity, as well as to serve in the ranks of the Armed Forces of Ukraine. The analysis of the latest researches and publications, normative documents, scientific sources, the current state of the development of fitness technologies shows that theoretical and methodical principles of the use of fitness technologies in the physical education classes in the institutions of higher education have not yet been the subject of comprehensive scientific research [15, 16, 17, 18, 19]. In addition, the actuality of researching the selected problem is intensified by the need to resolve the contradictions between the increasing demands of society for the physical self-improvement of students and the current level of applying fitness technologies at higher education institutions; the theoretical potential of modern knowledge about the development of fitness technologies and insufficient development of conceptual and methodical-organizational issues of its implementation at higher education institutions; the possibilities of the influence of physical education on the establishment of personality and the insufficient development level of the investigated problem of the use of fitness technologies in the classes of physical education; the students' need to master modern fitness technologies and the scientific uncertainty of the ways of solving this problem in the conditions of limited time devoted to physical education at the institutions of higher education.

The aim of the study is to substantiate the model of the methodical system of using fitness technologies in physical education of students.

2. Method

The research involved the use of theoretical and empirical methods. The theoretical methods are the study and analysis of pedagogical, psychological, and methodical literature, curricula and normative documents; synthesis; generalization. The empirical methods included the observation of the physical education process, interviews with teachers and trainers conducting physical education classes according to a training program, and extracurricular section classes in fitness technologies.

This study complies with the ethical standards of the Act of Ukraine "On Higher Education" No.1556-VII dated 01.07.2014 and the Letter from the Ministry of Education and Science of Ukraine "On the Academic Plagiarism Prevention" No. 1/11-8681 dated 15.08.2018. Also, this study followed the regulations of the World Medical Association Declaration of Helsinki – ethical principles for medical research involving human subjects.

3. Results and Discussion

A model is a symbolic system that makes it possible to reproduce the didactic process as a subject of study, to show its integrity, functioning, and to preserve this integrity at all stages of the study. By modeling, it is possible to reproduce not only the static of the didactic process but its dynamics. The presence of a scientifically sound model of the educational process lets to predict its development. This is especially important for the educational process because it must predict the future positive result [20].

The scientists [21, 22, 23] stated that pedagogical model is the model that reflects the interconnections and interdependencies between the projected qualities and personality traits as an object of pedagogy and the process of its development, as well as the organization of the pedagogical system within which it takes place and manages it. Reference sources show that the models of education are the formed means of sign systems, thinking analogs (logical constructs) that schematically reflect educational practice as a whole or its individual fragments. They are classified as descriptive, functional, and predictive [24, 25, 26].

The methodical system model of using fitness technologies in the educational process of physical education is considered as a descriptive model of education since it is first developed in the system of physical education, physical and health care activity and it can give an idea of the purpose, objectives, structure and basic elements of the physical and health improving activities by the means of fitness technologies. Therefore, the purpose, functions, and principles of the students' physical and health care activities can be considered as the content and technology, organizational and methodical support, psychological and pedagogical conditions of the methodical system functioning.

The methodical system model of using fitness technologies in the educational process of physical education was created taking into account the changes that are taking place in Ukraine, in particular, the integration of HEI into the European educational space, and the components of pedagogical process including the purpose, tasks, methodological approaches, principles, methods, forms, means, and ultimate goal which is the training and education of a future specialists' personality who have perfect fitness and health care competencies to apply fitness technologies in their own life. The methodical system model was formed on the basis of the developed concept which is based on the theory and methodology of physical education, the theory of professional training of specialists in the field of physical culture and sports.

Depending on the purpose of use, the methodical system model of using fitness technologies can perform the following functions: descriptive (which is a guideline during the selection of methods and techniques of training, education, and management), effective (that enables the model to be used in training or management), and prognostic (which is the final check of vitality and the practicability of the model).

The methodical system was built on the basis of methodological, theoretical and practical concepts that considered a student as a personality, individual, subject of one's own activity that is a specific system and which promotes the acquisition of systematic knowledge in the field of physical culture and sports, provides the development of physical abilities and skills, the formation of fitness and health care competences for the introduction of physical culture and sports in the sphere of professional activity and in life [27, 28].

The methodological concept was intended to reflect the interconnection and interaction of scientific approaches concerning the modernization of the educational process of physical education with the changes occurring in the education system of Ukraine and the updating of the methodical support of the educational process for the use of fitness technologies in the physical education at HEI in order to form physical and health care competencies, provide fitness and working capacity, health status and acquire healthy lifestyle skills. In addition, we applied different approaches including humanistic, systemic, activity-oriented, personally-oriented, innovative, cultural, and competency-based [29, 30, 31]. According to the humanistic approach, a student was considered as a unique personality who has great opportunities that can be realized by providing the necessary psychological, pedagogical and professional assistance. The systematic approach involved consideration of the methodical system of using fitness technologies in the educational process of physical education of students as a certain pedagogical system which allows revealing regular connections between its separate components, one of which is the physical and health care environment; it was reflected in structuring the content of fitness technologies of preparation for viability and professional activity concerning the interdisciplinary integrated relationships (physical culture, the theory and methodology of physical education, pedagogy and psychology, hygiene and ecology, anatomy and physiology, valeology, etc.) providing high orientation towards human life. The activity approach involved achieving the necessary integrity of the image of a modern specialist, engaging one in the fitness and health improving activity, determining the purpose of training in fitness technologies, selecting their content and forms of presentation for future professional activity. A person-centered approach considers the subject-subjective interaction of a teacher and a student that provides the transformation of objectivity of the content of the students'

preparation for mastering the skills in using fitness technologies in the physical and health improving activities. The innovative approach is aimed at the selection and application of fitness technologies in the educational activities of the students of HEI of physical, health care and recreational orientation. The cultural approach allows considering a set of theoretical and methodological provisions and organizational and pedagogical measures aimed at creating the conditions for mastering fitness technologies that ensure a healthy life and a high level of physical fitness of a student. The competency-based approach makes it possible to consider the use of fitness technologies by students in physical and health improving activities as a set of specific competences.

The theoretical concept defined the system of initial parameters and assessments, which were the basis for revealing the content and structure of the methodical system of using fitness technologies in the educational process of physical education of students as a pedagogical phenomenon that included the following main provisions:

- the standardization, systematicity and continuity, comprehensive, systematic and activity-based approaches, and humanization are the compulsory conditions of a unified educational space in which a methodical system of using fitness technologies in physical education of students should function;
- physical and health care activities in the educational space of HEI should be the main system-forming component of the health care and recreational system that ensures the state of health, the level of general and special physical fitness of students;
- the principle of the integration of fundamentality and health improving orientation of the content, forms, methods, and means of teaching should be leading in the methodical system of physical education of students;
- the content of the methodical system of using fitness technologies requires updating and modernization of fitness and health care activity according to the changes of the introduction of modern technologies in the system of the educational process at HEI of Ukraine with the changes that have their own peculiarities for each educational institution;
- the transparency of the methodological system of using fitness technologies for the introduction of innovative health care technologies and improvement and updating of traditional and national Ukrainian systems of physical education of students.

The practical concept provided the check of the efficiency of the methodical system of using fitness technologies in the educational process of physical education and physical and health improving activities of students, which was to provide students with health preservation skills, the abilities to maintain a high level of physical fitness and working capacity, the motives for maintaining a healthy life; the definition of psychological, pedagogical, organizational-methodical and practical conditions of functioning of methodical system; the assessment of criteria, indicators, and levels of students' readiness to use fitness technologies in their professional activities.

The methodical system of using fitness technologies in the educational process of physical education of students takes into account the following main provisions: 1) the educational process of physical education of students is designed as a methodical system, which has its purpose, objectives, content, methods, forms and means of physical and health care activities; 2) concerning the elimination of the physical education discipline from the curricula of HEI, physical and health care activities are obligatory in educational process during the whole studying period and they should be considered in the unity of content, procedural and effective components of a comprehensive preparation of future specialists; 3) theoretical information on physical and health care education should be a system of knowledge of history, psychology, pedagogy, anatomy, physiology, hygiene, ecology, biochemistry, nutrition, ethics, aesthetics, etc.; 4) the use of fitness technologies according to the choice of students and the opportunities of HEI condition physical and health improvement, the increase in the level of physical fitness and working capacity; 5) the methodical system of using fitness technologies in the process of physical education and physical and health improving activities of students should provide comprehensive physical training, be aimed at preserving health, the formation of working capacity; provide the necessary level of knowledge in the physical education and the norms of a healthy lifestyle; promote the prevention of bad habits (alcohol, drugs, smoking, gambling), the rational use of free time and active leisure, etc.; 6) the methods, forms, and means of fitness technologies

should be adequate for the level of physical fitness and health of students.

The basis of modeling of the educational health-improving process through the use of fitness technologies is a specially created form for reproducing the characteristics of the object studied. The pedagogical content of the model is reflected in the fact that it allows highlighting current and perspective tasks of the educational process, identifying and analyzing the relationship between the probable, expected and desired changes of the object studied.

Investigating the methodical system of using fitness technologies in the educational process of physical education of students, it is important that the model, along with the cognitive purpose, should provide a formative goal in many cases. That is, the process of modeling a methodical system has not only cognitive but also inextricably linked forming function because the model is not only an instrument of cognition but also a prototype of the state of the object modeled that has the structure of what does not exist in objective reality yet.

The introduction of the methodical system of using fitness technologies in the physical and health care activities of students of HEI requires the solution of methodological, content, psychological and pedagogical, methodical and organizational tasks. The solution of methodological tasks is grounded by developing the concept of the formation of the methodical system of using fitness technologies, determining its content and structure; designing its components; establishing relationships between its components. The content tasks are aimed at personal-oriented choice of fitness technologies and personal needs of students; taking into account the specific content of fitness technologies, depending on staff and material-and-technical equipment; the possibility of the formation of individual physical and health improving needs, individual level of physical fitness, state of health, mastering of sports and technical skills, etc. Solving psychological and pedagogical tasks requires the development of psychological, pedagogical, physical and health care means that allow using fitness technologies on the basis of the individual and psychological characteristics of students, including a) the creation of individual motor trajectories of mastering the content of fitness technologies; b) the application of the methods and forms of fitness technologies according to the features of interpersonal interaction and mastering the material. The solution of methodical problems is connected with the creation of efficient methods of activating physical and health care activities of students; the development of a complete system of methods and forms of using fitness technologies that correspond to the state of health, the level of physical fitness and the features of future professional activity; the development of methodical support for the use of fitness technologies in future life. The solution of organizational tasks is connected with the analysis of possibilities of applying different fitness technologies; the organization of group, collective and individual physical and health-improving activities; providing fitness and health care activities with modern fitness technologies.

According to G. P. Griban (2012), the methodical system of physical education is a complex phenomenon, which consists of numerous components that form a certain set due to the internal connections between them. We consider the methodical system of applying fitness technologies as a set of training methods of different types of physical activity and their combinations, aimed at promoting health, ensuring a high level of physical fitness and working capacity of students. The created model of the methodical system of applying fitness technologies in the educational process of physical education of students has its purpose, tasks, content, principles, methods, forms, means, and tests. All components of the methodical system are related to the purpose of the formation and education of a students' personality through the process of using fitness technologies, which should form a comprehensively developed personality.

The system-functional approach to the study of the methodical system of applying fitness technologies involves the consideration of the system as a multidimensional and multistage structure which has many parameters, as a complex internally integrated social organism that can be analyzed and explained; as a set of elements, properties and relations that interact. The main features of systematicity include integrity and purposefulness, which is the set of elements, internal division, ordering, classification; the relationship of external and internal; the integration of separate elements and links.

The methodical system of applying fitness technologies has the following subsystems: 1) the educational process of physical education and physical and health care activities at HEI, aimed at preserving and improving the health of students, acquiring the skills of maintaining a healthy lifestyle, active leisure; 2)

didactic and methodical principles of using fitness technologies aimed at comprehensive development and physical fitness of students; 3) general physical training aimed at improving students' working capacity and readiness for future life; 4) the content, structure, and functions of fitness technologies are considered in the context of providing the necessary level of physical activity of students.

The researches of scientists [33, 34, 35, 36, 37] show that the methodical system should also perform the following functions: diagnostic-correcting, stimulating-mobilizing, developmental, communicative-educational, and analytical-evaluative. Accordingly, when designing and creating a methodical system of using fitness technologies, we took into account that the diagnostic-correcting function should systematically ensure the monitoring of students' knowledge, skills, motivations during physical and health-improving classes; the analysis and correction of the content of fitness technologies, forms, and methods of conducting classes and physical and health care events; solve problems of education, development, preservation of health and increase in the level of fitness; eliminate the reasons that prevent the students' physical improvement. The stimulating-mobilizing function of the methodical system of using fitness technologies was aimed at creating a positive psychological climate during the classes in fitness technologies, the activation of students' motivational value-based attitude to physical health-improving activity, increasing the interest in physical activity and innovative technologies of physical education. The developmental function of the methodical system of applying fitness technologies included the introduction of fitness technologies, the creation of a health-improving environment, the prediction of the course of physical and health care activities, focusing on the motivation, health, and level of physical fitness of students. Individually, this function also included the selection and development of fitness programs for each student in order to model goals, resources, physical activity and engaging the students in fitness technologies classes. The communicative-educational function of the methodical system is aimed at forming the ability to conduct dialogue on the issues of physical education and health care activities, the ability to establish and maintain friendly relations with colleagues, to realize the communicative abilities in life. The analytical-evaluative function of the methodical system is aimed at control, self-control, evaluation, and self-assessment of the efficiency of using fitness technologies, aiming at the further comparison with the goals and tasks designated to make the necessary adjustments in the physical and fitness process.

4. Conclusions

The newly created model of the methodical system of applying fitness technologies in the educational process of physical education will contribute to the formation of motivational value-based attitude of students to fitness technologies, an increase in the educational level, the activation of the physical activity of students by creating an environment in higher education institutions that will develop interests in active exercise, encourage the formation of a healthy lifestyle. The authors' idea is to increase the efficiency of physical and health-improving classes through the use of fitness technologies by differentiation and individualization of physical activity in order to create comfortable conditions for training. This approach is aimed at the significant improvement of the motivational and value-based attitude of students to fitness technologies; it activates physical activity and promotes mastering the skills and abilities to apply health-improving means in the further life.

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Professional Skills and Competencies of the Future Police Officers

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Abstract

The article examines the level of professional skills and competencies of the future police officers during training according to experimental methodology. The methodology implies using specially developed situational tasks aimed at the formation of professional skills and competencies of future patrol police officers. The police officers of the National Academy of Internal Affairs (Kyiv, Ukraine) who attended the course of the initial professional training participated in the study. An experimental (EG) and control (CG) groups were formed. The research determined the EG officers to have a significantly better level of professional skills in comparison to the CG officers. A high level of professional skills will contribute to the improvement of the efficiency of the activity of future patrol police officers.

Keywords: professional skills and competencies, professional training, police officer

1. Introduction

The performance of the National Police officers of Ukraine places high demands on the formation of the professional skills and competencies of personnel. It is conditioned by the constant possibility of life-threatening and health-related situations during the performance of their duties [1, 2, 12, 14]. This is especially the case for patrol police officers, as they perform their duties in the conditions of constant contact with various segments of the population. Every time they have to stand against the most complicated contingent of the population and problem people (who are under the influence of alcohol or drugs;

emotionally excited; mentally ill). Such people are characterized by asocial orientation, unmanageability, aggression, the hidden nature of the criminal activity, confrontation and hostility to government officials. There is a constant threat of armed conflict. In such cases, police officers must be prepared to repel an attack and detain the offenders [3, 6, 9, 21, 29, 31].

Working over normative documents and scientific literature gives grounds to state that the professional readiness of the patrol police officers is determined by the knowledge of the legislative base, the formation of special physical skills, the development of professionally important characteristics, the practical experience [1, 5, 8, 33].

An important component of a police officers' professional readiness is the level of professional skills and competencies [7, 15, 25, 35, 36]. In scientific literature, the interpretations of the notion "professional skills" differ. It is conditioned by the specific professional activities of the specialists and their tasks. In the context of the professional activities of patrol police officers, the notion embraces a range of professional skills and competencies, including rapid and high-quality processing of official documentation, working with databases, radio communication, and videotaping during patrolling, providing emergency medical assistance, etc. The works [4, 13, 19, 23, 30] mention that it is vital to develop the competencies and skills of patrol police officers in using techniques of physical influence, special tools and firearms; driving skills in extreme conditions. The authors also emphasize that the officers with the developed skills in psychological influence on the offender and the ability to convince comply with the requirements of the law perform their duties more effectively.

2. Literature Review

The analysis of the latest researches and publications showed that there are a considerable number of scientific works devoted to the study of the problems of professional training of the workers of the security agencies [4, 10, 17]. The scientists [16, 22, 24, 32] state that a sufficient level of special physical skills and abilities makes it possible to perform the tasks related to police enforcement measures effectively. The specialized literature, based on the results of the questionnaire, designated that the performance of official duties mainly (81.3%) involves the use of police preventive measures and to a lesser extent (18.7%) police enforcement measures [20]. The ratio of the application of police measures depends on a number of factors, the main of which are the features of the patrol area, the weather conditions, and the level of professional skills of police officers. The seasonal (summer, winter) and weekly (weekdays, weekends, holidays) shifting of applying police measures were identified. The increase in the indicator of using coercive measures during night shifts, especially on weekends and holidays, during mass events (football matches, concerts, etc.) is discovered. This indicator is above the middle on patrol territory with more nightlife establishments. The scientists mention that in the case of such situations, police officers should be physically and psychologically prepared to repel the attack and detain offenders [6, 11, 28]. According to the results of the investigations K. V. Kim [10], the physical fitness of law enforcement officers is a certain physical condition formed in the course of physical training that ensures high working capacity and successful performance of functional duties and operational tasks.

There is a number of works aimed at studying and improving the physical training of the workers of security agencies [12, 17, 22, 25, 26, 27]. The authors recommend the use of various means, including kettlebell lifting, boxing, sambo wrestling, hand-to-hand combat, etc. According to the research of scientists [1, 16, 36] more effective formation of professional skills and competencies can be achieved due to the practical orientation of the educational process and the use of innovative teaching methods. In this regard, O. A. Morhunov [16] recommends introducing special tasks, which are developed on the basis of real-life situations, among which there are both standard, most common and problematic ones, in training courses on physical training of cadets.

An analysis of the patrol police officers' activity characteristics shows that during patrolling, officers have to use police enforcement measures. However, when offenders resisted, police officers faced difficulties and could not efficiently execute physical influence techniques in many cases. The problems arose during the detention of offenders, the use of special tools, firearms. That is, the police officers` competencies and skills of applying police enforcement measures are insufficiently formed. In extreme situations, their

efficiency is low. The improvement of existing training methods and the development of new ones aimed at training future law enforcement officers with a sufficient level of professional competencies and skills in a relevant area for scientific research.

The aim of the study is to investigate the level of professional skills and competencies of future police officers during professional training according to the experimental training methodology.

3. Method

3.1. Participants

The listeners of the Center of Initial Professional Training, called the Police Academy, of the National Academy of Internal Affairs (n=61) who attended a six-month course in 2019 participated in the pedagogical experiment. An experimental (EG, n=30) and control groups (CG, n=31) were formed. The control and experimental groups were formed with a random selection.

3.2. Materials

Concerning the content specifics of the program of the initial professional training of police officers, the requirements for professional skills and competencies and educational process peculiarities, the initial level of formation of the studied indicators was not determined. The investigation of the level of professional skills and competencies of future police officers in the process of training according to the experimental methodology and mathematical processing of the obtained results was carried out at the end of the pedagogical experiment, just before a comprehensive exam.

The research methods are theoretical (the method of conceptual-comparative analysis, structural-system analysis, synthesis, generalization); empirical (pedagogical observation of the educational process; interviews with listeners and scientific and pedagogical staff, pedagogical experiment, the methods of mathematical statistics).

4. Results and Discussion

The formation of professional skills and competencies of future patrol police officers takes place while mastering the course of initial professional training. The improvement is achieved working over cases, and subsequently – as a result of gaining practical experience and during the professional training of police officers (service training, postgraduate education). The efficiency of the formation of the professional skills and competencies of future police officers depends on the content and methodology of training. The professional training of police officers is carried out in accordance with article 72 of the Ukrainian Act "On the National Police" (2015). The professional training contains a number of stages, the key of which is the stage of professional establishment, which covers the period of mastering the course of initial professional training. The development of the skills of using the police coercive measures begins at this stage [20]. One of the police measures, which, according to the model of the use of force, usually precede the use of other coercive measures, is a physical force (hand-to-hand combat techniques). The use of physical force depends on a number of factors, the most important of which are: 1) the level of danger to life and health of both a police officer and the population. There is no algorithm for establishing the level of danger, it can be determined by psycho-subjective analysis of the scene, the presence of firearms or cold weapons, objects used as weapons, the probability of their use; the number of persons subjected to physical coercion measures, their physical and mental state, age, alcohol or drug intoxication, behavioral features (aggression); the availability of vehicles for both officers and offenders; 2) the environment and conditions under which the event occurs: locality, factors that prevent from using physical coercion, the items that can help or prevent the actions of an officer; 3) the level of physical preparedness of a patrol officer and one's ability to apply the techniques of physical influence; 4) the nature of the offense and its volume: the violation of public order; failure to comply with the legal requirements of a representative of the authorities; resisting a police officer or other person who performs official duties; assaulting citizens, police officers, or security, residential, or other objects; hostage taking, etc; 5) the purpose of applying the measures of physical coercion: assistance, rescue, prevention or termination of the offense; the detention of the person who committed the crime or who was caught while committing the crime.

The choice of a measure of physical influence is a personal choice of a police officer according to the

age, orientations, individual anthropometric data, the most acceptable type of martial arts, or a combination of several kinds of measures. The main thing is the achievement of the final result, that is, the efficient use of physical impact measures, provided that they are legally enforced. In all cases, the actions of patrol police officers should always be justified, fair and lawful.

Taking into account the advanced experience of professional training of future police officers, modern scientific researches in this area, the authors' methodology of training police officers, which included the use of forms, methods, and means of police officers training taking into account pedagogical conditions, principles and conceptual approaches, was developed. The main pedagogical conditions are the formation of motivation of police officers to increase their level of professional readiness; an adequate level of material support for the educational process; practical orientation of the educational process; professional competence of teachers and instructors; the engagement of police officers in active extracurricular activities of professional and practical orientation. According to the authors' methodology, the main approaches ensuring the qualitative formation of the professional skills and competencies of future police officers are axiological, humanistic, activity, integration, competence, person-centered, praxeological, resource, synergistic, and systematic. At the same time, the competence approach should be considered crucial in organizing the educational process of future patrol police officers. Achieving the goal of professional training is possible, subject to complying with a set of pedagogical principles, the main of which are the following: consciousness and activity, clarity, systematicity and consistency, accessibility, emotionality, stimulation of self-education and independence in studying, connection of theory with practice, professional orientation, continuity of education, succession and perspective.

The peculiarity of the authors' methodology is the advanced practical orientation of the educational process due to the introduction of specially developed situational tasks and variational situational tasks in the educational courses of professionally practical training and the complex development of professionally important characteristics. The application of situational tasks is aimed at more effective acquisition of special knowledge (the procedure and rules for the use of weapons, security measures when handling the weapon, the material part of firearms, legal grounds for the use of physical force and special means, etc.), the formation of skills and competencies (the use of physical force, firing exercises, compliance with firearms training standards). The purpose of a situational task is to formulate the algorithm of the correct actions and skills in dealing with service situations related to public order violation, crimes against life and health, crimes against property, violation of traffic safety. Each task involves: 1) learning the algorithm of legitimate and safe actions in a certain situation; 2) the improvement of the principle of "contact and coverage", efficient communication, personal security measures, knowledge of legal framework, emergency assistance, the enforcement of police coercion and self-defense techniques; 3) the promotion of the development of psychological resilience, courage, decisiveness, and confidence in one's own actions. The innovations of the presented methodology are to introduce variational situational tasks that are used while working over the cases. Their number is increased due to the introduction of situational tasks that simulate the performance of official tasks, which are most common in the work of patrol police, as well as tasks during which officers faced some difficulties, in the educational process.

In the context of the peculiarities of the professional activity of patrol police officers, identifying the level of development of special competencies and skills provided the designation of three indicators: 1) "the formation of competencies and skills in self-defense tactics"; 2) "the formation of competencies and skills in firearms training"; 3) "the formation of competencies and skills in working over the cases efficiently". According to the authors' methodology, the level of development of the indicator of the formation of competencies and skills in self-defense tactics was determined by the results in the practical solution of three situational tasks with the use of coercive measures. The first task involved complex actions during the forceful detention of a person in any way (submission hold or chokehold, throw, etc.) with the transition to detention, handcuffing, external examination, convoying. The second task included the complex actions of a police officer using special means (defensive and attack actions, detention, exemptions from captures and grasping with the use of a rubber baton, handcuffing, conducting a surface inspection of a person, in particular, with the threat of the use of firearms). The third task embraced the complex actions of a police officer in the case of an attack by an offender (exemptions from capture and grasping, striking by hands, feet,

improvised means, counteracting the threat of firearms or cold weapons). The mistakes while solving a situational problem with the use of coercive measures should be considered: not combined, delayed techniques applying, loss of balance, failures in any element of techniques; breach of personal security measures; violation of the task sequence; failure to perform the constituent elements of the techniques; carrying out actions with stops; omissions of strikes with hands, feet, improvised means, cold weapons; inappropriate use of special tools or their use violating legal grounds. The assessment of the performance of situational tasks was carried out on a four-point scale. The results of police officers were rated as excellent if the technique was performed as described, confidently, quickly, and completed with a logical outcome (the fixation of a partner with submission hold, chokehold, convoy, or complex of these actions, etc.); as good if the technique was performed as described, but slowly one minor error was made; as satisfactory if the technique was performed with violation of combination, slowly or two other mistakes were made; the task was performed in general, but uncertainly (submission hold and chokehold were not convincing, the strikes were not accentuated or they were made not in the vulnerable part, protective actions were performed irrationally, etc.); as unsatisfactory if the technique was not completed, or grossly distorted, or more than two mistakes were made; if the task or its individual elements were not completed (failed to perform protection, fixation of submission hold, convoy). The assessment of the level of development of the indicator of the formation of competencies and skills in self-defense tactics was carried out on a twenty-point scale. Scoring for situational tasks was determined by a combination of the scores gained. The individuals who gained 12 or fewer points had a low level of special skills development; 13-15 – a satisfactory level; 16-18 – a sufficient level; 19-20 – a high level. In the case of gaining the grades 5; 5; 5 for situational tasks, the level of formation of the studied indicator was estimated at 20 points. Provided that the grades were 5; 5; 4, the indicator was rated as 19 points. Receiving the following combinations of the grades: 5, 4, 4; 5, 5, 3, the level of formation was estimated at 18 points; 4, 4, 4; 5, 4, 3 – 17 points; 4, 4, 3 – 16 points; 5, 3, 3 – 15 points; 4, 3, 3 – 14 points; 3, 3, 3 – 12 points; 3; 3; 2 – 10 points; in all other cases – 0 points.

The level of development of the indicator of the formation of competencies and skills in firearms training was assessed during the comprehensive examination which included three tasks that were developed on the basis of the material studied and according to the police firing course. The first task involved the knowledge of the security measures when handling the weapon, the procedure, and rules for using the weapon, the knowledge of the material part of the weapon. The second task was in compliance with the standard of fire training. The third task was the exercise in the shooting. The evaluation of the first task was performed by five writing test tasks in each of the three directions. The grade for compliance with the standard on fire training and firing exercises was determined according to the criteria prescribed by the regulatory documents. The level of competencies and skills in the shooting was determined on the basis of the twenty-first exercise of the police firing course. The peculiarity of its implementation is to shoot from the shelter with changing firing positions and changing the magazine case. The third grade for the standard on fire training, which is a timely and qualitative indicator of the police officers' implementation of techniques and actions using training weapons in the gallery range (shooting ground, training area). The level of development of the indicator of the formation of competencies and skills in firearms training was determined depending on the combinations of gained grades for the task. The combinations of the grades for three tasks were transformed into a twenty-point scale and, depending on their combination; they determined the level of formation of the indicator. The distribution of the gained grades was also used for the estimation of the indicator of the formation of competencies and skills in self-defense tactics.

The evaluation of the indicator of the formation of competencies and skills in working over the cases efficiently was carried out according to the quality of solving the situational task provided by the case. The essence of the situational task is to simulate a specific event (offense) in which the role of the offenders and patrol police is performed by the police officers. The performance of the situational task of the case was evaluated by three specialists: the specialists in tactical (physical) training, emergency assistance training, and legislative area. The maximum number of points a policeman could receive in each direction for the performance of a situational task was 60 points. The minimum passing score was 32 points. The total score was the arithmetic mean of the three grades. However, if a student received less than 32 points in any direction, the exam was considered to be failed. The evaluation criteria included communication with

citizens at the place of call provided by the plot of the situational task; psychological and emotional control; legal framework operation, the accuracy of the determination of the offenders' actions; legal grounds for the enforcement of police coercive measures and the efficiency of their enforcement; compliance with personal safety measures and the principle of "contact/coverage"; emergency assistance skills; preparation of administrative materials. The levels of the listeners' special skills development according to the indicator of the formation of competencies and skills in working over the cases efficiently were defined in the following way: a low level corresponded to the range of 32 to 38 points, satisfactory – from 39 to 45 points, sufficient – from 46 to 52 points; high – from 53 to 60 points.

The analysis of the indicator of the formation of competencies and skills in self-defense tactics at the end of the pedagogical experiment showed an authentic ($p<0.05$) difference in the readiness of the EG and CG listeners (police officers). The mean value of the investigated indicator of the EG police officers was 16.26±0.33 points, the CG police officers – 15.00±0.36 points on a twenty-point scale. The introduction of the presented innovations of the original methodology in the educational process of the initial professional training of police officers provided an opportunity to state the EG police officers more efficient implementation of situational tasks in self-defense tactics. It should be noted that the performance of situational tasks by CG police officers included more mistakes. The most common were the violations of personal safety measures, slow performance of a technique, loss of balance, not always high-quality and skillful use of special means. The common situations for the CG police officers are those when they were unsure of their actions, could not respond with adequate defensive actions to the attack actions of the enemy with the use of strikes with his hands, feet, improvised means, cold weapons, etc.

On the basis of the efficiency of the situational tasks, it was possible to divide the EG and CG police officers into groups with different levels of formation of the mentioned indicator. At the end of the pedagogical experiment, no police officers with a low level of development of the indicator of the formation of competencies and skills in self-defense tactics were found in the EG, and 6.7% police officers were found in the CG. There were 12.9% police officers with a satisfactory level in the EG, and 40% officers in the CG. The greatest number of police officers of the EG was found to have a sufficient level of special skills formation – 67.7%, of the CG – 50%. The number of police officers with a high level varied significantly: it accounted for 19.4% in the EG, and 3.3% in the CG.

The analysis of the results of determining the development of the indicator of the formation of competencies and skills in firearms training showed an inauthentic ($p>0.05$) difference in the readiness of the EG and CG police officers. However, the indicator of the EG officers was higher by 0.93 points and accounted for 17.00±0.35 points, the indicators of the CG officers accounted for 16.07±0.40 points. The analysis of the gained grades for fire training revealed that the EG police officers have the best results in the knowledge of the procedure and rules of using the weapons, safety measures while handling the weapon. The grades for compliance with the standard of firing training and firing exercises did not differ authentically ($p>0.05$). The largest number of the EG and CG police officers had a sufficient level of development of this indicator. The EG included 54.8% officers with a sufficient level, the CG – 53.3%. There were found no officers with a low level in the EG, and 6.7% officers in the CG. There were found 19.4% police officers with a satisfactory level in the EG, and 30% in the CG. The number of the EG officers with a high level of development of this indicator was more than double higher, in comparison to the CG officers, namely 25.8% police officers in the EG, and 10% in the CG.

The analysis of the indicator of the formation of competencies and skills in working over the cases efficiently showed an authentic difference ($p<0.001$) in the preparedness of the EG and CG police officers at the end of the pedagogical experiment. The indicator of the EG officers was higher by 5.2 points and accounted for 44.1±0.96 points, of the CG police officers – 38.9±0.94 points. The largest number of the EG police officers had a sufficient level of development of the indicator of the formation of competencies and skills in working over the cases efficiently – 35.5%. There were found 16.7% of such officers in the CG. The number of police officers with a low level accounted for 22.6% in the EG, and 56.7% in the CG. 32.2% police officers with a satisfactory level were found in the EG, 23.3% in the CG. The number of police officers with a high level accounted for 9.7% in the EG, and 3.3% in the CG. The analysis of points received for solving situational problems showed authentically better results of the EG police officers in tactical training and

legislative direction. The police officers behaved more confidently, operated the legal framework in the cases involving police measures (preventive and coercive) more clearly. Such results indicate the efficiency of the advanced practical orientation of the educational process through the use of situational tasks in mastering the course of primary professional training.

5. Conclusions

The use of the presented innovations of the authors' methodology contributed to the increase in the level of the professional skills and competencies of police officers. At the end of the pedagogical experiment, the EG and CG police officers were defined to have a significant difference in the development of the indicators of the formation of competencies and skills in self-defense tactics ($p<0.05$), the formation of competencies and skills in firearms training ($p<0.001$), and the formation of competencies and skills in working over the cases efficiently ($p>0.05$). The results in the pedagogical experiment indicate the efficiency of the original authors' methodology. The high level of investigated indicators will contribute to the improvement of the efficiency of the future activity of patrol police officers.

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Professional Development of Future Physical Culture Teachers during Studying at Higher Educational Institutions

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Abstract

The work was focused on exploring the motives for choosing a teaching profession and the development level of motivation for continuing professional growth in the process of studying at a higher educational institution; the analysis of the levels of readiness of the students of the Faculty of Physical Education for continuing studying; the diagnostics of the dependence of the level of motor readiness of students, who are future physical culture teachers, on the level of their motivation and readiness for continuous professional development. Experimental studies were conducted at the Physical Education Faculty of the Taras Shevchenko National University «Chernihiv College». The study was conducted in 2016-2017 (during the 1st year of study) and in 2019-2020 (during the 4th year of study). The experimental group consisted of 67 students between the ages of 17 and 22. The studies showed the dependence of the level of motor readiness of students on the level of their motivation and readiness for continuous professional development. The indicators of motor activity of the fourth-year students with high levels of motivation and readiness for continuous professional development were increased concerning the amount of the motor activity that is characteristic of the professional activity of a physical culture teacher. The indicators obtained during the study indicate that students, who are aware of the need for professional development master the content of the curriculum better during the period of study and, as future physical culture teachers, better understand the purpose and objectives of education of pupils.

Keywords: physical education, physical culture teacher, motivation, student

1. Introduction

The success of the professional realization of a future teacher and the level of one's professional skill depend on the process of one's own professional development and growth [1, 2]. The professional development of a teacher is a process of continuous transformation in the pedagogical activity that leads to the sustainable development of professionalism. Most scholars [3, 4] divide it into stages, phases, levels, and characterize by the mutual influences and interdependence of all components. Each level of the mentioned process, based on its integrity, systematic organization and subordination to the logic of continuing pedagogic education, is linked to the previous one. This approach makes it possible to distinguish the following stages: the stage of professional self-determination and development during study at higher educational institutions (HEI); the stage of professional improvement and professional growth during postgraduate training in the course of advanced training [5, 6]. Our research focuses on the stage of professional self-determination and professional development of future physical culture teachers while studying at a HEI.

The level of development of the motor readiness of the students of the Physical Education Faculty takes one of the first places in the process of professional development of future physical culture teachers. The activity of a teacher requires constant enrichment of knowledge, development of abilities; therefore, it is important to find out the level of motivation and readiness of students for continuous professional growth and its influence on the development of the students' motor readiness.

2. Literature Review

E. F. Zeyer [2] considers motivation as a component of professional development, a structural component of professionalism. In its turn, professional development is defined as the formation of stable positive motives, socially significant and professionally important qualities of a person, readiness for continuous professional growth, finding optimal methods and ways of qualitative and creative performance of the professional activity, according to the individual-psychological characteristics of a specialist. The scientist identifies several types of the motivation of professional choice: basic, which is revealed in the combination of the attitude to work with an interest in the profession, assessment and testing of one's own qualities, readiness for self-improvement; the type of motivation for professional choice, which is to understand the specifics of the chosen profession and limit the choice related to the requirements for the mental and physical qualities of a person; a type of professional choice motivation which is characterized by a mismatch between the interest in the chosen profession and the motives for social duty. The latter type is considered the least effective, because a student is guided only by one's own desires, without considering the subjective and objective possibilities of realization of the latter.

Ye. P. Ilin [7] proves that professional and cognitive motives mostly affect the success of education. Educational activities at a HEI consist of many parts. These parts are relatively independent entities as if they are built into motives that contribute to the final result. Cognitive, professional, pragmatic, public and social, and personally-prestigious motivations are the components of a common motive for learning activities. The studies of scientists [8, 9, 10] prove that motivation is an important factor in successful physical activity of a student.

The notion of readiness among other things in pedagogical science is considered as the readiness for professional activity, continuous professional development. O. S. Kocharian, Ye. V. Frolova, & V. M. Pavlenko [11] reveal readiness in the context of a particular form of activity, its quality, and type. The scientist links the development of the readiness for the independent activity to the process of formation in the students learning generalized skills, during which the stages change from the motivational basis of action to the use of the ability to act independently to master a new skill.

Most scientists consider readiness as a certain mental state, by which they understand the specific manifestation of all components and the psychics in a certain period of time, and define it as concentration, instant mobilization of the forces of an individual directed to perform proper actions at the right moment or the state to act in a proper way in the proper direction [12, 13, 14]. The readiness as a mental state can mean the possibility of a future teacher to solve problems in the learning environment.

G. Griban, et al. [15] point out that the student's readiness for continuous professional development is the result of a purposefully organized process. The readiness includes the desire to solve professional tasks, to have professional skills, abilities, and knowledge developed at the proper level.

Yu. Zaitseva [16] points out that a physical education teacher must possess the technical elements of physical culture, adapted to one's professional activity, the methods of explanation and presentation of the basic and auxiliary elements. The professional motor activity of a physical culture teacher means the skills of mastering the technique of physical exercises and spotting, imitation of their technique, demonstration. In order for a physical culture teacher to become a true professional, one must have practical skills that are part of the professional pedagogical activity along with theoretical knowledge [17, 18].

Researching the technology of forming the culture of motor activity of the students of HEI, scientist [19, 20] prove that a future specialist in physical education, in addition to special pedagogical knowledge and skills, must have high motor readiness, professionally important motor skills, mastering of which must be stimulated during the educational process. Thus, the formation of motor readiness takes one of the defining places in the professional training of a future physical culture teacher. One's motor readiness is determined by the level of development of physical qualities, the formation of motor skills, the result of a specialized process of physical education, aimed at solving specific problems [21, 22].

The aim of the article is to investigate the fundamental factors of the continuing professional development of future physical culture teachers in the process of studying at a higher educational institution.

The tasks are

1) to investigate the motives for choosing the profession of a teacher and the level of students` motivation to education activities at a higher educational institution;

2) to determine the readiness levels of the students of the Physical Education Faculty for continuous professional growth;

3) to identify the dependence of the level of motor readiness on the students' motivation and readiness for continuous professional development.

3. Method

3.1. Participants

Experimental studies were conducted at the Physical Education Faculty of the Taras Shevchenko National University «Chernihiv College». The study was conducted in 2016-2017 (during the 1st year of study) and in 2019-2020 (during the 4th year of study). The experimental group consisted of 67 students between the ages of 17 and 22.

3.2. Materials

The experimental study used a set of techniques that revealed professionally important qualities. Theoretical and methodological data of the study of motivation and readiness for professional development, theory and technique of using test methods for personality study were applied. Choosing the indicators and methods of investigating the professional development of a student, the researchers took into account the content of the activity and the general psychological characteristics of a professional.

The experimental study included diagnostic techniques that revealed the personal and generally intellectual qualities of the respondents. The techniques used were investigated and evaluated in terms of their validity and reliability. To conduct the qualitative analysis of revealing the most important reasons for choosing the profession of a teacher, the questionnaire of Ye. P. Ilin [7] was adapted. The level of development of respondents' motivation for learning activities was determined using the adapted methodology of T. D. Dubovytska [11]. The level of the students' readiness for continuous professional growth was determined using the adapted methodology of V. Zvereva and N. Nemova [23].

In the process of research of the motives for choosing the profession of a teacher, the respondents were asked to evaluate the presented motives for choosing pedagogical activity on a scale from one to ten. The points were calculated on two scales, which revealed the importance of each motive and let to make the

conclusions about the respondent's pedagogical vocation, related and secondary interests that in turn made it possible to identify high, middle, low and levels of students' motivation.

The methodology of T. D. Dubovytska revealed the level of development of the respondents' internal motives. The motive is internal when it coincides with the purpose of the activity. Internal motives are related to the cognitive need of a subject, the pleasure one receives from the learning process. The purpose of studying is to master the learning material, which in this case has the character of educational activity. The domination of internal motivation is characterized by the manifestation of the student's own activity in the process of educational activity. The following regulatory boundaries were used to determine the level of internal motivation: 0-5 points – low internal motivation; 6-14 – the middle level of internal motivation; 15-20 – a high level of internal motivation.

The questionnaires were used to find out students' level of readiness for continuous professional growth. The evaluation was performed on a five-point scale. The adapted methodology of V. Zvereva and N. Nemova made it possible to find out the factors that hinder or stimulate the professional development of the respondents; to determine the level of realization of their development needs (a high level of readiness), the developmental dependence on the situation and conditions (the middle level of readiness), a low level of development (a low level of readiness).

To achieve the aim of the study, the following scientific methods were used: an analysis of scientific and methodological literature, pedagogical observation, chronometry method, heart rate monitoring, questioning, testing, pedagogical experiment, the methods of mathematical statistics.

The analysis of the scientific and methodological literature allowed us to find out the motives for choosing the profession of a teacher, the peculiarities of the development of motivation for educational activity because the motivational component determines the direction of future transformations of the student's personality, taking into account the needs of pedagogical activity and focusing on improvement and professional development; to analyze the concept of readiness, which pedagogical science considers as a readiness for self-education, independent activity, professional activity, continuous professional development, the content of motor training of the students of the Faculty of Physical Education. The method of pedagogical observation allowed us to investigate the meaningful component of the motor activity development of the students of the experimental group, its nature, and magnitude, not disturbing the natural course of the educational process. The chronometry method was used to control motor activity, total and motor density that is to determine the amount of time spent on the motor activity components of the students of the experimental group in the 1st and 4th years of study. It was carried out by the observation of each student. The heart rate monitoring was used to determine the energy orientation of the motor activity of the students in the 1st and 4th years of study. The heart rate, which characterized the energy-saving mode, was measured using a pulsometer during the student's motor activity with an interval of ten seconds. The questionnaires and testing methods were used to obtain reliable structured information regarding the motives for choosing a profession of a physical education teacher, the level of development of motivation for continuous professional growth in the learning process, and the level of readiness for the continuous professional development of students. The pedagogical experiment became the leading method of the research because it gave an opportunity to track the dynamics of development of the studied factors in the process of purposefully organized training, which is characterized by a positive attitude to continuous professional development.

The methods of mathematical statistics were used to perform the objective and qualitative analysis of the results of a study that had a numerical expression. The following procedures were applied: calculation of the percentage; calculation of arithmetic mean. Statistical processing was carried out using Microsoft Excel, which also helped to distribute experimental data.

3.3. Procedure

Higher pedagogical education is a fundamental component of the system of continuous pedagogic education. At the stage of studying at a HEI, a future teacher acts not only as an object of purposefully organized influence but also as a subject of continuing education. This stage is characterized by creative activity for mastering the educational program and one's own development, its purpose is to form a general

pedagogical basis for future pedagogical activity, the ability to solve pedagogical tasks. In fact, this stage determines the further professional activity and professional development of a teacher.

To achieve the aim of the work, we studied the level of motivation of the students of the experimental group for choosing the profession of a physical culture teacher, the level of their motivation for studying activities. We also determined the level of students' readiness for continuous professional growth. The structure and content of students' motor activity were investigated and the dependence of the level of motor readiness on the students' motivation and readiness for continuous professional development was revealed.

4. Results and Discussion

Motivation is a desire, incentives, and stimulation that leads to the activity and determines its orientation. Motivation internally drives activity, combines meaningful and dynamic sides of both actual and potential content. Generally, motivation is defined as a process that begins with the actualization of a motive and ends with the initiation of any action [23]. Motivation determines the direction of future changes in the personality of a student, taking into account the needs of pedagogical activity and focus on improvement and professional development. Mastering the profession, a student must have a strong professional motivation for studying, related to the interest in one's future profession because, at this stage, motivation is a prerequisite for the development of professionalism. The motivation for professional development is one of the important qualities of a pedagogical worker, but its formation is impossible in a short time. When referring to the motivation for continuing professional growth of a future educator, one should consider, first of all, educational and professional motivation, based on professional orientation and aimed at solving professional problems [6. 12, 24].

Exploring the motivation of educational activities, one should separate the motives for education and the choice of specialty. At the stage of professional choice, motivation is crucial in the process of professional self-determination. Only when school graduates adequately assess their own psycho-physiological capabilities and the content of the chosen profession, realize its social significance, the choice of the profession can be conscious [15]. The results of the study of the motivation for choosing a profession by the students of the experimental group are presented in Table 1.

The analysis of the obtained data shows that 25.37% and 59.70% students questioned had the desire to be engaged in the pedagogical activity at high and middle levels respectively. 40.40% and 44.77% students had high and middle levels of interest in the subject of Physical Education respectively. Choosing a profession for the opportunity to show the abilities, 46.27% students showed the middle level of motivation and 19.40% – a high level. 49.76% respondents (35.82% students showed the middle level of motivation; 13.94% – a high level) realized the need for continuous professional growth. At the same time, choosing a profession, 59.70% students had a high level of motivation for extra earnings and long-lasting vacations; 49.25% respondents – for a convenient work schedule. Generally, the analysis of the results made it possible to find out that more than half of the students of the group chose the profession regarding their own pedagogical orientation and interest in the subject of Physical Education, based on the awareness of their own pedagogical abilities and the need to constantly develop.

Table 1. *The study of the motivation of profession choice by the students of the first year of study of the Physical Education Faculty (n=67, %)*

The motives for choosing a profession	The level of motivation		
	Low	Middle	High
The desire to become a teacher	14.93	59.70	25.37
An interest in the subject	14.93	44.77	40.30
Non-standard, creative content of work	44.77	40.30	14.93
The desire to help students	40.30	40.30	19.40
The opportunity to show the abilities	34.33	46.27	19.40
The need for constant growth	50.28	35.82	13.94
Staying in a cultural environment	10.45	59.70	29.85
Independence, freedom of activity	29.85	50.75	19.40

Increased personal standards	25.37	55.23	19.40
Love and gratitude of students	70.15	19.40	10.45
Long-lasting summer vacation	20.90	19.40	59.70
Understanding students' problems	10.45	70.15	19.40
Recognition by society	26.87	53.73	19.40
The level of salary	59.70	29.85	10.45
Family tradition	40.30	29.85	29.85
Convenient work schedule	10.45	40.30	49.25
Possibility of additional earnings	29.85	10.45	59.70

The scientists [6, 25] note that the interest in the future profession is formed at the stage of its choosing; the perception of a profession, adaptation to professional activity – at the stage of vocational training. The process of mastering a pedagogic profession and understanding professional activity is the most difficult in the motivational structure. The substantive dissimilarity of the student's motivation is its transitional character because it combines cognitive and professional motivation. Beginning the study at a HEI, a former pupil is faced with a decrease in the level of external control over the educational activity and a change in the structure of the educational activity itself. Successful learning activities require a strong motivation because a student must plan, implement and control it by oneself.

The motivation for studying at a HEI is developed directly in the process of educational and cognitive activity of a future teacher because the life goals and sensory motives, related to the study, appear. However, the orientation to active learning arises only when personal cognitive interest, the basis of which is an internal motive, encourages studying [26, 27]. The results of the study of students' educational motivation are presented in Table 2.

Analyzing the orientation and the level of motivation of the students of the Physical Education Faculty for educational activity, it was revealed that among the students of the 1st year, the middle level of motivation, which accounted for 44.77% respondents, prevailed. 40.30% students of the 1st year had high motivation for study. In our opinion, the advantage of the number of students with the middle level of motivation for study in the first year is related to the decrease in the level of external control. 14.93% students had a low level of motivation for study, which coincided with the percentage of students who had a low level of motivation for teaching activities when entering a HEI.

Nowadays, the task of educational activity at the university is to create the conditions and activate the factors that positively influence the development of the educational activity of a future teacher, accelerate one's professional development. The indicators obtained as a result of the study of the 4th-year students' level of motivation indicated positive dynamics of motivation. Thus, the number of students with a low level of internal motivation was decreased by 8.96%, while the number of students with a high level of motivation was increased by 5.97%. The obtained indicators identify the creation of necessary conditions and activation of factors that positively influence the development of the educational motivation of a future teacher, indicate the emotional pleasure that a student receives of the learning process at a HEI. The positive dynamics of indicators also indicate the manifestation of students' own activity and confirm that the motivation for studying at a HEI is developed directly in the process of educational and cognitive activities of a future teacher.

Table 2. *The study of the motivation for educational activity by the students of the Faculty of Physical Education (n=67, %)*

The level of motivation	The 1st year of study	The 4th year of study	The difference
Low	14.93	5.97	8.96
Middle	44.77	47.76	2.99
High	40.30	46.27	5.97

In the process of mastering the profession, motives are changed, they acquire new content. The students form the readiness to act according to their motives. The readiness can be defined as an integral

system of values, cognitive, emotional and behavioral qualities that provide an individual with the opportunities for self-realization. The readiness is the result of upbringing, self-education, vocational training or professional education, professional orientation, professional self-determination, and professional development. Its content combines the desire to solve professional tasks independently and creatively, to have professional skills, abilities, and knowledge developed at the proper level.

Getting ready for an activity goes through several stages, namely, setting a goal, developing a model for future action, revealing readiness in specific actions, and comparing the goals set with the results. The situational and long-standing readiness is distinguished. The long-standing readiness is formed as a result of a specially organized activity, in advance. Unlike situational readiness, which is characterized by relative constancy, the long-standing readiness is a permanent prerequisite for successful activity. The long-standing readiness is interesting from the point of view of a pedagogical science since this state is formed in advance, developed under the proper conditions, it can lead to sustainable results. The level of students' readiness for continuous professional growth is presented in Table 3.

The indicator of the development level of readiness for professional development in the 1st year was mainly dependent on the lack of awareness of the specificity of the future profession, the level of theoretical knowledge and the lack of experience in teaching activities. At this stage of the study, the number of students with a low level of readiness for professional growth accounted for 34.32%. The first-year students with the middle level of readiness (50.75%) differed in the formal approach to the study, and only 14.93% students with a high level of readiness for professional development felt they were complete subjects of the educational process. That is why under the influence of teachers, the goals of freshmen were directed to the development of interest in the pedagogical activity, qualities, skills, abilities, revealing opportunities for professional realization and determining the direction of future transformations on the basis of the needs of the profession. The indicators of the 4th-year students were formed during the study period. Under the purposeful systematic influence of teachers, who simultaneously were the organizers of teaching practice, the image of the profession of a teacher and the perception of oneself as the subject of this profession, an active personal attitude to studying were formed, the motivations for professional orientation and the need for professional development were strengthened. Thus, the number of students with a high level of readiness for professional growth was increased by 26.87% and accounted for 41.79% in the 4th year of study. The number of students with a low level of readiness for professional development was decreased significantly, accounting for 14.79%. This potential of students gives the opportunity to conclude that there is a sufficiently high level of readiness to acquire new knowledge and to improve the acquired ones, to perform complex tasks.

Table 3. *The study of the level of readiness of the students of the Physical Education Faculty for continuous professional growth (n=67, %)*

The level of motivation	The 1st year of study	The 4th year of study	The difference
Low	34.32	14.93	19.40
Middle	50.75	43.28	7.46
High	14.93	41.79	26.87

It should be noted that the level of motivation and readiness for continuous professional development play an important role in the success of the future teacher's motor readiness, in particular motivation is defined as an important factor of successful physical activity [18]. The student's professional motivation is the basis of the professional training one receives at a HEI. The set of needs and interests forms the basis of the future teacher's professional training. Such needs as acquiring the basis for improvement and professional development, increasing professionalism, guide an individual in the process of mastering the profession of an educator.

A physical culture teacher must have professionally significant qualities, skills, abilities, and knowledge necessary for successful solving the tasks defined by the profession, that is, to have a high level of pedagogical skills [12]. The high level of professional skills of a teacher depends on one's professional development, based on the educational activity at a HEI. At the stage of studying at a HEI, one masters the

skills of physical exercise teaching, management of children's collective, the knowledge of age physiology, professional capacity. In addition to special pedagogical knowledge and skills, the graduates of the Physical Education Faculty must have a high level of motor (physical) readiness. The basis of it is practical skills that are formed over a long period of time, and therefore physical training takes one of the defining places in the professional training of students. Acquiring knowledge in the studying process, forming the skills needed for the physical education teacher, under the guidance of teachers, students form the professional potential necessary for the realization of pedagogical activity and development.

In addition to theoretical knowledge, the students of the Physical Education Faculty must acquire a sufficiently high level of skills. One of the objectives of our study was to analyze the level and dynamics of motor readiness, depending on the level of development of motivation and readiness for professional growth. In the course of the study, the practical classes in basic subjects were timed, in order to determine the energy orientation of students' motor activity, heart rate monitoring was performed.

Having analyzed the results of practical classes of first-year students in basic disciplines, we can conclude that their motor activity is mostly of a mixed character. A freshman spends significantly less time doing aerobic and anaerobic exercises. Performed motor activity is mostly represented by the middle or simple coordination complexity, complicated movements are rare. In terms of skills and abilities, the exercises which were already learned prevailed, in comparison to new exercises. The smallest amount of time is spent on additional actions. Such physical qualities as agility, power, and flexibility are used quite rarely in practical classes, in contrast to speed and endurance. Therefore, we can conclude that the first-year student's motor activity is characterized by speed, endurance, mixed orientation, simple or moderate coordination. The indicators of first-year students with a high level of motivation and readiness for studying activity almost do not differ from those of the students with a low level of motivation and readiness. The differences are observed only in the performance of additional actions, motor actions with revealing flexibility, dexterity, and power, which most likely depends on the level of initial motor readiness, physical development, skills, and lifestyle.

During the study, the requirements for students are being increased, and therefore the indicators of students' motor readiness are changed towards the prevailing components of motor activity, which are directly related to the professional activity of a teacher of physical education: an increase in the volume of motor actions of aerobic orientation, a decrease in the time to perform the movements of mixed orientation, reduced amount of extra movements, increased endurance and decreased agility and power, the ability to perform and correctly show physical exercises, to perform physical exercises with the students, the need to spot the students during the class.

The physical activity orientation of a physical culture teacher should ensure a low level of exhaustion and a high level of efficiency that increases the volume of motor actions of aerobic orientation. In the process of gaining pedagogical experience, the ability to rationally distribute load is formed, the endurance is increased and speed and power load are decreased, the ability to effectively solve pedagogical tasks through performing coordinating simple movements emerges. These components determine the efficiency of a teacher, are they are formed and improved during practical training and in the process of teaching practice. Their dynamics are directly influenced by the level of motivation and readiness for professional development (Table 4).

The experiment with the 4th-year students with the middle level of motivation and readiness for professional growth showed that in the course of practical classes, the volumes of motor actions of aerobic orientation (45.5%), simple coordination complexity (50%), showing previously learned exercises (53%), spotting (4%), and motor activity requiring endurance (35.5%) were significantly increased. At the same time, there was a decrease in the time of performing movements of mixed and anaerobic orientation – 35.5% and 19% respectively, medium (36%) and high (14%) coordination complexity, new exercises (24%), additional actions (19%). Such components of motor activity as speed and agility were hardly changed. The volumes of the physical actions of aerobic orientation of the 4th-year students with the middle level of motivation and readiness were increased by 13.5% of the time, in comparison to the students of the 1st year, while the motor activities of mixed and anaerobic orientation were decreased by 6.3% and 7.2% respectively. The volumes of physical activity of simple coordination complexity were increased by 18.9% of the time,

while the ones of medium and high orientation were decreased by 5.2% and 13.7% respectively. The indicators of the substantive component were changed in the following way: the time spent showing previously learned exercises was increased by 3.9%, spotting – 3.2% due to reduced time spent showing new exercises by 2.3% and performing additional actions – by 4.8%. Performing motor actions requiring endurance was increased by 15.1%, agility – 0.9%, power – 2.6%, while performing motor actions requiring flexibility and speed was decreased by 5.4% and 8% respectively.

The indicators of motor activity of the 4th-year students with a high level of motivation and readiness for professional development differed significantly from the ones of the 1st-year students. The volumes of physical activity of simple coordination complexity were increased to 51.9% (by 19.9%) due to the decrease in the volumes of motor activity of the medium coordination complexity to 34.5% (by 6%) and a high coordination complexity to 13.6% (by 13.9%). The mixed and anaerobic motor activities were decreased to 30% (by 11.4%) of the time and 14.8% (by 11.3%) of the time respectively, while aerobic motor activity was increased to 55.2% (by 22.7%) of the time. Regarding the substantive component, after passing the teaching practice, the time of showing new exercises was decreased to 19% (by 7.3%), the time of performing additional actions – to 18% (by 5.8%). At the same time, the amount of time to perform the previously learned exercises was increased to 56% (by 6.9%) and spotting – to 7% (by 6.2%). The indicator of endurance volumes were increased to 43% (by 22.6%) of the time, while the indicator of flexibility, speed, agility, and power volumes were decreased by 11% (6.2%), 14.1% (11.9%), 18 % (0.7%), 13.9 % (3.8%).

Table 4. *The structure and content of the physical activity of the students of the Physical Education Faculty (n=67, %)*

The indicators		A high level of motivation		The difference	The middle level of motivation		The difference	A low level of motivation		The difference
		1st year	4th year		1st year	4th year		1st year	4th year	
Orientation (%)	Aerobic	32.50	55.20	22.70	32.00	45.50	13.50	32.00	40.00	8.00
	Anaerobic	26.10	14.80	11.30	26.20	19.00	7.20	26.20	24.40	1.80
	Mixed	41.40	30.00	11.40	41.80	35.50	6.30	41.80	35.60	6.20
Coordination complexity (%)	Simple	32.00	51.90	19.90	31.10	50.00	18.90	31.10	32.00	0.90
	Medium	40.50	34.50	6.00	41.20	36.00	5.20	41.20	43.70	2.50
	High	27.50	13.60	13.90	27.70	14.00	13.70	27.70	24.30	3.40
Substantive component (%)	Showing new exercises	26.30	19.00	7.30	26.30	24.00	2.30	26.30	25.90	0.40
	Showing previously learned exercises	49.10	56.00	6.90	49.10	53.00	3.90	49.10	50.60	1.50
	Performing additional actions	23.80	18.00	5.80	23.80	19.00	4.80	23.80	21.00	2.80
	Spotting	0.80	7.00	6.20	0.80	4.00	3.20	0.80	2.50	1.70
Physical qualities (%)	Flexibility	17.20	11.00	6.20	18.00	12.60	5.40	18.00	12.80	5.20
	Agility	18.70	18.00	0.70	19.00	19.90	0.90	19.00	23.50	4.70
	Speed	26.00	14.10	11.90	24.90	16.90	8.00	24.90	24.00	0.90
	Power	17.70	13.90	3.80	17.70	15.10	2.60	17.70	17.80	0.10

	Endurance	20.40	43.00	22.60	20.40	35.50	15.10	20.40	21.70	1.30

In the structure of motor activity of 4th-year students with a low level of motivation and readiness for professional development, mixed (35.6%) and aerobic (40%) activities were observed most often. In comparison to 1st-year students, the volume of aerobic motor activity was increased by 8%, mixed motor activity – by 6.2%. Regarding the anaerobic motor activity, less time was spent on its performing – 24.4%, which was decreased by 1.8%. This motor activity was characterized by movements of a medium coordination complexity, the volume of which was increased by 2.5% and accounted for 43.7%. Regarding the substantive component, during practical classes, the majority of time was spent on displaying previously learned exercises, the volume of which was increased by 1.5% and accounted for 50.6%. A smaller amount of time was spent on additional motor activity – 21% (it was decreased by 0.4%) and on showing new exercises – 25.9% (it was decreased by 0.4%). Concerning the physical qualities of the 4th-year students, speed (24%) and agility (23.7%), a low level of manifestation of power (17.8%) and flexibility (12.8%) prevailed. Less time was spent on motor activity requiring endurance the volume of which accounted for 21.7% and was increased by 1.3%, in comparison to freshmen.

5. Conclusions

On the basis of the analysis conducted, the primary factors of the continuous professional development of the students of the Physical Education Faculty in the process of study at a higher educational institution were considered. The studies of the motivation for choosing a profession revealed that choosing their future profession, more than 50% students realized the need for continuous professional development, were motivated by their own pedagogical orientation and were aware of their pedagogical opportunities.

The analysis of the students' motivation for studying showed that the students with middle and high degrees of motivation prevail among the 1st-year students (44.77% and 40.30% respectively). The percentage of students with a low level of motivation (14.93%) corresponded to the percentage of students with a low level of motivation for professional teaching activities. The analysis of the dynamics of the level of motivation for educational activity shows that among the 4th-year students, the number of students with a low level of motivation was decreased by 8.96%, while the number of students with middle and high levels was increased by 2.99% and 5.97% respectively.

The analysis of students' level of readiness for professional growth showed that in the 1st year of study, it depended on the level of awareness of the specificity of the teaching profession and theoretical knowledge. The interest in the pedagogical activity, revealing opportunities of professional realization, awareness of the need for the professional development of the 4th-year students were formed under the purposeful systematic influence of teachers in the studying process. In general, the number of 4th-year students with a low level of readiness for professional development was decreased by 19.4%, in comparison with the first year of study, with the middle level – by 7.46%; the number of students with a high level of readiness was increased by 26.87%. The obtained results show that the 4th-year students have a sufficiently high level of readiness to acquire new knowledge and to improve previously acquired, to solve complex tasks.

The analysis of the dependence of the level of motor readiness of students on the level of their motivation and readiness for continuous professional development showed that the indicators of motor activity of the students of the 4th year with a high level of motivation and readiness for continuous professional development were changed, that is there was an increase in the volume of those motor actions, which are characteristics of the professional activity of a physical culture teacher. Thus, aerobic activity was increased by 22.7% of the time, mixed and anaerobic activities were decreased by 11.4% and 11.3% of the time respectively. The endurance volume was increased by 22.6% and agility and power volumes were decreased by 0.7% and 3.8% respectively.

Thus, the results of the research show that the students, who realize the need for professional development, acquire the content of the curriculum during the study better and understand the purpose and objectives of students' education better.

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The Role of Physical Education in the Professional Activity of Teaching Staff

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Abstract

The work revealed the influence of the negative factors of professional activity on the health state and working capacity of the teachers of higher military educational establishments; substantiated the role and importance of physical exercise for the reduction of the negative impact of professional activity and the improvement of the mental capacity of teaching staff at the theoretical level. The study determined that the main negative factors of the professional activity of teaching staff that worsened their performance included a low level of motor activity, high nervous-emotional tension, overwork of the intellectual sphere. The research established that the main task of the physical education of the teachers is to increase and constantly improve the level of their general physical fitness. The efficiency of the professional activity of the teachers depends on the degree of development of the following physical qualities: strength, static endurance of the trunk muscles, and the level of general endurance. Ensuring the formation of the core and improving the blood supply to the brain, static endurance of the trunk muscles (back and abdominal muscles) increases the efficiency of the teachers` activity and reduces the risk of occupational diseases.

Keywords: physical education, professional activity, teaching staff

1. Introduction

There is a constant need in society to train military professionals who are skilled, highly moral, and faithful to state ideals. The teaching staff of higher military educational institutions (HMEI) plays an important role in the training of future highly-qualified defenders of the Homeland. The professional activity of an instructor officer at HMEI is carried out in the conditions of the constant growth of the volume of educational information, a high level of responsibility for the results of training, overwork of the intellectual sphere, high nervous-emotional stress, long-term limitation of physical activity and keeping a static position [1, 2]. These factors lead to a decrease in the mental capacity of the HMEI teachers and the deterioration of their professional activity.

According to many scientists [3-7], physical training plays an important role in forming the military personnel's readiness for professional activity, enhancing their physical and mental capacity and resistance to negative factors. It is conditioned by the fact that the means of physical training provide the development and improvement of not only the physical but also the mental nature of people. Properly used means of physical training can significantly improve the professional performance of military professionals of various specialties [8-11].

The scientists [12-17] established close interrelationships among professional performance, health, mental capacity and the level of physical fitness of military personnel.

The problem of improving the physical preparedness of the instructor officers of HMEI is extremely important, and the high level of physical fitness is the basis for improving their health, mental capacity and the efficiency of their professional (teaching) activity.

2. Methodology

The aim of the article is to substantiate the role of physical training in improving the professional activity of the teaching staff of higher military educational institutions.

The tasks are

1) to reveal the influence of the negative factors of teaching activity on the health status and working capacity of the teaching staff of HMEI;

2) to theoretically substantiate the role and importance of physical exercises for the reduction of the negative impact of professional activity and the improvement of the mental capacity of the teaching staff of HMEI.

The study was conducted at S. P. Koroliov Zhytomyr Military Institute.

The research methods included theoretical analysis and generalization of scientific and methodological literature, normative documents on the organization of the educational process at HMEI, pedagogical observation.

Researches related to the involvement of cadets were carried out in compliance with all relevant national regulations and institutional policies (Order of the Minister of Defense of Ukraine "On Approval of the Regulation on the Organization of Scientific, Scientific and Technical Activities in the Armed Forces of Ukraine" dated 27.07.16, No. 385).

3. Results and Discussion

One of the prevailing tendencies in the structure of the modern work of teaching staff is not only its increasing intellectualization and a sharp increase in the requirements for the quality and speed of mental and psychomotor operations.

The teaching workload of an instructor officer at the modern HMEI of Ukraine accounts for about 20 hours a week; accordingly, one conducts 2 (sometimes 3) training classes with cadets each day – the daily workload accounts for 4 (sometimes 6) hours of classes. The rest of the instructor officers' teaching hours are devoted to the preparation for classes (the development of methodical recommendations, writing of lecture notes, etc.); consultations, work with coursework and degree works; conducting curatorial work; the participation in the educational-methodical, scientific work of the department (writing of scientific works, educational-methodical materials, preparation for conferences, etc.); the improvement of personal

professional training (writing dissertation, etc.); the execution of commands and participation in other activities, according to functional responsibilities. Thus, the instructor officers of HMEI spend most of the working hours indoors in a forced position (sitting or standing) that clearly demonstrates the effect of a large number of negative factors on the organism` systems of teachers, including hypodynamia and hypokinesia, the duration of working day and week, nervous-emotional tension, mental overwork, and stress, etc. In addition, bad habits and the lack of time for physical training do not ensure the necessary level of physical fitness and health of the instructor officers. Such activity has been happening for many years, and the factors mentioned lead to a significant decrease in mental and physical performance, deterioration of health and activity of the basic systems of an organism, a decrease in the efficiency of professional activity, and cause various diseases in the case of systematic action.

The analysis of scientific works [18-20] showed that low motor activity leads to various disorders of the organism's systems and metabolism, excess weight that adversely affects the state of health and causes various kinds of diseases. First of all, it affects the cardiovascular system (atherosclerosis, hypertension, coronary heart disease, etc.), and the musculoskeletal system. This gives rise to detraining (the deterioration of the ability to stand functional loads).

Low motor activity, nervous and emotional tension lead to chronic stress. According to statistics, hypertension, atherosclerosis, obesity currently account for over 80 % fatal cases in the middle and elderly age [21, 22]. Reduced motor activity adversely affects the condition of the muscular system. Muscles become flaccid, decrease in size. The core does not perform its main function (the spine is not in a normal position) that leads to a deterioration of blood supply to the brain and consequently, the decrease in mental and physical performance of the instructor officers [23-25]. The atrophic changes of a part of muscular fibers are also noticeable; the layer of fat tissue between them is increased. The stability and reliability of movement coordination disappear; muscle strength and endurance are reduced. Muscle atrophy has a negative effect on the adaptive mechanisms of blood circulation during physical activity and ultimately has a negative influence on the health of the instructor officers and their performance.

Staying in a static posture (sitting position) for a long time reduces the amount of circulating blood because of its deposition in the capillaries and congestion in the lower extremities. This provokes swelling of the lower extremities, an increase in the straining of the venous vessels of the lower leg, with the subsequent development of varicose veins. The impact of hypodynamia leads to a decrease in pulmonary ventilation and respiratory volume. The absence of a systematic load on respiratory organs causes the weakening of respiratory muscles that leads to a decrease in vital capacity of lungs. The limitation of physical activity is accompanied by natural deterioration of the organism's adaptability. The character and diversity of the changes are characterized primarily by a decrease in resistance to unfavorable factors of working activity. The permanent limitation of motor activity can lead to the biochemical reactions disorder, a decrease of the nervous system functions, deterioration of oxygen delivery to the heart muscle and brain, an increase in energy intensity [26, 27].

A long-term decrease in motor activity contributes to the weakening of metabolism that leads to fat deposits and body weight gain. People with excess weight do not have the desire for active movements. The lack of movement affects the functioning of the cardiovascular system, resulting in increased heart rate, reduced stroke volume and mass of the heart muscle. Hypodynamia increases the number of people with physical detraining with age [18, 21, 28].

Teaching activity requires officers to maintain a permanent working position for a long time. However, its maintenance for a long time (static regime) is often more tedious than the work, which is accompanied by low motor activity. In conditions of static moderate work, the correlation between pulmonary ventilation and blood supply to the lungs is interrupted because of irregular breathing and the decrease in oxygen saturation. Consequently, the body develops the phenomenon of oxygen deprivation (hypoxia) and accumulate carbon dioxide. Only some military personnel can stand the 4-hour sitting position, which localizes fatigue in the muscles of the neck, back, and legs, without complaints. The cardiovascular system suffers the most. The study determined that the more uncomfortable the posture is, the higher the neuromuscular energy cost to maintain postures is. In the case of long-term keeping of the

same posture, blood circulation is deteriorated, congestive phenomena appear, and working capacity is decreased [1, 2, 27, 29].

In addition to the mentioned adverse factors, the instructor officers experience high nervous and emotional tension. The nervous-emotional tension results in decreased performance, increased heart rate, breathing and blood pressure, high maintenance attention distribution, reduced attention and memory, increased number of mistakes, and rapidly arising exhaustion. The exhaustion is based on a decrease in the functional abilities of an organism, its reserves. As the professional activity of instructor officers is closer to mental and intellectual work, one of the first signs of exhaustion is a decrease in mental activity. The exhaustion decreases memory, concentration, distribution, and switching of attention, muscle strength, endurance, movement coordination, and speed of reactions [2, 20, 27]. The fatigue can also result in irritability, and decreased well-being. Concerning the reduction of muscular energy cost and the increase of mental load, it appears there is no need for the constant physical improvement of the instructor officers. However, research shows that reducing the amount of muscle energy cost in the process of working activity does not reduce but increases the physical fitness requirements for teachers in many cases [8, 9, 18].

Thus, adverse factors dramatically worsen the physical condition, performance of the instructor officers of HMEI, and the efficiency of their working activities in general. Therefore, the importance of physical fitness in improving the efficiency of teaching, promoting the health and resistance of the instructor officers' organisms to various negative factors is being increased more than ever.

Physical exercises that should provide excellent health, high productivity and a wide range of recreational and rehabilitation activities are of great importance for health promotion, disease prevention, and performance improvement. Physical training, solving its basic task that is the development of basic physical qualities, health promotion, the formation of motivation for exercise, can solve aspect problems, including the formation of emotional stability, resistance to the hypodynamic regime of activity, etc. The studies showed that, under the influence of unfavorable factors, the performance indicators of working activity are reduced by 20% for the military personnel with high physical fitness, and by 40-50% for those with low physical fitness. A high level of physical fitness reduces the exhaustion and delays it, lets to increase the body's resistance to specific adverse effects [30-33].

Regular and properly organized physical exercise encourages and regulates metabolism and the activity of important functional systems that generally has a deliberate effect on the improvement of health, performance, and the efficiency of the activity of instructor officers. At the same time, the efficiency of physical training for the formation of the required qualities of specialists depends on the variety of means used, their volume and focus [3, 5, 10, 16].

The physical training of military personnel is divided into general and special. The tasks of general physical training are the development and improvement of physical qualities (endurance, power, speed, agility); the improvement of physical development, health, and performance; ensuring the professional longevity and resistance of an organism to adverse factors of the environment and professional activity, reducing the work costs associated with diseases; the education of courage, decisiveness, initiative, persistence, independence, self-confidence, mental stability; the involvement of military personnel in regular physical training and sports, etc. On the basis of general physical training, special qualities are formed, and special physical training is improved. It was proved that, firstly, it is impossible to improve special qualities without a foundation, which is a high level of general physical training, and, secondly, an insufficient level of general physical training of officers leads to a deterioration of physical condition and health, different kind of diseases and a decrease in the efficiency of professional activity [20, 22, 26].

Concerning teaching activity, a low level of general physical fitness of officers leads to excess weight, congestive phenomena of an organism, reducing the strength and tone of muscles of instructor officers, disorders of the basic systems of an organism, reduced efficiency, and such diseases as hypertension, coronary heart disease, etc. All this also has a negative impact on the quality of the cadets' education process. Therefore, an increase in the level of general physical fitness is the main task of the physical training of the instructor officers of HMEI.

The use of physical exercise depends primarily on the nature and peculiarities of the officers' activities. The activity of instructor officers is characterized by intense intellectual workload and pronounced

hypodynamic character, which determines the need to learn literary sources concerning the usage of physical exercises to restore physical and mental performance, strengthen health and reduce the effects of negative factors (primarily, the lack of motor activity).

Many researchers indicated the role of physical exercises in motor activity. Thus, M. S. Ghoncharenko, & V. Je. Novykova [34] emphasized the need to use physical exercises to enhance the activation of the synthesis of proteins and nucleic acids in the body, to improve the immunobiological features of blood and skin, to increase the resistance to a number of infectious diseases. The other scientists [5, 19, 27] consider physical exercises as a means of prevention and an efficient way of combating such negative effects of hypodynamia as excess weight. According to scientists [35, 36], physical exercises are an important means of preventing coronary insufficiency, atherosclerosis and their complications, as an insufficient motor activity takes the first place among the risk factors that contribute to the development of these diseases. The scientific work [10] found a reliable relationship between prolonged "muscular starvation" and the acceleration of age-related changes in the cardiovascular system. The constant activation of the circulatory system through physical exercises helps to strengthen its structure and functional capacity. The experiments with 10-day isolation note a lower intensity of the effects of the neuro-psychic and vegetative functions during the period of applying physical exercises [29].

The active muscular activity is a reliable guarantee of the prevention of cardiovascular diseases caused by excessive nervous and mental tension. Numerous studies [20, 21, 29] proved that physical training significantly improves the activity of the mechanisms that regulate vascular tone. The cardiovascular system of a trained person has more stable mechanisms of regulation, and sudden significant physical activity of an untrained person can lead to the failure of the compensatory capacity and pathological changes of an organism. Physical exercises improve metabolism and blood circulation, strengthen the heart, blood vessels, lungs, and muscles, have a positive effect on the psycho-emotional sphere, promote activity, enhance performance, and preserve interest in life. It was also proven that physical exercises stimulate intestinal activity that reduces the time of contact of carcinogens with the lining of intestines; reduce the risk of prostate disease; stimulate the immune system, especially leukocytes that destroy cancer cells; strengthen the skeletal muscles and musculoskeletal system, prevent osteoporosis (a decrease in bone density that is likely to damage integrity); improve the heart and respiratory organs activities; promote the normalization of body weight. The physical training also contributes to the prevention of musculoskeletal diseases (radiculitis, osteochondrosis, etc.), which result from the insufficient motor activity and uneven activity distribution because of the peculiarities of the main working position. The important physical qualities of the officers whose activity is related to the sitting working position are the static endurance of the muscles of the back and shoulder girdle.

The investigations [4, 7, 12] indicate the need for comprehensive use of various means of physical training to optimize the physical condition of military personnel whose activity occurs under the conditions of limited motor activity. The content of physical training classes is recommended to comprehensively include the groups of directional impact, including general developmental, gymnastic, power exercises, cyclic exercises of moderate and variable intensity during the week.

The scientists [22, 25, 26] concluded that physical training with an emphasis on the development of endurance (general, power) has a positive effect on solving the tasks of combat duty of operator officers, whose activities occur in the conditions of low motor activity and are similar to teaching. Experimental studies [18] determined that the attention span, indicators of intellectual abilities, and memory of operator officers depend on the degree of development of physical qualities (power, static endurance of the trunk muscles) and the level of general physical fitness. In addition, forming the core and improving blood supply to the brain, the static endurance of the trunk muscles (back and abdominal muscles) increases the efficiency and reduces the risk of occupational diseases. The scientists recommend complex exercises such as walking, running, jumping, exercises for different muscle groups. The peculiarity of the organization of physical training of military personnel, whose activity has a pronounced hypodynamic character, is the use of general physical training with the predominant use of power and endurance exercises. Therefore, physical training classes for instructor officers, whose work is accompanied by the influence of hypodynamia, should be built on the principle of diverse training. Thus, the analysis of the works about the impact of physical exercise on

the improvement of the resistance to negative factors, health promotion, and prolongation of professional longevity of the representatives, whose professional activity is hypodynamic, convincingly proved the applicability of the means of general physical training. At the same time, concerning the diversity of the proposed means, the vast majority of authors point out the importance of the development of general endurance, power characteristics, and static endurance for this category of specialists.

The question of applying physical exercises to restore performance during mental work is of particular interest for researchers. Many works [35-38] studied the influence of physical exercises on some aspects of a person's mental capacity. A high level of mental capacity is maintained under the condition of the optimal excitability of the corresponding areas of the cerebral cortex. Resulting from prolonged mental work, inhibitory processes occur in the higher regions of the brain and cause reduced attention, memory, the ability to creatively analyze information, and lead to mistakes. The periodic transition to the physical exercises in the form of classes can accelerate the restoration of performance, relieve the feeling of fatigue, make a general health impact. Some scientists note the positive impact of physical training on improving mental capacity. Investigating the effectiveness of physical exercises during the exam session, it was found that regular diverse moderate exercises with sufficient emotional impact positively affect the performance of students.

It was established that as a result of intense educational activity, the mental functions, including memory, thinking, attention, are changed the most. The scientists [1, 35, 36] applied three sets of exercises: general developmental, power, and speed. All complexes had a positive impact on performance. More prominent was the impact of the general developmental complex. The training with a focus on speed development also led to increased excitement, making it harder for students to focus on difficult mental work. G. V. Korobeinykov [37] found that physical exercises had helped to improve the mobility of nerve processes in the process of mental work and thus, had created the preconditions for longer preservation of capacity. The author also noted that the stability of mental work depended on the level of general physical fitness. The performance indicators of individuals with a low level of general physical fitness were less stable. At the same time, other researchers [27, 28, 33] state that the efficiency of applying physical exercises depends on a number of factors. The negative impact of physical activity is noticeable most often during mental work. Hard physical activity leads to the nerve centers disorders, to the creation of a new dominant system of intercentral communication in the higher regions of the brain. This can complicate further mental work, which is based on a completely different mechanism. Hard muscular activity can create stable exhaustion. If the next processes take place during mental work, then its productivity may be decreased. Therefore, hard training should occur after the mental activity is finished at the end of the workday.

In the case of performing exercises in the process of mental activity, their selection and duration of performance should depend on the nature of the mental work. If it consists of habitual mental operations that do not contain complex analytical components, then the moderate activity of increased duration will not cause a decrease in productivity of the main work. But if the mental work is creative, connected with the analysis of a wide range of information, then one should not bring down the system of inter-central relations by switching to intensive muscular activity. In this case, the positive effect is achieved by light exercises, which do not violate the dynamic stereotype of the main work in the cerebral cortex. Performing physical exercises in the process of mental activity, one should also avoid excessive emotional impact, which can also increase the excitability of the central nervous system and complicate further involvement in mental work.

Thus, it is advisable to include the exercises that increase resistance to long-term keeping identical position and hypodynamia (general developmental exercises and exercises with the weight of one's own body); the exercises that slightly excite the central nervous system and have a preventive effect (walking, slow running, etc.); the exercises that develop back and abdominal muscles, and stimulate blood circulation; special exercises that make the nervous system focused on future work in the content of complexes performed in the process of mental work. Daily or weekly activity cycles, which alternate with mental work and other work, must always include training aimed at improving general physical fitness. Depending on the conditions, they may take the form of regular physical training, independent training or sports training. The classes should be completed one hour before the main work. It is better to carry out hard training in the

afternoon for a full recovery of working capacity after a muscular strain during the evening rest and nighttime sleep.

The high level of physical preparedness of the instructor officers will make it possible to carry out the tasks of teaching activity effectively; to strengthen physical development, functional abilities, and health; to maintain a high level of mental performance for a long time and quickly recover these indicators during rest periods; to prolong professional longevity.

Thus, in order to reduce the effects of negative factors of professional activity, to promote health and to restore the mental capacity of the teaching staff, the daily use of physical exercises by instructor officers should be aimed at solving the following tasks:

- in the process of teaching activity (between training classes), to change the dynamics of subcortical processes, to create the optimal excitement background; to improve blood circulation and metabolism by affecting the cardiovascular system actively; to carry out preventive influence on the musculoskeletal system and digestive organs; to eliminate congestion (especially in the pelvic region and in the lower extremities); to provide high mental capacity (to improve memory, thinking, attention); to improve emotional state;

- at the end of the working day (after conducting classes and finishing other kinds of mental activity), to develop and improve physical qualities (to form general physical fitness); to form the core; to promote health, improve the activity of cardiovascular, respiratory and other systems of an organism; to reduce the impact of hypodynamia and other adverse factors of working activity; to reduce exhaustion by engaging muscle groups, which were not involved in the work, in the intense activity, and to restore performance.

The resolution of these tasks is possible provided the high level of development of the general physical fitness of instructor officers. The general physical training improves the condition of the cardiovascular and respiratory systems and develop the qualities, which cause a high level of the general working capacity of officers, prevents occupational diseases and injuries, abnormalities of physical condition and development, and speeds up the recovery of nervous and muscular energy. In addition, general physical training helps to create the basis for the adaptation of an organism to various types of muscular work and the effects of adverse factors of professional activity.

4. Conclusions

1. The professional activity of the teaching staff of HMEI, which occurs in conditions of low motor activity and other adverse factors, places high demands on their level of physical fitness, health, and mental capacity. The insufficient level of these indicators leads to a decrease in the efficiency of the teaching activity of officers, which consequently, has a negative impact on the quality of training of cadets and students.

2. The tasks of physical training of the teaching staff of HMEI were determined to be an increase in the level of general physical fitness; the improvement of health, functional abilities of major body systems, disease prevention, professional longevity extension; ensuring a high level of mental capacity; the improvement of resistance to negative factors of teaching activity; the formation of motivation for systematic physical exercises and sports.

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The Effect of the Core Training Model on the Physiological Parameters of Secondary Education Students Who Do Sportsa

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Abstract

The purpose of this study is to investigate the effect of the core training model on the physiological parameters of students in secondary education age. In the study the group experiment n=(8) and the group control n=(8) are formed randomly from these secondary education students living in Gaziantep Nurdağı district who do sports regularly before and aged between 15-17.

In the study pretest-posttest patterned experimental method was used. The experimental group was given a 30-minute core training program for 8 weeks after training and no training program was applied to the control group except normal training. Heart rate, blood pressure, flexibility, strength, speed, aerobic capacity, anaerobic capacity and balance error measurements were performed before and after the 8 week core training of experimental and control groups. SPSS STATISTICS 22 for windows package program was used for the statistic analysis of the data obtained in the study. Comparisons of the two groups were based on the Independent Samples T Test, taking pretest and posttest differences.

When the pretest and posttest values of the experimental and control groups were compared, it was found that the balance performance of control and experiment groups, double foot long jump, speed performance, agility performance, push-up performance, sit-up performance, pull-up performance, anaerobic power performance, anaerobic capacity, were found to be significantly different in the experimental group compared to the control group.

As a result, it can be said that the core training model has a positive effect on the physiological parameters of the students in the secondary education age.

Keywords: Core training, Physiological Parameter, Students in secondary education, Sports

1. Introduction

The system, which encompasses all the movements of a person in his daily life and provides the opportunity to move to human beings, which shapes the human body, is called the movement system. Researchers studying the actions of the human on the movement system have reached the concepts of physical activity, sports, training, meaning of mobility.Of the individuals who do sports It is known that the physical activity level, progress or stay at the same level depends on the training activities (1).

The core training, which has been observed to be of great interest in recent years, has started to take its place on the basis of many training plans (2). It is seen that core training takes place on the basis of the training practice philosophy applied in ancient civilizations in the west and east, although with different nomenclature (3). When we look at the basis of Greek Olympics, classical and modern dance training, martial arts and yoga, we see that core training models are effective. The fact that this model was seen in such an old time and has not lost its influence since then proves its universality and whether not a temporary fashion style (3). The center of gravity of the human body is defined as the central point of the core (4). For the Core, many similar definitions were made. The core region is defined as a region of the abdomen, waist and hips along with the rib cage and knees (5). The The body is defined as the region, that provides the connection between the legs and arms (6). Joseph Pilates, the lower ribs of the body, the lower part of the hip defined as the surrounding section (3). It is stated that the core region muscle groups, which are defined by the muscles of the abdomen and spine, take the most effective position during a movement, by supporting the spine and acting as a corset with the movement of the spine, providing optimum efficiency during stability, mobility or resistance to a movement(7). Physiologically, the determination of the

core region differs from the study areas in athletic or therapeutic models. In the therapeutic sense, the muscles forming the core region are defined as a cylindrical double-walled structure, the anterior abdominal region, the parasipinal and the gluteal region above the diaphragm and the pelvic floor muscles below(8,9). It is defined as the whole region between the strenum and the knees, which is the center of the abdominal lumbar and hip regions (10).

The most important muscle groups considered to be strengthened by Core exercises are multifidus and transversus abdominis. Other muscle groups that work alongside these muscles are internal oblique, paraspinal muscles and pelvic floor muscles. Multifidus muscle group is important in stabilization of lumbopelvic region (6). For the purpose of strengthening the muscles and lumbopelvic muscle groups responsible for stabilizing the spine, the athlete can perform own body weight use to the exercise models, and to do this in a programmed manner is called core training. Through dynamic movements with these exercise models, it can be teachable to control the spine of the trunk muscles (11). It is known that the Core training model can be applied without any tools with only body weight, and there are various training options with the help of different materials. (12).

The aim of this study was to investigate the effect of core training model on the physiological parameters of students in secondary education.

2. Method

2.1. Participants

The participants of the present study,consisted of students of secondary education age engaged in handball and football in Gaziantep Nurdağı district. On the basis of volunteerism, 8 students and 8 control groups were included in the study. The experimental and control groups were selected by random method.

2.2. Materials

TFA brand portable thermometer was used to measure laboratory temperature as data collection tools. Heart rate and pulse rate measurements were made by Omron M2 Basic Sphygmomanometer, Height and Weight measurements were made by SECA brand Digital weighing and height measurement device. For balance measurement, the balance tool; (50 cm length, 4 cm height and 3 cm width) 15 cm long, 2 cm wide two support parts were used to maintain the stability of the balance tool. For the measurement of elasticity, the sit and reach test was applied. Eurofit test battery is made of the appropriate size flexibility table has been used. In the RAST and 30 m sprint tests, the photocell tool developed by Tümer Elektronic was used. In order to measure the aerobic capacity of the subjects 20 m. Shuttle Run test was used. 4 kg weighted health ball was used in the health ball launch.Sports mat was used for push-up and sit-up test, and for the pull-up test, iron bar fixed at a horizontal height of 2.20 cm at 3 cm thickness was used.

2.3. Procedure

This study was carried out with the approval of Ethics Committee dated 15/06/2016 of the Ethics Committee of the Institute of Health Sciences, KahramanmaraşSütçü İmam University. This research, which examines the effect of core training model on physiological parameters of students in secondary education students, was conducted in accordance with the experimental design with pretest - posttest control group.

Before starting the training program, the athletes participating in the research were informed about the core training model. The consent of the athletes who participated in the study was taken with the informed consent form. While the students in the control group continued their normal training, the athletes in the experimental group participated in the core exercise practices the 3 days in a week, 8 week along, after their normal training. Trainings are programmed with 16 different exercise models running the core zone. Core exercise models were implemented as scheduled within 8 weeks. Statistical analysis of the data was done in SPSS 22 for Windows statistical package program. Shapiro-Wilk normality test was performed. The arithmetic mean, standard deviation, maximum and smallest values of the data were determined. In accordance with the experimental design, the effect of core training model on the physiological parameters of the students was determined by Independent Samples T Test. Significance was accepted as $p < 0.01$.

3. Results

In this section, as a result of the analysis of the data collected by the applied tests of the control and experimental groups participating in the research, the pre-test and post-test values of the research group are given in Table 1, Table 2.

Table 1. *Physicalproperties obtained from the pre-test of the control and experimental groups.*

Age (years)	Control	8	16,0	17,0	16,6	0,5	0,2
	Experiment	8	15,0	17,0	16,0	0,9	0,3
Height (Cm)	Control	8	165,0	185,0	174,0	5,8	2,0
	Experiment	8	163,0	180,0	170,7	4,9	1,7
Body Weight (kg)	Control	8	52,0	90,0	63,0	11,9	4,2
	Experiment	8	52,0	64,0	57,5	4,6	1,7
BMI (kg / m²)	Control	8	16,0	26,0	21,0	2,8	1,0
	Experiment	8	17,0	22,0	20,0	1,6	0,5
Relaxation Pulse (min / beat)	Control	8	70,0	80,0	75,0	3,8	1,3
	Experiment	8	70,0	80,0	75,6	3,8	1,3
Systolic Blood Pressure (min / beat)	Control	8	100,0	150,0	117,5	18,0	6,5
	Experiment	8	100,0	120,0	115,0	7,6	2,7
Diastolic Blood Pressure (min / beat)	Control	8	60,0	80,0	64,0	7,5	2,6
	Experiment	8	50,0	70,0	62,5	8,8	3,0

According to Table 1, the age values of the participants were determined as 16.6 ± 0.5 years for the control group and 16.0 ± 0.9 years for the experimental group. Height values were determined as 17.5 ± 4.8 cm for the control group and 170.7 ± 4.9 cm for the experimental group. Body weight values were determined as 63.0 ± 11.9 kg for the control group and 57.5 ± 4.6 kg for the experimental group. Body mass index values were determined as 21.0 ± 2.8 kg / m2 for the control group and 20.0 ± 1.6 kg / m2 for the experimental group.The values of resting pulse were determined as 75.0 ± 3.8 min / beat for the control group and 75.6 ± 3.8 min / beat for the experimental group.The systolic blood pressure was determined as 117.5 ± 18.0 min / pulse for the control group and 115.0 ± 7.6 min / pulse for the experimental group. Diastolic blood pressure was determined as 64.0 ± 7.5 min / beat for the control group and 62.5 ± 8.8 min / beat for the experimental group.

Table 2.*Physical property values obtained from the last test of the control and experimental groups.*

Age (years)	Control	8	16,0	17,0	16,6	0,5	0,2
	Experiment	8	15,0	17,0	16,0	0,9	0,3
Height (Cm)	Control	8	165,0	185,0	174,6	5,7	2,0
	Experiment	8	167,0	182,0	173,0	4,4	1,5
Body Weight (kg)	Control	8	53,0	90,0	64,0	11,6	4,1
	Experiment	8	53,0	66,5	60,0	5,0	1,8
BMI (kg / m²)	Control	8	17,0	26,0	21,0	2,7	0,9
	Experiment	8	17,0	22,0	20,0	1,7	0,6
Relaxation Pulse (min / beat)	Control	8	70,0	80,0	76,0	3,6	1,3
	Experiment	8	70,0	80,0	76,0	3,2	1,1
Systolic Blood Pressure (min / beat)	Control	8	100,0	130,0	112,5	8,8	3,0
	Experiment	8	100,0	120,0	111,0	6,4	2,0
Diastolic Blood	Control	8	60,0	80,0	64,0	7,5	2,7

Pressure (min / beat)	Experiment	8	50,0	70,0	64,0	7,5	2,7

According to Table 2, the mean age of the subjects was determined as 16.6 ± 0.5 years for the control group and 16.0 ± 0.9 years for the experimental group. The height values were determined as 174.6 ± 5.7 cm for the control group and 173.0 ± 4.4 cm for the experimental group. Body weight values were determined as 64.0 ± 11.6 kg for the control group and 60.0 ± 5.0 kg for the experimental group.Body mass index values were determined as 21.0 ± 2.7 kg / m2 for the control group and 20.0 ± 1.7 kg / m2 for the experimental group.The values of resting pulse were determined as 76.0 ± 3.6 min / beat for the control group and 76.0 ± 32 min / pulse for the experimental group.Systolic blood pressure values were determined as 112.5 ± 8.8 mmhg for the control group and 111.0 ± 6.4 mmhg for the experimental group.Diastolic blood pressure values were determined as 64.0 ± 7.5 mmhg for the control group and 64.0 ± 7.5 mmhg for the experimental group.

The pre-test and post-test results of the motor skill test measurements of the participants were given in Table 3 and Table 4.

Table 3. *Physiologicalproperties obtained from the pre-test of control and experimental groups.*

Balance (min / error)	Control	8	3,0	10,0	5,9	3,5	1,0
	Experiment	8	3,0	11,0	5,8	3,0	1,0
Flexibility (cm)	Control	8	10,0	32,0	21,0	8,3	3,0
	Experiment	8	16,0	32,0	24,0	6,3	2,,0
Double foot long jump (cm)	Control	8	188,0	235,0	209,0	16,8	6,0
	Experiment	8	190,0	229,0	202,0	11,7	4,0
Triple jump (cm)	Control	8	602,0	740,0	683,0	38,8	13,8
	Experiment	8	610,0	771,0	720,8	52,3	18,5
30 Meters Speed (sn)	Control	8	5,3	6,5	5,7	0,4	0,1
	Experiment	8	5,0	6,6	5,9	0,6	0,2
Double Arm Health Ball Throwing (cm)	Control	8	330,0	532,0	428,7	72,9	25,8
	Experiment	8	343,0	509,0	420,0	62,2	22,0
Agility (sn)	Control	8	6,0	8,0	7,0	0,6	0,2
	Experiment	8	6,0	7,8	6,8	0,6	0,2
Push-up (Min / piece)	Control	8	7,0	43,0	23,6	12,7	4,5
	Experiment	8	13,0	36,0	24,0	8,0	2,8
Sit-up (Min / piece)	Control	8	16,0	45,0	35,0	9,0	3,0
	Experiment	8	30,0	43,0	39,0	4,5	1,5
Pull-up (Min / piece)	Control	8	3,0	11,0	4,8	2,7	1
	Experiment	8	1,0	7,0	4,7	2,0	0,7
Anaerobic Power (watt)	Control	8	239,0	514,0	362,0	80,8	28,5
	Experiment	8	217,0	570,0	357,0	109,8	38,8
Anaerobic Capacity (watt)	Control	8	182,0	305,0	270,0	43,5	15,5
	Experiment	8	162,0	357,0	262,5	64,5	22,6
Aerobic Capacity MaxVO2 (ml / kg / min)	Control	8	34,0	39,0	37,0	1,8	0,6
	Experiment	8	36,0	46,0	40,5	3,6	1,3

According to Table 4, the balance performance values of the participants were determined as 5.9 ± 3.5 min / error for the control group and 5.8 ± 3.0 min / error for the experimental group.Flexibility performance values were determined as 21.0 ± 8.3 cm for the control group and 24.0 ± 6.3 cm for the experimental group.Double foot long jumpperformance values were determined as209.0 ± 16.8 cm for the control group and 202.0 ± 11.7 cm for the experimental group.The three-step jump performance was

determined as 683 ± 38.8 cm for the control group and 720 ± 52.3 cm for the experimental group.The velocity performance of 30 m was determined as 5.7 ± 0.4 s for the control group and 5.9 ± 0.6 s for the experimental group.Double arm health ball throwing performance values were determined as428.7 ± 72.9 cm for the control group and 420.0 ± 62.2 cm for the experimental group.Agility performance values were determined as7.0 ± 0.6 seconds for the control group and 6.8 ± 0.6 seconds for the experimental group.Push-up performance was determined as23.6 ± 12.7 min / pc for the control group and 24.0 ± 8.0 min / unit for the experimental group.Sit-up performance values for the control group were determined as 35.0 ± 9.0 min / pc and 39.0 ± 4.5 min / unit for the experimental group. Pull-up performance values for the control group were determined as4.8 ± 2.7 min / unit and for the experimental group 4.7 ± 2.0 min / pc.The anaerobic power performance was determined as 362.0 ± 80.8 watt for the control group and 109.8 ± 38.8 watt for the experimental group.The anaerobic capacity performance was determined as 270.0 ± 43.5 watt for the control group and 262.5 ± 64.5 watt for the experimental group.Aerobic capacity performance values were determined as 37.0 ± 1.8 ml / kg / min for the control group and 40.5 ± 3.6 ml / kg / min for the experimental group.

***Table 4**: Physiologicalproperties obtained from the last test of the control and experimental groups.*

Balance (min / error)	Control	8	3,0	10,0	5,9	3,5	1,0
	Experiment	8	0,0	7,0	2,6	2,6	1,0
Flexibility (cm)	Control	8	12,0	33,0	22,0	7,9	2,8
	Experiment	8	17,0	34,0	26,0	6,8	2,4
Double foot long jump (cm)	Control	8	187,0	238,0	211,0	18,8	6,6
	Experiment	8	208,0	240,0	228,3	12,5	4,4
Triple jump (cm)	Control	8	605,0	778,0	692,0	46,7	16,5
	Experiment	8	692,0	804,0	755,0	40,4	14,3
30 Meters Speed (sn)	Control	8	5,0	6,4	5,6	0,5	0,2
	Experiment	8	4,0	5,5	4,9	0,5	0,2
Double Arm Health Ball Throwing (cm)	Control	8	346,0	576,0	432,5	72,8	25,8
	Experiment	8	375,0	570,0	453,5	56,5	20,0
Agility (sn)	Control	8	6,0	7,9	7,0	0,6	0,2
	Experiment	8	5,0	6,9	6,0	0,6	0,2
Push-up (Min / piece)	Control	8	7,0	44,0	25,0	12,5	4,5
	Experiment	8	16,0	40,0	29,0	9,5	3,5
Sit-up (Min / piece)	Control	8	16,0	48,0	37,0	9,7	3,4
	Experiment	8	41,0	54,0	48,0	3,7	1,3
Pull-up (Min / piece)	Control	8	3,0	12,0	5,5	2,8	1
	Experiment	8	4,0	11,0	6,9	2,4	0,8
Anaerobic Power (watt)	Control	8	290,0	552,0	377,3	82,0	29,0
	Experiment	8	272,0	652,0	503,6	119,0	42,0
Anaerobic Capacity (watt)	Control	8	231,0	319,0	284,0	33,5	12,0
	Experiment	8	237,0	449,0	378,0	75,0	26,5
Aerobic Capacity MaxVO2 (ml / kg / min)	Control	8	36,0	42,5	39,0	2,5	0,8
	Experiment	8	40,0	53,0	47,5	4,8	1,7

According to Table 4, the balance performance values of the participants were determined as 5.9 ± 3.5 min / error for the control group and 2.6 ± 2.6 min / error for the experimental group.Flexibility performance values were determined as22.0 ± 7.9 cm for the control group and 26.0 ± 6.8 cm for the experimental group.Double foot long jump performance values were determined as211.0 ± 18.8 cm for the control group and 228.3 ± 12.5 cm for the experimental group.The three-step jump performance was

determined as 692.0 ± 46.7 cm for the control group and 755.0 ± 40.4 cm for the experimental group.The performance values of 30 meters were determined as 5.6 ± 0.5 s for the control group and 4.9 ± 0.5 s for the experimental group.Double arm health ball throwing performance values were determined as 432.5 ± 72.8 cm for the control group and 453.5 ± 56.5 cm for the experimental group.Agility performance values were determined as 7.0 ± 0.6 s for the control group and 6.0 ± 0.6 s for the experimental group.Push-up performance was determined as 25.0 ± 12.5 min / pc for the control group and 29.0 ± 9.5 min / pc for the experimental group.Sit-up performance values for the control group was determined as 37.0 ± 9.7 min / unit and the experimental group was determined as 48.0 ± 3.7 min / unit.Pull-up performance values were determined as 5.5 ± 2.8 min / pc for the control group and 6.9 ± 2.4 min / pc for the experimental group.The anaerobic power performance was determined as 377.3 ± 82.0 watt for the control group and 503.6 ± 119.0 watt for the experimental group.Anaerobic capacity performance values were determined as 284.0 ± 33.5 watts for the control group and 378.0 ± 75.0 watts for the experimental group.Aerobic capacity performance values for the control group were determined as 39.5 ± 2.5 ml / kg / min and 47.5 ± 4.8 ml / kg / min for the experimental group.

As a result of the analysis of the collected data, the differences between the pre-test and post-test physical and physiological measurements are given in Table 5 and Table 6.

Table 5: *Physical properties of control and experimental group final test - comparison of preliminary test score differences.*

Body Height (Cm)	Control	8	-0,6250	0,744	0,263	14	3,300*
	Experiment	8	-2,3750	1,302	0,460		
Body Weight (kg)	Control	8	0,812	0,460	0,160	14	-4,22*
	Experiment	8	2,100	0,730	0,260		
BMI (kg / m2)	Control	8	0,123	0,196	0,069	14	0,229
	Experiment	8	0,165	0,477	0,168		
Relaxation Pulse (min / beat)	Control	8	0,750	1,165	0,410	14	0,942
	Experiment	8	0,000	1,930	0,680		
Systolic Blood Pressure (min / beat)	Control	8	-5,000	16,903	5,977	14	-0,200
	Experiment	8	-3,750	5,175	1,830		
Diastolic Blood Pressure (min / beat)	Control	8	0,000	5,345	1,890	14	-0,425
	Experiment	8	1,250	6,408	2,267		

($p<0.01$)

According to Table 5, when the differences between pre-test and post-test physical and physiological measurements were examined, a significant difference was found between the height and body weight values of the control and experimental groups ($p <0.01$).There was no meaningfulness difference between body mass index values, resting pulse values, systolic blood pressure values, diastolic blood pressure values.

Table 6: *Control and Experimental Group Obtained Physiological Properties Final Test - Comparison of Preliminary Test Score Differences.*

Balance (min / error)	Control	8	0,000	0,000	0,000	14	5,118*
	Experiment	8	-3,125	1,727	0,610		
Flexibility (cm)	Control	8	1,250	1,670	0,590	14	-0,695
	Experiment	8	1,750	1,165	0,410		
Double foot long jump (cm)	Control	8	2,125	5,489	1,940	14	-4,727*
	Experiment	8	26,500	13,510	4,777		
Triple jump (cm)	Control	8	8,375	12,839	4,540	14	-1,763
	Experiment	8	33,750	38,622	13,655		
30 Meters Speed (sn)	Control	8	-0,102	0,608	0,021	14	5,685*
	Experiment	8	-1,000	0,444	0,157		
Double Arm Health Ball Throwing (cm)	Control	8	3,8	34,3	12,1	14	-1,435
	Experiment	8	33,9	48,4	17,1		
Agility (sn)	Control	8	-0,058	0,052	0,018	14	4,709*
	Experiment	8	-0,873	0,487	0,172		
Push-up (Min / piece)	Control	8	1,125	2,748	0,971	14	-2,946*
	Experiment	8	5,000	2,507	0,886		
Sit-up (Min / piece)	Control	8	1,750	1,165	0,411	14	-5,491*
	Experiment	8	8,750	3,412	1,206		
Pull-up (Min / piece)	Control	8	0,625	0,745	0,263	14	-3,606*
	Experiment	8	2,250	1,035	0,365		
Anaerobic Power (watt)	Control	8	15,5	20,6	7,3	14	-5,271*
	Experiment	8	146,6	67,3	23,8		
Anaerobic Capacity (watt)	Control	8	13,4	14,9	5,3	14	-5,011*
	Experiment	8	115,1	55,5	19,6		
Aerobic Capacity MaxVO2 (ml / kg / min)	Control	8	1,687	0,885	0,313	14	-5,348*
	Experiment	8	7,112	2,728	0,965		

($p<0.01$)

According to Table 6, the difference between pre-test and post-test physical and physiological measurements, balance performance of control and experimental groups, Double foot long jump performance, Speed performance, Agility performance, Push-up performance, sit-up performance, pull-up performance, Anaerobic power performance There was a determined as significant difference between anaerobic capacity performance and aerobic capacity performance ($p <0.01$). Flexibility values, three-step jump performance, double arm health ball throwing performance, were not found to be a significant difference between.

4. Discussion and Conclusion

As a result of our study, it was determined that there was a significant difference in terms of height values of control and experimental groups ($p <0.01$). Because growth is a dynamic process.When evaluating physical performance in children and adolescents, the growth process should be considered (13).According to Gür (13); Core training program was applied to tennis athletes aged between 8-14 years. It was reported that the growth hormone in the beginning of the adolescence period was 7-10 cm in average and it was normal to increase the height of the subjects.

In this study, it is thought that the difference in height of the length is related to the extension in the critical period and the physiological structures of the individuals are suitable for this situation.

According to the data obtained from body weight measurements values between, of control and experimental groups were determeined as significantly different (p <0.01).

According to Dedecan (14); The effect of core training on some physical and physiological parameters of adolescents was investigated. There was a significant difference between groups in body weight parameters of experiment and control groups (p <0,05. According to Gür (13); 8-14 age group of tennis athletes by applying core training program, core force, static and dynamic balance properties, investigated the effect of the pre-post test body weight average of the groups participating in the research, said that a statistically significant development.

The difference in body weight measurements in this study, as seen in the literature review, is thought to be due to the difference in the average age of the group participating in the study, differences in nutrition levels, physiological characteristics difference of the participants.

According to the data obtained from this study, there was no obtained significant difference between the body mass index values of the control group and experimental group.

Dilber et al. (15) According to; In the 8 week core training performance of male footballers, physical fitness variables were examined and it was determined that there was no statistically significant difference between the body mass index measurement results of the participants (p> 0.05). According to Karacaoğlu (12); The effect of core training on physical fitness characteristics of male volleyball players was investigated, there was no statistically significant difference between study group body analysis pre test - post test results.

The effect of core training on BMI is a controversial issue in the literature review. In some studies significant results are obtained, while in some studies the result is meaningless. This may be caused by the variability of the sports branches in which the core exercises are included, as well as the variability of the subject age group. According to the statistical data of this study, there is no significant difference and body mass index can not be said to have a positive effect on the participants.

As a result of this study, it was determined that there was no significant difference between the resting pulse values, systolic blood pressure values, diastolic blood pressure values, of the control group and experimental groups.It can be said that Core training has no effect on resting pulse, systolic and diastolic blood pressure values.

At the end made measurement of our study, a significant difference was found between control and experimental groups balance performance (p <0.01).

According to Boyacı (16); The 12-week central zone training (core), which was applied to 12-14 age group footballers, reported that it contributed positively in the development of balance performance. Stray-Pedersen et al. (17) According to; In the study conducted, participant 12 football players in the Norwegian 1st League formed the experimental group, and the core stabilization exercises (slingexercises), which were applied twice a week for 8 weeks, have improved the stroke rate (3.5%) and static balance scores, were reported that more than the according to control group.Cosio-Lima et al. (18); 5-week core stability and balance training performed with pilates ball compared traditional training.As a result, the core stability and balance training groups reported that positive progress in single foot balance values.

According to the results obtained in the literature, study of there is significant results that obtained and cannot be obtained on the balance parameters. As a result of this study, like as a result of many studies, significant differences were found in balance performance. According to these results, it can be said that the core training study confirms its positive effect on balance performance.

As a result of the measurements we made in our study, it was determined that there was no significant difference between the elasticity values of the control and experimental groups. According to the Atıcı (19); At the end of the 8-week core training performed on women, the findings obtained from the values of motor abilities such as right-left hand grip, leg and back force, flexibility, vertical jump and balance were found to be significant (p <0.05). Dilber et al. (15) According to; In the 8 week core training of male football players, physical fitness variables were examined, the statistical data obtained in the study of the statistical results, of the participants were statistically significant difference between the flexibility results (p<0.05).

As a result of the literature review, it is thought that the age group, sex, physiological structures and branch of the study, which participated in the study for core training, differed in each study and therefore differed naturally in the results. As a result of this study, body flexibility with core training did not difference significantly and flexibility was not affected.

In the light of the data obtained at the end of the measurements in this study, a significant difference was found between control and experimental groups' double foot long jump performance ($p < 0.01$). According to Dedecan (14); The effect of core training, on some physical and physiological characteristics of adolescents period was investigated. There was a significant difference between the groups in long jump parameters of experiment and control groups ($p < 0.05$).According to the Boyacı (16); As a result of the 12 week central zone training (core), conducted for 12-14 age group football players, long jump was a positive contribution to the performance improvement.

As a result of the research, the result significant of double foot long jump performance were obtained.There is a significant difference in the results encountered in the literature.The results of our study are in parallel with these studies, suggesting that core studies have an positive effect on double foot long jump performance.

At the end of this study result, it was found that there was no significant difference between the control and experimental groups three-step jump performance.

According to Aslan (20); As a result of the 8-week core training program applied to young players, it was determined that the three-step jump averages did not show a significant difference between the experimental and control groups in both pre-test and post-test ($p > 0.05$). As a result of the core training studies, there was no significant difference in the performance of the three-step jump, suggesting that this study would not be an effective study.

At the end of this study, a significant difference was found between the for speed performance value, control and experimental groups ($p < 0.01$).

According to Boyacı (16); The 12 week along, central zone training for 12-14 age group athletes reported that they had a positive contribution to the development of 20m sprint performance. According to Balaji and Murugavel (21) reported that handball players showed significant difference in speed values after eight-week core strength training.

It can be said that the significant difference seen with the measurements in the research result the core training model effect on the speed performance of the athletes.

As a result of the measurements made in this study, it was determined that there was no significant difference between double arm health ball throwing performance values, of the control and experimental groups.

According to Başandaç (22); In the study conducted on the effect of progressive body stabilization training on upper extremity functions in adolescent volleyball players, the results of the health ball throwing test showed a significant increase. According to the Boyacı(16); The 12 week along central zone training (core), which was implemented for 12-14 age group players, reported that it contributed positively to the development of health ball throwing performance.

As a result of the core training program applied in this study, there was no difference in the performance of double arm health ball throwing performance of the athletes participating in the study. This situation is different with the literature review. It is thought that many of the studies, on the significant results, encountered in the literature are effective, in combination with the with impressive arm and upper extremity exercises.

As a result of the measurements made in this study, it was found that there was a significant difference between the agility performance of the control and experimental groups ($p < 0.01$).

Snyder et al. (23) in a study conducted by; Recreationally active, 7 male and 11 female subjects aged between 19 and 23 years, 5-week short-term dynamic core training program was applied. As a result of the study, it was reported that dynamic core training performed on the stable surface could improve agility. According to Balaji and Murugavel (21); After 8 weeks of core strength training, the handballers' speed, agility, leg explosive strength and upper body strength were significantly increased.

In the light of the data obtained from the research and the results of the studies on core training, it can be said that the core training model study has a significant effect on the agility performance of the athletes.

As a result of the measurements made in this study, it was found that there was a significant difference in the push-up performance and sit-up performance ($p < 0.01$) of the control and experimental groups.

According to Boyacı (16); The 12 week central zone training (core), which was applied to 12-14 age group players, reported that it contributed positively in the development of push-up and sit-up performance. According to Dedecan (14); The effect of core training, on some physical and physiological characteristics of adolescents period was investigated, 1 minute push-up and 1 min sit-up parameters were reported significantly different between control and experimant groups ($p < 0.05$). The results obtained after the core training model in this study and the results of the literature review showed that the core training model has an effect on the development of upper extremity and abdominal region strength, and thus influenced the performance of push-ups and sit-ups. The results obtained after the core training model in this study and the results of the literature review showed that the core training model has an effect on the development of upper extremity and abdominal region strength, and thus influenced the performance of push-ups and sit-ups.

As a result of the measurements made in this study, it was determined that there was a significant difference between the control and experimental groups' pull-up performance ($p < 0.01$).

According to Balaji and Murugavel (21); He reported that after eight weeks of core strength training, the upper body strength of handball players increased significantly. According to Dedecan (14); The effect of core training on some physical and physiological parameters of adolescents was investigated, experimental and control group, back strength, right and left hand grip strength parameters were report significantly different between the groups ($p < 0.05$). Dilber et al. (15) According to; In the 8 week core training of male football players, physical fitness variableswere examined and statistically significant difference was found between the results of back force measurement of the participants in statistical data obtained in the study ($p < 0.05$). According to the statistical data obtained in the study and the results obtained from the literature review, it can be said that the significant change in the performance of the pull-up influenced the continuity performance of the core training in the upper extremity.

As a result of the measurements made in this study, it was found that there was a significant difference in the anaerobic power performance and anaerobic capacity performance ($p < 0.01$) of the control and experimental groups.

Dilber et al. (15) According to; In the 8 week core training of male football players, physical fitness variables were examined. In the statistical data obtained from the study, a statistically significant difference was found between the anaerobic power measurement results of the participants ($p < 0.05$). According to Dedecan (14);The effect of core training on some physical and physiological parameters of adolescents was investigated. There was a significant difference between groups in anaerobic power parameters of experiment and control groups ($p < 0,05$).

In the light of the statistical data obtained in this study and the results obtained from the literature review, it can be said that the core training model has an effect on anaerobic power and capacity.

As a result of the measurements made in this study, a significant difference was found between in aerobic capacity parameters, of experiment and control group ($p < 0,01$).

According to Atıcı(19); At the end of the 8-week core training performed on women, a significant difference was found in the last test of MaxVO2 variables ($p < 0.05$). According to Doğan (24); 8 weeks of core training work on the footballers the study as a result of the pre-test and post-test in the groups statistically significant increase in athletes Max VO2, $p < 0.05$ level in the study group was found to be a significant, change in the control group, was not found any significant result According to Dedecan (14); The effect of core training on some physical and physiological parameters of adolescents was investigated. There was a no significant difference between on MaxVO2 test, of experiment and control group ($p > 0,05$).

Many of the research results indicate that core training creates significant differences in aerobic capacity. When the results of this study and previous research results are evaluated, it can be said that core training as a strength training that positively affects the aerobic capacity One of the main factors that

differentiate the core exercises as a result of the research is that the of researches are carried out on different sports branches It can be said that the results of the research are affected by this difference.It can be concluded that Core studies alone will not have a strength-conditioning enhancing training program for each sports branch.It can be said that the training program can increase the effect of the training program in the direction of the selected core exercise models by using different kinds of core exercise in training programs.Considering the results of this study and the other studies conducted, the following suggestions can be presented to the researchers who want to study similar to this study; It can be suggested to conduct the Core training program by including, it in the content of the training program in accordance with the sports branch to be investigated.One of the parameters that cannot be obtained significant change in this study is the health ball throwing performance. In this study health ball throwing performance, has affected by core training model or normal training process. In order to learn the active training model, the study can be repeated at the same age range and with more athletes'participation.This study can be repeated with more participants in different age and education categories.

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Psychological and Physiological State of Bioenergetics of Hockey Players at the Beginning of a Hockey Match that Affects the Result of Playing Activity

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Abstract

The purpose of the study: rationale primigravida energy state of the players on the outcome of the hockey match of the continental hockey League.

Material and methods: analysis of scientific-methodical literature, concerning the experiment, analysis and synthesis of information, method of mathematical statistics.

The study applied the methods of quantum evaluation of energy and functional status of hockey teams Avangard and Traktor. Quantum method is a contact measurement bioenergiesysteme hockey teams Avangard and Traktor, used for diagnosis, evaluation of recovery of functional status during and after the game the training and the competitive activities. Have hockey teams Avangard and Traktor was determined by performance in competitive activity: functional status, recovery process, color, energy level in competitive activity.

Results. Identify the color of the energy state hockey teams is the basis for prediction of successful competitive activity. Consider the energy condition and results of operations dependent on the color grid, the functional status of hockey teams, hockey match Avangard – Traktor. The energy system of the hockey teams of the Vanguard and Tractor before the start of the match was different in color energy state and, accordingly, the functional preparedness of the game activity, the game result of the hockey match was different.

In conclusion, we note that effective hockey teams in game matches will have a bright red, red energy potential in the form of a circle, rather than a horizontal square with green, yellow, blue, brown color of energy, indicating vague fuzzy outlines of energy, which confirms fatigue, overwork, overstrain, leading to the loss of the hockey team.

Keywords: psychophysiological state, result of a hockey match, bioenergetics of hockey players

Introduction

The hockey team of the continental hockey League, the closer it is to the completion of the continental hockey League, the clearer it appears the color grid players in improving the functional system. In this regard, the necessary efficient and precise methods for assessing the functional readiness of gambling activities that define an optimal state of special physical preparedness in achieving game results.

The hockey players of the continental hockey League color grid method Kant defines the function of operative control of the functional state, functional recovery, functional performance, predict the outcome of the game before and after hockey games.

The hypothesis of the study: The results of the game match of the day at the hockey teams and various color will energy levels – low, medium, high, and shape of the grid in the power system operation functional system. Summing up hockey teams to a high level of special physical preparedness and high game score will only contribute to a high level of power system light red, red energy, creating a high functionality in-game matches.

The purpose of the study: rationale primigravida energy state of the players on the outcome of the hockey match of the continental hockey League.

Material and Methods

Analysis of scientific-methodical literature, concerning the experiment, analysis and synthesis of information, method of mathematical statistics. The method of mathematical processing of experimental results involved the calculation of reliability student's t-test, which determines the differences between the comparative results of the pedagogical experiment. Statistical processing of the results of the hockey teams was carried out according to the method between the sample averages at 5% level of significance ($P < 0.05$), which is quite reliable criterion for research. The study applied the methods of quantum evaluation of energy and functional status of hockey teams Avangard and Traktor. Quantum method is a contact measurement bioenergiesysteme hockey teams Avangard and Traktor, used for diagnosis, evaluation of recovery of functional status during and after the game the training and the competitive activities. Have hockey teams Avangard and Traktor was determined by performance in competitive activity: functional status, recovery process, color, energy level in competitive activity.Moreover, the distance between the quantum method of the hockey team in the process of restoring the color energy system and the functional state is important [3, 8, 21, 24]. The color energy system of the teams was rated in points from 1 to 10.

From the informational energy forms of the energy system of the hockey teams, Vanguard and Tractor determined the levels: low - horizontal square with green-red energy; middle - a vertical square with yellow-red energy; high - a vertical square with a red content; light red, green-red, red-green color energy. and the highest is an ellipsoidal circle containing red, light red, green-red, red-green color energy. The hockey teams Vanguard and Tractor had the highest - ellipsoid circles with the contents of red, light red, green-red, red-green color energy, but did not reveal the average level of the power system.

Study participants. The study involved hockey teams Vanguard and Tractor of a hockey match of the Russian Continental Hockey League.

The Results of the Study and Their Discussion

Will submit to the consideration and justification of energy the law of successful and unsuccessful game activity of the teams of the continental hockey League on the example of a hockey match (18.01.2018 G., Avangard–Traktor).

The energy law States that a hockey team has a high color system in the manifestation, if the players have netravmirovannymi the spinal canal, musculoskeletal system, neuromuscular system. Hockey players have red, bright red, dark red energy in the form of an information circle, then the hockey team has high achievements is in the standings to a high position.

The results of the study of play activities revealed that hockey teams identified various color energy levels – low, medium, and shape of the grid at the energy centers of the energy system of the spinal canal, neuromuscular and functional systems. Summing up hockey teams to a high level of special physical fitness and game result contributes only high level power system, i.e. light red, red energy, proclaims high functional sports features in-game matches.

Identify the color of the energy state hockey teams is an essential basis for predicting successful competitive activity. Consider the energy condition and results of operations dependent on the color grid, the functional status of hockey teams, hockey match Avangard – Traktor. Power system hockey teams of the Avant-garde and the Tractor before the match different color energy state and, consequently, different functional readiness of the gaming activities, gaming result of the hockey game. Before a hockey match, the players of the hockey team Avangard are in a state of dark-red energy in the form of horizontal information square, which was not conducive to achieving a win in the gaming activity, since a high level of 8.2 points – a dark red color energy level is in a low level of horizontal energy information the form of a square. Not only the colors green energy 1, 8 points defines the performance of a hockey match, but the color energy of the different levels ($t = 3,24 < 0,01$).

Before a hockey match at the hockey team Tractor color grid belongs to the middle level, containing 3.5 points red-light and 6.5 oktas of green energy in the form of horizontal information of the cylinder at t $2,90 < 0,01$ (see table). The color grid on the form is more "energomontaj", but not important relative to the horizontal color information of the energy of the square. The result of the hockey game was tense given the similar forms of the energy information of the horizontal "cylinder" of the hockey team: the Tractor won the

match against Avant-garde with the score 2:1, with minor functional and energy advantage in gaming activities.

Before the match the hockey team it is necessary to consider the color and shape of the various levels of the power system. For effective gaming activities players need to develop the red energy in the form of vertical information square, but rather in the form of a circle, contributing to effective recovery before and after playing matches. It is the high level of the energy centers of the energy system of the spinal canal are color-energy (red, light red colors) in the form of information of a circle, and not the information of the horizontal square, as it was revealed in the hockey team Avangard. Hockey team in this case would show with red color the grid in the form of an information circle high game results in the hockey games, because there is no fatigue, overwork, overstrain of the functional systems. The hockey teams revealed on the day of the hockey game minor energy differences.

Analysis of the hockey game showed that there is a perfect background color of the grid red, bright red, contributing highly to the game result. In the power of the hockey teams there is yellow, brown, green energy, changes the form of manifestation of energy, pointing to fatigue, exhaustion and such players often make technical mistakes, get penalties, no discipline. Have hockey teams Avangard and Traktor fatigue manifests itself as yellow, green energy from two to three of the seven energy centers of the power system players. The hockey team red energy in the form of information vertical square indicates a high functionality.

Table: *color bio-energy before a hockey match Avangard and Traktor in (points)*

_____color bioenergy	X ± m		t P
	Avangard n=24	Traktor n= 25	
Dark red color	8,2 ± 0,9	3,5 ± 0,8	3,24 <0,01
Green color	1,8 ± 0,9	6,5 ± 0,9	2,90 < 0,01

The novelty of the study is determined by the results:

1) it was revealed that the prelaunch energy state of hockey teams is a criterion of effective competitive activity, the bioenergy system of the hockey team allows you to see the game result in competitive activity;

2) the pre-start energy state of hockey teams having a bright red, red color of energy determines a high level of functional performance of hockey players in competitive activity;

3) bringing hockey teams to a high level of special physical fitness and a high game result will be promoted only by a high level of the power system, light red, red color of energy, creating high functionality in game matches.

Discussion

Status of bioenergy need to own a hockey team at the Olympic games. The Olympic hockey tournament for bioenergy is determined by the readiness of the team to show results and to take high places at international competitions. Bioenergy hockey team depends on the state of fitness and special physical training to achieve high results of the game. At the Olympic games this is the basis that determines the rate and criteria the bioenergy color of the power system players, competing for medals in the Olympic games.

In the study of bioenergiesysteme Volnih DU, Lapshina EA noted that the energy of the athletes determines the condition of sports form through the development of aerobic-anaerobic mechanism of energy supply in the performance of special physical exercise in competitive activity [6].

The study Gubanova, L. S. demonstrates and proves that high athletic performance corresponds to a high level of special physical fitness, developing the power grid of the Central nervous, neuromuscular and functional performance of athletes. The author notes that a certain level of functional readiness, corresponds to a certain level of power system athletes. [8].

In the study of bioenergy athletes in numerous studies it is noted that the energy possibilities need to be explored during the whole competition period. The power system is changing and functional state of athletes on the day of competition. The power system is different in content, form and degree of manifestation. Bioenergy athletes is a diagnostic basis in predicting success or failure in competitive activities [11; 15].

In many scientific studies, the authors proved that bioenergiesysteme athletes has an impact on the result of competitive activity, and has a diagnostic value in determining fitness level and status functional performance of athletes [20].

The analysis of scientific studies shows that the energy of the players is an important indicator of the success of competitive activity. This confirms Belousova N. A. and co-authors that the energy potential of the players is interconnected with the grid and functionality in the education of physical and motor qualities. The co-authors point out that insufficient level of special physical preparedness is reflected in the energy development of athletes [2].

In the scientific work Brooks, G. determined the relationship between characteristics of the power system and education of special physical qualities of athletes [1].

In the study of bioenergy athletes Volkov, N. I. proved correlation and identified positive correlations between the different levels of the power system of athletes in competitive activity [3, 4].

In the study, R. V. Tambovtseva when studying bioenergetic parameters after test physical activity after a three-day fasting have established that substrate-energy malnutrition affects energooobmen athletes[23, 24].

Foregoing the results of numerous studies broaden and complement the bioenergetic approach in sports activities our studies [16, 18] about the need to monitor and account for the grid athletes, not only in determining functional readiness to show high achievements, but to see the result of competitive activity through energy diagnostic and prognosis.

Our study is associated with the fact that the absence of energetically–diagnostic monitoring of the power system athletes will not contribute to the energy forecasting sport results in competitive activity. In this case the quantum method in the study of bioenergiesysteme, functional status, recovery processes, the state of sports form of sportsmen will increase the effectiveness of competition [12; 21].

With the results of the above studies agree and confirm that bioenergiesysteme athletes is an important factor, which is still insufficiently applied in sports practice, as there is no scientific and theoretical knowledge from the experts in this field. The results of our study confirm that the higher the level of functional efficiency, the higher the level of development of the energy system of athletes [23].

The prospect of further study and extension of the research topic "bioenergiesysteme in sports" will contribute to the operational monitoring of the functional state restoration processes. While increasing physical activity and sport results in competitive activity energy method pridetsya premature fatigue, overwork, overexertion injuries in competitive activities of sports teams [9].

The study of bioenergiesysteme athletes will allow the prediction to be realized in high sport results effectively to determine the functional prelaunch readiness on the day of competition. The study will contribute to the development of a scientific direction in enhancing the effectiveness of training and competitive process of athletes in cyclic, acyclic and mixed sports [22].

In conclusion, we note that productive hockey teams in game matches will only have bright red, red energy potential in the form of a circle, and not with an informational horizontal square with green, yellow, blue, brown color of energy, indicating vague fuzzy outlines of energy, which confirms fatigue, overfatigue, overstrain, leading to the loss of the team.

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Using Dance Exercises at Physical Training Lessons in the 5-th Forms as a Mean of Versatile Development of Pupils

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Abstract

The research deals with a problem of using dance exercises at physical training lessons as a mean of versatile development of the 5-th form pupils. The purpose of research is in developing program of using dance exercises at physical training lessons and experimental checking of its efficiency. Three content components of the program have been identified: aesthetic, motional and gender. The program content, which was implemented on three stages, has been substantiated: at the first stage, pupils acquired theoretical knowledge and practical abilities to perform the basic dance elements; in the process of the second stage the technique of dance exercises was brought to the level of perfection, physical qualities and moral-volitional behavior traits were formed; at the third stage was developed the ability of children to create new compositions that were corresponded to the individual possibilities of each pupil. Into the basis of the motional component is laid: classical dance, folk dance (polka, waltz); Latin dance (cha-cha-cha and jive); aerobics. It has been determined dance exercises as the basic forms of classes and the ways of educational activity organization.

Keywords: dance exercises, pupils, choreography, versatile development, physical training lesson

1. Introduction

An important motivational stimulus for pupils to do physical exercises is increased attention to the beauty of their appearance, so physical training at school should be built so that they would be justified not only from the physical, medical and functional point of view, but also from the aesthetic point of view. Given this, increasing pupils' interest to physical training is possible by choosing means that have high aesthetic potential [1; 2; 3]. One of such means are dance exercises, which are increasingly popular because they form a posture, harmoniously develop muscles, movements become beautiful and graceful [4; 5].

Exercises with elements of sports and ballroom dance, classical dance, modern dance and also aerobics, which comprehensively improve motional abilities of pupils, take leading place among dance exercises. They are effective way of recreational physical culture, promote a formation of movements culture, development of systems and functions of organism, formation of schoolchildren's postures. Moreover, dances contribute to their intellectual development and artistic education, form aesthetic culture of a person, his ability to perceive, understand and appreciate beautiful things [6; 7; 8].

Analysis of scientific and methodical literature shows a significant interest of specialists in physical education and sports in the problem of choreography development [9; 10]. This is due to the fact that dance exercises are one of the factors for improving the physical and technical training of pupils [11]. A high level of the school dancers' development is a basis of mastering complex motional actions [12].

Thus, the relevance of our research is determined, on one hand, by value and importance of dance exercises as a mean of diverse schoolchildren's development, on the other hand – by absence of solving the problem in scientific and methodical literature, and that has caused the choice of research topic.

The purpose of the study is to develop the program of using dance exercises at physical training lessons and experimentally check its efficiency.

To achieve the purpose, the following tasks were identified:

1. Theoretically substantiate specialties of using dance exercises at physical training lessons.
2. To identify the attitude of teachers of physical training and pupils to using dance exercises in educational process.
3. To develop a program of using dance exercises at physical training lessons.
4. To determine the content, stages and forms of using dance exercises at physical training lessons.

2. Materials and Methods

To solve the tasks the following methods of research were used: study of literary sources; theoretical analysis, synthesis and modeling; interviews and questionnaires; pedagogical observation and pedagogical experiment; testing (physiological); methods of mathematical statistics.

To find out the state of using dance exercises in the practice of secondary schools, the study curricula on physical culture, published by the Ministry of Education and Science of Ukraine, have been analyzed. Analysis of the program content allows making a conclusion that insufficient attention is paid to the use of dance exercises in the process of physical education of schoolchildren. In particular, the list of dance exercises provided in school curricula is practically the same; classical dance and rhythmical gymnastic the most often are used; the sequence of placing separate elements of dance in classes is ill-considered. For example, it is proposed to study three positions of feet in the second form, but in the third – first and second; it is not mentioned about positions of arms in any curriculum at all; little attention is paid to polka and waltz steps, which are performed by pupils usually on school-leaving parties, and they are used only in the elementary school and as individual steps, not as a composition; in the curricula of the seventh and eighth forms there are no dance exercises at all; practically no attention is paid for teaching dancing boys, especially in high school; aerobics competitions between schools are held every year, in which pupils from 5-th to 12-th forms take part, but to this kind of activity due attention is not paid. Current curricula underestimate the possibilities of dance exercises in the establishment of national system of physical education where, the accent should be placed on the personality of pupils, the relationship between physical and aesthetic education.

To identify the attitude of physical training teachers to dance exercises and using them at the lessons we made a questioner among physical training teachers and 5-th form pupils of the Western regions of Ukraine. The poll of physical training teachers about the use of dance exercises as a mean of physical education found out that only 17,5% systematically and 50,6% of respondents occasionally offer them to schoolchildren. The rest do not have suitable conditions and musical accompaniment and appropriate training such as study curricula of universities did not provide for purposeful dance training; do not master the dance exercises and are not provided with methodical literature. At the same time, dance exercises are more often used by women teachers.

It is considered appropriate to practice dance exercises at the lessons of physical training 90,4% of respondents, such as they: «develop coordination of movements»; «increase emotionality during studies»; «organize a class»; «set a rhythm of a lesson»; «soothe the nervous system»; «stimulate interest for physical culture»; «form and strengthen the posture»; «manifest creative skills of a child»; «bring up beauty, elegance, respect, have a health value».

The questionnaire of pupils has found that: 50,7% of them want that dance exercises would be used at the lessons of physical training; 57,5% of schoolchildren would like to have music played at the physical training lessons; 25,5% of respondents would prefer dance exercises among different types of motional activity, if they had such a choice. The most pupils like collective actions (45,5%) at the lessons of physical culture, and are not satisfied with: a strict regulation of their activities (28%), light load (32%) and monotony (20%).

The conversation revealed that these children consciously perceive physical activity as one of the important conditions for a full-fledged life and human development. Motional activity is considered by them as a biological irritant that stimulates the process of growth, development and formation of human organism.

3. Results

The prerequisites for creating a program for using dance exercises at the lessons of physical training were: data of the theoretical and methodical analysis of literary sources and documental materials, observation and questionnaire (poll, conversation) of the physical education teachers and pupils about using dance exercises at physical training lessons, own experience.

The purpose of the program we determined the provision of versatile development of fifth form pupils by means of dance exercises at physical training lessons. According to the purpose we defined three tasks of the program, deciding of which provided: 1) to expand the scope of aesthetic influence of motional activity on pupils; 2) to ensure the rational formation of individual reserve of dance motional abilities and skills and achieve health-improving effect; 3) to promote gender education of schoolchildren.

We highlighted three interconnected components in the structure of the program content: aesthetic, motional and gender.

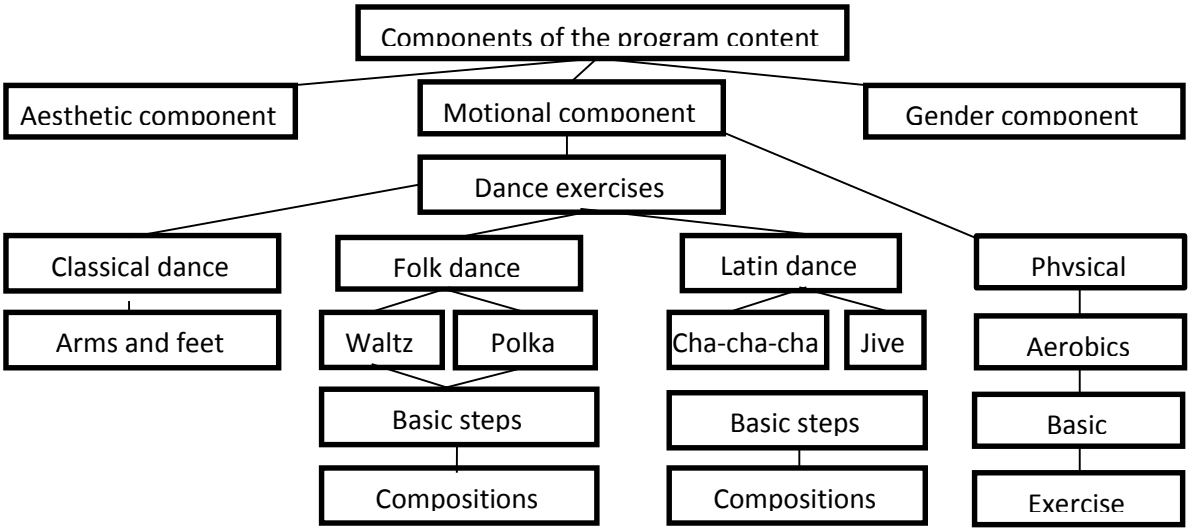

***Figure 1**. Components of the program content in using dance exercises at physical training lessons.*

Aesthetic component provided a disclosure of the dance world to a child, its beauty, training to show his character in his movements, to convey an appropriate mood, to familiarize children with means of musical expression, to transmit in movements its rhythm and dynamics.

Motional component was presented by: classical dance, classical dance (polka, waltz); Latin dance (cha-cha-cha and jive); aerobics.

The basis for mastering all the mentioned dances have become classical dance exercises which were available to children. Beginners have been laid the foundation for further mastering the dances provided by the program. Its essence was in teaching initial positions of feet, arms and head, acquiring the primary coordination skills of elementary exercises at a barre and in the middle of the hall. That is why, during the first year of the experiment, complex trainings were held, which included elements of classical dance and exercises, provided by the study curriculum. That gave to lesson mobility, prevented monotony, and contributed to a better assimilation of the material.

Folk dance is a dance, which is in its natural environment and has certain traditional movements, rhythms, costumes for the given locality. Folk dance is a spontaneous expression of feelings, mood and emotions. We have chosen two folk dances: polka and waltz.

Polka is a famous fast dance that contains jumps, springs, gallops. Our formed program of using dance exercises at physical training lessons for the 5th form pupils provided for the study of the following figures: variable step in pairs with a turn, claps, gallop, variable step with a spring, polka in pair. It was in this sequence that we also danced polka.

Waltz is an extraordinary effective mean of physical education that promotes the ability to move beautifully, forms a posture, beautiful figure, develops grace, and provides for the physical development, and the school waltz is the first dance, which graduators dance at their school-leaving party. In the process of training our program includes the study of such figures: balance, balance with a turn (right and left), waltz track, waltz turn right and waltz in couple. Musical size is 3/4. Studied the waltz at first at a slow tempo and only as a measure of assimilation gradually fasten tempo, attending smoothness and ease of movements. The composition trained in such sequence: for times balance, turn, two times balance, turn, two times balance, waltz track and waltz in couple.

No less popular is *Latin dance* today. From the Latin program we selected two dances: cha-cha-cha and jive.

Cha-cha-cha is a young dance, the appearing of which caused the influence of jazz, sting and Cuban dance music. Rhythm cha-cha-cha is 4/4, but in this dance, the fourth musical part is divided into two parts, in result the rhythm is 2, 3, 4 and 1. The emphasis is on the first musical part. Cha-cha-cha is performed in the rythm of 120 beats per minute. We studied such basic movements: chassé, main step, new york, hand to hand, stop turn. The composition can be performed in the following sequence as movements are described. But we also changed them, for example: «main step» forth and back, «new york» 3 times, «stop turn», «hand to hand», «stop turn», «main step» forth, «hand to hand», «new york», «stop turn», «main step» forth and back; «chassé» right, left, «new york» 3 times, «stop turn», «main step» forth and back, «hand to hand».

Jive is a dance, which influences on a creation of new dancing variations. Characteristic of jive: movements are rhythmical, fast, swing character presents, lots of throws; mood of performance is humorous, flirting; fun, holiday and active rest. Jive is very fast dance. Musical size is 4/4. Tempo is 44 times per minute. Our program included study of basic jive steps: chassé, rock back and change of positions. These steps can be danced in any order, for example: rock, chassé, rock, chassé; chassé, change of positions, rock, chassé; change of positions, rock, chassé, rock, change of positions.

The main structural unit of *aerobics* was a set of exercises. According to the influence on the systems of pupils' organisms all exercises of aerobics we have divided into three groups. The first one includes exercises, which affect the cardiovascular and respiratory system, the second one includes exercises for muscles and joints, the third one contains exercises, action of which is directed to the nervous system by relaxation methods, suggestion, autotraining.

We used such main basic elements of aerobics: basic hand movements and basic steps (steptouch, openstep, grapewine step, V-step), jumps, kicks, squats, lunges. Using these exercises in different combinations in connection with carrying, turns, various movements of hands provided accessibility, diversity and high emotional background of physical training lessons. In order to diversify in such classes and engage pupils, we used various exercise complexes based on the basic steps. Musical support has also changed, so that pupils could more emotionally perceive such physical exercises.

Realization of *gender* component was ensured by close contact between the partners, trust in each other, equality, friendliness and respect, which takes place in dance classes, and that allows the formation of appropriate moral and ethical qualities and norms between sexual behaviors of children of both genders.

The content of the program realized in stages by means of using dance exercises at physical training classes. At the first stage, pupils acquired theoretical knowledge and practical abilities to perform the basic elements of the dance. In the process of the second stage we brought to the level of perfection the technique of dance exercises, brought up physical qualities and moral, volitional traits of behavior, and at the third stage we developed the ability of children to create new compositions that corresponded to the individual abilities of each pupil.

Main forms of classes were: complex lesson of physical training, individual classes, contests, demonstrations and competitions. Ways of organization studying activity were: frontal, individual, group.

To check the effectiveness of the experimental program, we have conducted a forming experiment,

which was conducted on the basis of Ternopil secondary schools #16 and #19. 103 schoolchildren of the fifth forms of the main medical group, which comprehended experimental and control classes, took part in it. Experimental classes (EC) included 57 pupils (26 boys and 31 girls), control classes (CC) included 54 pupils (28 boys and 26 girls). The experimenter conducted lessons of physical training with the pupils of EC with the priority use of dance exercises. The physical training teacher traditionally conducted lessons with the pupils of CC in accordance with the current curriculum of physical education of schoolchildren.

The criterion for the effectiveness of the experimental program of using dance exercises at physical training classes we have used the method of express assessment of the somatic state of health [13].

Comparing morpho-functional indicators of schoolchildren we have found that between the pupils of EC and CC there were no suitable differences before the experiment (P>0,05). Comparison of the results of biological tests (life index, power index, Robinson index and Ruffier index) before the experiment has not revealed any true differences between the pupils of EC and CC (P>0,05). Therefore, we can argue that the experimental classes in the experiment according to morpho-functional indicators and the results of biological tests practically did not differ.

After the experiment the indicators of morpho-functional tests showed increasing in EC and CC, the statistical significance of the differences between schoolchildren of EC and CC was observed.

Analysis of the results of biological samples for determining the respiratory possibilities of pupils from EC and CC were compared using the indicator of life index (Table 1). A statically significant difference was found after the experiment among the pupils of EC (P≤0,01), the girls' life index showed a positive tendency on (15,7%), for boys on (14,3%). The increase in children's CC rates was less significant, for girls it increased by (6,6%), for boys by (7,8%).

Similar results were observed in the process of determining power index (according to indicators of carpal dynamometry) between the pupils of EC and CC after the experiment. The indicators of power index showed significant differences, for boys of EC, the increase in results was (33,3%(P≤0,001)), for girls (28,6% (P≤0,05)). For boys of CC, the indicator of power index has improved less significantly, only on (8,2%), for girls on (12,3%).

The study of the effect of experimental program on the functional characteristics of central hemodynamics in a state of rest revealed changes in functional state of the cardiovascular system. The testing, conducted after the experiment showed statistically true differences (P≤0,01) in indicators of Robinson index between the pupils of CC and EC. After the sudy of Robinson index indicator in CC the results remained unchanged. The reserve possibilities of the cardiovascular system for girls in EC increased by(19,6%), for boys by (27,9%).

To characterize the level of physical ability of pupils' organisms from EC and CC we have studied the dynamics of Ruffier index changes. After the experiment indicator of physical ability of pupils from the studied classes has been changed. According to the results of defining Ruffier index there was a statistically true difference (P≤0,05) between the pupils of CC and EC after the experiment. There was improvement for girls in EC on (23,1%), and for boys on (30,8%).

Table 1. *Indicators of somatic health of pupils in EC (♂=20; ♀= 17) and CC (♂=32; ♀=35) before and after pedagogical experiment*

Biological samples				Life index, ml/kg		Power index, %		Robinson index, c.u.		Ruffier index, c.u.	
Sex				♂	♀	♂	♀	♂	♀	♂	♀
Stages of research	Before experiment	CC	M_x	44	37	38	35	93	86	14	11
			± m	1,45	1,27	12,95	11,26	3,01	2,74	0,64	0,55
		EC	M_x	47	42	42	30	95	102	15	14
			± m	1,47	2	1,68	2,14	6,64	4,55	2,34	1,15
		t		1,60	2,22	1,32	1,82	0,26	2,94	0,39	2,31
		P		>0,05	≤0,05	>0,05	>0,05	>0,05	≤0,05	>0,05	≤0,05

	After experiment	CC	M_x	47	40	43	38	94	93	13	11
			± m	9,68	1,74	2,02	2,06	3,66	2,84	0,77	0,59
		EC	M_x	55	45	56	42	78	77	11	9
			± m	2,07	2,17	2,00	2,93	2,81	4,18	0,71	0,68
		t		3,12	2,25	4,35	1,03	3,47	3,25	1,82	1,85
		P		≤0,01	≤0,05	≤0,01	>0,05	≤0,01	≤0,01	>0,05	>0,05

Summarizing the evaluation of indicators of the physical health of the fifth-graders from the experimental classes, we can conclude that after the implementation of the program of using dance exercises at physical training classes, statistically true changes occurred according to indicators of all biological samples between pupils of EC and CC. That suggests that experimental program affects the state of pupils' somatic health with greater success than traditional methods of teaching. Therefore, the proposed program of using dance exercises at lessons of physical training can be used those secondary school which seek to optimize the process of physical education of schoolchildren.

4. Discussion

As result of our research we have got three groups of data: those that confirm the results obtained by other authors; data complementing existing developments; and absolutely new results on studied problem.

To the results that confirm the data of other authors are included the directions of research about positive influence of dance exercises on the development of pupils, their place in physical and spiritual culture of society [14; 15; 16]. We have proved experimentally that dance is an effective mean of physical education, which promotes the ability of beautifully moving, forms a posture, beautiful figure, develops gracefulness, brings joy of communication to music, and assists the formation of somatic health .

To the results that complete the research of other scientists [17; 18; 19], are included the data we received about the volume and content of dance exercises for a lesson of physical training in the fifth form and the sequence of their study; influence of regular trainings with dance exercises on aesthetic, physical and gender education of schoolchildren; influence of music, which activates the motional activity of pupils of the fifth form and has an educational value; use of dance elements from the classical, folk, Latin dance and basic movements of aerobics, is a mean of versatile pupils development.

The new results have got in the research is the development of program of using dance exercises at lessons of physical training, content components and stages of its realization, forms of classes and organization of study activity. We were the first to offer a set and sequence of dance exercises at physical training lessons for the aesthetic, physical and gender development of pupils of the fifth forms.

Three groups of data were obtained as a result of the study, are closely interconnected, logically complement each other and create a clear idea of the harmonious development of pupils in the process of physical education through dance exercises.

5. Conclusions

The non-traditional kinds of motional activity gain popularity in the sphere of physical education for the improvement of schoolchildren's physical development. The effectiveness of dance classes is in the purposeful realization of complex use of means of physical, aesthetic and gender education that harmonizes physical and spiritual qualities of children, provides development of body beauties, gracefulness, elegance of movements, and aesthetic effect of appearance.

As the analysis of physical education curricula showed, the most often they propose elements of classical dance and rhythmical gymnastics. Curricula pay insufficient attention and underestimate the potential of dance exercises in the establishment of national physical education, where the accent should be put on the making foundation of harmonious physical and spiritual development of pupils' personality.

The questionnaire of physical training teachers about using dance exercises as a mean of physical education has found out that only 17,5% systematically and 50,6 % of respondents episodically propose them

to schoolchildren at lessons. In addition, dance exercises are more often used by women teachers. At the same time, 90,4 % of respondents consider it expedient to practice dance exercises at physical training lessons, because they, according to their thoughts: «develop coordination of movements»; «increase emotionality during studies»; «organize a class»; «set a rhythm of a lesson»; «soothe the nervous system»; «stimulate interest for physical culture»; «form and strengthen the posture»; «manifest creative skills of a child»; «bring up beauty, elegance, respect, have a health value».

The questionnaire of pupils has found that: 50,7% of them want that dance exercises would be used at the lessons of physical training; 57,5% of schoolchildren would like to have music played at the physical training lessons; 25,5% of respondents would prefer dance exercises among different types of motional activity, if they had such a choice. The most pupils like collective actions (45,5%) at the lessons of physical culture, and are not satisfied with: strict regulation of their activities (28%), light load (32%) and monotony (20%).

The developed program of using dance exercises at lessons of physical training had a purpose: the provision of versatile development of fifth form pupils by means of dance exercises at physical training lessons. According to the purpose we defined three tasks of the program: 1) to expand the scope of aesthetic influence of motional activity on pupils; 2) to ensure the rational formation of individual reserve of dance motional abilities and skills and achieve health-improving effect; 3) to promote gender education of schoolchildren.

We have identified three interconnected components in the structure of program content: aesthetic, motional and gender. The content of the program realized in stages by means of using dance exercises at physical training classes. At the first stage, pupils were acquired theoretical knowledge and practical abilities to perform the basic elements of the dance. In the process of the second stage we brought to the level of perfection the technique of dance exercises, brought up physical qualities and moral, volitional traits of behavior, and at the third stage we developed the ability of children to create new compositions that corresponded to the individual abilities of each pupil. Into the basis of the motional component is laid: classical dance, folk dance (polka, waltz); Latin dance (cha-cha-cha and jive); aerobics. Main forms of classes were: complex lesson of physical training, individual classes, contests, demonstrations and competitions. Ways of organization studying activity were: frontal, individual, group.

The criterion of effectiveness of the program was used express evaluation of somatic health by Apanasenko [13]. At the time of formal experiment statistically true better results ($P \leq 0,05$) showed the pupils of EC in biological samples. Therefore, the life index for boys of EC grew by 6,5% more than for boys of CC, and for girls by 9,1%; the power index for boys by 25,1%, for girls by 16,3%; the Robinson index for boys grew up on 20,1%, for girls on 18,5% and the Ruffier index for boys on 14,3%, for girls on 23,4% than for pupils of CC.

Summing up the results of the indicators of somatic health of pupils of the fifth form, we can conclude that after implementation of the program of using dance exercises at physical training lesson, statistically true changes occurred according to the indices of all biological samples between pupils of EC and CC. This suggests that the experimental program influences the state of somatic health of schoolchildren more effectively than traditional teaching methods. Thus, the proposed program of using dance exercises at physical training lessons can be used by secondary schools, which seek to optimize the process of physical education and diverse development of schoolchildren.

Our research does not solve all aspects of that problem. There remains an unclear question about the content of using dance exercises in the process of physical education of high school pupils, the impact of dance exercises on the motivational and moral sphere of pupils that may be the subject of further scientific research.

Conflict of Interests

The authors declare that there is no conflict of interest.

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Modernization of the Federal Program on the Discipline "Physical Education and Sports" for University Students

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Abstract

The current structure and content of the university disciple "Physical education and Sport" do not meet the requirements of students' health care program. The purpose of the study is to describe and verify the efficiency of a model of active health-care program introduced into the pilot program of sport education of freshmen at universities with a non-sport profile. The model is tested in the conditions of a real university curriculum of the discipline "Physical education and sport" with 50 students-participants of a target group. The results are compared with the data received from 50 other students, who have traditional PE lessons. Testing is carried out with the help of some traditional measuring means as well as innovative methods of monitoring students' health: the method of gas-discharge visualization, the integral entropy method. The received data processing is performed with the use of GDV-programs. The received results show a significant difference between the target and the control groups in the parameters of chest circumference (on pause) and lung capacity, carpal dynamometry, life and power indexes, endurance (3000 m running), power indicators, speed-power exercises (long jump), the physical abilities and flexibility indicators. The paper concludes that real health care requires greater number of hours spent on physical activities, the rational combination of physical activity, supplementary means of health care and self-control, a greater variety of exercises focused on individual physical capabilities and skills, upbringing work focused on the importance of self-disciple and physical self-development in life. All the enumerated factors used as a system result in better physical and health parameters of university students, contribute to the decrease in the number of diseases and eliminate fatigability, low study motivation, headaches, and other autonomic disorders.

Keywords: model of active health care program, general physical education,students' health, innovative monitoring techniques

1. Introduction

In the contemporary society, universities are not only intended to train future specialists, but they should also be focused on their social and cultural development, as they play a key role in providing innovative and scientific growth of any community. In Russia, the Federal State standards of higher education are targeted at the education accompanied by students' physical activity and sports [4]. However, the statistics show little progress in developing students' health in the last decade. The number of students assigned to special medical group (CMG) ranges from 25% to 50% or even more [18, 20]. The study of morbidity among the students shows that in recent years, the diseases of the cardiovascular system are on the first place; the diseases of musculoskeletal system are on the second place (osteochondrosis, scoliosis, etc.); the diseases of the respiratory organs are on the third place. These are the body systems that are mostly vital for the life support [4, p. 29]. The analysis of health status of students revealed the following: relatively healthy students account for 8%, those having various treated injuries and undergoing short-term illness present 27%, and those having multiple violations in functional systems are 65% [13]. The problem is not new, as the students' as well as the children's health problems are still of great concern in many countries. As Ogden, Carroll, Kit & Flegal note, despite the extensive evidence that physical activity provides adolescents with important health benefits, most children and adolescents in developed nations do not meet the accepted physical activity guideline, while the obesity rates are the highest in the same nations that manifest the lowest compliance with physical activity guidelines [17]. In 1992, the American Heart Association, based on sizeable bodies of epidemiological and physiological research, declared lack of physical activity to be a major risk factor for cardiovascular disease [21]. Subsequent to that pronouncement,

the U.S. Centers for Disease Control and Prevention and the American College of Sports Medicine issued a public health guideline on physical activity [21], and the U.S. Surgeon General released a report declaring that, "people of all ages can improve the quality of their lives through a lifelong practice of moderate physical activity [17, p.483]. Similar data are received by the Portuguese scientists that note in adolescents, the combination of high cardiorespiratory fitness and high muscular fitness is positively associated with a better health-related quality of life, sport and physical activities [12]. Thus, the need for the development and introduction of physical activity and health care programs in the educational process is still relevant and significant.

2. Literature Review

In recent decades in Russia a low level of physical development and sport preparation has been observed as the result of the loss of interest in strengthening and maintaining university students' health. This negative factor calls for adapting and improving general sports education quality.

Nowadays it is stated that adequate physical activity is associated with better physical fitness, body composition, bone health, and cardiometabolic risk status in young people [22]. Substantial evidence suggests that physical activity promotes good mental health as well as improved cognition and school performance [22]. Public health authorities around the world have adopted physical activity guidelines for children and adolescents, and these recommendations typically call for young people to be active for 60 minutes per day at intensities in the moderate-to-vigorous range [22]. There are a lot of issued guidelines all over the world calling for persons of all ages to target increased participation in moderate to vigorous physical activity as a key strategy for reducing the incidence of a broad array of chronic diseases [19]. According to the World Health Organization recommendations, a lot of Russian state universities adopt programs of physical activity and sports. Following this direction, the curricula of the discipline "Physical Culture and Sport" at the three faculties of Chelyabinsk State University (ChelGU) has been upgraded significantly. The main direction of this program is that students should master the basics of their personal physical culture implying the organic unity of knowledge, needs and motives, the optimal level of physical health and the ability to carry out one's own physical-culture activities. The need to update the programs on these subjects is caused by the following factors. Firstly, practical experience and research have shown that only a small part of first-year students have a sufficient level of physical activity. Secondly, most freshmen have low motivation for independent organization of physical activity, that results in a low level of physical development and education and, consequently, unsatisfactory level of their health. Thirdly, there is a low culture of sport and physical activity and lack of habits including doing fitness, jogging, doing morning physical exercises, etc.

The recent survey shows that everybody out of the 100 recipients who have participated in a short survey everybody is well aware of the positive and significant effect of physical activity on their health. Answering the question: "What impact do you think sport and physical activity has on your life?", 85.4% of the abovementioned respondents believe that physical exercises will be beneficial later in life; 86.3% of them are sure that they will allow them to be physically fit and have a good-looking figure; 54.1% of the respondents think that physical activity will provide them with both corporal (physical) and mental improvement; 59.6% connect physical exercises with discipline, and a healthy lifestyle. However, the knowledge of the majority of students does not coincide with their real involvement in the PE classes, as only 30.9% of the respondents do physical exercises and sport consistently; those who actively participate in sports activities account for 8.5% and, as a consequence, only 5.6% of students have athletic titles. The physical activity of the most respondents (69.8%) involves 2-3 hours a week, which is almost the same as the average amount of PE classes at a university. Among them only 48.8% of students attend all the PE classes; 46.9% prefer non-academic activities (sports schools, centres, clubs), and only 8.8% are doing physical exercises individually. The conducted preliminary studies also show a low level of development of sport skills and abilities, improper adaptation of students' organisms to physical activity, a low level of development of speed, power and speed-power capabilities, and a very low level of stamina [14].

The received materials call for the need to increase students' motivation for PE classes attendance, the increase of the level and effectiveness of physical activity, the harmonization of the development of basic

and advanced physical skills and abilities, and the development of the skills and habits of doing sports and fitness. These steps are not possible within the framework of the existing curriculum. Thus, the present students' independent physical activity and self-organization should be reorganized to be effectively integrated with the training sessions in the course of the university study. The integration of compulsory classes with self-training may be carried out during the joint (teacher-student) project and research activities based on the following algorithm:

1) the problem statement and the examination of the research conditions, regarding the given data and the desired results in relation to a particular subject;
2) a strategy development based on the study of the problem and the awareness of its essence;
3) the achievement of goals regarding possible deviations in the search for the problem solution;
4) the realization of the project in the process of joint activities;
5) the current control and correction;
6) the evaluation of results and the experience exchange.

On the whole, the program should reflect a change in the organization of students' physical activity. In fact, it means the transition from regulated activities to self-organization (with the elements of creative, exploratory nature) of motor activity. To get the set target a pilot programme of sport education of freshmen at universities with a non-sport profile has been developed.

Table 1. *The structure and content of the pilot program of sport education of freshmen at universities with a non-sport profile.*

Types of training			Monitoring
theoretical	*methodological*	*practical*	
Lectures (36 hours): health and physical activity of students (definition of health; age and individual characteristics of human body development; the factors and criteria that determine health state, the main health technologies).	Instructional sessions on the formation of specialised knowledge and skills for healthy lifestyle (36 hours)	Physical education training focused on skills and abilities of doing fitness independently Extra-curricular lessons of physical culture and sports.	Credit (Summer and winter examination period) Stage control (start, middle, and the end of a school year): medical check-up, testing (the rating of physical capabilities), questionnaire (the attitude to health and physical activity). Current control: practical recommendations on the development of healthy lifestyle skills and abilities.

3. Method

3.1. Participants

The 100 participants of the present study are equally divided into 2 groups. The first of them is a control group of male and female students who are the main medical group and study according to the standard program worked out according to the present educational standards of the discipline "Physical culture and sport" The other is a target group of male and female students who are the main medical group and study according to the pilot programme of sport education of freshmen at universities with a non-sport profile. The participants are first-year male and female students, aged 16-18, studying at various faculties of Chelyabinsk State university.

3.2. Materials

During the experimental study two major tasks are solved. The first problem concerns the determination of the level of physical condition and motivation of the students of higher educational institutions to doing physical exercises. The second one is to justify the pedagogical impact of the pilot programme on the major components of students' health and assess the effectiveness of this program.

The solution of these tasks is carried out with the regard to the scientific knowledge about laws of genetical-determination of physical and cognitive development, and motor activity as a socio-biological phenomenon. The emphasis is placed on:

a) the objective assessment of university students' health and physical abilities;

b) the rationale of the motor activity as a factor of increasing health reserves;

c) upbringing of students' youth value orientations and conscious thinking about health and physical perfection;

g) the need of liberalization of forms, means and methods of physical training, sports education and sports training;

d) integration, complementarity of systems of physical training, sports education and preparation of high-level sportsmen based on the conversion of selected elements of technologies of sports training in order to improve the content and forms of physical education and sports education in various universities [1, 2, 11, 13];

e) the integration of training sessions and self-study in physical education and athletic preparation of young students [9, 16, 19];

f) personalization of motor activity of students [9, 10].

Considerable attention is paid to the study of the organization and efficiency of physical activity of the students. The latter is considered to be a system of views on the basic laws of controlled development and the recycling of physical capacity of an individual; ways and means of educating active individual attitude to the process of physical improvement, the direction and forms of individual physical activity of people. It is focused on the need for physical perfection of each student based on his/her individual morphofunctional and age-related characteristics, the specificity of physical abilities; personal relations to health, health care, and effective implementation of current learning and future professional activities.

The solution of the raised issues required the study of literary material on the theory and methodology of physical education of children and young adults, education of related disciplines - Age and Sports Physiology, Pedagogy, Psychology, Morphology, Sports Medicine and Medical Monitoring.

3.3. Procedure

The main method of the research is the pedagogical experiment with the use of surveillance techniques, survey, literature study, testing, health assessment, physical development, morphofunctional abilities and mathematical statistics.

Along with the generally accepted methods of research, the original methods used in the experiment are:

1) the method of gas-discharge visualization (GDV). This method, developed by Russian scientists under the guidance of professor Korotkov K.G. (ITMO, St. Petersburg) and based on the Kirlian effect, represents a computer registration and the subsequent analysis of gas-discharge light emission of any biological objects. The device "GDV-camera" is a tool for visualization of the human energy field. This diagnostic device allows you to see the bio-energy glow of a person and identify human diseases at an early stage, sometimes long before the appearance of clinical symptoms. The disease is detected at the stage when it manifests itself in the form of energy defect, and the morphological changes in body could still be missing. The GDV method is actively used as the means of rapid assessment and monitoring psychophysiological being of a human. Implementing an integrated approach, it is possible to obtain a more thorough knowledge of a human being as of individual and a personality, of a subject as of the object of practical activity. The glow of gas discharge that occurred near the surface of the subjects' fingers, placed in the electric field of high tension, was recorded.

Each examinee recorded gas-discharge glow of ten fingers with filter and without the filter. The following indicators are determined: integrated space, integrated entropy, the coefficient of activation, symmetry ratio. Integrated space (IS) reflects the functional state of the organism as a measure of the adaptation process, assessing the safety margin or an internal strength reserve of the organism. Reduction of this indicator shows the formation of asteno-neurotic syndrome.

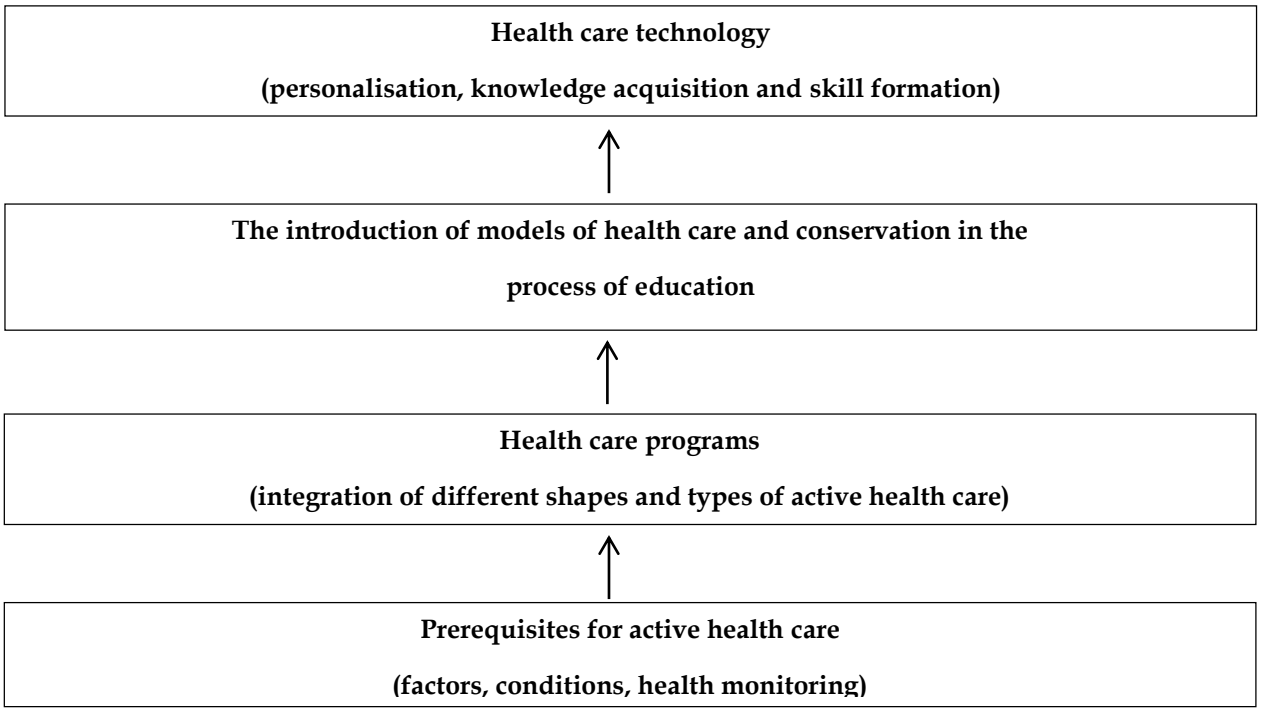
2) Integral entropy (IE) gives an idea of the balance of regulation processes. Larger size of the entropy leads to more chaos and dysregulation in the body. Low entropy reflects the rigidity of regulation. The coefficient of activation (CA) is calculated as the difference between the values obtained with the registration of GDV-grams of fingers both with filter and without it. By this indicator, it is possible to assess the degree of stressful condition of the body. Decreased values indicate the "delayed functioning of the body", depression and psychosomatic reactions to stress. Symmetry reflects the level of energy balance in the body and the extent of the dysregulation of the autonomic nervous system.

3) Data processing is performed with the use of GDV-programs: GDV-Diagnostics, GDV-energy field, GDV-science laboratory and occurs in two phases:

- primary treatment includes psychological analysis of standardized methodologies and data obtained by GDV Diagnostics;
- secondary processing involves statistical analysis and the use of SPSS program. The criterion of U-Mann-Whitney is used.

Regarding the used methods as well as the structure and content of the pilot program of sport education of freshmen at universities with a non-sport profile, the efficiency of the model of active health-care program at university is verified in the experiment. It is to be compared with the efficiency of the standard program of the physical and sport education used at Chelyabinsk State university.

Figure 1. *Model of active health care program at university.*



The integration of the model in the educational process implies a number of factors and conditions:

- equipment that enables you to streamline the learning process in accordance with the federal government standards;
- the establishment of a functional system, unifying the different forms and types of health impacts, leading to mainstream value orientations of students that enable you to activate a health-consuming behavior;
- the increase of the role of suitable physical activity to increase health reserves [5, 6];
- the strengthening of moral-willed and value-motivational qualities of students' personality [20];

- the implementation of General (non-special) sports education towards obtaining the necessary knowledge to build and sustain one's own health at the optimal level, as well as the development of vital practical skills;

- the use of a variety of forms and methods of pedagogical monitoring of students' health-being, including modern technology.

Consistency in the organization of these processes, i.e. establishing sustainable feedback at all the stages of implementation of the proposed model is provided by monitoring of all aspects of students' readiness: intellectual, physical, functional, etc.

The introduced organization of students' health care activity used in target groups within the pilot program of the discipline "Physical Culture and Sport" implies increasing the volume of the discipline (the number and the duration of classes, the number of exercises used in the class), the quality of the organization (the rational combination of exercises of various duration and focus that are used in various PE classes or greater educational events), physical activity and the effective use of health care procedures (the rational combination of physical activity, the use of cold showers, phyto-therapeutic and aromatherapy treatments, nutrition, respiratory exercises and self-control to influence students' health and get the preventive and therapeutic effects). The latter has enabled to increase students' health reserves significantly.

4. Results and Discussion

The received results have shown that, firstly, the physical potential of students being in a target group has increased significantly (according to the complex of quantitative and qualitative indicators of morphofunctional and motor abilities, tables 2-5), as well as their resistance to the impact of unfavourable environmental conditions (the amount and the duration of diseases during the school year has decreased).

During the academic year (September-June) the students of the target group have increased their chest circumference (on pause) and lung capacity, carpal dynamometry, life and power indexes, endurance (3000/ 2000 m running), power indicators (pulling on the beam), speed-power exercises (long jump), the physical abilities and flexibility indicators (a bend forward from a seated position) (according to the tables 2 and 3).

During the school year, most of the students have broadened and deepened their knowledge on a healthy lifestyle (theoretical contents of examinations and credits, a thesis on the selected topic). The skills and abilities of independent organization of physical activity have been formed (the independent use of separate parts of training exercises, homework assignments and the mini-practices requirements), students' motivation to physical improvement and self-development have been also increased and specified.

Table 2 and 3 show the difference between the students of the target and control groups. The main parameters used in the tables 2, 3 are: M – mathematical expectation; σ - standard deviation; V – error probability; P – probability coefficient.

Table 2. *The Dynamics of morphofunctional and motor abilities of the students being in a target group.*

Parameters	The beginning of the academic year		The end of the academic year		Differences	
	M±σ	V	M±σ	V	%	P
1. Circumference of chest (in a pause), sm	86,1±3,4	3,9	92,2±3,8	4,1	7,1	<0,05
2. Stange's test (with breath holding), sm	72,7±26,0	35,8	81,0±25,9	32,0	11,4	<0,05
3. Ruffier-Dixon, standard units	11,5±4,7	40,9	9,6±3,1	32,3	16,5	<0,05
4. Romberg's test, sm	8,8±4,0	45,5	10,5±3,7	35,2	19,3	<0,05
5. Vital volume of lungs, ml	3672,7±389,3	10,6	4146,6±372,3	9,0	12,9	<0,05
6. Dynamometry (hand), Kg	40,1±5,2	13,0	43,9±4,6	10,8	9,4	<0,05
7. Running, 60 m, sec	9,1±0,7	7,7	8,8±0,5	5,7	3,9	-
8. Running 3000 m, min, sec	15,50±1,09	7,3	14,09±**58**	6,8	10,1	<0,05

9. Pull-ups, the number of times	5,9±5,0	84,7	9,0±4,1	45,6	52,5	<0,01
10. Standing long-jump, sm	200,0±15,4	7,7	215,5±12,3	5,7	7,8	<0,05
11. Sitting forward bend, sm	10,1±3,0	29,7	17,4±4,0	23,0	72,3	<0,001
12.Biotic index, ml/kg	53,5±6,5	12,1	59,9±7,1	11,8	12,0	<0,05
13. Strength index, standard units	0,58±0,06	10,3	0,63±0,06	9,5	8,6	<0,05
14. Proportion index, %	48,6±2,9	6,0	52,0±2,9	5,6	7,0	-

The pedagogical observing as an estimation method accompanied the assessment of the objective data. It shows that the more the subjects master the techniques of self-organization and self-regulation, the higher is their self-esteem, the less is their vulnerability, the calmer are their reactions to various media factors.

Table 3. *The Dynamics of morphofunctional and motor abilities of students being in a control group.*

Parameters	The beginning of the academic year		The end of the academic year		Differences	
	M±σ	V	M±σ	V	%	P
1. Circumference of chest (in a pause), sm	86,2±3,2	3,8	89,3±4,3	4,4	3,6	3,6
2. Stange's test (with breath holding), sm	72,1±21,1	29,3	77,8±22,7	29,2	>0,05	>0,05
3. Ruffier-Dixon, standard units	11,2±4,1	36,6	10,4±3,4	32,3	7,9	7,9
4. Romberg's test, sm	8,9±3,7	41,6	10,7±3,6	41,5	>0,05	>0,05
5. Vital volume of lungs, ml	3625,8±326	8,9	3966,6±364	9,2	7,7	7,7
6. Dynamometry (hand), Kg	,1	13,8	,3	12,4	>0,05	>0,05
7. Running, 60 m, sec	38,4±5,1	8,9	40,2±4,8	6,8	12	12
8. Running 3000 m, min, sec	9,7±0,86	6,9	9,4±0,64	6,6	<0,05	<0,05
9.Pull-ups from a gymnastic bench, the number of times	16,14±1,12	73,7	15,49±1,02	56,8	9,4	9,4
10. Standing long-jump, sm	5,7±4,2	8,9	8,1±4,6	6,9	<0,05	<0,05
11. Sitting forward bend, sm	194,0±17,2	39	206,5±14,3	42,5	4,7	4,7
12.Biotic index, ml/kg	8,2±3,2	13	11,3±4,8	13,1	<0,05	<0,05
13. Strength index, standard units	55,4±7,2	14,3	57,8±7,6	11,9	3,1	3,1
14. Proportion index, %	0,56±0,08	6,7	0,59±0,07	6,9	>0,05	>0,05

The analysis of GDV energy field also verified the positive dynamics of students' psychological and physical health who studied according to the pilot program of the Chelyabinsk state university (not specializing on sport) (Table 4).

The received GDV changes (the veracious increase in the integral space and the symmetry coefficient, and the entropy reduction) speak about the significant improvement of adaptive solutions aimed at shortening or eliminating negative influence of the conditions and factors on the educational process.

Table 4. *The dynamics of the GDV energy field parameters of students of the target group.*

Parameters	The beginning of the academic year		The end of the academic year		Differences	
	M±σ	V	M±σ	V	%	P
1. The integral space, pixel	4113,0±1008,0	24,5	7217,0±1134,0	15,7	44,0	<0,01
2. The integral entropy, unit vs norm	3,06±0,24	7,8	1,97±0,21	10,7	55,3	<0,05
3. The activity coefficient, unit vs	4,07±0,23	5,7	4,20±0,11	2,6	3,1	

norm						
4. The symmetry coefficient, %	73,0±7,6	10,4	94,0±6,9	7,3	22,3	<0,01

The students studying according to the standard program show moderate negative dynamics in the GDV energy field parameters (Table 5). The revealed changes reflect a growth of the astheno-neurotic syndrome, a decrease in the effectiveness of adaptive reactions and the compensation abilities of the bodies of the students who are in the control group. The received data are verified by the statistics of complaints. The 79% of the students being the control group complained of the increased fatigability, low study motivation, often headaches, and other autonomic disorders. When recording the autonomic disorders on Wayne scale, the parameters of only 11% of students being in the control group met the norm. When determining the psychological stress on the somatization scale SCL-90, Spilberg's scales of stress and aggression, and the activation coefficient the GDV energy field parameters show that only 5,7% of students are in the eustress group. 31,9% of the students being in the control group all the GDV energy field parameters point to the presence of decompensated stress. Besides, the students experiencing the highest levels of distress have higher parameters on the aggression scale.

Table 5. *The dynamics of the GDV energy field parameters of students of the control group.*

Parameters	The beginning of the academic year		The end of the academic year		Differences	
	M±σ	V	M±σ	V	%	P
1. The integral space, pixel	5113,0±1001,0	19,5	4138,0±1065,0	25,7	23,7	<0,05
2. The integral entropy, unit vs norm	2,17±0,21	9,7	3,34±0,19	5,7	35,0	<0,05
3. The activity coefficient, unit vs norm	3,07±0,33	10,7	5,20±0,32	6,2	41,0	<0,01
4. The symmetry coefficient, %	78,0±8,6	11,0	73,0±6,9	9,5	6,8	<0,01

5. Conclusion

The significantly improved program of the disciple "Physical culture and sports" for the students of the non-sport profile universities, has proved its efficiency. In comparison with the standard program of the PE discipline the pilot program involves: 1) greater number of academic hours, 2) the rational combination of physical activity, the use of cold showers, phyto-therapeutic and aromatherapy treatments, nutrition, respiratory exercises and self-control included in the program, 3) the greater variety of exercises (including also outdoors exercises) used at PE lessons and the students' participation in sport events, 4) upbringing work focused on the importance of self-disciple and physical self-development in life, 4) use of self-training as a supplementary means of physical development. All the enumerated factors used as a system result in better physical and health parameters of university students, contribute to the decrease in the number of diseases and eliminate fatigability, low study motivation, headaches, and other autonomic disorders.

On the other hand, the received data point to the necessity of searching for new approaches to the problem of keeping students healthy. Further perspective researches may concern the improvement of the physical activity and sport organization, which would meet the health specifics of each student and would define individual program of training and nutrition (if necessary).

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The Effect of Ultramarathon Running on Bone Mineral Density in Male Athletes

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Abstract

The purpose of this study was to compare bone mineral density of older aged ultramarathon runners with physically active and sedentary age-matched males. Forty-two healthy males aged between 44 and 56 years participated voluntarily to the study and were grouped equally as ultramarathon (UM), active males (AM) and sedentary control (C). BMD was measured at the lumbar spine (L2–L4) hip, femoral neck and total body by DXA. Statistical analysis was performed with IBM statistics (SPSS version 23.0, Armonk, NY, USA) windows package program. Kruskal-Wallis H test was used to compare differences between groups which was not normally distributed. Dunn's post-hoc test was performed to determine which groups were different from others. The results were evaluated within the 95% confidence interval and significance was set at $p<.05$. The results showed that femoral neck ($p=.024$), hip ($p=.001$), lumbar spine ($p=.000$) and total BMD ($p=.000$) of the UM runners were significantly lower compared to AM group. Moreover, total BMD of the UM runners were significantly lower than those of the C group ($p=.001$). On the other hand, femoral neck ($p=.043$) and lumbar spine ($p=.028$) BMD of the AM group was significantly higher compared to C group. As a conclusion, it is thought that middle-aged male UM runners should include weight-bearing exercises in their training program to attenuate the decrease in BMD because of increased exercise volume.

Keywords: BMD, DXA, Runner, Weight-bearing exercise

1. Introduction

It is well known that bones have many vital functions throughout life cycle and dynamically reconstruct 10% of the skeleton every year [1]. Although several methods and techniques has been used to determine stiffness and bending properties of bones [2,3], measurement of bone mineral density (BMD) is still the most reliable and valid predictor of bone health [4,5]. Several studies have proven that BMD is closely related to muscle strength [6,7] which supports the theory that mechanical stimulus for continuous bone remodeling comes mainly from muscles, which apply mechanical load on bones during continuous contraction and relaxation [8,9]. Therefore, regular participation to physical activity and sports plays an important role in increasing bone mass and/or preventing bone loss at any age [10,11].

2. Literature Review

The benefit of physical activity on bone metabolism depends on the FITT principle (frequency, intensity, time and type) of exercise. Physical activities with load and strains below a threshold level do not promote bone formation as much as larger loads and strains [12]. Recent literature stated that weight-bearing and high-impact exercises stimulate more bone formation and retard the onset of bone loss because of mechanical load on bone. However, the volume of exercise plays a critical role in the shift of bone metabolism [13,14]. Moderate level of exercise volume appears to stimulate an increase in BMD, whereas level of training higher than a certain threshold seems to lead a decrease in BMD [15,16]. Piasecki et al. [17] showed that regular running was associated with greater BMD in hip and spine of sprinters, but not in endurance runners. They are also concluded that although indicators of mechanical load components such as body composition, muscular strength and type of movement are the same, BMD may vary due to different components of exercise. Studies have shown that weight-bearing exercise has site-specific effects [18] and adequate energy and calcium intake plays also an important role in bone remodeling [19].

Athletes had significantly stronger bones varying from 16% to 96% compared with non-athletes and higher BMD was mediated by muscle strength [20]. Given the central role that muscle plays in bone's response to loading [21], surprising and controversial results have been obtained by studies including endurance athletes. Heiniö et al. [22] performed a study with 88 athletes from different type of sports. They

found that the endurance runner still had 6% lower BMD, whereas other athletes had greater BMD values compared to active controls after the adjustments for body weight, height, percent body fat and muscle strength. High fracture risk and low BMD has been observed in female long distance runners [23]. Not only females, but also male runners experience several complications and discomfort in skeletal system [24]. Studies have shown that BMD of male elite runners training 100 km per week was 20 % lower compared to non-running active controls [25]. On the other hand, some studies reported that long-distance runners who train at moderate intensity have higher BMD compared to less active controls [26,27]

Endurance running is a popular way of socialization among elderly in recent years [28]. More and more people join endurance running to improve cardiorespiratory system, strengthen muscular system and struggle against weight gain and obesity. However, excessive amount of exercise may have detrimental effects on bone metabolism [27,29]. Stress fractures have been widely observed during ultramarathons (UM) [23]. UM is performed at various distances ranging from 50 km [30] up to multistage ultra-marathon races covering the south of Europe to the North Cape [31]. Most of UM runners are eager to test their limits in extreme conditions such as high altitude, different weather and terrain [32,33]. These conditions may cause physical and mental stress on UM runners as well as more medical complications compared to other runners. Controversial results were obtained from studies that measured bone turnover markers in blood samples of UM runners [13,34] or regional BMD assessed by dual-energy X-ray absorptiometry (DXA) [24,35].

Therefore, the primary objective of the present study was to compare BMD of older aged UM runners with physically active and sedentary males by using the gold standard DXA.

3. Method

3.1. Participants

All participants signed the written consent and were included to the study with accordance to the principles in the Declaration of Helsinki after the approval of the local committee of ethics. Participants with family history of osteoporosis, metabolic disorder such as renal, hepatic, gastrointestinal, thyroid disease that may affect bone metabolism or impair performance were excluded from the study. Other exclusion criteria were history of hormone supplementation (such as corticosteroids), previous low energy fracture, prolonged immobilization and usage of any medication. Forty-two healthy male who were eligible for inclusion such as age, health status, training volume volunteered to the study and were grouped as ultramarathon (UM), active males (AM) and sedentary control (C).

3.2. Materials

The UM group were selected from the enrollee of the race of Ultra Sky-trail which is an international UM annually organized in Erciyes Mountain in Turkey. The race is preferred by experienced UM runners due to its difficulty. The distance is 64 km with an altitude gain of over the 3200 m performed within 15 hours which needs a certain level of experience. The UM runners were free to consume foods and fluids throughout the race. They were also allowed to carry equipment that is necessary to ensure the safety of their run for possible weather conditions. Mean ambient temperature was 27.03±3.1°C at day and 12.75±0.96°C at the evening, humidity was 21.2±2,6% and wind speed was 10 km/h (AccuWeather Superior). WetBulb Globe Temperature which is a measure of the heat stress in direct sunlight was calculated as 12.2 °C and heat index as 17.23 °C during the race.

UM runners were invited to fill a questionnaire including personal information, medical, training and race history one week before the race. Fourteen Caucasian experienced male UM athletes (51.43±2.62 years) aged between 48 and 56 years with a weekly training distance (104.29±39.61km) higher than 64 km volunteered to participate. Similarly, aged-matched healthy AM having a fitness center membership were invited to fill the questionnaire. Fourteen AM (50.29±2.53 years) who met the age-appropriate health recommendations for exercise for at least 5 years volunteered to participate and were grouped as AM in the study. Fourteen sedentary males (49.64±3.97 years) from the academic staff of university volunteered to join the study as C group.

3.3. Procedure

Physical measurements of all participants were performed at the same day before the race. Subjects were asked to wear light clothes such as t-shirt and shorts without any metal artefacts during the measurements. Height was measured using a stadiometer (Seca, Germany) and body weight was measured with calibrated electronic scale (Seca, Germany) according to standardized method described elsewhere [36]. Body mass index (BMI) was calculated by dividing body mass by the square of the height and expressed as kg/m^2.

Anteroposterior lumbar spine, hip, femoral neck and total body BMD were measured using dual energy X-ray absorptiometry (DXA) (Stratos, DMS Imaging, France). All scans were performed by the same technician at the same day. Daily calibration by bone phantom was applied for quality assurance. BMD results were interpreted as according to the T-score definition of World Health Organization. T scores were used for prediction of osteoporosis (lower than -2.5 SD) and osteopenia (between -1.0, and -2.5 SD) [37]. Characteristics of the participants are presented in Table 1.

Statistical analysis was performed with IBM statistics (SPSS version 23.0, Armonk, NY, USA) windows package program. The normality of the data was tested by Shapiro-Wilks tests. Kruskal-Wallis H test was used to compare differences between groups in terms of BMD values of the total body, femoral neck, hip and lumbar spine separately. In order to determine differences among groups Dunn's test was used as post-hoc test. The results were evaluated within the 95% confidence interval and significance was set at p<.05. Values are presented as mean and standard deviation ($\bar{x}$±SD) for all groups

4. Results

Characteristics of the participants were identical in age and height. On the other hand, the weight was significantly higher in the C group compared to UM (p=.005) and AM (p=.027) groups. The BMI showed statistically significant difference between UM and AM (p=.016), AM and C (p=.000) and UM and C (p=.000) (Table 1).

Table 1. *Physical and training characteristics of the participants*

	UM (n=14)		AM (n=14)		C (n=14)	
	$\bar{x}$±SD	CI (%95)	$\bar{x}$±SD	CI (%95)	$\bar{x}$±SD	CI (%95)
Age (year)	51.43±2.62	49.91-52.94	50.29±2.53	48.83-51.74	49.64±3.97	47.35-51.94
Height (cm)	173.64±9.04	168.43-178.86	173.21±6.59	169.41-177.02	174.36±4.14	171.96-176.75
Weight (kg)	67.50±8.47^{b}	62.61-72.39	70.22±7.35^{a}	65.97-74.46	77.00±5.08^{ab}	74.06-79.94
BMI (kg/m^2)	22.29±.98*^{b}	21.73-22.85	23.32±.81*^{a}	22.85-23.79	25.30±.72^{ab}	24.88-25.71
Sports year	9,00±4,915	6.16-11.84	7.29±2.70	5.73-8.85	.50±1.92	5.40-7.60
Duration of training (hour/week)	8.21±3.14	6.40-10.03	7.07±1.54	6.18-7.96	5.21±1.42	4.39-6.04
Distance covered in a week (km)	104.29±39.61	81.42-127.15	61.50±7.46	57.19-65.81	NA	NA
Distance covered in a year (km)	4020±1600.79	3095.73-4944.27	3010.71±374.77	2794.33-3227.10	NA	NA

*p<.05 Values for differences between the UM and AM groups; ^{a}p<.05 Values for differences between the AM and C groups; ^{b}p<.05 Values for differences between the UM and C groups.

Results of the analysis showed that there were significant differences in femoral neck, hip and total BMD values between the three groups. BMD acquisition was significantly lower in UM group when compared to AM at all sites and C only at total BMD (Table 2). *p<.05 Values for differences between the UM and AM groups; ^{a}p<.05 Values for differences between the AM and C groups; ^{b}p<.05 Values for differences between the UM and C groups.

Table 2. *Bone mineral density of the participants according to the body sites*

	UM (n=14)		AM (n=14)		C (n=15)	
	x̄±SD	CI (%95)	x̄±SD	CI (%95)	x̄±SD	CI (%95)
Femoral neck BMD (g/cm²)	.92±.25*	.77-1.06	1.13±.11*[a]	1.07-1.20	.93±.26[a]	.77-1.08
Hip BMD (g/cm²)	1.10±.13*	1.03-1.18	1.30±.12*	1.23-1.37	1.18±.14	1.10-1.27
Lumbar spine BMD (g/cm²)	1.09±.14*	1.01-1.17	1.31±.11*[a]	1.24-1.37	1.19±.10[a]	1.14±1.24
Total BMD (g/cm²)	1.06±.07*[b]	1.02-1.11	1.21±.04*	1.19-1.24	1.17±.07[b]	1.14-1.22

*p<.05 Values for differences between the UM and AM groups; [a]p<.05 Values for differences between the AM and C groups; [b]p<.05 Values for differences between the UM and C groups.

Femoral neck (p=.024), hip (p=.001), lumbar spine (p=.000) and total BMD (p=.000) of the UM runners were significantly lower compared to AM group. Moreover, total BMD of the UM runners were significantly lower than those of the C group (p=.001). On the other hand, femoral neck (p=.043) and lumbar spine (p=.028) BMD of the AM group was significantly higher compared to C group.

5. Discussion and Conclusion

The present study was designed to investigate the differential effect of different type of exercises on bone health in elderly males. The main findings of the study showed that UM running has an adverse effect on BMD and may cause osteopenia in male runners, whereas moderate physical activity has site-specific benefits on BMD compared to sedentary males older than 45 years old.

Our findings showed that moderate level physical training in late adulthood attenuates bone mineral loss and preserves BMD at measured sites as observed in AM group, but not UM group when compared to C group. The present findings appear in line with previous literature. Studies revealed that regular high-impact exercise led to significantly increased bone mass at the weight-bearing bone sites, but not at the non-weight-bearing sites. Vainionpaa et.al [38] demonstrated positive effects of high-impact exercise on especially weight-bearing bones with a gain of 1.1% BMD in femoral neck and 7.3% BMD in calcaneal bone after 12 months high-impact exercise program, whereas there was no change in BMD at upper extremities when compared to the control group. Umemura et al. [39] also showed that low volume regular jumping training done every day were as effective as higher volume of jumping training in increasing BMD. This can be explained by Wolf's Law which hypotheses that BMD and bone shape are regulated by forces acting on the bone that cause Internal piezoelectricity stimulating osteoblastic activity and trigger new bone formation [40]. Not only the mechanical loading, but also the metabolic changes during exercise may stimu¬late osteoblastic activity and increase BMD [41]. A study showed that soccer player had lower spine BMD compared with their lower extremities [42], thus we might speculate that spine BMD is more sensitive to training volume. It is known that training has site-specific effect and lumbar spine and, to some extent, the femoral neck consists of trabecular bone which has a higher metabolism than cortical bone [43] Thus, it is hypothesized that trabecular bone responds earlier to exercise than cortical bone.

However, Hetland et al. [25] reported that weight-bearing exercise could cause a decline in BMD in the trabecular proportion of bones when the volume of training exceeds a threshold level. Running volume higher than 100 km weekly caused a decline of 19 % in the lumbar BMD in runners. Moreover, the study showed negative correlation between running volume and BMD in the lumbar spine, proximal femur, distal forearm and total body compared to the controls. These findings were also supported by other studies that found lower vertebral BMD in runners who train weekly over 92 km [25,44]. Our findings were parallel to these results since UM group had a lower BMD value in lumbar spine, hip, femoral neck when compared to the AM and total body when compared to physically active control group. On the other hand, MacDougall et al. [45] showed that BMD of the spine did not show any significant correlation to running distance and remained unaltered in runners compared to control group, whereas BMD of the lower leg was negatively

correlated with running distance. Moreover, Goodpaster et al. [46] found no significant difference in BMD values in middle-aged elite distance runners who trained at various levels compared with normative values. There was a trend towards lower BMD in runners training approximately above 90 km a week, and the BMD for this group was higher only compared to the sedentary controls, only. Since running mainly causes repetitive mechanical loading on the lower extremities such as the foot and legs, its benefit to BMD appears to be more site-specific than general. These repetitive loads also cause five to six times the body weight to be delivered to the upper segments [47] but these forces gradually dampened by muscles until they reach the lumbar spine [48]. Bennell et al [49] reported no significant difference in BMD of the lumbar spine between track athletes and controls. It can be speculated that this finding was due to the repetitive low amplitude loads and strains associated with running since BMD increases are more likely to occur under unusual strains and loads on body parts [50]. Furthermore, sustained mechanical overuse, increased micro damage and inflammation may possibly have led to a lower BMD [44].

BMD values of lumbar spine, hip and femoral neck were found to be lower in UM group compared to the AM group in the present study. Moreover, while UM runners had lower BMD values considering total body compared to the control group, AM group had significantly higher values suggesting that frequency, intensity, type and duration of exercise have important effects on the rate of bone metabolism. This is consistent with some studies that found lower vertebral BMD in older UM runners training over about 92 km a week, as compared with controls [25, 44]. One study suggested that low volume of distance running less than 50 km per week cause increase in BMD at lumbar spine [51]. Heinonen et al. [22] demonstrated that higher BMD values in the femoral neck and lumbar spine had been observed after 18 months of high-impact training. Similarly, Bassey et al. [52] reported that vertical jump training for 6 days per week revealed significant differences in femoral BMD after five months compared to control group. Woitge et al. [53] also reported different hormonal responses to endurance and resistance training in relation to bone metabolism. He stated that both osteocalcin and deoxypyridinolin levels were related to BMD loss according to the type of training. However, since we did not measure these hormones in this study, we cannot speculate these results.

All these findings together showed that BMD of UM runners were significantly lower than those of AM were, whereas regular training at moderate intensity has higher BMD values compared to age-matched controls. Our results might be explained by the mechanostat theory [54] suggesting that exercise volume might play an important role in bone metabolism. When the level of the load applied on the bone is low, it has no effect on the bone metabolism, however, if level of the load is more than a certain threshold, bone formation may be accelerated and cause a gain in BMD. Furthermore, if the load applied to bone exceeds a certain threshold, it possibly results in impaired bone tissue. This hypothesis agrees with previous studies in which running long-distance temporarily stimulated bone absorption and suppressed bone formation (26). This bone turnover might be explained by increased stress hormones [55], lower testosterone levels or increased inflammatory mediators [56] in elite runners. Hind & Burrows [14] reported that 36% of elite male distance runners had lower BMD and therefore they face with the risk of osteopenia or osteoporosis.

Low lean mass in most of UM runners could be another critical variable effecting BMD. Pollock at al [57] reported lower lumbar spine BMD in elite runners as observed in the results of the present study. The weight and BMI of UM runners in this study was significantly lower compared to control group, suggesting that the lower BMD in UM runners might be partially due to low body mass. Anthropometric analysis showed that long distance runners are usually skinny, lightweight, have smaller skeleton structure and weaker muscles compared to performance athletes or weight lifters. Low body weight of UM runners causes strains lower than the threshold value required for bone remodeling. This might be explained by Wolf's law, since bones are constantly subjected to various loads, they try to keep up with this alternation by changing their geometry and mass [14]. Thus, body weight and weight changes are strongly linked to the maintenance of BMD or reduced bone loss in UM runners [23]. Since UM events have lower magnitude of load and higher exercise volume, they fail to trigger increase in BMD and do not have benefit on bone metabolism like high impact or resistance exercises which put excessive load on bones [23,29]. Therefore, UM does not cause an increase in bone mass, but even may cause a decrease [23]. We can conclude that differences in the body weight may be linked to BMD differences in middle-aged males regardless of the body site.

On the basis of existing literature, some studies reported higher BMD [51] or bone mineral content [26] in male distance runners than those of less active controls, but, others have found the opposite [25,44] which is similar to our findings. These conflicting results may arise from the magnitude and volume of mechanical loading on the skeleton, large range in age and experience of the athletes and differences in the frequency, intensity, type or duration of exercise. Moreover, the selection and characteristics of the participants such as nutritional and hormonal status may affect the results. However, calcium consumption, another critical variable effecting BMD in late adulthood, has not been questioned in this study. Furthermore, to constitute even groups, control group in the study were selected from recreationally active healthy men, who participated in weight bearing non-endurance exercise at least twice a week. This may have also limited the BMD differences between groups. Although the controls were less active than the UM and AM groups, they participated more often in weightlifting training. Another limitation for this study was to limitation consumption of calcium in all groups. Therefore, the findings of the study can be generalized only to the male population, and not middle-aged females who differ enormously in metabolism in their late adulthood as a result of menarche etc.

It is generally accepted that low BMD is associated with higher risk of fracture. In this study, we demonstrate that moderate level of exercise may substantially reduce the lifetime risk of fracture, whereas endurance running may cause harm on bone tissue. Therefore, middle-aged male UM runners should include weight-bearing exercises in their training program to attenuate the decrease in BMD as a result of increased exercise volume. As a conclusion, training programs for endurance runners or sedentary middle-aged male should include weight-bearing exercise for at least 1 hour per week to prevent osteopenia or osteoporosis during aging

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Correlation of Metabolic Age with Body Mass Index, Body Fat Weight, Body Density and Regular Exercise

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Abstract

The aim of this study is to determine which body mass index, body fat weight and body density of body analysis measurements affect the metabolic age of overweight and obese individuals before and after regular physical activity. Nineteen healthy sedentary overweight and obese male subjects aged 20-29 years participated in the study. Body composition measurements of the study group were made before starting the study and after the 12 weeks of regular exercise, the measurements were taken for the last time again. Before starting the study, the Body Mass Index (BMI) measurement ranges determined by the World Health Organization (WHO) were used to determine whether the individuals were overweight or obese. "Tanita MC 180 Segmented Body Analysis" was used to determine body density, body fat weight and metabolism age measurements. SPSS Package program was used for statistical analysis of the study measurements. T-test was used to determine pre-test and post-test values, and regression analysis was used to investigate the relationship between multiple independent variables and dependent variables. Significance values were taken as $p < 0.05$.

In this study, body parameters which have positive or negative effects on metabolic age were examined and as a result; body mass index (β =, 561) and fat density (β =, 154) and body density (β = -, 182) respectively. However, among these variables, body mass index and body fat weight increase or increase in body density is adversely affected by the age of metabolism, while body mass index and body fat ratio decrease and body density decreases the age of metabolism positively. These results were determined in this study.

Keywords: Body mass index, Body fat weight, Body density, Regular exercise, Metabolic age

Introduction

Obesity comes from the Greek word ez Obesity Yem (Brownell, 1992). Obesity, ie obesity, is a non-contagious preventable disease due to the definition of WHO. Obesity also refers to excess fat tissue (Stone, 1994). The use of bioelectrical impedance is a method for the difference of lean tissue mass and electrical permeability of adipose tissue used in the determination of body composition of individuals. A low electrical current (800 µA; 50 KHz) is used to measure the resistance and internal properties of the body.

Individuals should not use any fluids prior to Bioelectrical Impedance Analysis (BIA) measurement. Intensive physical activity should not be performed before 24-48 hours. The measurement should be made at least 2 hours after the meal is eaten. The lowest value used for individuals is (R). Given the low electric current permeability is calculated and an individual's lean body mass is determined (Patrick and Bushnell, 2004). Mahor, Jackson and Pollock found a standard error of 3.4% with B-A and 4.6% with B-A in skin fat percentage calculations. The instrument is portable. It is also an inexpensive method (Güler et al., 2007).

Body Mass Index (BMI) is a method that can be calculated simply (weight [kg] / height2 [m]). It is recommended to use BMI especially in the evaluation of obesity (Sarria, 2001). However, it is important for individuals to be trained or sedentary during calculation. Because in body mass index calculations, trained individuals may mislead the person who made the wrong calculation or measurement due to the density of the muscle mass. The general meaning of physical activity in society is perceived as meaningful with the word "sport". However, physical activity is defined as activities that occur with energy expenditure as a result of movements of muscles and joints, increase the tempo of the heart and respiration and create fatigue of different intensity in each individual in daily life. In line with these explanations, exercise, play and various activities performed during the day are considered as physical activity (Bek, 2008; Zorba et al., 2006). Obesity is a serious health problem that shortens life expectancy and reduces quality of life. Because of the extra weight in the physical activities of obese cardiovascular and respiratory overload is larger than normal

and physical performance is severely affected (Stone, 1994). Regular physical activity has a positive effect on the treatment of obesity:

- Increases the amount of energy consumed.
- Increases lean body weight and muscle mass density.
- Increases the durability of the thick and vascular system.
- Increases the basal metabolic rate.
- It provides positive developments in psychological and sociological terms (Güler et al., 2009).

Basal metabolic rate is defined as the energy needed by the individual in a 12-hour rest period in daily life. The concept of the age of basal metabolism can be associated with the basal metabolic rate of the individual. The age of bzal metabolism can also be called the current yaş age of energy.

The aim of this study is to determine which body mass index, body fat weight and body density of body analysis measurements affect the metabolic age of overweight and obese individuals before and after regular physical activity.

Material and Method

Nineteen healthy sedentary overweight and obese male subjects aged 20-29 years participated in the study. Body composition measurements of the study group were made before starting the study and after 12 weeks of regular exercise, the measurements were taken again for the last time. Before starting the study, the Body Mass Index (BMI) measurement ranges determined by the World Health Organization (WHO) were used to determine whether the individuals were overweight or obese. Tanita MC 180 Segmented Body Analysis "was used to determine body density, body fat weight and metabolism age measurements. Before the measurements on the device (before and after the pre-test), the following important factors were taken into consideration in order to increase the reliability and validity of the device measurement:

- None of the subjects had food and fluid intake 4 hours before.
- Subjects were not exercised 12 hours before.
- Each subject urinated 30 minutes before.
- No subject received alcohol 48 hours before the measurement.
- None of the subjects used diuretics 7 days before the measurements.
- Subjects were rested for 5 minutes before the device was measured. Accordingly, the average pulses at rest were determined.

In addition, the content of 3 months of regular exercise is divided into two parts. The first part is the content for aerobic endurance applied to reduce the proportion of body fat available. The second part was the dynamic strength training program to increase the lean muscle mass of individuals. In practice, the order of the movements is given from large muscle groups to small muscle groups.

1. Aerobic program to reduce adipose tissue:

- Training: 60% aerobic
- Training intensity: Moderate intensity, 60-80% Max-Vo2, (Bompa, 1992)
- Duration and frequency of training: 3 days a week between 40-60 minutes
- Total applied time: 12 weeks (3 months)
- Movement includes: 30 minutes exercise bike (18-20km / h), 7 minutes elliptical bike (15-18km / h), 7 minutes stepper (climbing) (6-8km / h),

2. Anaerobic dynamic training program to increase lean muscle mass and body density:

- Front leg (extension)
- Rear leg (flexion)
- Breast press
- Butterfly
- Lat pull down
- Rowing machine
- Shoulder press
- Side opening dumbbells
- Barbell curl

- Pulsh down triceps
- Crunch shuttle
- Roman chair
- Abdominal machine

SPSS Package program was used for statistical analysis of the study measurements. Tespit T test inde was used to determine the pre-test and post-test values, and gres Regression için was used to examine the relationship between multiple independent variables. Significance values were taken as p <0.05.

Results

Table 1: *Is there a significant difference between body mass index measurements before and after regular training of the individuals between 20-29 years of age who apply to sports center?*

Body Mass Index	**N**	**X**	**Ss**	**t**	**p**
First test	19	28,96	4,36	5,725	,000
Last Test	19	26,94	3,99		

When Table 1 is examined, t-test analysis for independent groups performed to determine whether the changes seen in body mass indexes after regular training is significant in favor of regular pre-training body mass index measurements (t18 = 5,725). , p <.05). The mean pre-training body mass index (X = 28.96) of the individuals was higher than the post-training body mass index (X = 26.94).

Table 2: *Is there a significant difference between body fat weight measurements before and after regular training of individuals between 20-29 years of age who apply to sports center?*

Fat weight	**N**	**X**	**Ss**	**t**	**p**
Firs test	19	26,28	9,75	7,325	,000
Last Test	19	22,30	9,12		

When Table 2 is examined, it is seen that there is a significant difference in favor of regular pre-training fat weight measurements for independent groups performed to determine whether the change in fat weights after regular training is significant or not for individuals aged 20-29 years (t18 = 7,325, p). <.05). The pre-training fat weight average of the individuals (X = 26,28) is higher than the post-training fat weight average (X = 22,30). In this case, it was found that fat weight measurements also decreased because the body mass index rates decreased due to 3 months of regular exercise and individuals approached normal weight.

Table 3: *Is there a significant difference between body density measurements before and after regular training of individuals between 20-29 years of age who apply to sports center?*

Body density	**N**	**X**	**Ss**	**t**	**p**
First test	19	1,0304	,01561	-4,700	,000
Last Test	19	1,0381	,01860		

When Table 3 is examined, it is seen that t-test analysis for independent groups performed to determine whether the change in body intensities after regular training is significant or not in favor of regular pre-training body density measurements (t18 = -4,700, p <.05). The mean pre-training body density of the individuals (X = 1,0304) is lower than the average post-training fat weight (X = 1,0381). In this case, it can be said that body densities have increased as a result of decreasing body mass indexes and body fat ratios due to 3 months of regular exercise.

Table 4: *Is there a significant difference between the measurements of metabolic age before and after regular training of individuals who are between 20-29 years old who apply to sports center?*

Metabolic age	**N**	**X**	**Ss**	**t**	**p**

First test	19	29,31	4,546	7,475	,000
Last Test	19	26,63	5,469		

When Table 4 is examined, t-test analysis for independent groups to determine whether the changes seen in the age of metabolism after regular training is significant in favor of regular pre-training metabolism age measurements (t18 = 7,475, p). <.05). The mean age of metabolism before training (X = 29.31) is higher than the mean age of metabolism after training (X = 26.63). In this case, due to the decrease in body mass index and body fat ratios due to 3 months of regular exercise, in contrast to the increase in body densities, a positive decrease was found in the age of metabolism.

Table 5: *To what extent does body mass index, fat weight and body density affect the age of metabolism before exercise?*

Variable	**B**	**Standart Error**	**β**	**t**	**p**	**Binary r**	**Partial r**	**R**	**R²**	**F**	**P**
Costant	151,9	86,132		1,765	,098			,793	,629	8,474	,002
Bmi 1	,916	,358	,879	2,56	,022						,022
Fat weight1	-,234	,211	-,502	-1,11	,284						,284
Body density1	-138,8	82,207	-,477	-1,68	,112						,112

When the Table 5 is examined, the regression analysis conducted to determine how the variables such as fat weight, body mass index and body density which are thought to have an effect on the age of metabolism affect the metabolism age, body mass index, fat weight and body density variables together with metabolic age were significant. (R =, 793; R2 =, 629) (F (3-15) = 8,474, p <.05). Together, these three variables account for 55% of the change in metabolic age. According to standardized regression coefficients, the relative importance order of the independent variables on the age of metabolism was body mass index (β =, 879), fat weight (β = -, 502) and body density (β = -, 477). When the significance tests of regression coefficients were taken into consideration, it was seen that only the body mass index (p <.05) of independent variables had a significant effect on the age of metabolism. When the relationship between the age of metabolism, body mass index (r =, 747), fat weight (r =, 662) and body density (r = -, 639) is correlated with the level.

Table 6: *To what extent does body mass index, fat weight and body density affect metabolic age after 3 months of regular exercise?*

Variable	**B**	**Standart Error**	**β**	**t**	**p**	**Binary r**	**Partial r**	**R**	**R²**	**F**	**P**
Constant	59,43	82,13		,724	,000			,832	,693	11,26	,000
Bmi 2	,769	,375	,561	2,051	,058						,058
Fat weight2	0,92	,228	,154	,403	,692						,692
Body density2	-53,53	77,56	-,182	-,690	,501						,501

When Table 6 is analyzed, regression analysis was conducted to determine the effects of variables such as fat weight, body mass index and body density which are thought to have an effect on the age of metabolism as a result of the regression analysis. (R =, 832; R2 =, 693) (F (3-15) = 11,269, p <.05). The combined effect of these three variables explains 63% of the change in the age of metabolism. According to the standardized regression coefficients, the relative importance order of the independent variables on the

age of metabolism is body mass index (β =, 561), fat weight (β =, 154) and body density (β = -, 182). When the significance tests of the regression coefficients were taken into consideration, it was seen that only the body density (p <.05) of the independent variables had a significant effect on the age of metabolism. When the relationships between independent variables and age of metabolism are examined, there is a correlation between body mass index (r =, 806), fat weight (r =, 778) and body density (r = -, 664).

Discussion

According to Table 1, 3-month regular training for sedentary obese individuals decreased body fat weight ratios of obese individuals. According to this result, it can be said that body mass index measurements are decreasing to the standard level and they are getting rid of obesity because obese individuals have decreased to normal weight with three months of regular exercise. Haneefa et al. (2017), in their study on 100 obese women, divided the women into two groups for 6 months and applied only one diet treatment (1500 kcal per day) to the other group and they applied regular exercise in addition to the diet treatment. As a result, significant decrease in body fat percentage and BMI was found in both groups. This study is similar to and supports our study. Sevimli et al. (2018) found a significant decrease in body mass index of overweight and obese women with the regular exercise they performed on 965 women who participated in volunteering. This study is similar to our study and supports our study.

When Table 2 was examined, it was found that body fat weight measurements decreased due to the decrease in body mass index rates and approaching normal weight due to 3-month regular exercise performed in sedentary obese subjects. It can be said that the decrease in body fat ratio in sedentary obese individuals removes body mass index rates from the risky group. In the study conducted by Yaprak Y. (2004), 41 obese women whose BMI was higher than 30 kg / m2 were subjected to 60 minutes aerobic exercise for 4 weeks. At the end of this exercise program, 7.8% body weight, 5.8kg body fat percentage, BMI 7.5 kg / m2 and waist hip ratio was reduced by 1.2. Yaman H and Atay E. (2007) found significant and significant differences in weight loss in their study. These studies are similar to our study and support our study.

When Table 3 was examined, it was found that body densities were increased in the event that there was an increase in muscle masses as a result of decreasing body mass indexes and body fat rates due to 3 months of regular exercise performed for obese sedentary individuals. As a result, regular exercise decreases the body mass index and fat tissue in an obese sedentary obese individual, while increasing body mass and muscle mass. Katoh et al. (1994) in a study conducted by a total of 14 women for 12 weeks diet (1900-2300kcal / g) were subjected to aerobic exercise for 2 hours a day for 7 days per week (VO2max 60%). As a result, 8.9 kg weight loss, 1.1 kg lean body mass and 7.2 kg fat mass reduction was obtained. This data supports the result of the above study.

When Table 4 is examined, it is observed that body mass indexes and body fat ratios decrease due to 3-month regular exercise performed to obese sedentary individuals and vice versa.

Conclusion

As a result, the concept of the Age of Basal Metabolism is not yet fully defined by scientists. This is due to the large number of organism-related variables. However, the concept of metabolism is expressed as yaşam the totality of life and chemical changes that take place in order to obtain movement and energy in living organisms ". Therefore, if a person's metabolism goes ahead of his or her own age, it is a sign that he will age faster. In this study, based on these considerations, body parameters that have positive or negative effects on the age of metabolism were examined and as a result; body mass index (β =, 561), fat weight (β =, 154) and body density (β = -, 182), respectively. However, among these variables, body mass index and body fat weight increase or increase in body density is adversely affecting the age of metabolism, while body mass index and body fat ratio decrease and body density decreases the metabolic age positively. These results were determined in this study. However, it is important to note that body mass index measurements are very important for individuals to be sedentary. Because body mass index determination in trained and muscular mass densities can be misleading. In this study, especially sedentary and obese individuals are discussed.

Suggestions

In line with these results, it is necessary to pay attention to the low body fat weights and high body densities of the body mass indexes in order to prevent the present age of metabolism in sedentary obese individuals to go beyond their normal age. Regular physical activity and regular nutrition are inevitable for this.

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The Investigation of Basic Psychological Needs of Referees Actively Working in Different Branches

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Abstract

In this study, it is aimed to examine the basic psychological needs of referees who are active in different branches in terms of various variables. For the model of the research, the survey model, one of the quantitative research types, was chosen. The universe of the research is composed of referees working in different branches in Mugla Province and 167 referees whose sample was selected by a randomized sampling method and voluntarily participated in the research. The 8-question "Personal Information Form" organized by the researchers was used to determine the demographic characteristics of the participants, and the "Basic Psychological Needs Scale" was used to determine the basic psychological needs. The data obtained from the form and scale used were analyzed using the SPSS 17 package program. Frequency, percentage, average, and standard deviation values were used in the analysis of the data. Data normal distributions were analyzed with Skewness-Kurtosis values. Since the data showed normal distribution, t-test, and ANOVA tests, which are parametric, were used, and the significance level was accepted as $p < 0.05$. According to the findings of the study, referees' basic psychological needs did not display a significant difference with the variables of age, education level, refereeing time, and refereeing classification. It was found that the needs of the participants in the relatedness sub-dimension were higher than their needs in the other sub-dimensions. As a result, it can be said that the basic psychological needs of the referees participated in the research are high.

Keywords: Referees, Psychological, Working, Investigation

1. Introduction

Today, the effect of psychological factors on performance on sports environments has become the center of attention of sports psychologists and other scientists (psychology, sports sciences, etc.) (1). The concept of need is defined by Morgan (2) as any physiological and subsequent failure or deficiency of a person. The needs and expectations of people in life are unlimited and endless. As such, individuals make particular demands based on unlimited and endless needs expectations. As these needs of individuals are met, they create more demands and expectations, and these demands and expectations start to increase (3). As some physiological needs of individuals are met, they expect to meet some psychological needs in the hierarchies of need (3). Individuals feel happy or unhappy whether these needs are met, or these demands are inadequate. According to the Self-Determination Theory, individuals share three basic psychological needs situations that show positive characteristics and have inherent competence, autonomy, and relationship needs, if they are supported in interaction processes, which have positive and negative results (3, 4, 5).

The need for autonomy is a situation in which individuals have the feeling of behaving by making choices rather than feeling compulsory behaviors in their activities (5, 6). The need for autonomy has been explained by Ryan and Brown (7) as a situation in which a person can decide freely and take the initiative in their behavior (6). The need for competence is known as the urge to affect one's surroundings well and the ability to interact well with the environment (6). The need for competence is known as the sum of interaction, achievements, and harmony in which the individual engaged. Meeting the need for competence is possible only if the person feels sufficient in the process of producing the results he/she expects or feels that he/she is getting better in this process (6, 8, 9, 10, 11). The need for relatedness, according to Andersen et al. (12), gives mutual care, respect, and trust to other people and includes sensitivity, emotional acceptance, and warmth (6).

One of the most important actors of the football game is the referees. The referees can directly or

indirectly affect the football game and its followers with the decisions they make or do not. The game also has a big share in making the game more beautiful and more interesting (13). When the literature is examined, it is primarily considered necessary for people such as teachers, coaches, administrators and parents who take care of these needs, motivate and control other people in order to prevent the negativities that may arise due to basic psychological needs concepts (14). These negativities can put the referees in the sport into big problems. In this regard, determining the basic psychological needs of referees is vital for the study. It is observed that many studies have been carried out on psychological needs, especially after the 2000s, from mathematicians to athletes, academicians to nurses, and students to sedentary individuals (15, 16, 17, 18, 19). However, there are very few studies on determining the psychological needs of referees. Since it is known that the individuals who serve as referees in the sports environment are under enormous pressure during the competition (20), different studies are needed to determine the psychological needs of the referees, and this is another importance of the research. We aimed to examine the basic psychological needs of the referees actively working in this research in terms of various variables. For this purpose, we have determined the following hypotheses:

1- The basic psychological needs of the referees differ according to gender.
2- The basic psychological needs of the referees differ according to age groups.
3- The basic psychological needs of the referees do not vary by the level of education.
4- The basic psychological needs of the referees vary according to the year of refereeing.
5- The basic psychological needs of the referees vary by category.

2. Method

2.1. Research Model

For the model of the research, the survey model, one of the quantitative research types, was chosen.

2.2. Study Group

The universe of the research is composed of referees working in different branches in Mugla Province and 167 referees whose sample was selected by a randomized sampling method and voluntarily participated in the research.

2.3. Data Collection Instrument

The 8-question "Personal Information Form" organized by the researchers was used to determine the demographic characteristics of the participants. The Basic Psychological Needs Scale, developed by Deci and Ryan (4) and adapted to Turkish by Kesici et al. (21), was used to determine the basic psychological needs. The scale is a five-point Likert type and consists of 3 sub-dimensions and includes a total of 21 questions. The scale is scored as "Very accurate: 5", "Correct: 4", "A little Correct: 3", "Not Correct: 2", "Not Correct at all: 1". The scores obtained by the participants from items in the sub-dimensions are summed up, and the scale score in 3 sub-dimensions is obtained for each person. These dimensions are; "Need for Autonomy," "Need for Competence," and "Need for Relatedness" (4). The total highest score on the scale is 35, and the lowest score is 7. As the score increases, the people feel that their psychological needs are met, and as it decreases, they feel that their psychological needs are not met. In need for competence sub-dimension, the highest score can be 30, the lowest one can be 6 ', while the highest in need for relatedness can be 40, the lowest one can be 8. The sub-dimensions consist of the following questions.

Need for Autonomy: 1, 4, 8, 11, 14, 17, 20.
Need for Competence: 3, 5, 10, 13, 15, 19.
Need for Relatedness: 2, 6, 7, 9, 12, 16, 18, 21.
Cronbach's Alpha (α) value for the "Basic Psychological Needs Scale" was found to be 0.73.

2.4. Data Analysis

The data obtained from the form and scale used were analyzed using the SPSS 17 package program. Frequency, percentage, average, and standard deviation values were used in the analysis of the data. Data normal distributions were analyzed with Skewness-Kurtosis values. Since the data showed normal

distribution, t-test, and ANOVA tests, which are parametric, were used, and the significance level was accepted as p <0.05.

3. Results

The descriptive statistics test, T-test and ANOVA test results in order to determine whether the basic psychological needs of the referees differ according to various variables are presented in this part of the research conducted in order to examine the basic psychological needs of referees working in different branches in terms of various variables.

Table 1. *Demographic characteristics of the referees*

Variable		n	%
Gender	Female	40	24
	Male	127	76
Age	18 years and under	19	11.4
	Between 19-22 years	63	37.7
	Between 23-25 years	47	28.1
	Between 26-29 years	22	13.2
	30 years and above	16	9.6
Educational Level	High school education	25	15
	Associate education	5	3
	Undergraduate education	125	74.9
	Postgraduate education	12	7.1
Year of Refereeing	One year and below	74	44.3
	Between 2 and 3 years	70	41.9
	Between 4 and 5 years	13	7.8
	Six years and over	10	6
Classification	Province	66	39.5
	Candidate	93	55.7
	National	6	3.6
	Observer	2	1.2
Total		**167**	**100**

Table 2. *Differences between genders in terms of basic psychological needs*

Variable	Gender	n	Mean	SD	df	t	p
Autonomy	Female	40	23.2000	2.93694	165	.411	.682
	Male	127	22.9843	2.88396			
Competence	Female	40	20.2250	2.49602	165	-.678	.499
	Male	127	20.4961	2.10771			
Relatedness	Female	40	27.8500	2.75076	165	1.863	.064
	Male	127	26.9528	2.62726			

(p>0.05)

Table 2 presents the difference between genders in terms of basic psychological needs. There were no significant gender differences regarding basic psychological needs (p>0.05). It was also found that the relatedness needs of the participants were higher than their needs in the other sub-dimensions.

Table 3. *Differences between age groups in terms of basic psychological needs*

Variable	Age	n	Mean	SD	f	p
Autonomy	18 years and under	19	22.3158	2.74980	.760	.553
	Between 19 and 22 years	63	23.0159	3.28973		
	Between 23 and 25 years	47	22.8723	2.48138		
	Between 26 and 29 years	22	23.5000	2.28348		
	30 years and above	16	23.8125	3.27045		
Competence	18 years and under	19	20.7895	2.01602		
	Between 19 and 22 years	63	20.6825	2.37477		

	Between 23 and 25 years	47	20.0000	2.20671	.810	.520
	Between 26 and 29 years	22	20.2727	1.69542		
	30 years and above	16	20.5000	2.33809		
Relatedness	18 years and under	19	27.1579	2.33959		
	Between 19 and 22 years	63	27.5556	3.04683		
	Between 23 and 25 years	47	26.8936	2.38869	.956	.433
	Between 26 and 29 years	22	26.4091	2.08530		
	30 years and above	16	27.5000	2.98887		

(p>0.05)

Table 3 displays the differences between age groups in terms of basic psychological needs. There were no significant differences between age groups regarding autonomy, competence, and relatedness (p>0.05). It was also found that the relatedness needs of the participants were higher than their needs in the other sub-dimensions.

Table 4. *Differences between referees according to their educational levels in terms of basic psychological needs*

Variable	Educational Level	n	Mean	SD	f	p
Autonomy	High school education	25	23.0000	3.70810	.086	.968
	Associate education	5	22.4000	1.14018		
	Undergraduate education	125	23.0640	2.83908		
	Postgraduate education	12	23.0833	2.10878		
Competence	High school education	25	21.1200	2.33310	1.598	.192
	Associate education	5	19.0000	1.87083		
	Undergraduate education	125	20.3680	2.18697		
	Postgraduate education	12	20.2500	2.00567		
Relatedness	High school education	25	27.0800	2.30796	1.172	.322
	Associate education	5	25.8000	.83666		
	Undergraduate education	125	27.3360	2.80824		
	Postgraduate education	12	26.1667	2.24958		

(p>0.05)

Table 4 shows the differences between referees according to their educational levels in terms of basic psychological needs. There were no significant differences between referees according to their educational level in terms of autonomy, competence, and relatedness. It was also found that the relatedness needs of the participants were higher than their needs in the other sub-dimensions.

Table 5. *Differences between referees according to the year of refereeing in terms of basic psychological needs*

Variable	year of refereeing	n	Mean	SD	f	p
Autonomy	One year and below	74	22.9189	2.50893	.218	.884
	Between 2 and 3 years	70	23.2286	3.00806		
	Between 4 and 5 years	13	23.0000	4.61880		
	Six years and over	10	22.6000	2.11870		
Competence	One year and below	74	20.4730	2.06220	.145	.933
	Between 2 and 3 years	70	20.4286	2.26230		
	Between 4 and 5 years	13	20.5385	2.84650		
	Six years and over	10	20.0000	2.16025		
Relatedness	One year and below	74	27.3108	2.47688	.539	.656
	Between 2 and 3 years	70	27.1143	2.65692		
	Between 4 and 5 years	13	27.3846	3.15009		
	Six years and over	10	26.2000	3.70585		

(p>0.05)

Table 5 shows the differences between referees according to the year of refereeing regarding basic

psychological needs. There no significant differences between referees according to the year of refereeing (p>0.05). It was also found that the relatedness needs of the participants were higher than their needs in the other sub-dimensions.

Table 6. *Differences between referees according to the classification in terms of basic psychological needs*

Variable	Classification	n	Mean	SD	f	p
Autonomy	Province	66	23.4242	3.27724	1.008	.391
	Candidate	93	22.8387	2.64694		
	National	6	21.6667	1.63299		
	Observer	2	23.5000	2.12132		
Competence	Province	66	20.5606	2.50617	1.133	.337
	Candidate	93	20.4409	1.97518		
	National	6	18.8333	2.04124		
	Observer	2	20.5000	.70711		
Relatedness	Province	66	27.5758	2.67789	1.292	.279
	Candidate	93	26.9462	2.59751		
	National	6	25.8333	3.81663		
	Observer	2	28.0000	1.41421		

(p>0.05)

Table 6 presents the differences between referees according to the classification in terms of basic psychological needs. The basic psychological needs did not differ according to the classification. It was also found that the relatedness needs of the participants were higher than their needs in the other sub-dimensions.

4. Discussion and Conclusion

This study aimed to examine the basic psychological needs of referees acting in different branches in terms of various variables. In this section, the results obtained from the research findings and the relationship of these results with the related literature are discussed, and suggestions are made for other studies to be conducted.

The first hypothesis was, "The basic psychological needs of the referees differ according to gender." The results showed no significant differences between genders in terms of basic psychological needs (Table 2). This hypothesis was rejected. This result supported the results of Akdeniz et al. (22) results. The results in Autonomy was supported by some findings in the literature (14, 21). In need of competency sub-dimension, the study findings of Ryan, et al (23) contrast to the findings of this study. In relatedness, while our findings were parallel with the results of Arslanoğlu et al. (14), Sünbül, et. al (24), a contrast to Celikkaleli and Gündoğdu (25). On the other hand, according to the research findings, the needs of female referees in autonomy and relationship sub-dimensions are higher than that of men. It is supported by the literature that women are raised in a more closed environment than men, and that women feel higher autonomy and relationship psychological needs than men in the environment in which they get rid of this environment as a result of the oppressive attitude of women (25).

The second hypothesis was "the basic psychological needs of the referees differ according to age groups." There were no significant differences between age groups, and the second hypothesis was rejected. However, some results in the literature supported our results. The results of Yigit (26), Ekici et al. (27) supported these results by reporting no significant differences between genders. Kolayis, et al. (28) reported no significant differences between age groups in terms of autonomy. Bayraktar and Kuru (29) reported no significant differences between age groups regarding autonomy and relatedness. Akdeniz et al. (22) found no significant differences in terms of autonomy and competence. Some results in the literature are in contrast to our results. Kolayis, et al. (28) reported significant age differences in competence and relatedness, while Bayraktar and Kuru (29) found significant differences between age groups in competence. In the study of Akdeniz, et al. (22), a significant difference was found in relatedness.

On the other hand, scores in relatedness are higher than the scores in other sub-dimensions in each

age group. The relatedness is associated to the relationship of the individuals with the people who are important to them in the social environment, the feeling of being loved as a result of the relationship they establish with them, that they feel to be embraced and belonging to that environment (30). Therefore, it can be seen that this dimension is felt higher in every age group.

The third hypothesis was that "the basic psychological needs of the referees do not vary by the level of education." There were no significant differences between educational levels in terms of basic psychological needs (Table 4). This hypothesis is accepted. There studies parallel to our findings. The findings of Kaya et al. (17) are similar to those of this study. In the study of Arslanoğlu et al. (14), no significance was found between the education level variable regarding the sub-dimensions of the basic psychological needs scale. Different study findings are not similar to the findings of the study. In the study of Akdeniz et al. (22), a significant difference was found in the relationship between education level and autonomy and competence sub-dimensions. On the other hand, the scores obtained from the relatedness sub-dimension at each level of education are higher than the scores from other sub-dimensions.

The fourth hypothesis was "the basic psychological needs of the referees vary according to the year of refereeing." There were no significant differences between the year of refereeing in terms of basic psychological needs (Table 5). This hypothesis was rejected. In Bayraktar and Kuru (29) study, a significant difference was found in all of the scale sub-dimensions. This finding is not similar to the findings of the study. On the other hand, the scores obtained from the relatedness sub-dimension are higher than the other sub-dimensions according to the year of refereeing. Some phenomena such as experiences, dialogues with other people, and a feeling of self-efficacy can lead to this situation (29).

The fifth hypothesis was that "the basic psychological needs of the referees vary by category." There were no significant differences between classification in terms of basic psychological needs (Table 6). This hypothesis was rejected. Different studies in the literature show parallel to study findings. In Bayraktar and Kuru (29) study, no significance was found in the classification variable of the referees in the sub-dimensions of autonomy and competence. In the study of Arslanoglu et al. (14), no significant difference was found between classifications in terms of the sub-dimensions of the basic psychological needs. Some findings are not similar to the findings of the study. Bayraktar and Kuru (29) found significant differences between classifications in terms of relatedness. On the other hand, in the classification variable, the scores obtained from the relatedness need sub-dimension are higher than the scores from other sub-dimensions. The variability of these needs among categories is also supported by the literature (29).

Consequently, it can be said that the basic psychological needs of the referees participating in the study are high. According to the findings of the study, referees' basic psychological needs did not display significant differences with the variables of age, education level, refereeing time, and refereeing classification. It was found that the needs of the participants in the relatedness sub-dimension were higher than their needs in the other sub-dimensions.

Based on the findings of the research, the following suggestions can be made for future studies:

1- More diverse and larger sample groups can be included in future research.

2- Working with referees in all classifications can enrich the research.

3- Adequate and necessary supports can be provided to referees who are not sufficient in terms of need.

4- Referees working in different branches can be compared.

Conflict of Interest

The authors declare that they have no conflict of interest.

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Investigation of the Relationship between the Leadership Characteristics and Sportsmanship Orientations of Amateur Football Players

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Abstract

This study has been designed to investigate the relationship between amateur football players' leadership characteristics and sportsmanship orientations. 205 amateur football players, who compete in the amateur football league in Konya and were determined by convenience sampling method, participated in the study on a voluntary basis. A questionnaire was used to collect data. In addition, the Leadership Orientation Scale including 4 sub-dimensions with 8 items each and developed by Bolman and Deal and adapted to Turkish by Dereli to determine the leadership characteristics of amateur football players as well as the Multi-dimensional Sportsmanship Orientation Scale including 5 sub-dimensions and 25 items and developed by Vallerand et al. (1997) and adapted to Turkish by Balçıkanlı (2010) were used in the study. In the analysis of the data, the percentage and frequency were used to determine the distribution of the personal information of the participants, and the skewness and kurtosis values of the data were checked to determine whether the data showed a normal distribution. In addition to descriptive statistical models, Anova and correlation analysis methods were used in the statistical analysis of data ($\alpha = 0.05$). As a result, it was concluded that there was a significant difference between the sub-dimensions of the leadership orientation scale and the multidimensional sportsmanship orientation scale according to the age variable, and a positive correlation between the two scales according to the correlation analysis conducted between the leadership orientation scale and the multidimensional sportsmanship orientation scale. According to the position variable, no significant difference was found in the leadership orientation scale and multidimensional sportsmanship orientation scale. The current limitations of the research and evaluations for possible future studies have been discussed in this context.

Keywords: Amateur football players, Leadership, Sportsmanship

1. Introduction

In today's constantly evolving and changing world along with the effect of technology and environmental factors, there is a need for knowledgeable, talented, and experienced leaders in sports institutions and organizations such as public and private sector organizations. Because sporting events are the most common and it's one of the effective social institutions [1]. It is expected that the club coach and team captains will have leadership characteristics in addition to the leadership characteristics of other players in the team, particularly in football, which has the most audience in terms of its economic, social and cultural characteristics. Sportive activities contribute to the physiological, sociological, psychological and moral developments [2]. Given the amateur football clubs, it can be observed that the teams with the leadership characteristics are more successful than the competitors and reach the intended goals much faster [3].

The leader is defined as the person who guides, communicates and influences his followers by gathering a community in line with certain goals. Leadership, on the other hand, is defined as the ability to motivate the members of the group that the leader has gathered around, to mobilize them towards the specified goals and to achieve those goals successfully [4].

Leadership is a structure that enhances the mechanism between the organization's building block, its environmental and individual analysis through processes such as motivating the existence of the organization, being able to make decisions, telecommunication and having the control [5].

Fair play is considered as an idea that acts with the principle of equality without deviating from the fair play, even in situations that are difficult in the competition, stating the truth even if it is advantageous, and adopting and valuing opponents by approaching them in a friendly way with the thought that they have the same level of rights [6].

Leaders are obliged to develop various strategies within the framework of fair play by considering both their competitors and other environmental factors while achieving their goals. While determining these strategies, leaders are expected to make and implement plans in accordance with the ethical and moral norms of the society they live in and the organization they work with. Fair-play, which is an important element for the sports world, appears as a rising ethical value for all branches [3].

The researcher of this study believes that there should be a strong connection between the leadership characteristics of athletes and fair-play orientations. At the same time, the lack of sufficient domestic and international scientific research on the relationship between amateur football players' leadership characteristics and fair-play orientations has been a significant factor to carry out this study.

2. Method

205 amateur football players, who compete in the amateur football league in Konya and determined by convenience sampling method, participated in the study on a voluntary basis. A questionnaire was used to collect data. The questionnaire consists of two sections. The personal information section of the form includes the participants' age, education level, sports age, and position. In addition, the Leadership Orientation Scale developed by Bolman and Deal and adapted to Turkish by Dereli to determine the leadership characteristics of amateur football players as well as the Multi-dimensional Sportsmanship Orientation Scale developed by Vallerand et al. and adapted to Turkish by Balçıkanlı were used in the study [7; 8; 9; 10].

2.1. Data Collection Tools

The Leadership Orientation Scale developed by Bolman and Deal and adapted to Turkish by Dereli was used to determine the leadership characteristics of amateur football players [7; 8]. The Leadership Orientation Scale consists of 32 items in total. The 4 sub-dimensions of the scale include 8 items. The scale was used to determine the leadership orientation of the scale players with 4 sub-dimensions: Human Leadership (Items 2, 6, 10, 14, 18, 22, 26 and 30), Structural Leadership (Items 1, 5, 9, 13, 17, 21, 25 and 29), Transformational Leadership (3 7, 11, 15, 19, 23, 27 and 31) and Charismatic Leadership (4, 8, 12, 16, 20, 24, 28 and 32 items). The 5-point Likert type scale was scored according to the answers given, as 1: never, 2: sometimes, 3: rarely, 4: often, 5: always. In addition, the multi-dimensional sportsmanship orientation scale developed by Vallerand et al. and adapted to Turkish was used by Balçıkanlı [7; 8]. Multidimensional Sportsmanship Orientation Scale (MSOS-25) is a 5-point Likert type scale and consists of 5 sub-dimensions and 25 items, including compliance with social norms, respect for rules and management, commitment to responsibilities in sports, respect for the opponent and negative approaches.

2.2. Statistical Analysis

In the analysis of the data obtained in the study, the percentage and frequency were used to determine the distribution of the personal information of the participants, and the skewness and kurtosis values of the data were checked to determine whether the data showed a normal distribution. As a result of the analyses, it was determined that the data has a normal distribution. According to Jondeau and Rockinger, when the coefficients of skewness and kurtosis of the sub-dimensions range between +3 and -3, these sub-dimensions are suitable for normal distribution parameters [9]. In addition to descriptive statistical models, Anova and correlation analysis methods were used in the statistical analysis of data ($\alpha = 0.05$).

3. Results

As shown in Table 1, the mean scores of experimental and control groups are nearly the same, indicating equality of two groups regarding their knowledge of targeted structures.

Table 1. *Distribution of the Scale Scores*

Sub-dimensions	Number of Items	N	Mean	Ss	Skewness	Kurtosis
LYÖ 1 (Human Leadership)	8	205	34.88	2.41	-1.14	2.46

LYÖ 2 (Structural Leadership)	8	205	34.63	2.72	-1.16	3.20
LYÖ 3 (Transformational Leadership)	8	205	33.95	3.05	-1.25	2.24
LYÖ 4 (Charismatic Leadership)	8	205	33.58	2.87	-1.28	4.16
ÇBSYÖ 1 (Compliance with social norms)	5	205	19.67	2.78	-.474	.209
ÇBSYÖ 2 (Respect for rules and management)	5	205	20.87	2.19	-.461	.194
ÇBSYÖ 3 (commitment to responsibilities in sports)	5	205	21.66	1.70	-.180	-.345
ÇBSYÖ 4 (Respect for the opponent)	5	205	18.99	3.20	-.400	-.896

The averages of the scores of the participants in the study within the sub-dimensions of leadership orientation scale and multidimensional sportsmanship orientation scale are given in Table 1. Accordingly, it was determined that the highest averages in the leadership orientation scale were in the "Human Leadership" sub-dimension with 34.88 and in the "Commitment to Responsibilities in Sports" sub-dimension with 21.66 in the multidimensional sportsmanship orientation scale. In addition, considering skewness and kurtosis values, it was determined that the data were suitable for normal distribution.

***Table 2**. Demographic Information of Participants*

Variables		f	%
Age	16-18	45	22.0
	19-21	31	15.1
	22-24	61	29.8
	25-27	43	21.0
	28-30	15	7.3
	31 and over	10	4.9
	Total	**205**	**100**
Place of living	Metropolis	1	.5
	City Centre	144	70.2
	County Town	57	27.8
	Village	3	1.5
	Total	**205**	**100**
Amateur Football History	0-2 years	42	20.5
	3-4 years	74	36.1
	5-6 years	54	26.3
	7 years and over	35	17.1
	Total	**205**	**100**

Position	Goalkeeper	28	13.7
	Centre-back	42	20.5
	Back	39	19.0
	Midfield	52	25.4
	Forward	44	21.5
	Total	**205**	**100**
Income	Low	24	11.7
	Middle	116	56.6
	High	64	31.2
	Very high	1	.5
	Total	**205**	**100**
Educatıon	Secondary	4	2.0
	High School	69	33.7
	University	118	57.6
	Graduate	14	6.8
	Total	**205**	**100**
Mother's Education	Illiterate	7	3.4
	Elementary	105	51.2
	Secondary	59	28.8
	High School	28	13.7
	University	6	2.9
	Total	**205**	**100**
Father's Education	Elementary	22	10.7
	Secondary	63	30.7
	High School	83	40.5
	University	37	18.0
	Total	**205**	**100**

As it can be seen in Table 3, 29.8% of the participants within the scope of the study are in the 22-24 age range, 70.2% of them live in the city centre, 36.1% of them have an amateur football history of 3-4 years, and 25.4% of them are midfield players, It was determined that 56.6% of them have a middle income, 57.6% of them have a high school education level, mother's education level of 51.2% of them is elementary school and father's education level of 40.5% of them is high school.

Table 3. *The ANOVA test results According to the age variable*

Sub-dimensions	**Variable**	**Mean**	**Ss**	**F**	**p**
LYÖ 1 (Human Leadership)	16-18	34,7778	2,24508	1,971	,084
	19-21	34,7419	2,27988		
	22-24	34,5902	2,55197		
	25-27	34,7209	2,40362		
	28-30	36,2667	1,22280		
	31 and over	36,3000	3,40098		

LYÖ 2 (Structural Leadership)	16-18	34,3778	2,35767	3,415	,006
	19-21	33,3226	2,78552		
	22-24	34,6721	2,94800		
	25-27	35,0000	2,46885		
	28-30	35,4667	1,68466		
	31 and over	36,8000	3,29309		
LYÖ 3 (Transformational Leadership)	16-18	34,0667	2,55307	1,010	,413
	19-21	33,3226	3,42916		
	22-24	33,5574	3,34427		
	25-27	34,3953	2,92069		
	28-30	34,5714	2,20887		
	31 and over	35,0000	3,62093		
LYÖ 4 (Charismatic Leadership)	16-18	34,5778	2,36920	2,049	,073
	19-21	33,0645	3,17212		
	22-24	32,9508	3,10605		
	25-27	33,9070	2,61692		
	28-30	33,4667	2,44560		
	31 and over	33,3000	3,46570		
ÇBSYÖ 1 (Compliance with social norms)	16-18	19,6444	3,31769	,614	,689
	19-21	19,9032	2,27090		
	22-24	19,3443	2,85707		
	25-27	19,7442	2,64659		
	28-30	20,6667	2,58199		
	31 and over	19,4000	2,17051		
ÇBSYÖ 2 (Respect for rules and management)	16-18	20,9556	2,53122	,662	,653
	19-21	20,7097	2,35504		
	22-24	20,6230	2,02619		
	25-27	21,1628	2,01104		
	28-30	21,4667	1,99523		
	31 and over	20,4000	2,27058		
ÇBSYÖ 3 (Commitment to responsibilities in sports)	16-18	21,6667	1,66515		
	19-21	21,0000	1,52753		

	22-24	21,6066	1,54141		
	25-27	22,1395	1,78060		
	28-30	22,0000	2,00000		
	31 and over	21,6000	2,17051	1,780	,118
ÇBSYÖ 4 (Respect for the opponent)	16-18	21,0222	2,46327		
	19-21	19,5484	3,05329		
	22-24	18,6230	3,20502		
	25-27	17,9302	3,11979		
	28-30	18,0667	3,19523	7,500	,000
	31 and over	16,4000	2,27058		

According to the analysis of the Anova test conducted between the sub-dimensions of the leadership orientation scale and the multidimensional sportsmanship orientation scale according to the age variable, there was a significant difference in the "Respect for the Opponent" sub-dimension in the multidimensional sportsmanship orientation scale (p> 0.05).

Table 4. *The ANOVA test results According to the position variable*

Sub-dimensions	**Variable**	**Mean**	**Ss**	**F**	**p**
LYÖ 1 (Human Leadership)	Goalkeeper	35,0714	2,63774		
	Centre-back	34,7857	1,90680		
	Back	35,0769	2,60954	,204	,936
	Midfield	34,6923	2,45380		
	Forward	34,9318	2,57355		
LYÖ 2 (Structural Leadership)	Goalkeeper	34,4286	3,65583		
	Centre-back	34,7619	2,15055		
	Back	35,0256	2,64065	,340	,851
	Midfield	34,5000	2,33053		
	Forward	34,4545	3,08375		
LYÖ 3 (Transformational Leadership)	Goalkeeper	33,7500	4,41064		

	Centre-back	34,0952	2,50667		
	Back	33,3590	3,12450	,688	,601
	Midfield	33,9804	2,49391		
	Forward	34,4318	3,07577		
LYÖ 4 (Charismatic Leadership)	Goalkeeper	33,7500	3,47078		
	Centre-back	33,3333	2,56303		
	Back	33,2308	3,48275	,372	,828
	Midfield	33,8462	2,16374		
	Forward	33,7045	2,98508		
ÇBSYÖ 1 (Compliance with social norms)	Goalkeeper	19,1429	2,60646		
	Centre-back	19,2381	2,87809		
	Back	19,9231	2,64957	,877	,479
	Midfield	19,7692	2,77676		
	Forward	20,1136	2,94299		
ÇBSYÖ 2 (Respect for rules and management)	Goalkeeper	20,3929	2,61533		
	Centre-back	20,9286	2,04096	,405	,805
	Back	20,8718	1,96254		
	Midfield	20,9808	2,32202		
	Forward	21,0000	2,14585		
ÇBSYÖ 3 (Commitment to Responsibilities in sports)	Goalkeeper	21,4643	1,83550		

	Centre-back	21,8571	1,52334		
	Back	22,0513	1,55511		
	Midfield	21,3846	1,62280		
	Forward	21,6136	1,96736	1,097	,359
ÇBSYÖ 4 (Respect for the opponent)	Goalkeeper	19,3571	3,24567		
	Centre-back	18,9286	3,18068		
	Back	17,9231	3,42118		
	Midfield	19,2308	3,39905	1,546	,190
	Forward	19,5000	2,62811		

According to the analysis of the Anova test conducted between the sub-dimensions of the leadership orientation scale and the multi-dimensional sportsmanship orientation scale according to the position variable, no significant difference was found (p> 0.05).

Table 5. *Correlation analysis Table related to the Relationship between the Leadership Orientation Scale and the Multi-Dimensional Sportsmanship Orientation Scale*

		LYÖ 1	LYÖ 2	LYÖ3	LYÖ4	ÇBSYÖ1	ÇBSYÖ2	ÇBSYÖ3	ÇBSYÖ4
LYÖ 1	R	1							
	p								
	N	205							
LYÖ 2	R	,599**	1						
	p	,000							
	N	205	205						
LYÖ 3	R	,571**	,598**	1					
	p	,000	,000						
	N	204	204	204					
LYÖ 4	R	,498**	,464**	,580**	1				
	p	,000	,000	,000					
	N	205	205	204	205				
ÇBSYÖ 1	R	,037	-,010	,096	,067	1			
	p	,600	,889	,170	,341				
	N	205	205	204	205	205			
	R	,092	,197**	,185**	,152*	,339**	1		

ÇBSYÖ 2	p	,192	,005	,008	,029	,000			
	N	205	205	204	205	205	205		
ÇBSYÖ 3	R	,209**	,290**	,138*	,050	,122	,275**	1	
	p	,003	,000	,050	,472	,081	,000		
	N	205	205	204	205	205	205	205	
ÇBSYÖ 4	R	-,037	-,026	,101	,281**	,240**	,069	-,161*	1
	p	,594	,711	,151	,000	,001	,326	,021	
	N	205	205	204	205	205	205	205	205
** 0.01									
*0.05									

According to the correlation analysis between the leadership orientation scale and the multidimensional sportsmanship orientation scale, it was concluded that there was a positive significant relationship between the two scales.

4. Discussion and Conclusion

This study has been designed to examine whether amateur football players' leadership characteristics and sportsmanship orientation levels vary according to various variables such as age and position. Data were collected from a total of 205 players playing in amateur football teams in Konya province via questionnaire.

It was determined that 29.8% of the participants within the scope of the study are in the 22-24 age range, 70.2% of them live in the city centre, 36.1% of them have an amateur football history of 3-4 years, and 25.4% of them are midfield players, It was determined that 56.6% of them have a middle income, 57.6% of them have a high school education level, mother's education level of 51.2% of them is elementary school and father's education level of 40.5% of them is high school.

According to the analysis of the Anova test conducted between the sub-dimensions of the leadership orientation scale and the multidimensional sportsmanship orientation scale according to the age variable, there was a significant difference in the "Respect for the Opponent" sub-dimension in the multidimensional sportsmanship orientation scale. In the study of Çelikdağ, which is partially similar to the findings we obtained in the research [12], it was found that the leadership orientation scale's human resources framework, structural framework, and political framework sub-dimensions differ significantly according to the age variable. In his study regarding amateur football players, Çakıcı determined that there was a significant difference in some sub-dimensions according to the age variable in the leadership orientation scale and multi-dimensional sportsmanship orientation scale [3]. In his study on university students, Çar, did not find a significant difference in the sub-dimensions of the leadership orientation scale according to the age variable [13].

According to the Anova test conducted between the leadership orientation scale and the multidimensional sportsmanship orientation scale according to the position variable, there was no significant difference. Studies in literature reveal that the results are similar to our study. Akpınar and Küçükakçeken, stated that there was no significant difference according to the position variable in their study designed to examine the fair play understanding of the athletes playing football in amateur clubs [14]. The study conducted by Kalkavan to examine the sportsmanship perceptions of different players also revealed that there is no significant difference according to the position variable [15].

According to the correlation analysis between the leadership orientation scale and the multidimensional sportsmanship orientation scale, it was concluded that there was a positive significant relationship between the two scales. According to the results, as the amateur footballers' tendency towards leadership increases, the dimensions of sportsmanship orientation increase. In his study, Çakıcı reported that there was a positive and low-level relationship between the leadership orientation scale and the multidimensional sportsmanship orientation scale [3].

Conflict of Interests

The authors declare that there is no conflict of interest

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Investigation of the Effects of 8 Week Core Training Applied to University Students on Dynamic Balance

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Abstract

Introduction and purpose:The aim of this study was to investigate the effects of eight-week practice training on the dynamic balance performance of students taking the courses of Physical Education and Sport College. The sample of the study consisted of the core training experimental group (n = 14) who took the elective tennis lesson in the Department of Physical Education Teaching at the Karamanoğlu Mehmetbey University School of Physical Education and Sports and the control group from the Sports Management department (n = 12) taking the elective tennis course.The changes in the dynamic balance performance of the participants after eight week core training applications were examined.

Method: In addition to tennis lessons, core training was applied to experimental group 3 days a week for 8 weeks, the control group only participated in tennis lessons. Dynamic balance test measurements of the experimental and control groups were taken before and after the 8-week training program.Pre-test and post-test experimental method was used in the study.

Findings:The normal distribution assumption of the data was checked using skewness-kurtosis and histogram. ANOVA test was applied for the mixed measurements of 2 (group) x 8 (direction). The error level (α) was accepted as 0.05 for all statistical methods. A significant difference was found between the pre-test and post-test values of both groups ($F(4.37, 104.90)= 63.75$, $p<.05$). The final test values of the groups in 8 directions increased significantly. In order to check whether there is a significant difference between the groups, in the analysis results no significant difference was found between the experimental and control groups ($F (1, 24) = .20$, $p> .05$).

Result:As a result, a significant difference was observed in the pre and post test values of the experimental and control groups of 8 week core training applications. However, a positive effect on balance performance of participants taking tennis lessons was observed, too.

Keywords: Balance, Core, Tennis

1. Introduction

The definition of core stated that the most effective position of the spine and protect this position by being supported by the abdominal and spine muscles during a movement (1). Akuthota and Nadler (2). defined the core strenght as muscular control required in that area to ensure functional stability of the lumbar spine.

Although there are many definitions about the concept of core, the common point where these definitions meet is that the place called core is the center of the body, makes muscles in the center work and provides a proper posture by being strengthered of the central muscles by exercises.In addition, core exercises used as dynamic and static training improve core balance and strength by developing proprioceptive senses and providing muscular healing and body control (3). In sports performance research the central region; abdominal, waist and hips are taken to the focal point, the region between the sternum (rib cage) and kness is accepted (4).In many sports branches, during a movement with the arms and legs, the components of the force appear to disturb the balance state of the body.When a tennis ball or a soccer ball is hit, momentum due to movement of arms and legs force the trunk to move in the opposite direction with the arms and legs.To produce the desired level of force from the arms and legs and to maintain the movement in the same direction as desired, the muscles of the core should keep the spine in balance (5).

Balance exercises help to control body movements and move symmetrically. It also allows the right-left regions of the body to improve balance and range of motion equally. Balance feature as in many other branches, it also takes part in tennis players within important coordination features (6). The effects of core

training on dynamic balance investigated in the study on tennis athletes. Experimental group showed a positive development in the dynamic balance feature as a result of 5 weeks of core training (7). Cosio-lima et al. (8). in his study compared 5-week corestability with pilates ball and balance training with traditional training. According to one foot balance values, the results showed that positive progress of the core stability and balance training group. Recent research demonstrated the importance of balance and range of motion in improving sporting performance. The aim of the study is to reveal the importance of the effects of 8 weeks of regular core training on the balance characteristics of the students taking tennis lessons at The School of Physical Education and Sports.

2. Material and Method

The study group of the research consisted of the core training experimental group (n=14) participant students which takes elective tennis lessons from The Karamanoğlu Mehmetbey University School of Physical Education and Sports and the control group (n = 12) who took the elective tennis course from the Department of Sports Management. Star balance test was applied to both groups for dynamic balance measurement.

2.1. Data Collection

Body weight measurements of the subjects were measured with electronic scales with a sensitivity of 0.1 kg (SECA, Germany) (9).

2.2. Height and Leg Length

Length and leg lengths of the subjects; the measurement was recorded as 'cm in anatomical posture, bare feet, toe heels united, holding his/her breath, head in the frontal plane, after the head is positioned so that it touches the vertex point (1).

2.3. Star Balance Test

Star Balance Test was used to determine dynamic balance performances. An oral and visual representation of the test procedure is explained to each participant for information purposes. Before starting the test, 6 practice trials were performed in 8 different directions for each leg, (10).

The participant was asked to reach eight different lines (anterior, posterior, medial, lateral, anteriormedial, anteriorlateral, posteriormedial, and posteriorlateral) at the last point where he/she could reach. During the test, the participant made a slight touch on the reaching point to return to the starting position in the center without disturbing the position of the other foot. The maximum reach was recorded as the reach of the reach foot at the last point.

If the participant raised the support leg, removed from center and pressed the reach foot the point where it reached to support instead of touch, the trial was accepted invalid and provided to reapply. With the Star Balance Test, each participant was given the right to try 3 out of 8 lines with both feet. Each participant was allowed to start the test with the right foot at the center of the test. At the end of 3 trials, 5 minutes were interrupted and 3 more attempts were made with the other foot.

2.4. Training Program

Training program was applied regularly for 8 weeks for 3 days a week in addition to the end of the tennis lesson programs of the experimental group. Details of the training program are given in table 1.

Table 1. *Core Training Program (11)*

WEEK	MOVEMENT	SET/TIME	REST BREAK
1st week	**1)** Plank	3 x 35sec	40 sec
	2) Side Plank (rightelbow on floor)	3 x 30sec	35 sec
	3) Side Plank (leftelbow on floor)	3 x 30sec	35 sec
	4)OppositeArmandLeg- AllFours (rightleg- leftarm)	3 x 30sec	35 sec

	5)OppositeArmandLeg- AllFours (leftleg – rightarm)	3 x 30sec	35 sec
	6)Double Side Jackkife (on therightarm)	3 x 25sec	30 sec
	7)Double Side Jackkife (on theleftarm)	3 x 25sec	30 sec
	8)Glute Bridge	3 x 50sec	40 sec
2 – 3rd week	**1)**Plank	3 x 40 sec	40 sec
	2)UpPlank- Flutters(each set differentlegs)	6 x 25 sec	30sec
	3)BalanceHold	6 x 30 sec	30sec
	4)PlankSwimming (Youshouldusedifferentarmandleg in each set)	6 x 30 sec	35 sec
	5)Russian Twists: (feetfromthegroundtocomeforwardwiththe body tocomeforward) thatpositionwillstandfor 10 sec. Thenthetrendtotherightsidewiththecommand (5 sec). Thentrendtotheleftside (5sec).A total of 4 rightand 4 lefttrendswill be realized.		
4th week	**1)**UpPlank- Flutters(each set differentfeet)	6 x 25 sec	30sec
	2)BalanceHold	6 x 35 sec	30sec
	3) Bent- LegKickbacks(Youshouldusedifferentleg in each set)	6 x 15 repeat	25sec
	4)Glute Bridge, SingleLegRotation(each set differentfeet)	6 x 30 sec	30sec
	5) Russian Twists		
5th week	**1)**UpPlank- Flutters(each set differentfeet)	6 x 25 sec	30sec
	2)BalanceHold	6 x 35 sec	30sec
	3)PlankSwimming (Youshouldusedifferentarmandleg in each set)	6 x 15sec	35 sec
	4) Bent- LegKickbacks (Youshouldusedifferentleg in each set)	6 x 15repeat	25sec
	5)Glute Bridge, SingleLegRotation(each set differentfeet)	6 x 30 sec	30sec
	6) Russian Twists		
6th week	**1)** Plank	3 x 35sec	40 sec
	2)UpPlank- Flutters(each set differentfeet)	6 x 25 sec	30sec
	3)BalanceHold	6 x 35 sec	30sec
	4)PlankSwimming (Youshouldusedifferentarmandleg in each set)	6 x 15sec	35 sec
	5) Bent- LegKickbacks (Youshouldusedifferentleg in each set)	6 x 15 repeat	25sec
	6)Glute Bridge, SingleLegRotation(each set differentfeet)	6 x 30 sec	30sec
	7) Russian Twists		
7 - 8 th .week	**1)**UpPlank- Flutters(each set differentfeet)	6 x 25 sec	30sec
	2)BalanceHold	6 x 35 sec	30sec
	3) Bent- LegKickbacks (Youshouldusedifferentleg in each set)	6 x 15repeat	25sec
	4)Glute Bridge, SingleLegRotation(each set differentfeet)	6 x 30 sec	30sec
	5)GluteBridge	3 x 50sec	40 sec
	6) Russian Twists		

2.5. Analysis of Data

ANOVA test was used for 2 (group) x 8 (direction) mixed measurements. This analysis was chosen since the difference between pre and post tests of two groups and the difference between groups was checked (12).

Homogeneity, normal distribution and independent observation assumptions were checked before

analysis. Levene's test was checked for homogeneity and the data obtained in 8 directions were found to be homogeneously distributed. The normal distribution assumption was checked using skewness-kurtosis and histogram. Data showed normal distribution according to the findings. The last assumption, the independent observation assumption is provided for this test. As a result of assumptions, it was decided to check the significance level according to Greenhouse-Geisser values.

4. Results

Table 2. *Demographic Information Table*

	Group	*Average Square*	*Standard Deviation*	*N*
front_anterior	subject	65.73	3.64	14
	comparison	67.26	4.34	12
	Total	66.44	3.97	26
front_anterolateral	subject	70.72	5.23	14
	comparison	72.93	3.23	12
	Total	71.74	4.48	26
front_lateral	subject	74,55	6.06	14
	comparison	76.85	4.15	12
	Total	75.61	5.29	26
front_posterolateral	subject	77.26	6.74	14
	comparison	80.82	5.05	12
	Total	78.90	6.18	26
front_posterior	subject	75.56	8.72	14
	comparison	79.61	8.42	12
	Total	77.43	8.66	26
front_posteromedial	subject	71.06	9.13	14
	comparison	76.64	10.34	12
	Total	73.63	9.92	26
front_medial	subject	62.96	8.15	14
	comparison	66.74	6.81	12
	Total	64.71	7.66	26
front_anteromedial	subject	59.12	5.97	14
	comparison	60.28	7.15	12
	Total	59.65	6.43	26
post_anterior	subject	71.77	4.19	14
	comparison	70.81	6.10	12
	Total	71.33	5.07	26
post_anterolateral	subject	77.04	4.46	14
	comparison	76.65	6.17	12
	Total	76.86	5.21	26
post_lateral	subject	83.96	6.35	14
	comparison	81.79	8.07	12
	Total	82.96	7.13	26
post_posterolateral	subject	87.15	7.61	14
	comparison	85.56	8.19	12
	Total	86.42	7.76	26

post_posterior	subject	87.15	9.46	14
	comparison	84.78	10.29	12
	Total	86.06	9.72	26
post_posteromedial	subject	81.21	10.35	14
	comparison	81.68	10.60	12
	Total	81.43	10.25	26
post_medial	subject	73.85	6.63	14
	comparison	73.68	10.39	12
	Total	73.77	8.38	26
post_anteromedial	subject	65.74	5.86	14
	comparison	64.69	8.91	12
	Total	65.26	7.29	26

Table 3. *Intragroup Values Table*

		df	*Average Square*	*F*	*Sig.*
Balance	Sphericity Assumed	15	1565.27	63.75	.00
	Greenhouse-Geisser	4.37	5371.80	63.75	.00
	Huynh-Feldt	5.69	4128.19	63.75	.00
	Lower-bound	1.00	23479.03	63.75	.00
Error (balance)	Sphericity Assumed	360	24.56		
	Greenhouse-Geisser	104.90	84.27		
	Huynh-Feldt	136.50	64.76		
	Lower-bound	24.00	368.33		

According to Table 2, a significant difference was found between the pre-test and post-test values of both groups ($F_{(4.37,\ 104.90)}$= 63.75, p<.05). The post-test values of the groups in 8 directions increased significantly.

Table 3*. Intergroup Values Table*

	df	*Average Square*	*F*	*Sig.*
Group	1	102.43	.20	.66
Error	24	502.15		

Table 3 shows the results of the analysis to check whether there is a significant difference between the groups. According to the findings, no significant difference was found between the experimental group and the comparison group ($F_{(1,\ 24)}$= .20, p>.05).

5. Discussion and Conclusion

The human core is described as the human low back-pelvic-hip complex with its governing musculature (13,14). The core is important because it is the anatomical location in the body where the center of gravity is located, thus where movement stems (14,15,16). The core functions to maintain postural alignment and dynamic postural equilibrium during functional activities, which helps to avoid serial distortion patterns (17).

The aim of this study was to investigate the effect of 8 weeks of core training on dynamic balance of university students.In this context, according to results of the study a significant difference was found between the pre-test and post-test values of the core training applications in both groups ($F_{(4.37,\ 104.90)}$= 63.75,

p<.05). Post-test values of the groups in 8 directions increased significantly. There was no significant difference between the groups (F(1, 24)= .20, p>.05). When recent studies are examined, Gür and Ersöz (1) examined the effect of core training on static and dynamic balance properties in tennis players in the 8-14 age group in a similar branch and as a result, there was no significant difference between the pre-training and post-training static and dynamic balance averages between the experimental and control groups (p> 0.05). The research differs from this aspect with this study. When different sports branches were examined, Atıcı (18) observed the effectiveness of eight-week core training practices on static balance in women of similar age range swimming (p <0.05). In another study, Bıyıklı (19) reported that 10-week core training in female swimmers aged 11-13 showed positive improvements on static balance (p <0.05). Dilber et al. (20) found that 8-week core training in male football players made a statistically significant difference on static balance (p <0.05). Perrin et al. compared static balance test performance among judo, dance and control groups. They stated that judo performers performed higher than dancers (21).Another investigators Hessari et al. (22) examined the effect of core training on balance in hearing impaired and found that eight weeks of core training increased the balance performance of the experimental group. Cosio-Lima et al. (8) in their research on thirty women studying in college examined the effectiveness of back and abdominal core stability exercise program on static balance performance on five-week balanced and unbalanced surface consisting of experimental and control groups, found positive mean changes in trunk balance duration for both tests after training and in the experimental group significantly higher than the control group. In many native and foreign studies, core strength training and its effects have been examined and results have been found to help athletes develop motor skills, increase their balance ability and protect them from sports injuries (23,22,24,25).

Tennis is a sport that requires speed, agility and explosive force and as a result, includes versatile movement patterns. Most of the research focused on these skill components(26,27). Samson (7) in his research on 13 healthy tennis athletes at university level found that the effect of a five-week core stabilization program on balance in athletes was significant.26,27,7

When the results of this study are compared with the results of similar populations and different populations, both this study and other studies have provided similar evidence on the positive effectiveness of core training practices on balance performance.

As a result, it can be said that core training practices performed in this research population group and other research populations have statistically positive effects on static or dynamic balance performance.

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The Examination of Postural Variables in Adolescents Who Are Athletes and Non-Athletes

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Abstract

Introduction:The regular posture for children and young people is very important and environmental and genetic factors are among the factors that determine and direct posture.

Aim:This research was conducted to determine whether there was a postural difference between adolescents athletes and non-athletes children.

Method:A total of 68 adolescent children who attended the study in primary education institutions and whose average age was 13.43 ± 0.94 participated.Athlete and non-athlete children were included in the study and the groups were respectively: Badminton (n=14), Boxing (n=12), Judo (n=14), Taekwondo(n=13)andnon-athletes (n=15).Postural analysis of the students was made through the Body Analysis Kapture (B.A.K.) program, which allows measuring body segments from anterior, frontal and posterior.For postural analysis, each participant was photographed with a digital camera on the lateral, anterior, and posterior planes (3 pcs) and transferred to the computer.

In the analysis of the data, was used SPSS 24 package program. The normal distribution of the data was determined by the Shapiro Wilk test and the Kruskal Wallis test was used from the nonparametric tests.Significance level was taken as p <0.005.

Results: A statistically significant difference was found in the shoulder symmetry between the non-athlete group and the taekwondo branch athletes (p<0,005); Pelvic symmetry values were found to be different between non-athletes and those in boxing, judo, taekwondo and badminton branches according to the anterior and lateral plan(p<0,005).While there was a significant difference in the posterior plan shoulder symmetry values between the non-athletesonly in the taekwondo branch,There were differences between the non-athletes and the three branches (taekwondo-boxing-judo) in the values of pelvic symmetry.

Conclusion:The non-athletes were found to have more postural asymmetries than the athletes.It had been seen that sport was quite effective and important in protecting the upright posture position.

Keywords: Posture, Sport, Symmetry

2. Introduction

Throughout our lives, our spine shows different curvatures. These curvatures also determine our posture structure. Posture is defined as the alignment of body segments at a specific time (1-2).Posture is also an important health indicator, and postural abnormalities are associated with multiple disorders including pain syndromes (3). Here should be considered to be able to distinguish the spinal curvatures from the diseases during the development of a child. Bad posture can show weakness of ceratin muscle groups like strenght, inter-muscular force imbalance, regional stiffness, pain, fatigue, weakness, stress ; it also causes problems on motor and performance skills (4).

Having a proper posture is as important as a balanced diet, exercise and regular sleep (3). Nowadays, children who spend long hours in front of computers and television, sentenced to life immobile city need to do exercise as much as at least adults, but since this age group is in the age of growth it is important for them to exercise according to their age.It is observed that postural disorders in school-age children ignored by many families. Especially in this age group children have serious disorders in the spine as a result of not sitting on the desk upright has also been observed in research (5-6).

The basic condition of healthy development is parallel to healthy growth with healthy posture habit gained in childhood. For a good posture, during a variety of activities such as standing, sitting and walking require a smooth and balanced arrangement of the head, body, arms and legs. However, good posture is defined as the posture in which the person takes it loosely without worrying (7).

In the school age period, the way of sitting inside the classroom, studying at home, watching

television, carrying the bags inappropriately can become permanent defects in time (8,9).Especially false sitting in front of computer, children sitting on desks which not suitable for their size in schools are the most important causes of childhood posture disorders (6).

Sports exercises that are often asymmetrical or intensively high and formulate special abilities can lead to postural disorders, especially when applied to young people (10). Excessive coercion in practice may lead to failure of the correct technique and symmetry (11-12). Sports such as canoeing, boating, weightlifting, gymnastics or double figure skating that force certain body positions can disrupt the shape of the spine by causing excessive strain on the spine (13-14). Spinal static disorders are observed as a result of unilateral muscle study especially related to sports.(15).

In addition, although exercises have some disadvantages on the posture, the positive effect of physical activity on the physical fitness of children and young people has also been confirmed by some researchers.(16-17).

While applying exercise programs, general information such as age, gender, height, weight, health problem should be considered traditionally. It is considered that posture, which is an indicator of human body structure, not only for the basic exercises and success in the best way, but also known the importance in daily life by coaches .

In this study, it is aimed to investigate whether there are postural differences between primary school students and those who do sports in the box, judo, takewondo and badminton branches and those who do not do sports.

3. Method

3.1. The Model of Research

Aim: To determine the postural differences between primary school students at the ages of 13-15 who do sports in the box, judo, taekwondo and badminton branches and those do not do sports. Quantitative research method was used to collect, analyze and interpret the data obtained from the study. The research is designed as a model of causal-comparison model from quantitative research models.

Universe and Sample

The universe of the study was composed of male students studying in 5 primary schools and 6 secondary schools in Karaman province. A total of 68 students participated in the study voluntarily. The sample of the study was consisted of students who do not do sports (n = 15) and do regular sports for 1-3 years at the branches badminton (n = 14), boxing (n = 12), taekwondo (n = 13) and judo (n = 14). Permission for research was obtained from Karaman Provincial Directorate of National Education and consent form was obtained from the parents of the students.

3.2. Materials

Height-Weight Measurement

The height and body weight of the students (0.1 kg, 0.1 cm precision) will be measured in kilograms (kg) with bare feet. The stadiometer of the precision weighing instrument shall be measured and measured in meters (m). Body mass index (bmi) was calculated with weight / height (kg / m2) formula.

B.A.K (Body Analysis Capture) Posture Anaysis

It is an optoelectronic system consisting of 1 to 8 infrared video cameras to perform the morphological examination of the participant in standing position. The B.A.K program developed by the Postural Biomedicine Team is carried out by Milletrix software and analysis procedures. The BAK system is an innovative system established to obtain images from different points in anterior, posterior and lateral analysis by placing markers on the relevant parts of the participant. Reference points are used to identify body symmetries and specific markers are placed at these reference points.These reference points:

Frontal Anterior View

Eyes (right/left), Zygoma (right/left), Acromio clavicular(right/left), Anterior Superior iliac spine (SIAS) (right/left), patella centre (right/left), malleoller (right/left);

Frontal Posterior View

C7/D1 Apophysis, Scapula Inferior Apex (right/left), posterior superior iliac spine (SIPS) (right/left), Achilles Tendon (right/left), Heel Centre (right/left);

Side View

C1 Apophysis, SIAS, SIPS, Dorsal maximum protuberance, Gluteal maximum protuberance, Lateral Condyle Femur , Achilles Tendon(17).

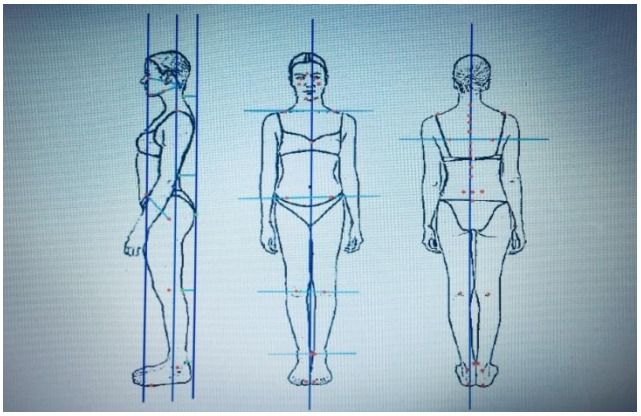


Figure 1: *Reference Points Used for Posture Analysis*

For the posture analysis, a single photograph was taken from the right lateral, anterior and posterior planes of each subject and transferred to the computer. Body Analysis Kapture (B.A.K.) program was used to investigate whether students have a different appearance from natural stance. Angular values were expressed as "degrees" (^{0}), distance was expressed as" cm.

Data Analysis

SPSS 21.0 statistical package program was used to analyze the data and to find the calculated values. One-Sample Kolmogorov-Smirnov and Shapiro-Wilk test were used to determine whether the data were normal. Kruskal Wallis H test was used to determine the differences between the groups because the data were not normally distributed. Kruskal-Wallis 1-way ANOVA (k samples) test was used for multiple comparison tests to determine the difference between groups. The error level was 0.05.

4. Results

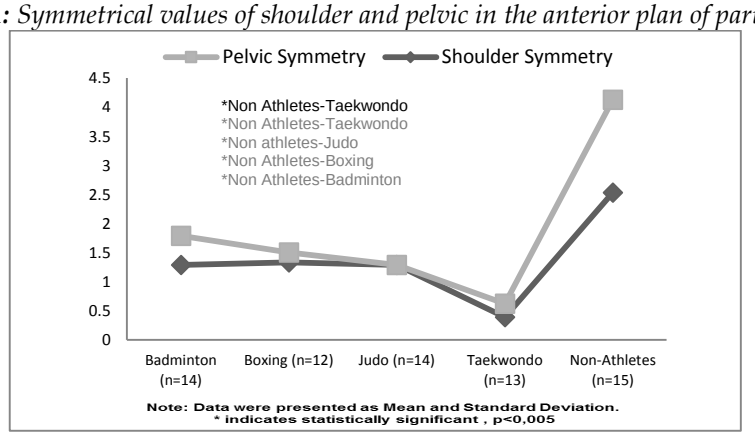
Table 1: *The demographic characteristics of participants*

Branches	Variables	N	Mean	Std. Deviation
Badminton	Age	14	13,43	0,94
	Weight	14	46,57	8,32
	Height	14	1,55	0,11
	BMI	14	19,21	2,47
Boxing	Age	12	14,00	1,71
	Weight	12	48,42	13,51
	Height	12	1,57	0,14
	BMI	12	19,20	2,98
Judo	Age	14	14,50	1,95
	Weight	14	53,29	14,97
	Height	14	1,62	0,14
	BMI	14	19,97	3,17
	Age	13	15,38	0,96

Taekwondo	Weight	13	54,46	14,44
	Height	13	1,64	0,14
	BMI	13	19,84	3,29
Non-Athletes	Age	15	14,67	0,49
	Weight	15	49,53	8,37
	Height	15	1,57	0,07
	BMI	15	20,03	2,43

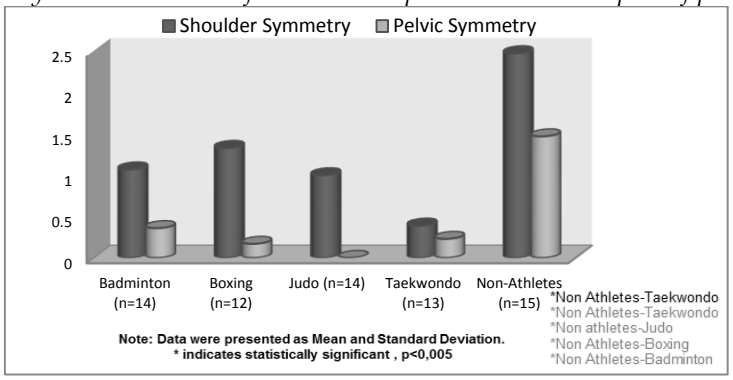
As shown in Table 1, the mean (SD) age is 13.43 ± 0.94 years, body height is 1.55 ± 0.11 m, weight is 46.57 ±8.32 kg and BMI is 19.21±2.47 for the badminton athletes. For the boxing athletes, the mean (SD) age is 14.00 ± 1.71 years, body height is 1.57± 0.14 m, weight is 48.42 ±13.51 kg and BMI is 19.20±2.98. For the judo athletes, the mean (SD) age is 14.50 ± 1.95 years, body height is 1.62± 0.14 m, weight is 53.29 ±14.97 kg and BMI is 19.97±3.17. For the taekwondo athletes, the mean (SD) age is 15.38 ± 0.96 years, body height is 1.64± 0.14 m, weight is 54.46 ±14.44 kg and BMI is 19.84±3.29. For the non-athletes, the mean (SD) age is 14.67 ± 0.49 years, body height is 1.57± 0.07 m, weight is 49.53 ±8.37 kg and BMI is 20.03±2.43.

Figure 1: *Symmetrical values of shoulder and pelvic in the anterior plan of participants*



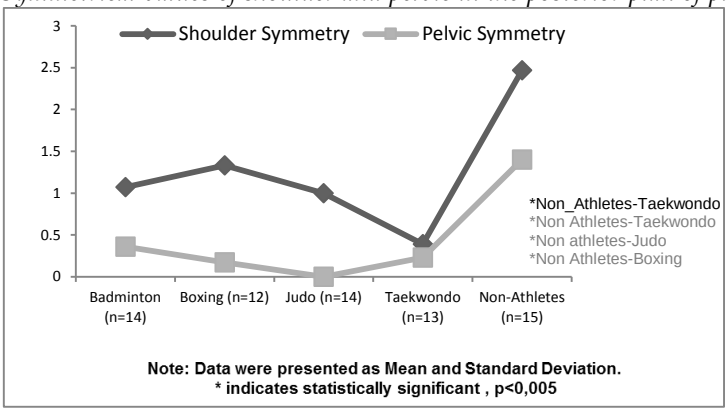
As shown in Figüre 1, while there was a statistically significant difference between the non-athletes and the taekwondo athletes in the symmetrical shoulder values; There was a significant difference between the nonathlete and all other branches at symmetrical values of pelvic in the anterior plan (p<0,005).

Figure 2: *Symmetrical values of shoulder and pelvic in the lateral plan of participants*



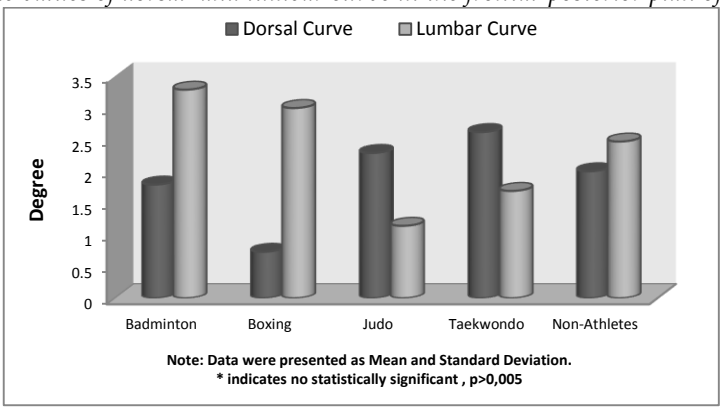
While there was a statistically significant difference between the non-athletes and the taekwondo athletes in the symmetrical shoulder values; There was a significant difference between the nonathlete and all other branches at symmetrical values of pelvic from the lateral plan in figure 2 (p<0,005).

Figure 3: *Symmetrical values of shoulder and pelvic in the posterior plan of participants*



While there was only found significant difference between the non-athletes and the taekwondo athletes at the symmetrical shoulder values; There was a significant difference between non-athletes and boxing, judo, taekwondo athletes in pelvis symmetrical values examined in the posterior in Figure 3 ($p<0,005$).

Figure 4: *The values of dorsal and lumbar curve in the frontal-posterior plan of participants*



Dorsal curve averages were respectively: Taekwondo 2,62±1,94, Judo 2,29±1,73, non-athletes 2,00±1,85, badminton 1,79±2,42 and boxing 0,73±1,27. Lumbal curve averages were respectively: badminton 3,29±2,23, boxing 3,00±2,24, non-athletes 2,47±2,75, taekwondo 1,69± 1,97 and judo 1,14±1,92. But there was no significant difference ($p>0,005$).

5. Discussion and Conclusion

In this study, it was determined that the mean values of shoulder symmetry of the students who do not do sports according to the results obtained from the anterior and lateral plan were higher and statistically significant compared to the students dealing with taekwondo branch ($p<0.005$). When the pelvic symmetry values were examined, it was determined that the average of the students who do not do sports is different and statistically significant from the students in all branches When the pelvic symmetry values were examined, it was determined that the average of the students who do not do sports is different and statistically significant than the students in all branches ($p<0.005$) (Figure 1-Figure 2). Considering that the symmetry is proportional and similar with the right and left parts of the body; it is observed that especially their right shoulders of students who do not do sports differ from left shoulder symmetrically. The reason for the fact that the shoulder symmetries of students doing sports in Taekwondo branch is negligible that it is thought that the exercises performed according to the characteristics of the sports branch do not cause

asymmetry on the muscles due to the correct exercise practices. Considering that the difference in normal shoulder symmetry should not be more than 2/30 (1,5), it was found that the average of students who cannot do sports is close to 30. Hamaoui (2014) stated that taekwondo athletes should have their own postural characteristics in terms of balance, postural control and muscle symmetry in order to obtain the best possible results during competitions (19). Adolescent period; children's body structure is a period of rapid growth. In this period, insufficient physical activity and faulty postural habits affect the future life of the adolescent and lead to irreversible chronic degenerative disorders (20). Strengthening the muscles holding the posture upright with the right and effective exercise program of adolescents is thouhgt to be able to cause to eliminate the risk of scoliosis in the later period.

According to the results obtained from the posterior plan, the mean values of the left shoulder symmetry of the students who did not do sports were higher and statistically significant than the students who were dealing with taekwondo branch ($p < 0.005$); the mean values of students who did not do sports in right pelvic symmetry values were found to be statistically significant ($p < 0.005$) (figure 3). It is thought that symmetric differences may be caused by unilateral muscle hypertrophy (21). It is thought that the reason of the difference in the symmetric differences among the students who are engaged in sports compared to the students who do not do sports, may have brought the symmetry differences to a minimum level depending on the mechanics of the movement applied in the exercises. In addition, Yüce (1989) reported that pelvic tilt levels in standing posture posture were associated with lumbar lordosis depth and abdominal muscle function (22). Judo branch is a dynamic sport of sport which requires physical competence and high mental discipline, aiming to control the opponent on his back or control the ground (23) and Thomas et al. (1989) stated that the upper body was employed in judo training (24). Taekwondo training is characterized by high intensity and intermittent training (25) that meets the exercise intensity guidelines recommended by the American College of Sports Medicine (26). Furthermore, the taekwondo branch consists of rigid contacts aimed at disrupting the opponent's balance, and movements that improve the force that the leg and hip muscle strength will exert to resist the force of gravity (27). In badminton, evaluation of maximal force and explosive force are closely related. The ability to make high spikes and block splashes in badminton is a good indicator of explosive activity (28). Mitchell et al. (1994) stated that the boxing branch has a complex structure due to its high degree of dynamic and static characteristics and it has entered into a high-power combat sport (29). Due to force and explosive force is more dominant in terms of biometric features at the branches such as judo, box, taekwondo and badminton and the intensive study of the motions for strengthening the muscles holding the posture upright it is thought there may be important symmetric differences among non-sports students.

In addition, according to the data obtained from the anterior and lateral plan, the difference between the mean and left shoulder symmetry averages were found in the branches of boxing, badminton, judo and taekwondo, while the difference between the mean of pelvic symmetry was found in badminton, taekwondo, boxing and judo branches. This difference is thought to be due to dominant single-sided loads.

The data obtained from the frontal-posterior plane showed that the dorsal slope degree was the highest in the students who did not do sports with taekwondo, judo branch, respectively, and the lowest degree of dorsal slope was found in the boxing and badminton students. When the average of lumbal slope ratings are examined, it is observed that badminton, boxing branch and non-sports students have the highest values respectively; students in taekwondo and judo branch were found to have lower lumbal gradients. However, it was determined that the difference between means was not statistically significant ($p > 0.005$) (Figure 4).

Disruption of body symmetry causes serious problems by overloading muscles, bones and other structures (30). Therefore, bad posture causes mechanical stress in the central nervous system, but various anatomical disorders occur (31).

As a result, it is observed that sports is very effective and important in maintaining the upright posture. However, it is suggested that one-sided loading should be avoided during the routine training and competition training according to the characteristics of the sports branches especially in the adolescent period. It is thought that the content of the trainings to be applied should be prepared carefully by the expert coaches in their field so as not to cause possible postural deformities / asymmetries in the future.

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Management-Risk Assessment of the Power Plant Process Systems Design and Operation

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Abstract

The problems of evaluation and identification of management-risks of design and operation of technological systems of nuclear power facilities are considered in the article. According to the author, it is necessary to take into account all kinds of management-risks during the implementation of any project in nuclear energy. Errors in the design and operation of power facilities lead to an increase in the probability of risk situations and catastrophic situations. It is of great interest to identify the risks, as well as to identify ways to eliminate them n order to predict, reduce the likelihood and prevent the occurrence of such risk situations. The author used the following methods: retrospective analysis of sources (including the Cost and Time Management Program for the construction of nuclear power plants in the State Corporation "Rosatom"), popular scientific methods of induction and derivation, expert methods, particularly the method of ranking alternatives (alternative solutions), which is based on the provisions of the theory of fuzzy sets, etc.

Keywords: risk management, expertise, energy technology, risk management process, quantitative and qualitative risk assessment

1. Introduction

Great attention is paid in the twenty-first century to the threats to the economy of the country and to the world community as a whole from accidents and disasters of a man-made and natural nature.

Consumption of energy resources (electricity, heat and fuel) has a steady trend throughout the industrialization phase and, despite energy conservation policies, continues to increase its pace in the context of the Fourth Technological Revolution.

Nuclear power has become one of the basic energy technologies during 60 years of existence. The globalization of the capacity of energy industry projects implies in-depth attention to the study of numerous management-risks of projects, as well as their effective management.

According to the information and analytical agency nuclear energy of Russia is a powerful energy complex, which employs more than 350 enterprises, in total the industry employs at least 250 thousand people in 2018. It includes 4 scientific-and-production complexes. The industry continues to develop actively by improving the efficiency of enterprises. There are now 10 nuclear power plants in Russia, which use 35 power units. Just in 2016, the nuclear stations were treated with 196.37 billion kWh. of electric power.

In 2018, the share of nuclear energy in Russia 's total electricity production reached 18.3%; that is the highest among in the former CIS states. The construction of 6 new power units in the Russian territory continues, as well as the implementation of 33 major projects abroad, such as construction of a power unit at the Akkuyu nuclear power plant in Turkey, construction in Belarus, China, Jordan, Bangladesh, Iran and other countries. The company works with the countries of the Middle East, Latin America, Egypt, etc.

Today, Rosatom is cooperating with the International Atomic Energy Agency (IAEA) towards the international development of nuclear infrastructure. The Russian side has pledged to contribute up to 1.8 million dollars annually to the IAEA budget for the implementation of targeted programmes for the development of nuclear infrastructure in the member countries of the agency.

Nowadays there are 450 active power units in the world: USA - 100, France - 58, Japan - 43, Russia - 36, China - 36. The total generating capacity of the NPP is over 392 GWt. Global nuclear power capacity is projected to increase by 88% under a high scenario by 2030.

The first half of 2017 is characterized by the generation of 2.476 terravatts - hours (TWh) of electricity in 31 countries with nuclear reactors. This is 1.4% higher than the production in 2016. However, this is 6.9% lower than in 2000. Nevertheless, nuclear power production has increased worldwide since the Focima

incident. However, nuclear generation managed to restore only about half of the volume of the generated electricity during the five years after the disaster.

Every modern energy technology should be considered from two sides. For example, the developed and widespread production of energy from fossil non-renewable energy, on the one hand, reduces for future generations their reserves as the only raw material for the chemical industry, and on the other, leads to environmental oppression and creates military-political conflicts and tensions due to their uneven availability in the regions of the world. The world energy consumption structure forecast is presented in Table 1.

Table 1. *World Energy Structure Forecast*

Source	Share of energy consumption in 2030,%
Traditional energy on organic fuels	20.1
Atomic energy	7.0
Hydroelectric power	9.0
Alternative sources	30.0
In total	100.0

We should note that in general the production of nuclear energy produces the most environmentally friendly type of products. There is minimal environmental impact With stable electricity prices. This is particularly true for greenhouse gas and carcinogenic emissions from coal and oil stations.

However, despite all the advantages and features described, nuclear energy carries real threats both nationally and globally. In normal mode, nuclear power plants are absolutely safe, but emergency situations with radiation emissions have a devastating impact on the environment and health of the population. Despite the introduction of technologies and automatic monitoring systems, the threat of a potentially dangerous situation remains. The causes of emergency situations are diverse: human factor, neglect, equipment failure, natural disasters and fatal circumstances can lead to a loss of life accident.

Certainly, the fact that disasters occur at nuclear power facilities is very rare is positive, but the consequences are global. According to the International Atomic Energy Agency (IAEA), which has developed the International Nuclear Events Scale (INES) in recent decades, no safety violations have occurred at Russian nuclear power plants above the first level of this scale. However, there is a dynamics of abnormal situations that do not affect the safety of the NPP. Although they do not require additional systems, there are problems with individual mechanisms and systems. Thus, the periodic occurrence of zero-level situations is typical for each nuclear power plant.

Any abnormal situation, known to society, forms a negative public opinion on the construction and operation of nuclear power facilities. Uncertainty in solving global nuclear safety problems affects each of the stages of the life cycle of nuclear power facilities: from construction to nuclear power plant preservation processes.

In the "Foundations of State Policy in the Field of Nuclear and Radiation Safety of the Russian Federation for the Period up to 2025," special attention is paid to the development and introduction of innovative methods and means as part of the complex analysis. Forecasting and the possibility of identifying management-risks at each stage of the life cycle of the nuclear power plant is of particular importance.

2. Literature Review

Methodological and theoretical issues of identification, analysis, assessment and risk management were investigated in the works of Avdiya V., Kolavina N., Lapygina Yu., Malenkova Yu., Murzina A., Rogova M., Flivbiorg B., Heldmen K. and many other domestic and foreign authors. Issues of nuclear energy safety economics, economic indicators of risk assessment are most developed in the works of Asmolov V., Beberov M., Gordon B., Shamina D., etc.

The current methods of identifying of abnormal situations risk at nuclear facilities are usually based

on the use of control lists, after which the decisions are analysed. The information on previous situations, their causes and consequences is used and experienced developers are involved in the work for this purpose. The disadvantages of such techniques are the difficulty of work with checklists.

3. Method

The application of checklist-based techniques requires the involvement of experienced developers (subject matter expert experts), as techniques can include up to several hundred items. In general, risk management involves the steps, presented in Figure 1 at each planning stage.

When designing and operating electrically driven valves of NPP process systems, the issues of reliability and safety risk assessment are particularly acute. Despite its auxiliary (intended) function, this group of equipment nevertheless has a significant impact on the efficiency of the station as a whole.

Failures in operation of electrically driven valves are one of the reasons for reduction of economy and reliability of NPP. In some cases failure of the equipment under consideration can lead to shutdown of the entire power unit.

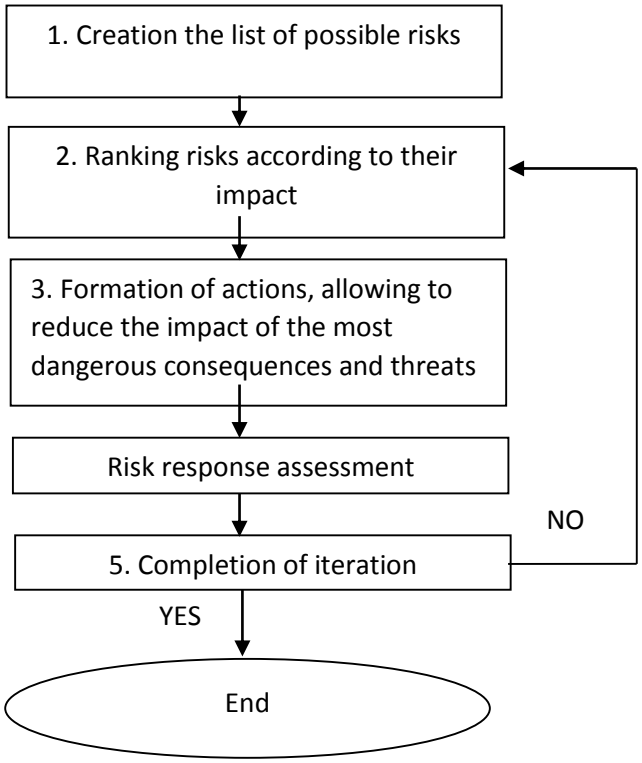

Fig. 1. *Risk management process*

Within the study, the author, in the conditions of the Russian nuclear power plants, carried out an analysis of the reliability of electrically driven valves (EPA). The results of a qualitative assessment of the tested group of equipment made it possible to identify the main types of failure (Table 1):

Table 1. *Main types of refusal*

№ п/п	Критерии отказа	Основные причины отказа

1.	Criteria of refusal Leakage of locking knot (Leaks from drainages In the section to be disconnected)	1. Wear of seat, locking element. 2. Butts on sealed surfaces of shutoff member, seat. 3. Partially open position of the locking element. 4. Erosion damage of seat surface, locking element
2.	Non-conformity of position indicator with readings of flow meters	5. Incorrect position of indicator, track switch. 6. Wrong provision of a spindle.
3.	Lack of change of parameters working environment. Lack of movement mobile details. Shutdown of the electric motor.	7. Damages of the electric motor 8. Damages of the electric drive 9. Damage to torque limiting clutch 10. Damages of coupling of electric drive with spindle 11. Jamming No. 1, because of a spindle curvature 12. Jamming No. 2 due to item 2 13. Reduction of electric drive efficiency as a result of wear and tear
4.	No movement of movable parts from manual backup	As item 8,10,11,12,13
5.	Excess of time Actuation, surging during movement	As item 2,8,10,11,12,13
6.	Operation of the coupling, current relay	As item 2,8,10,11,12,13
7.	Sub-sections on the housing, humidity increase	14. Damages of the case 15. Failure of tightness of the housing connection with the cover
8.	Smudges on the flange, increase in humidity	As item 15.
9.	Smudges on consolidation, increase in humidity	16. Damage of the sealing gland 17. Teases on a spindle

Risk effects are managed through various organizational and economic measures. Improving the reliability and safety of nuclear power plants is largely ensured by the use of information and measurement diagnostic systems, which allow to detect equipment defects at an early stage of origin and predict their development. Diagnostics system including object and hardware relates essentially to control systems. However, the specificity of technical diagnostics consists in the direction of its methods to determine the condition of products in working condition with detection of the need to restore lost operability.

4. Results

The depth of the defects search by technical diagnostics depends on the conformity of the applied methods with the defects encountered. In order to assess this compliance, the database on failures of thermal and mechanical equipment of NovoVoronezh NPP for 1997-2017 was analyzed within the framework of this work (Table 2). Failures of EPR, pumps and fans were classified by types and units of EPR in which they are fixed.

Table 2. *Failure distribution*

Types of risks	Negative influence (points)	
	Leaks	Electromechanical part

Failures by valves and shut-off valves units	722	402
Failures by pulse valve units	41	38
Failures by safety valve units	6	0
Failures by gate valve units	710	300
Defects by regulator units	114	179
Failures by pressure regulator units	4	4
Failures on level regulator nodes	13	19
Failures on feedback valves units (not including LSS)	44	15
Failures by KOS units	47	31
Failures on other solenoid valve assemblies	23	5
Failures by gate units	30	8
Failures by ventilation plug valves units	36	9
Failures by valves units of unspecified type	165	104

Quantitative and qualitative assessment of the manifestation of the risks of failure of the process systems of the power plant (on the example of pipeline valves) was carried out using expert methods, in particular the method of ranking alternatives (alternative solutions). This method is based on the provisions of fuzzy set theory, which reduces the influence of subjective factors on the result of examination, allows to consider the parameters of the alternative as its "advantages" and "shortcomings." A fuzzy set is constructed for each alternative A_i.

Matrix A looks as follows:

$$A = \begin{vmatrix} 722 & 402 \\ 41 & 38 \\ 6 & 0 \\ 710 & 300 \\ 114 & 179 \\ 4 & 4 \\ 13 & 19 \\ 44 & 15 \\ 47 & 31 \\ 23 & 5 \\ 30 & 8 \\ 36 & 9 \\ 165 & 104 \end{vmatrix}$$

Let us define the function of belonging to a fuzzy set A_i, quantifying the degree of conformity j-th alternative, which is calculated by formula:

$$\mu_{A_i}(y_j) = \frac{u_j^i}{\max\limits_j \left(\left| u_j^i \right| \right)}$$

Based on the expert 's assessment of the importance of each of the criteria inherent in alternatives, a fuzzy set B, is constructed, having Property - Property Importance construct, with membership function $\mu_B(y_i)$, Evaluating the importance of the criterion. The point evaluation of the importance of the

properties is used. Vector $\vec{\omega} = (\omega(y_1), \omega(y_2), \ldots, \omega(y_p))$ - is the expert 's opinion vector, whose coordinates will be a point assessment of the importance of each of the parameters by which alternatives are evaluated.

Since it is important not the score itself, to which the importance of the property is assessed, but the ratio of points between each other, about normalizing the ballroom ratings, the values of the membership function are as follows:

$$\mu_B(y_j) = \frac{\omega(y_j)}{\sum_{y_j \in U_1} \omega(y_j)}$$

From the results of matrix A, we build matrix B:

$$B = \begin{vmatrix} 1 & 1 \\ 0{,}057 & 0{,}094 \\ 0{,}008 & 0 \\ 0{,}98 & 0{,}746 \\ 0{,}157 & 0{,}445 \\ 0{,}005 & 0{,}009 \\ 0{,}018 & 0{,}047 \\ 0{,}061 & 0{,}037 \\ 0{,}065 & 0{,}077 \\ 0{,}031 & 0{,}012 \\ 0{,}041 & 0{,}02 \\ 0{,}049 & 0{,}022 \\ 0{,}228 & 0{,}258 \end{vmatrix}$$

We choose an expert group consisting of two people and the head of the working group. Based on the experts 'assessments, we will build Table 3.

Table 3. *Expert Points*

Types of risks	Experts	
	1	2
Failures by valves and shut-off valves units	10	9
Failures by pulse valve units	3	7
Failures by safety valve units	2	2
Failures by gate valve units	5	3
Defects by regulator units	7	4
Failures by pressure regulator units	9	1
Failures on level regulator nodes	3	4
Failures on feedback valves units (not including LSS)	5	6
Failures by KOS units	6	4
Failures on other solenoid valve assemblies	2	1
Failures by gate units	5	3
Failures by ventilation plug valves units	7	7
Failures by valves units of unspecified type	8	6
TOTAL	72	57

We will construct a matrix C:

$$C = \begin{vmatrix} 0,14 & 0,16 \\ 0,04 & 0,12 \\ 0,03 & 0,04 \\ 0,07 & 0,05 \\ 0,1 & 0,07 \\ 0,13 & 0,02 \\ 0,04 & 0,07 \\ 0,07 & 0,17 \\ 0,08 & 0,07 \\ 0,03 & 0,02 \\ 0,07 & 0,05 \\ 0,1 & 0,12 \\ 0,11 & 0,17 \end{vmatrix}$$

We will determine the weight of the expert group. Qualification weight of the expert is K_w In practice, the head of the working group of experts usually determines. Since experts are unequal, the head of the working group determined the expert 's qualification weight in table 4.

Table 4. *Expert qualification weight*

Experts	Weight
No 1	0.7
No 2	0.3

The collective strategy indicator is defined by the following formula:

$$\alpha_j^0 = \frac{1}{m} \sum_{i=1}^{m} k_{вес_i} \cdot \mu_{B_i}^j$$

where m is the number of experts
Kw - expert qualification weight
The results obtained are presented with the use of matrix S.

$$S = \begin{vmatrix} 0.51 \\ 0.32 \\ 0.02 \\ 0.03 \\ 0.05 \\ 0.05 \\ 0.03 \\ 0.5 \\ 0.04 \\ 0.04 \\ 0.03 \\ 0.05 \\ 0.06 \end{vmatrix}$$

Then matrix W, which elements will be degrees of belonging, determining preferences of alternatives, can be found as a product of matrices:

$$W=B\times S.$$

$$W = \begin{vmatrix} 1 & 1 \\ 0.057 & 0.094 \\ 0.008 & 0 \\ 0.98 & 0.746 \\ 0.157 & 0.445 \\ 0.005 & 0.009 \\ 0.018 & 0.047 \\ 0.061 & 0.037 \\ 0.065 & 0.077 \\ 0.031 & 0.012 \\ 0.041 & 0.02 \\ 0.049 & 0.022 \\ 0.228 & 0.258 \end{vmatrix} * \begin{vmatrix} 0.51 \\ 0.32 \\ 0.02 \\ 0.03 \\ 0.05 \\ 0.05 \\ 0.03 \\ 0.5 \\ 0.04 \\ 0.04 \\ 0.03 \\ 0.05 \\ 0.06 \end{vmatrix} = \begin{vmatrix} 0.51 & 0.51 \\ 0.01824 & 0.03008 \\ 0.00016 & 0 \\ 0.0294 & 0.02238 \\ 0.00785 & 0.02225 \\ 0.00025 & 0.00045 \\ 0.00054 & 0.00141 \\ 0.0305 & 0.0185 \\ 0.0026 & 0.00308 \\ 0.00124 & 0.00048 \\ 0.00123 & 0.0006 \\ 0.00245 & 0.0011 \\ 0.01368 & 0.01548 \end{vmatrix} = \begin{vmatrix} 1.02 \\ 0.04832 \\ 0.00016 \\ 0.05178 \\ 0.0301 \\ 0.0007 \\ 0.00195 \\ 0.049 \\ 0.00568 \\ 0.00172 \\ 0.00183 \\ 0.00355 \\ 0.02916 \end{vmatrix}$$

After conducting the expert risk assessment, it was determined that the most dangerous risk for the power plant was the risk of failure on the valves and shut-off valves. In order to reduce the probability of this risk in the conditions of the energy enterprise, it is necessary to carry out the diagnostics of the valves condition.

5. Discussion and Conclusion

Thus, the management-risk modeling process can be implemented in the following sequence:

1. Disaggregating the analysed process into risk groups and individual risks in groups;
2. Expert assessment of the value of loss price (severity of consequences) for each risk: minimum, most probable and maximum values;
3. Identification of the most dangerous management risks and simulation of loss price values;
4. Calculation of the relative strength (magnitude or probability) of each individual risk by means of paired comparisons with subsequent estimation of the corresponding element of the eigenvector of the priority matrix normalized to one (the procedure for determining eigenvectors of the matrices can be approximated by calculating the geometric mean in the hierarchy analysis method);
5. Calculation of total possible losses based on the simulated risk value and its probability of occurrence;
6. Identification of ways and methods of reducing the probability of risk situations.

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Innovative Component of the Facility Timing and Cost Management: TCM NC System

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Abstract

The problems of the facility timing and cost management using the example state corporation "Rosatom" are discussed in the article. According to the authors, it is necessary to take into account all kinds of risks and threats of non-implementation for any international project. Errors within forecasting of the cost the facility construction lead to the increase in risk situations, errors and misunderstandings between customer and contractor. The concept of Integrated Construction Time and Cost Management (TCM) is of great interest in predicting, reducing the likelihood and preventing such risk situations. This system is aimed at optimization of construction processes. It includes all the stages: from the design development to the facility maintenance. The use of TCM allows to minimize the level of risk significantly, and in many situations avoid losses completely.

The authors used the following methods: retrospective analysis of sources (including the Time and Cost Management Program for the construction of nuclear power plants in the State Corporation "Rosatom"), popular scientific methods of induction and extraction, etc.

Keywords: Digitalization, cost management, manufacturing and construction processes, project pricing

1. Introduction

The twenty-first century is the century of high speeds and progress in all the spheres of life, it is also the age of increased rates of scientific-and-technological progress and innovations. Globalization is fully inclusive. At the same time, the society depends both on the basic long-term trends in social progress and on the impact of today 's multifaceted changes, economic shifts and changes in the development dynamics. To do this, one need to consider factors which affect both individual companies and the entire industry. In such circumstances, scientific and technological factors, in particular digital technologies and the digital economy, are of particular importance. This is due, first of all, to the fact that on the global scale their influence contributes to the increasingly rapid transformation of progress and its development, penetrating into all the spheres of society and changing everything around it.

Nowadays, humanity has actively entered the era not only of widespread but also of rapidly accelerating diffusion and innovation in the field of digital technologies. Various processes are optimized in all industries. The World Economic Forum estimates that digitalization will increase revenues by 30 US dollars by $2025.

2. Literature Review

The process of of the economy digitalization in different fields has been studied in the works of such foreign and Russian scientists: Bella D., Gritzenko V., Ivanov D., Castels M., Martin W., Masuda J., Rakitova A., Toffler E., Khrezhnova G., Bugorsky V., Vütrich H., Dyatlova S., Doljenko A., Efimova E., Zolotchevaskoy E., Zunde V., Kuperman V., Kataeva A., Matveevoy L., Parinova S., Tolstych T.O., Khubaeva G., etc. It should be noted that the research focused mainly on the information technologies.

The construction and energy complex is also more affected by all the changes taking place. As a result, it was found that production processes and construction stages are more susceptible to innovation in the conditions of digitalization. The importance of digital technology and the digital economy in today 's world is so great that, if not introduced and used, it can lead to the lag, stagnation and serious crisis, as energy and construction are the integral part of the economy, acting as its catalyst.

Nowadays, innovation, information technology, and technological advances help to reduce time, effort, and costs, as wel as to improve safety in the construction and subsequent operation of nuclear power plants. These factors make it necessary to develop digital technologies, introduce them into the process of construction and operation of nuclear power plants and then to use them effectively in the subsequent

construction of nuclear facilities.

The issues of formation of cost of objects and management of investments in construction at the stage of project development were dealt with by scientists: V.R. Trovkin, M.A. Besedin, Zhuravleva M.A., Reznickenko V.S., I.P. Saveleva, etc.

3. Method and Materials

Rosatom State Corporation is one of the global technological leaders, as well as the largest electricity producer in Russia, providing more than 18% of the country's energy needs. Rosatom has the first largest portfolio of foreign projects in the world, which includes 36 power units in 12 countries. The corporation has the second largest uranium reserves in the world and the fourth largest production and 17% of the nuclear fuel market. The construction of nuclear power plants contributes to the economic development of the country, provides employment of the population and developed infrastructure. Thus, the construction and operation of nuclear power plants with two power units provides employment to more than 10,000 people in the infrastructure sphere and more than 3,000 new jobs directly at the stations themselves.

The main strategic goals of the State Corporation are to increase the share of presence in international markets and reduce the cost and time of processes.

The State Corporation "Rosatom" is authorized on behalf of the Russian Federation to comply with the country 's international obligations in the field of the peaceful use of nuclear energy, as well as the compliance with the nuclear non-proliferation regime.

"Rosatom" state corporation takes an active part in expanding the international legal framework. The Unit for International Activities of the Russian Federation and inter-agency agreements are responsible for the preparation and implementation of intergovernmental agreements. Thus, 11 intergovernmental agreements and 16 major interdepartmental agreements were concluded in 2017, and 5 "framework" intergovernmental agreements were signed with the Kingdom of Cambodia, the Republic of Paraguay, the Republic of Sudan, the Republic of Tajikistan and the Republic of Uzbekistan, creating the basis for bilateral cooperation between the Russian Federation and these countries in the nuclear sphere.

Such activity implies close cooperation with foreign partner customers. Therefore, in order to reach the international market, Rostam develops a network of its representative offices. In 2017, such missions were operating at Russian embassies and trade missions in 10 States of the world, as well as at the Permanent Mission of the Russian Federation to international organizations in Vienna (Austria).

The promotion of Russian nuclear technologies to foreign markets forms the basis of the corporation 's international activities, which is more facilitated by the creation of favourable international legal-and-political conditions, the strengthening of nuclear security and nuclear non-proliferation regimes, as well as the active work in international organizations and forums.

4. Results

The TCM NC project pricing model developed by the government corporation is transparent and predictable. Total Cost Management Nuclear Construction TCM NC is Rosatom 's know-how to move from project control to strategic asset management. In the nuclear industry, such a system has not yet been applied anywhere in the world - Rosatom is a pioneer. TCM NC is seen as a way to predict the value of both a foreign and domestic construction facility. The purpose of integrated cost management in the nuclear industry is to ensure that the investor, when investing in a project at the stage of inception of the concept, has complete and reliable information about the cost and time of implementation of this project up to the stage of operation of the facility.

Pilot projects in this area are the construction of replacement facilities at the Kursk Nuclear Power Plant, Hanhikivi Nuclear Power Plant (Finland) and Akkuyu (Turkey). Given the complexity of the facilities, the construction time and the planned scope of work, it is not easy to predict the cost in 10 years and minimize the risks of losses before the completion of the project, but it is necessary.

The TCM NC process model begins with a simple concept, within which the famous Shuhart-Deming PDCA (Plan - Do - Check - Evaluate) cycle used to manage asset quality. This cycle is the basis of the TCM because it is first time-tested and widely accepted as a practical management model, second used in the area

of quality, and third easily applicable to cyclical value management processes. Figure 1 illustrates the steps of the PDCA process.

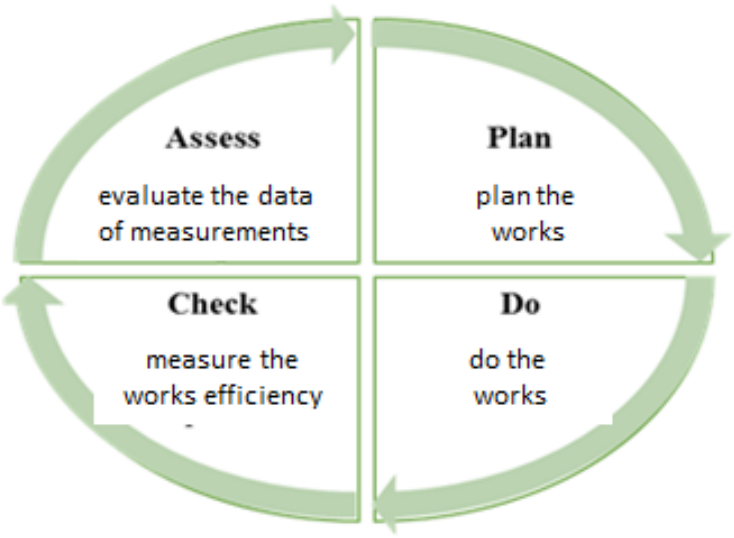

Figure 1. *Assess, Plan, Do, Check, Do Cycle*

The TCM concept is based on the functional, basic and auxiliary processes, based on the sub-processes specific to these conditions (planning, implementation, performance monitoring and evaluation) (Figure 2). Thus, the system and rather detailed processing base is formed, combining the whole set of interconnected and interacting processes of construction and operation of energy facilities.

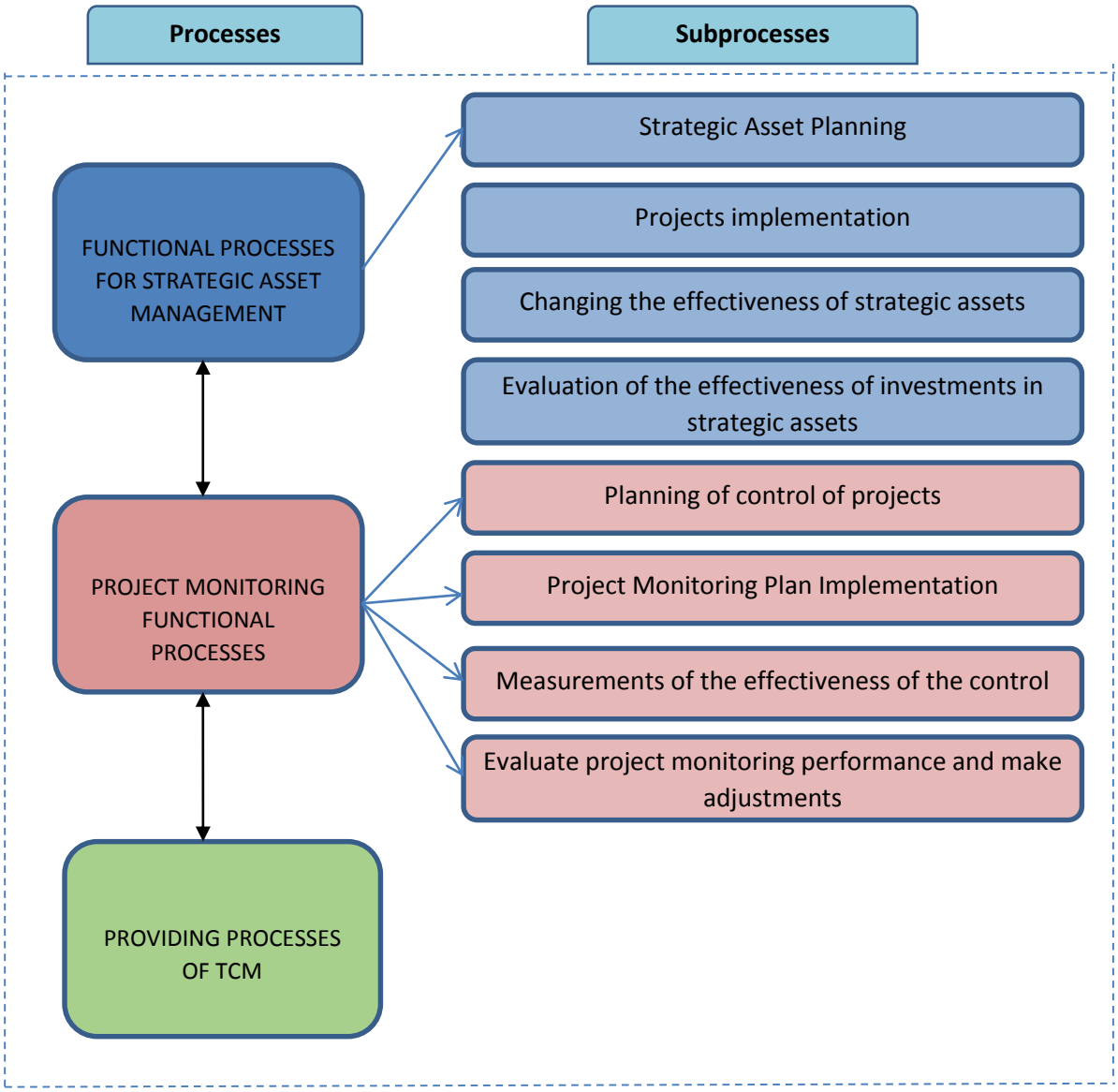

Figure 2. *TCM Process Scheme*

In our opinion, the positioning of TCM relative to other cost management tools is interesting (Figure 3). The centre, as the integrating component, is integrated cost management, supported by collaborative project management, resource management and management accounting. Complements this system by focusing on key production factors (object costs, workflows, and resources). All this in the complex constitutes a process model, in which all systems operate in a close relationship between each other during the whole life cycle of the object (from the moment of development to the moment of final preservation). Thanks to this, the method covers not only unique enterprises, as basic projects, but also operational activities, as the use of strategic assets in a continuous mode.

Figure 3. *Integrated Cost Management Process*

The feature of TCM NC is that it is the universal, applicable to any international project and can be localized anywhere in the globe. The system is multi-component and allows to take into account a large number of parameters: requirements of legislation, cost of labor, materials, equipment in a specific region, etc. All this will be generated and adjusted by elements of the digital economy.

On the basis of TCM NC for each project the limit and target value, the minimum price of the contract is generated. The marginal value is determined before the conclusion of the contract with the customer and at the next stages is checked for the possibility of reduction. This is the upper limit of the value valuation at TCM NC, the value indicator for the investor. The target cost (TCM NC average value) is used in order to calculate project margin and participant motivation. The minimum price is one below which the contractor is not taken for the project. It is defined, for example, before the tender procedure in order to have competitive advantages over the proposals of the participants of the tender procedure.

Thus, according to experts, the implementation of TCM NC program will allow:

1) reduce the time of development of design and estimate documentation by 20%;
2) reduce risks of changes in the project by 50%;
3) reduce the construction planning time by 20%;
4) reduce the cost of preparation and construction by 20%;
5) as a result, increase the quality indicators of the project implementation as a whole by 20%.

5. Discussion and Conclusion

Thus, we can conclude, innovation through digital technologies and the digital economy are extremely important strategic factors for the development of all the industries in general and the nuclear industry in particular. However, it should be noted, that they are also the factors that have a significant impact on the process of comprehensive assessment of the cost of construction of nuclear power facilities, and act as a tool that Rosatom GC is actively introducing in its activities as well. The purpose of their implementation is to reduce some risk situations when calculating the cost of nuclear industry construction facilities at all the stages of the project implementation.

The introduction of TCM NC in the nuclear industry is a very important and significant step in the development of international relations in the field of nuclear energy. The interim results of the Digital

Economy program implemented in Russia significantly accelerate the process of its development and implementation of the system. Nowadays, it is the pilot project of "Rosatom" State Corporation which is still being implemented only in the construction of nuclear power plants, but the option of its further integration into other industries is not excluded. All this defines digital technologies and the digital economy as the most promising strategic directions in the activity and development of any organizations.

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Methodology for Increasing the Efficiency of Design Work in Construction

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Abstract
In this article modern design systems for construction have been studied what allowed outlining their positive and negative sides. The analysis of one-stage and two-stage development of working documentation is carried out. The positive and negative sides of each system are revealed. The main problems of developing documentation in the pre-design and design stages are shown, recommendations are given for their elimination. The fundamental difference between one- and two-stage design is only in parallel or sequential development of design and working documentation.Using network diagrams and Gantt charts the ways of improving the quality and profitability of construction production through an improved methodology for organizing design work has been presented. The proposed design system is based on a change in the system of two-stage design and cooperation of construction entities. The proposed system allows reducing the time and cost of design work. Outsourcing the development stage of project documentation to contractors will allow getting a quality project with reduced construction time and cost.
Keywords: Construction, Project, Design stages, Cooperation

1. Introduction

Market competitive conditions stimulate companies to search innovative methods for optimizing the economics of the construction industry. In such conditions, the main goal of the construction business is to implement a high-quality project in a short period of time and with the most optimal costs. The way to achieve this goal is to implement innovative approaches to the design stages and optimize the construction processes [1 ... 4].

During the design stages the initial data are collected and the design documentation is developed for the further construction or reconstruction of the future building, the coordination of design decisions and the implementation of architectural supervision, as well as the monitoring of compliance with the developed design documentation and its alteration if necessary are carried out. A project here can be considered as a set of text documents, graphic schemes and drawings, calculation materials containing technological, architectural, structural solutions and estimates, technical and economic calculations, equipment solutions for a future building or its reconstruction [5, 6].

Organization of construction production involves the implementation of complex technological and organizational solution and measures that provide keeping deadlines, maintaining proper quality level and meeting the interests of all stakeholders of this construction. The main participants in the construction processes include customer, developer, investor, contractor, engineering organization and project design organization. All the participants are responsible for a certain and fixed work scope but sometimes they can exchange and combine different scopes [7, 8].

The goal of this study is to increase the efficiency of capital construction with the developed method of cooperation between design and contracting organizations.

To achieve this goal the following tasks have been solved:

- analysis of the design process in construction;
- development of a method for making reasoned design decisions based on the cooperation of design and contracting organizations;
- formulation of principles for the effective decision-making in the design process of construction projects;
- justification of the advantages and disadvantages of the developed method of cooperation of the design and contracting organizations.

Object of study is the participators of investment and construction project design.

2. Literature Review (Analysis of the modern state of design process in construction)

For the construction objects design of various levels of complexity the development and subsequent approval of design documentation is required [5, 6]. The exact number of design stages will depend on the complexity of the construction works and the story number of the building. The final number of stages is pre-negotiated between the client and the designer. In the absence of complex elements a project can consist of a small number of stages. These rules apply to mass and reuse constructions, projects of the first and second level of complexity. For projects of the third level of complexity, at least two stages will be required. When designing constructions of the fifth and fourth level of complexity where more requirements are set such as the use of various architectural studies, environmental friendliness, aesthetics of a certain style, the preparation and approval of additional project standards and documentation is required. When using the latest technologies or new building materials the minimum number of stages increases up to three [9].

The process of designing objects is divided into 3 stages. An example of design process organization is shown in table 1. Depending on the purpose of the construction object, the design stages may vary slightly, be supplemented with necessary activities and works, but the process basis remains the same for all objects.

Table 1. *Stages of the design process in construction.*

Stage	Input information	Contractor
Stage 1. Predesign works		
1.1. Development of a feasibility grinding and calculation	Capital investment plan. Intent resolution of the property developer	The customer himself or a design or research organization on his behalf
1.2. Signing of a design contract	Suggestions of the customer	Customer and design organization
Stage 2. Design works		
2.1. Project predesign	Order and contract	Design organization
2.2. Project development by stages	Design specification. Instructions for the development of projects and contracts	Design organization
Stage 3. Examination and approval of the project		
3.1. Project examination	Instructions on the project development. Project examination instructions	Design organization. Project examination department
3.2. Project approval	Instructions on the project development	Design organization
Stage 4. Development of project documentation		
4.1.Approval of project documentation contents	Technical solutions defined in the design documentation. System of design documentation in construction	Customer. Design organization

The main document of financial regulation and legal relations between the customer and the design documentation developer is the contract between the customer and the design organization. The design specification must be attached to the contract.

Project documentation is developed primarily through tenders. A tender for the construction object design can be carried out for a part of the design documentation, on the entire amount of design documentation, or only on project documentation.

Project documentation is one of the most important elements in technological progress linking science, modern engineering and technology with production. In order to get a building permit it is necessary to have a developed, approved by state examination and accepted design documentation [10].

The whole variety of requirements and factors affecting the design process can be conditionally classified into four groups:

- natural and climatic;
- socio-psychological;
- architectural and construction ones;
- economic.

All the above factors directly affect the design of facilities, the construction cost and duration [10].

3. Method

The traditional design system is based on a certain sequence of actions which are developed centrally [9, 10]. Validation of the project depends on the approval of its documentation by the customer-developer. The development of the project schedule is tied to the deadlines of the main stages. Usually customer sets a deadline for the completion of each stage, and then the responsible party works freely within these deadlines. As a result, the schedules of such projects are more likely to be fixed rather than flexible. At the same time, risks are not identified, and measures to mitigate the consequences of adverse events are not prepared.

It should be noted that on the basis of the government decree [14] the project documentation is the documentation developed with the aim of implementing technical, technological and architectural solutions in the construction process. The content of the project documentation depends on the requirements of the customer-developer, on the level of detail of those solutions in the design documentation and design specification.

The conventional approach to design involves 100% equipment redundancy without taking into account the actual calculation of the redundancy level based on the equipment reliability. This often leads to a negative increase in capital and operating costs, as well as on the territory of the construction site (Figure 1).

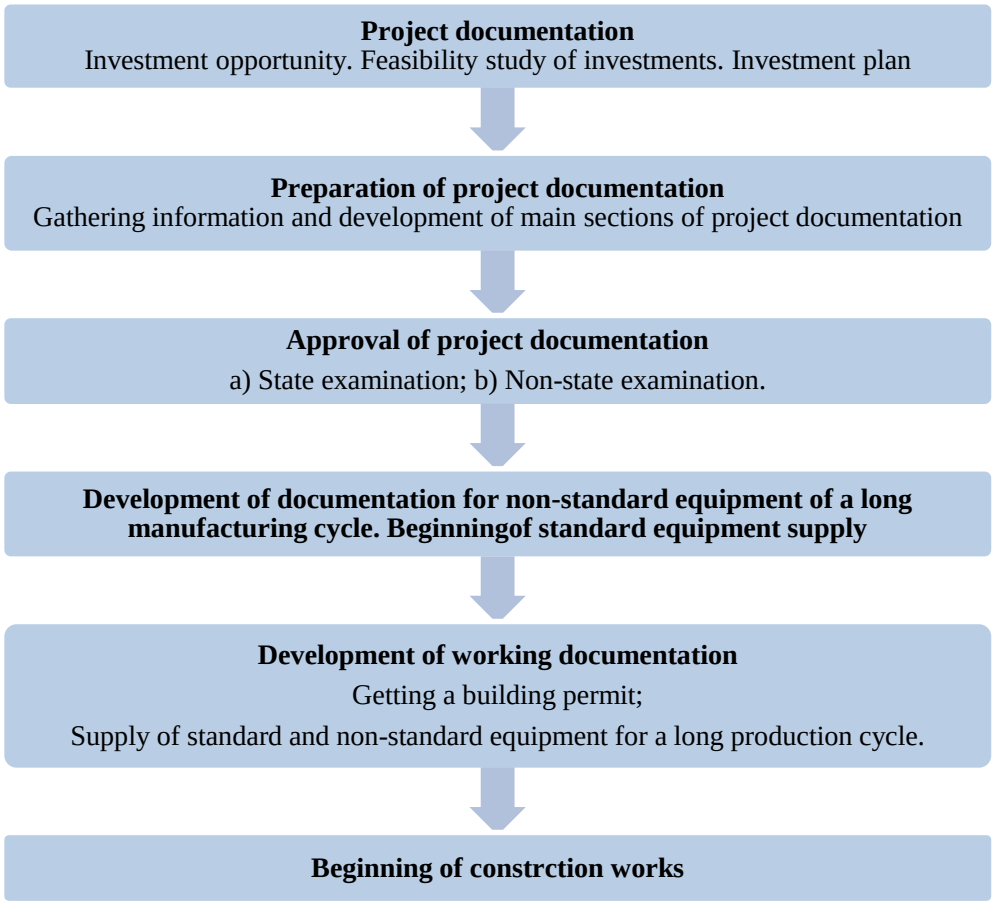

Figure1. *Conventional approach for construction objects design*

Currently a tendency to apply modern scientific methods, tools and technologies focused on the effectiveness of the final results while compliance with the legislative and regulatory standards in design and construction is of high interest. An innovative approach of construction projects management is presented in Figure 2.

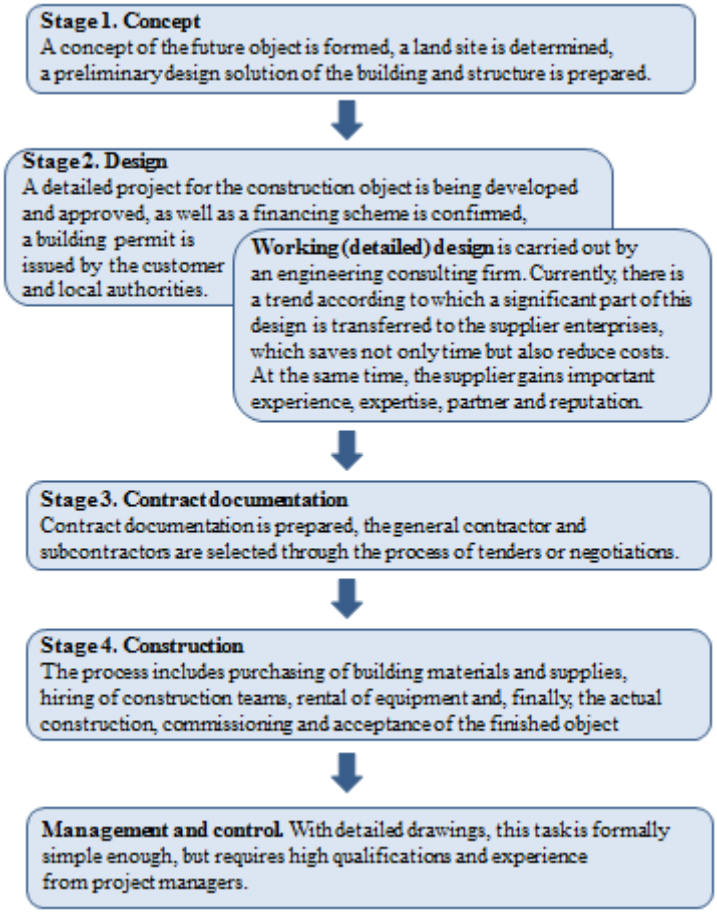

Figure 2. *An innovative approach for construction objects design*

The need for an innovative approach for construction project management is caused by the scale and complexity growth of projects, increase of the participant number, stringent requirements for the project duration and the effective use of financial and labor resources. In worldwide design and construction practice customers usually implement projects only side by side with a qualified engineering company who support the management of design and construction process [15, 16].

In Figure 2, it can be seen that the project execution is based on overall schedule and are supported by detailed implementation schedules for each stage, which are carefully monitored while execution. Since project schedules are usually very rigid, the core activities are often carried out simultaneously. Project validation depends on the business process on the client side. At the same time, it is possible to use the "design-build" scheme (a system for implementing a construction project, in which the design and construction is carried out by one company). The design-build scheme allows reducing risks for the investor (including customer) due to the simultaneous implementation of the design, production, delivery and building of the construction object [17, 19].

The system "design-build" is increasingly used in the construction of industrial facilities. With such a management system, the main contractor becomes responsible for such works as design, management, construction, equipment installation, commissioning of an object which are the same works as in the case of performing them on an integrated contract. In other words, with the "design-build" system a company taking responsibility for the implementation of the entire work scope declared in contract.

Comparing analysis of conventional and innovative approaches for construction design is presented in Table 2.

Table 2. *Analysis of construction design systems*

	Construction design system	
	One-staged (simultaneous)	Two-staged (sequential)
Conditions of se	Standard projects	Projects of large residential, public, industrial buildings
	Repeatable projects Technically simple projects	Unstandardized technological production
	Possibility of simultaneous development of design and project documentation	Development of a technological project and working drawing
	Possibility to develop project documentation before examination and approval of design documentation	Applicable under difficult conditions
Advantages	Combination of technical design and working drawings into a comprehensive document	Development of project documentation after approval of design documentation
	Reduce of design development time	Reducing the risks of errors in the project documentation
	Duration reduce of construction work and commissioning of a construction project	Sequential development of design and project documentation
		The high cost of design works
	Not applicable for unstandardized technological production	Increase of project development duration
Disadvantages		
	Not applicable under particularly difficult construction conditions.	Duration increase of construction work and commissioning of a construction project

In two-stage design the work is divided into the following stages:

1) the "Project" stage includes: a master plan, documentation for engineering networks and equipment, environmental issues solution, choice of equipment, construction methods and labor protection, the necessary engineering calculations, processing and sending documentation for examination;

2) the “Working documentation” stage includes development of drawings and other documentation for construction work [9, 10].

For the correct development of estimates at the "Project" stage, a deeper study of the section "Design solutions" [20] is necessary. These further limits the contracting organizations in the possibility of making optimal decisions at the stage of construction production. It also causes the duration increase and the cost of design work.

On the one hand, the simultaneous development of design and project documentation is not prohibited by the current legislation of the Russian Federation. On the other hand, in practice a simultaneous design system is still not widespread. This leads to an increase of the construction project duration, pushes back the investment compensation and profit, increases the risk the project effectiveness reduce in general.

4. Results

The effectiveness of developed approach with the simultaneous development of design and project documentation has been proved within a real construction project. The main participants of design and construction process were customer, general designer organization, general contractor, and minor contractor. In this project the general designer and the general contractor were responsible for developing the project documentation as well as construction and installation at the facility whilst the design organization will carry out design, comprehensive design, and research work. The main objective of the design organization is the integrated development of design estimates and calculation documentation, which will ensure the high quality of the designed building, as well as the high economic efficiency of the construction. Designing itself is carried out at the expense of customer organizations, which signs contracts for design work with the general designer organization.

The analysis of the resource provision and the expertise level of participant on the project has allowed to implement cooperation between participants during design works:

- delegation of the project documentation development to contractor with a sufficient number of specialists;
- each organization makes specific project documentation, chooses rational methods based on its own technical equipment and optimization of its own technical processes;
- the contractor develops project documentation;
- developers (architect, engineer, process engineer or other professionals) manage the project;
- the contractor and general designer organization work in partnership;
- a partnership or joint venture between a design and construction companies is created on a long-term basis or for the implementation of a specific project (Figure 3).

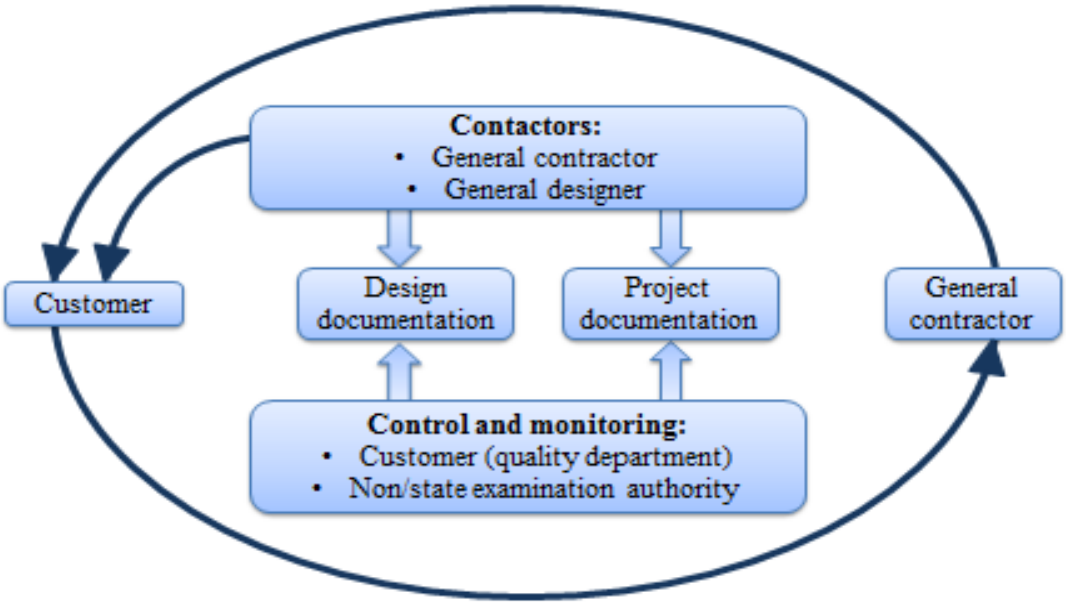

Figure 3. *Scheme of participants' cooperation within an improved design system*

Advantages of the proposed construction project design system:

- accelerated start of construction;
- reducing the probability of error at the design documentation development;
- a contractor with relevant experience in construction may suggest reasonable changes to the project before the design documentation approval.

The timelines of stages (in months) from the development of the project concept to the start of construction works by the conventional and innovative approaches are presented in Figures 4, 5.

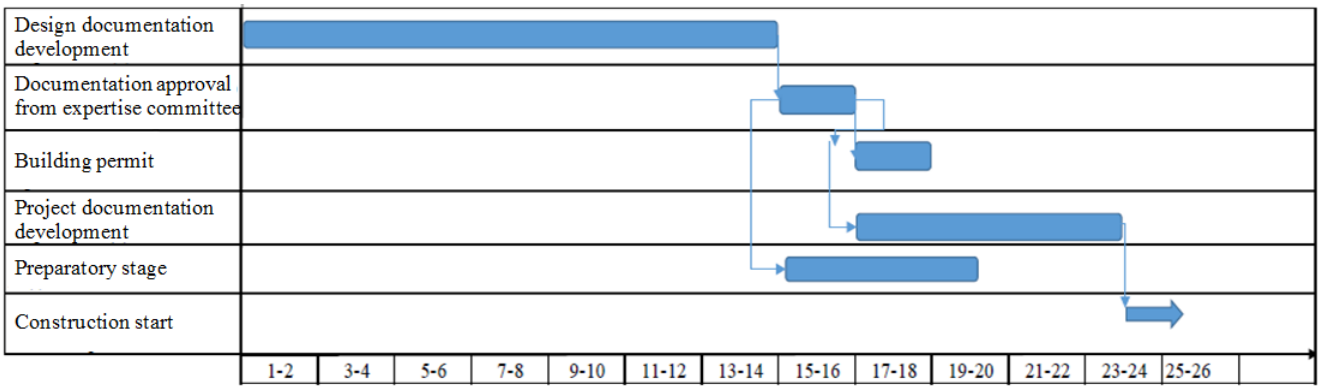

Figure 4. *Timeline (in months) of project stages using the conventional approach*

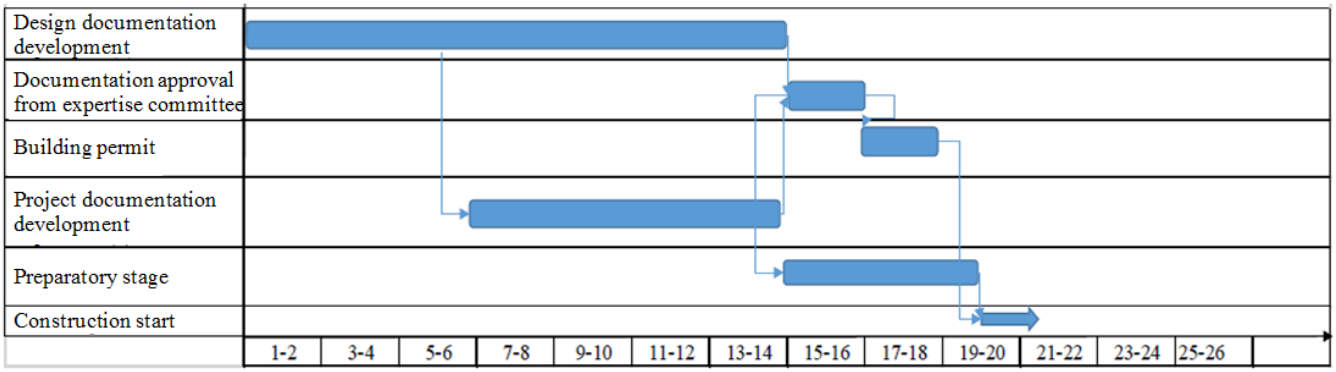

Figure 5. *Timeline (in months) of project stages using the innovative approach*

A comparative analysis of the diagrams in Figures 4, 5 shows that while using the proposed innovative design approach, the contractor gets a full set of project documentation faster, so the construction organization can start construction work in 19.5 months compared with 23.5 months in the conventional two-stage design system.

An analysis of the duration of design documentation development confirms the possibility of efficiency increase for the design works implementing the cooperation between contractors and design organizations. One of the conditions for design organizations cooperation is the highest possible increase of design solution manufacturability.

5. Discussion and Conclusion

The following points can conclude this article.

1) To reduce possible risks while implementation of the improved approach, it is recommended to invite contractors for the construction of facilities of I - IV complexity category, for the V complexity category participation of experienced design organizations is desirable.

2) For the project documentation development organizations that have staff with the required qualifications and work experience as well as specific equipment and facilities should be involved as the quality of project documentation directly affects the safety, durability, energy efficiency, earthquake resistance and other characteristics of the construction object [21].

3) The capacity balance of the design and contracting organizations should be considered when cooperating and ensuring a stable load of their staff.

4) Design divisions on the sites of contracting organizations with the necessary material and technical equipment as well as qualified personnel should be created.

5) Organizations specialized both in architectural and construction design should be developed.

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Development of a Touristic Complex Model Based on Cluster Approach

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Abstract

This article touches upon questions of touristic services market development based on cluster approach. Logically this paper can be divided into several parts. The first one summarizes best practices of cluster approach usage in tourist industry in different countries and regions. As a result the theoretical principles of cluster theory for development of touristic market have been formulated. The second, major part is dedicated to the development of methodological approach for touristic clusters model design. That includes description of approach participants (government agencies, public organizations, private business structures), resources (art craft venues, national parks, ski resorts, historical and cultural monuments) algorithm (5-step procedure). Next, in the third part developed touristic cluster model has been applied to one of Russian regions in order to build a model for regional touristic-recreational cluster. Furthermore, the factors and conditions for model successful deployment as well as practical recommendations for the model implementation have been introduced. Finally, the article suggests further directions for model development and research. It has been proved that suggested approach can be used both on regional touristic market of a certain area and on national level for the entire country.

Keywords: Touristic cluster, Recreational resources, Market structure, Value chain

1. Introduction

Cluster development in the domestic tourism industry is relevant and supported by a number of governmental programs at the federal and regional levels. That is why the touristic services market development based on the cluster approach is becoming an urgent task and one of the workable ways to increase market efficiency.

Among constant leaders of Russian domestic tourism are Krasnodar region, St. Petersburg, Moscow, Crimea and the cities of the Golden Ring. Unfortunately, the Chelyabinsk region lags significantly behind the mentioned regions in terms of domestic and inbound tourism.

Today, the Chelyabinsk region has all the necessary resources for the development of domestic and inbound tourism. The basic factors are favorable climatic conditions, historical and cultural heritage, a high level of economy, investment attractiveness, convenient geographical location, developed transport infrastructure, a sufficient number of events of regional, national, international levels, developed business infrastructure, entertainment and hospitality industry, various educational institutions. In the Chelyabinsk region there are more than two thousand monuments, ensembles and places of interest, 764 of which are assigned with the status of a monument of history and culture. Nine cities of the Chelyabinsk region are included in the list of historical settlements (Chelyabinsk, Verkhneuralsk, Zlatoust, etc.). In Zlatoust, Verkhneuralsk, Troitsk and Chelyabinsk town-planning ensembles of the 19th century have been preserved (including 120 buildings of religious architecture, public buildings, and monuments of industrial architecture).

One of the major problems of the region is the lack of systematic research and development of an innovative model for the development of the touristic services market based on a cluster approach. Significant increase of the region touristic attractiveness and touristic services market growth are considered as the results of development and implementation of the cluster model.

The purpose of the study is to justify the touristic services market development model for the Chelyabinsk region based on the cluster approach.

The study touches upon following tasks:

a) to summarize the theoretical principles of the cluster theory for touristic services market development;

b) to study the principles of the touristic clusters effective functioning;

c) to analyze cluster models and design one for the development of the touristic services market;

d) to develop practical recommendations for the formation and implementation of a cluster model in order to develop touristic services market in the Chelyabinsk region.

The object of this study is the domestic market of touristic services in the Chelyabinsk region. The subject is the development of the touristic services market based on a cluster approach.

2. Literature Review (Theoretical principles of the cluster approach to the development of the touristic services market)

It is natural that the original Porter's definition of industrial innovation cluster has undergone some changes and evolved (Table 1).

Table 1. *Modern official interpretations of the term "a cluster" [1].*

Source and organization	Definition
UNIDO (United Nations Industrial Development Organization), Cluster and Network Development Program	***Clusters*** – industry and geographic clusters of enterprises that produce and sell related or complementary goods and face common challenges and opportunities. These bonds make it possible to obtain external savings effects: the emergence of specialized suppliers of materials, the development of labor force with specific skills, and the development of specialized services in the technical, managerial and financial spheres. ***Networks*** – groups of companies that collaborate within projects, supporting and complementing each other to overcome common problems, achieve collective efficiency and penetrate markets that are not available to each participant individually. Networks can develop both within clusters and out of them.
Boosting Innovation: The Cluster Approach by OECD	***Clusters*** usually begin to form on a certain territory, but their borders do not always coincide with the boundaries of administrative entities. They can develop in one or several industries of goods and services. Innovation clusters are the engines of economic growth of countries and a key policy tool for the development of national competitiveness.

At the same time, as a potential cluster members enterprises face a choice which is called as the "cluster dilemma" (Table 2).

Table 2. *"Cluster dilemma" of a potential cluster member [1].*

Option "agree to participate in a cluster"		Option "refuse to participate in a cluster"	
Positive consequence	Negative consequence	Positive consequence	Negative consequence
The synergy effect from the participation of related and supportive companies, joint lobbying for the cluster interests, financial support of the state, the ability to use the innovations of other participants	Partial loss of sovereignty in making business decisions	Independent growth (the ability to obtain full competitive advantage from the usage of innovations, leader position in a particular market or niche)	Less efficient industry in general that slows down development of companies

The modern European approach to understanding of the cluster paradigm includes four main components:

a) production (a combination of industries in a cluster, the formation of full-cycle industries, production localization, economic indicators of cluster operation efficiency);

b) spatial (geographical proximity of production, their spatial location);

c) innovative (information exchange in the cluster, the presence of research centers, a mechanism for the commercialization of innovations, innovative capacity of the cluster);

d) social (the presence of trust between participants as the main intangible asset, the problem of interaction in social networks, the coordination mechanism in the cluster).

It is important to understand that a cluster is a type of network cooperation based on the constant exchange
of information and the use of joint competitive advantages, for example, a unified educational center and IT platform in order to obtain the synergy effect. In Europe the innovation cluster nowadays is understood as a unified business ecosystem.

As a key condition for the balanced development of innovation clusters in Europe the Triple Helix mechanism concentrates on interaction of business, government and science. In the absence of at least one of the categories the formation of full-fledged clusters is impossible [1].

The implementation of the cluster approach in tourism has started relatively recently. However, Porter M. [2] in 1998 emphasized the importance of developing touristic clusters. Jackson D. and Murphy P. [3] outlined the need for a cluster approach in the tourism industry. Cluster approach studies in the tourism industry have been carried out by Russian and foreign experts: Adamova K.Z., Aleksandrova A. Yu., Almeida A., Benner M., Boyko A.E., Vicks B.E., Vlasenko A.A., Gritsay M.A., Gunfadurdoss F., Dondokov B. B., Dunets A.N., Ivanovik S., Kim N., Kol O. D., Kropinova E. G., Long V., Mayevsky D. P., Markova Yu.A., Martyshenko N.S., Mikinak K., Mitrofanova A.V., Morozova Yu. Yu., Nedosvitiy N.V., Osminkina A.D., N., Rassadin B.I. , Santos K., Tarabai D., Texeira A., Ulyanchenko L. A., Fernando I., Hannah H., Khvaja A.N., Shepelev I.G. et al. [4].

According to M. Porter, a cluster is a new type of spatial organizational form located between markets “at arm's length” on the one hand, and hierarchy or vertical integration on the other [2]. Thus, a cluster can be considered as an alternative way a value chain creation [5].

There are many other interpretations of the “cluster” concept, clarifying certain features of this phenomenon. In general, among foreign and Russian researched a number of approaches to the interpretation of this concept can be distinguished in the following works: territorial networks (M. Enright, T. Anderson, E.-J. Visser, R. Bomshe), functional networks (V. Elsner, M . Steiner, T. Ignan), territorial-sectoral networks (Markov L.S., Ferova I.S., Lavrikova Yu.G., Stashevskaya G.N., Abashkin V.L., Gazimagomedov R.K., Gorkin A .P., Kleiner GB, etc.). Despite various approaches to the definition of a cluster, each author lays down the rules for identifying the subject of the cluster [4].

In the economic field the most spread definition of “a cluster” is “a group of interconnected companies concentrated on a certain territory: suppliers of products, components and specialized services; infrastructure; research institutes; universities and other organizations that complement each other and enhance the competitive advantages of individual companies and the cluster as a whole” [6].

The touristic cluster value accumulation system includes four types of value chains: suppliers (primarily transport companies), accommodation and entertainment facilities, distribution channels for touristic products (tour operators, travel agents), and tourist buyers themselves (Figure 1).

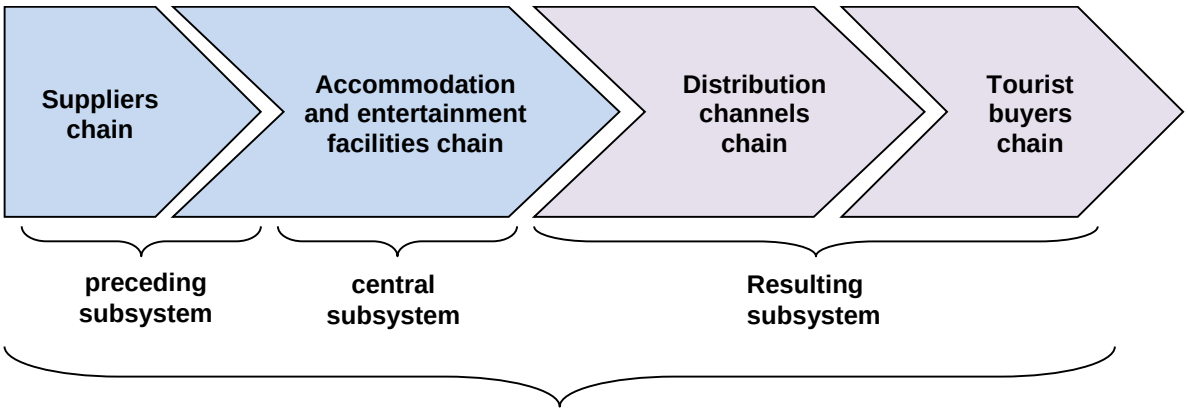

***Fig. 1**. Value accumulation system for a touristic cluster [6].*

Touristic-recreational cluster is a system of interconnected recreational and cultural facilities, service enterprises of various profiles (accommodation, transport, catering), other related services equipped with the necessary supporting infrastructure.

As a part of this study the main approaches to the touristic-recreational cluster forming have been identified:

- system approaches consider the touristic-recreational cluster as a set of objects (tourist attractors, tourist infrastructure) and subjects (members) of the tourist cluster. Moreover, only Monfort's approach is object-subjective, i.e. includes a combination of not only participants of touristic-recreational cluster, but also touristic infrastructure facilities.
- structural approaches consider touristic-recreational cluster as a structure of subjects with varying degree of destabilization. A number of authors consider as subjects of touristic-recreational cluster only entrepreneurial structures (Shepelev I.G., Markova Yu.A., Kol O.D., Osminkina A.D., Tarasenok A.). The integrated approach is presented in works of Morozova Yu. Yu., Kruzhalina V.I., Sozieva Z.I., Kapone F., which includes authorities and public institutions along with entrepreneurial structures.
- the process approach considers the touristic-recreational cluster as a process of cooperation, joining forces and tourism organizations (Mitrofanova A.I., Khvadzha A.N., Rassadin B.I.).

In our opinion a system object-subject approach to the concept of touristic-recreational cluster seems to be more complex and concise comparing to the structural approach.

In addition to structural organization, clusters are classified according to various criteria (Table 3) [7].

***Table 3**. Classification of touristic clusters types*

Classification criterion	Types of touristic clusters
Geographic location	Intra-regional; inter-regional; close-to-border
Life cycle stage	Pre-clusters; emerging; developing; mature; expiring
By the degree of participation of innovation generation centers (IGC)	With scientific centers- and universities-based IGC; with enterprise-based IGC; with no IGC
Types of touristic attractors	Museum, entertainment, sports, environmental, ethnographic, spa, cultural, etc.
Types of touristic resources	Water (sea, river, lake); forest; mountain; mixed
Scale	Local, regional, national, transnational
Management type	Managed by business entities; managed by a public authority; managed through public-private partnerships.

Target audience groups	Tourist-recreational; only tourist
Organization approach	Targeted; historical

According to the proposed classification, the touristic cluster of the Chelyabinsk region can be characterized as a target developing touristic-recreational cluster (cultural, sport, environmental) of a mixed type, with a center for generating innovations based on universities and individual enterprises, managed on the basis of public-private partnerships. The results of this chapter have allowed justifying methodological approaches to the design of touristic-recreational cluster development models.

3. Method (Methodological approached to building of touristic clusters models)

3.1. Participants (Participants and resource base for touristic cluster model)

The objects of competition in the cluster can be divided into several groups: goods, enterprises (as producers of goods), activities, territories.

The core of the cluster are the companies and organizations directly involved in the process of providing services such as travel agencies that provide services to attract tourists.

Cluster members can be classified into groups: tour operators (suppliers of tourism services); hotels and accommodation providers; transport companies (providing buses, air travel, rail transportation); educational institutions; committee of trade and tourism regulation.

Resource potential of the touristic cluster model lies in specially protected natural areas, monuments of historical and cultural heritage, art crafting sites and workshops, museums, specially created touristic sites and venues; natural parks and zones.

Thus, the cluster model provides not only mutually beneficial cooperation, the exchange of information, ideas, technologies and employees, but also implies the presence of competition between them.

A model of a competitive cluster approach in tourism was developed by Porter in the 1990s [9]. According to the Porter's theory, 4 key elements should provide a competitive advantage: factor conditions, demand conditions, adjacent and serving industries, strategy, structure and competitors.

The analysis of Russian and foreign touristic clusters models is presented in Table 4.

Table 4. *Characteristics of models of touristic clusters.*

Author(s)	Model definition of touristic cluster	Structure elements of touristic cluster	Model key element
Universidad de Sevilla, 2003	Touristic cluster is a population of a certain type of economic objects having a specific distribution area in the territory	Activities directly related to tourism. Touristic centers of attraction. Government. Ecological institutes. Service sector companies. Associations and committees.	Touristic centers of attraction
S.K. Cunha, J.C. Cunha, 2005		Activities directly related to tourism. Touristic centers of attraction. Government. Universities and research centers. Service sector companies. Associations and committees.	Tourist product
N. Kim, B.E.Wicks, 2010	Touristic cluster as an effective territorial form of increasing the competitive advantages of the tourism sector	Travel companies. Government. Universities. Transnational companies. Destination management organizations (unions, associations, etc.) Factors of cluster formation and development.	Transnational companies
A. Malaka-uskaite, V. Navickas, 2010	Touristic cluster as a regional management mechanism aimed at strengthening the interests of the region, its independence,	Activities directly related to tourism. Touristic centers of attraction. Government. Academic universities and institute. Service sector companies.	Touristic destination

	competitiveness and sustainable development	Associations and committees. Touristic destination	
A.N.Dunets, 2011	Complex approach	Consumers of touristic products. System-forming complex. Production complex. Social service complex. Owners of touristic and recreational resources. Potential tourists.	Consumers of touristic products
E.G.Karpova, 2012	Process approach	Tourist product supply chain	Tourists' needs

3.2. Materials (The typical structure of the cluster model)

The following elements can be considered as the base for further cluster model developed in this research:

- element 1 - core (root business). All enterprises on the territory, grouped by type of main product or by sub-sector.
- element 2 – suppliers of cluster enterprises (local companies and enterprises from other regions, grouped by type of supply).
- element 3 – consumers of the cluster enterprises.
- element 4 – supporting infrastructure what includes industrial and public associations, administrative support, financial, storage and transportation.

The main distinguishing feature of the touristic cluster is its route-infrastructure organization. The specificity of the consumption of touristic resources lies in the fact that the consumer himself moves in time and space to the places where these resources are concentrated. The companies providing the touristic routes, supporting the infrastructure and realizing the touristic product are interconnected, therefore possible competition is transformed into interaction in one market.

3.3. Procedure (Touristic cluster development procedure)

The algorithm for creating a cluster in a specific territory can be described with the following steps:

Step 1. SWOT analysis is carried out to determine the main competitive tourist advantages of the territory. As a result a reference cluster and gap analysis are carried out.

Step 2. Touristic zoning of the territory is carried out based on the marketing, recreational, natural-ecological and socio-economic criteria.

Step 3. Touristic routes and local zones with the greatest tourist potential and territories with a pronounced competitive advantage are plotted on the territory map. Each local zone can become a prototype cluster.

Step 4. In each prototype of the cluster a nodal (core) company is chosen. Cluster prototypes are transformed into real clusters, a unified promotion channel appears concentrated around the nodal company. Nodes are the business centers of local zones and tourist flow.

Step 5. In accordance with the theory of business processes, all cluster companies are divided into four groups: a node company and related companies; secondary companies; companies providing communication and coordination of participants in the touristic cluster; companies involved in the design and implementation of cluster development programs.

As a result a touristic cluster formation model will be developed. This model is presented in the form of two-level territorial "tourist balances", what suggest a correlation of the clustering processes at the local and national (international) levels. According to this approach, the entire territory is divided into two types of clusters (local and national).

During the design of the cluster model, two structural domains can be identified: primary and secondary. The primary domain is associated with the formation of internal clusters, the purpose of which is to increase the competitiveness of the territory by attracting domestic tourists. Features for the second

domain include cluster associations for the realization of large-scale projects and international events. This clusterization scope is usually formed around a specific unique touristic site or event (Figure 2).

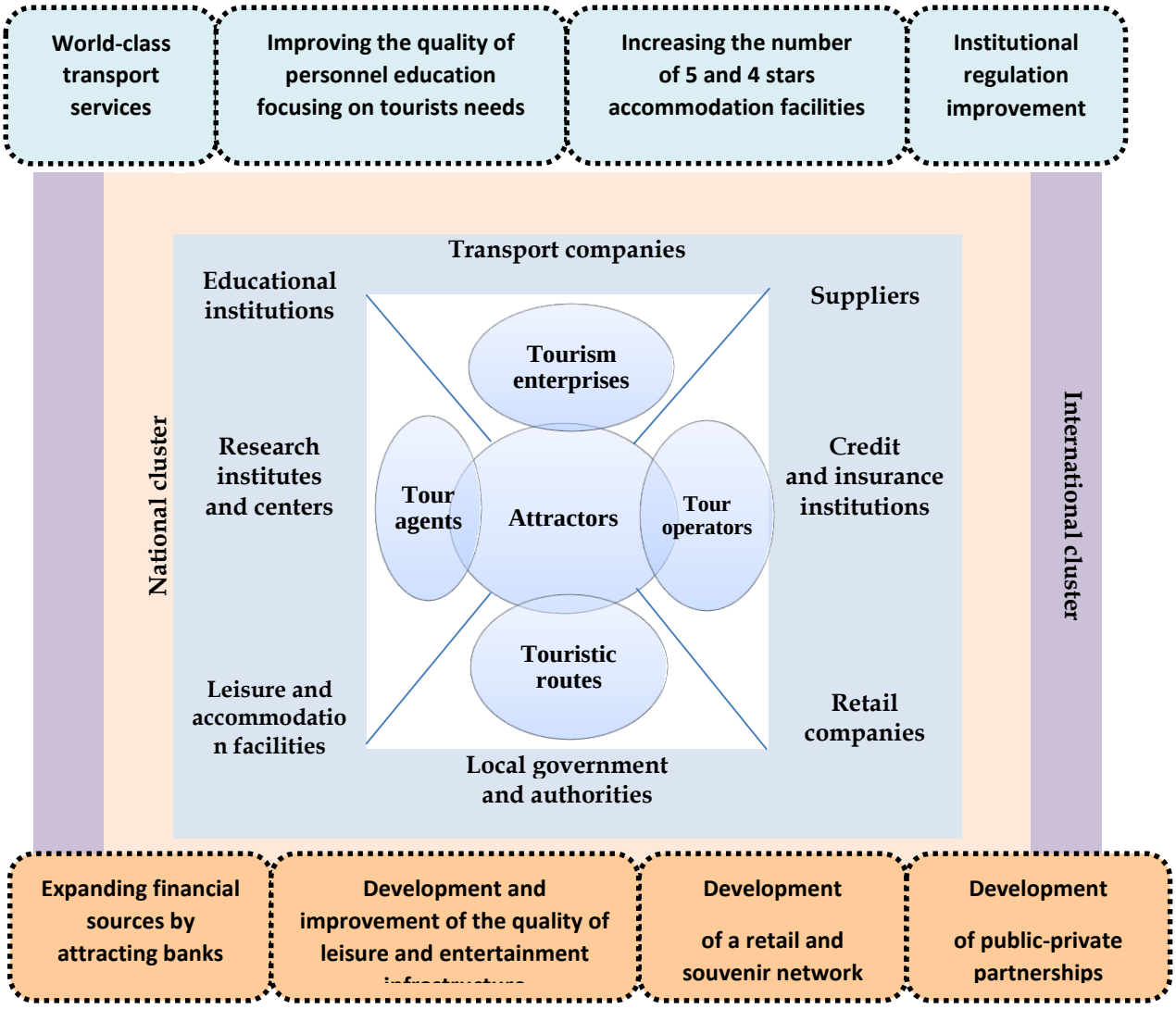

Fig. 2. Two-domains model of touristic cluster formation.

4. Results

Based on the research of the touristic-recreational cluster formation methodology from previous chapter a model for the Chelyabinsk region tourist cluster has been developed.

Today, the Chelyabinsk region has all the necessary resources for the development of the domestic and inbound tourism market. Among basic factors for region tourism development are favorable climatic conditions, historical and cultural heritage, a high level of economy, investment attractiveness, convenient geographical location, developed transport infrastructure, a sufficient number of events of regional, national, international significance, developed business infrastructure, entertainment industry, hospitality, availability of educational institutions that train professional personnel for tourism industry. The resource potential of the Chelyabinsk region includes specially protected natural areas, monuments of historical and cultural heritage, crafts sites, museum, specially created touristic sites; natural complexes (table 5).

Table 5. *Touristic resources of Chelyabinsk region*

Resource name	Number of sites	Square, thousands, ha.	Throughput, thousands. people
Ski centers and complexes	12	Undefined	
National parks	2	145	
Nature reserves	1	30	
Specially protected natural areas, including nature reserves and natural monuments	188	662	
Sanatorium areas	14		81
Lakes	3 170	213	
Complex monuments of nature and historical and cultural heritage	6	Undefined	
Professional theatres	14		747
Museums	48		608
Concert organizations	3		236
Sport facilities and venues	6 782		197

In the system of integrated economic regionalization in the Chelyabinsk region three economic districts can be distinguished: Gorrnozavodskoy, Northern and Southern districts and two urban agglomerations - Chelyabinsk and Magnitogorsk [10].

One of the strategic objectives of the touristic-recreational cluster development in the Chelyabinsk region is the balanced development and integration of cluster-forming elements, among which several significant sub-clusters can be distinguished such as sport, health-improving, environmental, cultural and educational ones. The developed structure of the Chelyabinsk region touristic cluster is presented in Figure 3 [5].

<table>
<tr><td rowspan="6">1. State support of tourism entities and activities

2. Public-private partnership</td><td colspan="3">Project of touristic cluster for Chelyabinsk region</td></tr>
<tr><td colspan="3">Local clusters</td></tr>
<tr><td>Northern</td><td>Mountain</td><td>Southern</td></tr>
<tr><td colspan="3">Basic objects of local clusters</td></tr>
<tr><td rowspan="2">The Demidovs' manor ("White House"); Kaslinskoye art casting</td><td>Ski centers and resorts: “Eurasia”, “Sunny Valley”, “Zavyalikha”, “Urenga”</td><td rowspan="2">Monuments of ancient history "Country of cities"; Historical and cultural reserve area "Arkaim"</td></tr>
<tr><td>Ilmensky reserve area; National Parks: “Taganay”, “Zyuratkul”</td></tr>
</table>

Objectives:	1. To build the awareness and knowledge of the Southern Urals; to increase inbound tourism; to increase the attractiveness of the Chelyabinsk region for Russian and foreign tourists. 2. To attract investment; to build a portfolio of investment projects; to promote of investment projects in the domestic and foreign markets
Result:	Positive image of the Chelyabinsk region as a tourist complex

***Fig. 3**. Structure of the Chelyabinsk region touristic cluster.*

Formation of two-domain touristic cluster models quite adequately corresponds with current trends in the tourism cluster approaches of international practice.

5. Discussion and Conclusion

Based on the analysis of statistical data, data on touristic information sources, objects of touristic and road infrastructure, the following conclusions can be made. The main factors restraining the development of the tourist flow within the formed touristic cluster are:

1) insufficient level of equipment with roadside service facilities;

2) lack of information support and promotion; it is necessary to place bilingual tourist navigation signs as well as information desks providing tourists with information about display, accommodation facilities etc.;

3) a small number of accommodation facilities, which is confirmed by touristic statistics. The need of additional accommodation facilities is caused by significant length of tourist routes from the cities of the main tourist flow (Chelyabinsk, Yekaterinburg, Ufa);

4) underdevelopment of the catering network (including cafes, restaurants, bars etc.);

5) limited access to touristic sites and venues. Current work schedule of museums does not apply for evening visiting, there are no parking lots around touristic sites;

6) a small number of objects for outdoor activities organization, which significantly reduces the attractiveness of the route;

7) additional construction of objects required by tourists when visiting the objects of display (specialized parks, halls and auditoriums for various workshops and exhibitions);

8) shortage of professional personnel with tourism related professional skills and language training;

9) mismatch between the current transport infrastructure conditions of certain sections of roads and predicted traffic intensity and regulatory requirements.

As competitive advantages of the formed touristic cluster the following ones have been outlined:

1) transport accessibility;

2) the availability of conditions for the formation of integrated touristic products:

- industrial tourism (Arsenal, Oruzheinik-park),
- ecotourism (National park «Taganai», eco-park «Bird Park»);

3) new investment projects aimed at developing patriotic education and introducing to the original culture among the younger generation, mastering the skills of folk crafts;

4) touristic facilities included in the basis of the routes will form the concept of traditional values and the brand of the city of Zlatoust (weapon craft, damask steel, Zlatoust metal engraving);

5) the unique historical past as well as cultural and natural heritage allow to create interactive courses (lessons, classes, workshops) as a part of school programs.

Competitive advantages guarantee a steady demand for touristic services offered as part of the implementation of the developed model.

An analysis of the limitations and advantages of the touristic cluster of the Chelyabinsk region as well as the results of the forecast scenario for the touristic services market development have confirmed the validity and adequacy of the proposed model for the development of the studied market based on the cluster approach.

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Development of the Algorithm of the Primary (Superficial) Assessment of Investment Attractiveness of the Project

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Abstract

The purpose of the article is the analysis of some existing methodological approaches to the assessment of investment projects in the context of emergence of the investment risk as well as the offer of the most acceptable methods and mechanisms of the efficiency evaluation of investments, taking into account the risk factors. The author does not set the purpose of a detailed research of the existing methods; on the contrary, the purpose of this article is rendering the practical assistance to investors the development of a laconic mechanism of the investment attractiveness assessment which would be based on the simplicity of perception and calculation and which could be carried out without the involvement of "narrow" specialists for preparation of primary conclusions.

Keywords: Investments, investments market, investment efficiency, investment risk, investment project, financial provision

1. Introduction

Efficiency evaluation of investments is necessary for making decision on the investment of the project. It is necessary not only for the expected investor who wants to prove the expediency of these investments, but it also can warn the management of the enterprise against the adoption any wrong investment projects. Some methods which allow to estimate the risk of an investment project are known, but they do not offer a definite answer to the question of expediency of investment to a certain project. This decision often has to be made immediately, but the way from the development of an investment programme to making decision on investment to the project is rather long and can take from several months to several years. This disadvantage is the one more reason of special attention of the author to the revealed problem.

The questions of structural changes in the enterprise business activities require special attention in the conditions of system crisis. These changes first of all depend on the efficiency of the investment projects implementation. In practice making decision on investment has a subjective character, however the development of some objective criteria on the basis of which one can define the investment attractiveness of the project is relevant for the person accepting it. The economy of the USSR did not know the concept of "investments", since the concept of "capital investments", studied by Alimov A.N., Bershedu E.R., Garbuzov V.F., Zherdetsky P. F., Krasovsky V. P., Pedan M. P., Savchenko A.G. and other famous scientists, was more acceptable for the socialist economy.

This research was performed by the means of consideration of some logically interconnected tasks:

- to carry out the analysis of the existing techniques of the investment projects efficiency evaluation;
- to analyze the methods of risks evaluation during the use of the existing techniques of the investment projects efficiency evaluation;
- to reveal the disadvantages of the existing methods of risks evaluation;
- to develop a simple and labour-intensive technique and an algorithm for more complete risks evaluation within the investment projects efficiency evaluation;
- to carry out an experimental verification of the technique of more complete risks evaluation;
- to carry out the analytical comparison of the results of the use of the existing techniques and the technique, offered by the author;
- to draw the conclusions on the practical applicability of the method.

2. Literature Review

The most famous foreign researchers in the sphere of investment are: Berens B. [1], Birmann U. [2], Vasilchenko Z.M. [3] Gitman L., Dzhonk M. [4], Gubanova E.B. [5], Sharp U., Alexander G., Bailey J. [6]. and others. Unfortunately, the Russian economy differs from the foreign one considerably. Thus, the application

of the research of the named scientists is impracticable without considerable transformations and adaptation to the national peculiarities. So, the development of specific conditions for stimulation of investment activities of separate industries in Russia by the Russian and foreign investors is a especially relevant task. The development of the legislation and highly effective actions of the executive authorities at the local level, i.e. in the regions, which problem is the creation of favorable climate for the attraction of such investments, has to become the key to success in introduction of such conditions.

The analysis of the methods of the investment risks evaluation is in the center of attention of many researchers, such as I. Blank [7], V. Boyarko [8], T. Mayorov [9], V. Moskvin [10], A. Salamatin, D. Petrova [11], D. Sergeyev [12] and many others. But the approaches to the classification of investment risks and methods of their evaluation differ. Some elements of the investment risks management demand more detailed studying.The investment risk is calculated quantitatively taking into account the specific essence of the investment uncertainty, which is connected with the possibility of unfavorable events and their consequences in the form of certain financial losses (loss of income, increase in expenses, loss of profit, etc.).

So, I. A. Blank suggests to use four groups of indicators for the assessment of investment attractiveness of a project. The first group include the assets conversion cycle, the second group includes the analysis of the enterprise profitability, the third group includes the analysis of financial stability, the fourth group includes the liquidity analysis [7].

Vergun A. I. suggested to carry out the analysis in the following directions:

- assets conversion cycle;
- liquidity and financial stability of the enterprise;
- cash flows; profitability.

The analysis of absolute and relative priority of investment projects is recommended to be carried out on the basis of such indicators as payback period, net present capital value, internal regulation of profitability [13]. Gutorov A. I. and Kramarenko K. N. offer the parameters of determination of integrated assessment of investment attractiveness of the enterprise considering such groups of indicators as property state, liquidity, financial stability, business activity, profitability and so on [14].

Risk management is an important component of project management and for this reason this process begins with risk assessment. In the research project, carried out by M. Bernadeta Yunkes, Anabel P. Terezo, Paulo SLP Afonso [15] carried out the detailed analysis of the methodologies used for processing of risks in the investment projects, approved by Banco da Amazonia SA. For this purpose, the investment projects presented to FNO (The constitutional fund of financing of the North) during 2011 and 2012 were considered for this purpose. It was established that the evaluators of this credit institution use several indicators for risks evaluation, which play an important role for decision making and promote a statement or a rejection of a introduced project. These indicators include solvency, financial statements of organizers of the project, several financial restrictions, capital level, level of financial indebtedness.

Livshits V.N. and Vilensky P.L. paid special attention to consideration of the delusions of methodological and methodical character, connected with the investment projects efficiency evaluation, as well as with incorrectness of accounting of inflation factors, influencing on the evaluation of the investment projects efficiency in the conditions of risk and uncertainty which cause mistakes and, finally, lead to financial losses for the investor [16]

Yarin D.N. considers various techniques, demanding representation of a huge number of basic data, carefully. For example, statistical techniques which result is the calculation of any coefficients, do not impose special requirements to their systematization and registration. At the same time dynamic methods assume the creation of any indicators, changing in time and they are sensitive to correctness of registration (otherwise the probability of mistakes considerably increases during the analysis results interpretation). As the comparative research, conducted by the author, proved, when carrying out the analysis of indicators, a schedule is the most convenient form of their representation. Other forms complicate the application of the corresponding techniques significantly, as they do not meet the requirements of presentation [17].

3. Method and Materials

The method of logistic regression, which allows to reveal the factors, most influencing the investment support, was used in the work. Two groups of methods of evaluation of cost efficiency of investment projects (i.e. static and dynamic methods, which are the cornerstone of this research) as well as he methods which are capable to commensurate the investment project efficiency with the degree of its risk, were applied. The reduced model of forecasting of bankruptcy, created for medium-sized and small enterprises of the construction industry was offered. The simplified methodological bases of making decisions on the expediency of issue (receiving) of investments and financial provision of investment projects after carrying out the careful many-sided analysis of these projects were investigated.

The methods of system and comparative analysis, economic-mathematical modeling and forecasting, the theory of change of value in time, procedures of discounting and reduction of cost, the theory of risks made up the methodological base of the research.

The practice of assessment of investment projects, received by such appraisal companies as "Centre for Independent Property Examination" and "Professional Evaluation Team", materials of scientific conferences, seminars and round tables on this subject formed the practical basis of the research.

Standard and methodological basis of the research are made by the following documents:

- Federal law No. 39-F3 "On investment activities in the Russian Federation carried out in the form of the capital investments" (approved on 25.02.1999);
- Federal law No. 135-F3 "On evaluation activity in the Russian Federation" (approved on 29.07.1998);
- "Methodical recommendations on evaluation of investment projects efficiency and their selection for financing" No. 7-12/47 (official publication, approved by the State Committee for Construction of Russia, Department of Economic Affairs of the Russian Federation, the Ministry of Finance of the Russian Federation, Goskomprom of Russia on March 31, 1994);
- "Methodical recommendations on evaluation of investment projects efficiency (the second edition)", No VK 477. (Approved by Department of Economic Affairs of the Russian Federation, the Ministry of Finance of the Russian Federation, the State committee of the Russian Federation on construction, architectural and housing policies on 21.06.1999);
- "Recommendations on drawing up business plans for territories, separate projects, complexes, new construction and reconstruction", No MPP-4/2/03-94 (approved by Committee for Architecture and Urban Development of the Government of Moscow);
- International standards of assessment (MSO-2SUZ).

The report on experimental check of the developed technique of superficial (urgent) assessment of the investment project taking into account risks on the example of assessment of the investment project of construction of the "Evropeyka" Apartment complex, implemented by "Integral Public stock company (Ukraine)" is made.

3.1. Participants

For the purpose of check and testing of the offered algorithm of instant, "superficial" assessment of the investment project the specialists of credit department of Bank of Moscow (BM Joint Stock Company - Ukraine), who have an experience of assessment of investment projects attractiveness for the purpose of possible investment crediting of the construction company-builders, working in the sphere of housing construction, were employed. The group of experts consisted of three people, who had to estimate the attractiveness of the project offered by the builder, working independently one from another. At the same time they carry out the approbation of the technique, offered by the author according to the developed algorithm.

3.2. Materials

The following materials were given out to the participants for examination:

1. Business plan for the end of construction of "Evropeyka" Apartment complex.
2. Balance sheet of the enterprise (Form Number 1) for the two last years.
3. Report on financial results (Form Number 2).

4. The developed questionnaire with the names of indicators and the scale for their assessment.

5. The form of expert evaluation with columns for expert evaluations, according to the developed scale.

3.3. Procedure

Scientists already developed a wide range of methods and approaches, allowing to analyze the project risks. Risks in the investment management can be analyzed with the use of qualitative (subjective) and quantitative (objective) methods which supplement each other.

The task, stated by the author is the creation of the simplified mechanism of primary (superficial) assessment of the investment project attractiveness. We grouped the indicators, characterizing the production-and-financial activities, which application will allow the potential investors, to give an assessment to investment attractiveness of the enterprise very "mobile", without passing a long preparatory stage, using only data of financial and statistical reporting. After adoption of primary positive decision on attractiveness of the project, these indicators will allow to carry out the detailed financial and economic analysis with the use of modern techniques. The technique, offered by us, suppose simple calculations, and the algorithm of determination of the expected effect of the investment project can be presented as follows:

1. The level of "usefulness of the project" is estimated according to the scale from 1 to 10 points. Usefulness of the project is an important, even the major indicator for adoption of the correct decision, since it gives the chance to find a proper correlation between income and project risks. As a rule, several participants (experts) take part in making decision on so-called "usefulness of the project", therefore the expressed result of "usefulness" will be expressed mathematically, for example, as an arithmetic-mean expression of the marks, which are put down jointly during making an investment decision.

2. The formalization of the procedure of the investment decision justification is carried out. It is clear, that the justification of the need (or opportunities) of investments cannot be performed intuitively, since the assessment has to get a digital expression (as a percentage, points and so forth). The presentation of the business plan which feasibility study contains financial-and-economic conditions and possible results of the project implementation, can form a measurement base. If the rating scale is provided in ball expression, it most likely is in range from 1 to 10 points.

3. Such a component of business plan as "Marketing plan" is estimated, since the assessment of market opportunities of the enterprise is given, the formation of the level of demand structure is presented and the results of the investment project are predicted in this section. Besides, the marketing research forms base for the long-term development strategy of the enterprise and defines its resource requirement. Our offer is a ball system of assessment by experts in the same range-from 1 to 5 of points.

Let us notice that the offered algorithm is based on the ball quality evaluation of the project, at which a certain point is appropriated to separate criteria, according to its importance, where the project is estimated by the score. Thus, the maximum number of points, which the project can receive, is 25.

However, this method is not without subjectivity. Therefore, it is necessary to use some other known methods during the investment projects evaluation.

Let us call this part of the evaluation of the project investment attractiveness the "subjective (high-quality) project evaluation".

The score, received by this project according to 3 experts is divided into 3, so as an arithmetic-mean value of the "value judgment" is obtained.

Qualitative methods of the investment risks evaluation can include the methods of expert evaluations, analogies, expediency and others. Their common feature is that they are based on practical experience, the accumulated knowledge, and on the experts' intuition as well. For this reason, we consider these estimates to be subjective. However, such analysis allows to consider various aspects of a problem, to reveal the major factors and possible decisions, to prepare information for further formalization and creation of "model of primary project evaluation".

The application of qualitative methods in the investment analysis is caused by the following reasons: subjectivity of the studied phenomena or characteristics; the absence or lack of necessary information, impossibility of the analysis of objective and acceptable methods; the lack of the research subject (which

have to be created during the project implementation progress).

Expert analysis of investment risks is usually applied at the initial stages of the project (at the investment stage) if the volume of the initial information is insufficient for quantitative assessment. The benefits of expert risk analysis are the requirement of exact basic data and specialized software for assessment of the possibility of calculation of the project efficiency and relative simplicity of calculation. The main shortcomings are difficulties in involvement of independent experts and subjectivity of estimates.

Quantitative risk analysis is a numerical determination of the investment risk of the project in general. Quantitative analysis is carried out with the use of various methods, namely: sensitivity analysis, Monte Carlo method, method of expert evaluations and other methods. That is, being guided by this knowledge, the investor chooses the method which is the most expedient for the project. As it was already pointed out, we do not set the purpose to list and characterize the existing methods of investment projects evaluation, and we will try to offer an absolutely "artless", but rather informative, so-called "objective project evaluation" according to the following scheme:

1. Complex project analysis which is to be carried out by the means of the coefficients, characterizing the investment attractiveness of the project is carried out.

The analysis of sources [1-13] gives the opportunity to consider about 50 coefficients for the assessment of the enterprise activity, as well as for the capital structure assessment. At the stage of justification of the investment project attractiveness at is enough to allocate a group of indicators which will give an opportunity to formulate a total characteristic of an investment project.

The author offers to use the mechanism, using various approach to projects of different financial loading with the use of the increasing quantity of indicators depending on the degree of the project importance for the specified assessment.

For:

1. "Small projects":
* - indicator of net present value;
* - payback period of investments;
2. "Average projects":
* - indicator of net present value;
* - payback period of investments;
* - internal rate of return;
3. "Large projects":
* - indicator of net present value;
* - payback period of investments;
* - internal regulation of profitability;
* - coefficient of current liquidity;
* - share of borrowed funds in the liabilities;
* assessment of threats of enterprise bankruptcy (according to the two-factor model).

Analyzing the research by the aforesaid scientists it is possible to note that all of them have different approaches to the set of criteria of the investment cost efficiency. But there is the fact, that each of them surely allocates the following indicators:

- payback period of investments;
- net discounted income;
- internal rate of return;
- index of profitability;

All these criteria are based on discounting of cash flows and they are the key indicators recognized in the world practice, which accumulate the effect of introduction of the investment project. Their calculation indicates cost efficiency of the investment project, first of all.

The analysis of the business plans development and efficiency evaluation of various projects proved, that, despite the use of these commonly accepted criteria, the calculation is most often carried out by domestic specialists according to the various algorithms with the use of various structure of cash flows and it

is limited to the use of traditional methods of reduction of receipts of future periods to the current level (the discounting method) and reductions of this level to the future (the build-up method). Besides, there is no uniform view of statement and the solution of tasks and justification of the chosen discount rate.

We came to the conclusion, that for expeditious making decision on investment it is enough to carry out the quality (expert) standard, having supported it with calculation of the above-stated indicators. Such an algorithm will be suitable for all project groups (small, average, large).

Formulas for calculation can be presented in the following form (though some authors offer other their modifications) as a technique for expeditious making decision on investment

1. The payback period is estimated in the number of the years necessary for return of investments, taking into account the expected annual pure cash flows, which are the net income after tax.

$$PPa = \frac{II}{NCFa} \quad (1)$$

where:PPa -average payback period;

II - initial investments;

NCF -net cash flow (average annual).

We have to invest 100,000,000 roubles in the evaluated project, while annual net cash flows are expected as 0+26000000+24000000+22000000+20000000+19000000

$$PPa = \frac{100{,}000{,}000}{18{,}500{,}000} \quad (2)$$

The actual payback period slightly differs from the payback period, calculated by the offered formula (it will be equal 5.44 in our case) [3] and that does not give a significant error when calculating, therefore we will not consider it in the research.

Thus, the payback period can be used only for primary ranging of projects with the purpose of an exception of obviously unacceptable projects from the further analysis.

The offered rating scale looks as follows: 0...5 points - the more a project payback period, the lower the assessment.

2. At this primary analysis stage it is possible to take an indicator, indicator that is the reverse of the aforesaid one, as the profitability indicator, i.e.

$$Kie = \frac{NCFa}{II}; \quad (2)$$

$$Kie = \frac{18{,}500{,}000}{100{,}000{,}000} = 0{,}185\ (18{,}5\%)$$

where: Kie – coefficient of the capital investments efficiency.

Forming the level of profitability of investment activities of the enterprise it is necessary to consider the investment risk surely. The higher the risk, the more return from investments is required.

The offered rating scale looks as follows: 0...5 points; the more profitability, the higher assessment.

3. Now it is possible to pass to importance assessment of such criterion as "an indicator of net present value" or "the net discounted income "(NPV) for the efficiency evaluation of investment projects.

The authors of the theory of discounting suggest to discount a cash flow by years at the rate of r which expresses the discount rate of the Central bank and made 7.75% in Russia till 10.02.2019:

$$NPV = \sum_{t=0}^{n} \frac{Pt}{(1+r)^t} - \sum_{t=0}^{n} \frac{ICIt}{(1+r)^t} \quad (3)$$

Pt are cash flows (annual net profit) without investment costs, monetary units;

ICIt -initial capital investments, monetary units;

r - discounted rate;

n - calculation period, years;

t - calculation period, years.

Calculation of the project net present value allows to estimate the investment project from the positions of the current situation by the means of discounting, e.i, by the reduction of both the investments, distributed in time, and the receipts (cash flows) from the investments with the use of a compound interest,

to the basic (current) timepoint of cost assessment of the future values. At the same time the discount rate characterizes the minimum regulation of profitability, expected by the investor from this project, i.e. 7.75% for today. The project can be approved only in case if NPV is positive (> 0).

The offered rating scale looks as follows: 0...5 points - in this case only 0 points (if NPV≤0) or 5 points (if NPV≥0).

When calculating NPV and other performance indicators of the project during its realization by the concrete enterprise we should take into account the following aspects:

- during the project implementation by an operating enterprise, which releases different types of products, the output balance (at the time of carrying out calculations) has to display the structure and cost of its own and borrowed funds of the enterprise, expressed as the indicator of WACC (weighted average cost of capital).

Then:

NPV of the project = NPV of the enterprise with the project - NPV of the enterprise without the project (4).

Actually, the indicator of NPV which is calculated reflects the assessment of the market value of the enterprise business (with the project and without it) carried out with the application of the approach, based on the forecasting of expenses and profit, which can be generated by the assessment project in the future. Taking into account, that we consider the c expediency of investment both for the enterprise performing the project, and for the investor, it would be desirable to focus on the efficiency evaluation of the bank crediting of the enterprise for the project implementation. That is defined by positive NPV of the cash flow, in which the outflows are the funds, provided by a bank as a credit line (or the credit), and the inflows is the return of credit resources with percent.

$$NPV_{кредитора} = \sum_{t=1}^{T} \frac{K_t + \%t}{(1+i)^t} - \sum \frac{K_{vt}}{(1+i)^t}; \quad (4)$$

Kt - returnable credit resources and percent %t;

Kvt - issued credit resources in t timepoint;

i - discount rate which is equal to the maximum profitability of the financial instruments, alternative for a bank, with the same risk level.

%t the amount of a payment for the credit for the term of the use of resources.

4. The internal rate of return (IRR) shows the upper bound of the acceptable level of a discounted rate, which excess makes the project unprofitable. It is calculated as:

$$\sum_{t=0}^{T=t} \frac{CFt}{(1+IRR)^t} + \sum_{t=0}^{T=t} \frac{(C_0)t}{(1+IRR)^t} = 0 \quad (5)$$

Any investment project assumes the availability of initial investment which will lead to cash receipts in the future (ideally). The internal rate of return of the investment project shows the credit rate at which we will not receive any loss from our investment, i.e. zero will be the result of all the monetary inflows and outflows, e.i. no profit and no losses. In this case our investments into the project will pay off the future cash receipts from the project, but finally we will earn nothing. Such tactics of investment can be used only by co-owners of the company, who carry out "injection" of money to the enterprises, belonging to them for the purpose of avoidance of temporary financial difficulties from time to time. As a rule, those are short-term investments.

The economic sense of this indicator is that IRR shows that rate of return of investments at which it does not matter for the investor: to invest means in the project or not.

We suggest to use this indicator for reference, without estimating according to the ball system.

Analyzing the investment project risk, they use two the main approach:

1) to adjust a discount rate on the risk factor and then to use it to discount the expected cash flows, which arise owing to the project implementation (the difference between income and expenses)

2) to adjust the expected cash flows on the risk factor and then to discount them at the rate, which does not consider the risk factor;

The higher the risk in the project, the higher award for risk is required.

Source of emergence of external factors of risk is the external environment concerning the enterprise. Treat them: vendor relations and consumers, the competition, the taxation system, an economic situation in the country, perhaps natural disasters and other risk factors.

Internal factors of risk can be divided into groups of factors which are connected with the personnel of the enterprise, its equipment and technology, its production environment. These groups contain dozens of specific risk factors operating at the enterprise.

The author suggests to estimate the influence of external and internal factors on the possibility of investment in terms of assessment of the bankruptcy probability at the enterprise by the means of the modern adapted models. In other words, it can be interpreted as follows: if the enterprise is in the state, close to bankruptcy at the time of the expected investment, it is better for investors "not to push luck" and to make investments in a more worthy project.

The research, carried out by E.A. Fedorova and M.P. Lazareva [18] notes, that "many Russian scientists in the works try to adapt foreign techniques to modern realities of our country, considering its political, economic and social features. These techniques consider influence and external and internal factors, however the limited quantity of indicators, which authors of techniques consider the most significant, is accepted for their analysis". For example, researchers came to the following conclusions:

1. the more the value of an asset turnover ratio, the is less the probability of the enterprise bankruptcy;
2. the higher the instant liquidity, the less is bankruptcy probability;
3. the increase in the indicator of current liquidity reduces the risk of bankruptcy;
4. the increase in the indicator of profitability reduces the risk of bankruptcy;
5. the decrease in the value of operational profitability strengthens the enterprise;
6. the return on assets leads to the decreases in the risk of bankruptcy.

M.N. Kochuguyeva, N.N. Kiselyova and S.M. Anpilov [19] allocated and ranged certain financial indicators depending on their capability to predict the risk of the enterprise bankruptcy. They are:

1. return on assets;
2. information on current liquidity;
3. operational result;
4. character and volume of expenses.

The results of the similar indicators calculation have evident economic interpretation. Besides, the information base for the express diagnostics acts as the material for the further financial-and-economic analysis and also as the basis for performing of the further complex diagnostic of the enterprise economic condition.

As we have already specified earlier, it is expedient to perform such a procedure by third-party consultants (experts) to receive impartial opinion.

We suppose, that the combined approach, which gives the chance to generalize the influence on the emergence and the course of the crisis phenomena, the most effective and expedient. The use of only of financial performance according to the enterprise reports characterizes only the current state for a certain date and does not allow to reveal the major factors which caused it. The joint use of economic and financial performance and as it was specified, and the use of external and internal factors are more expedient.

Nevertheless, the author considers that the two-factor model of assessment of probability of the enterprise bankruptcy is considered to be one of the simplest and available forecasting models of the bankruptcy possibility [20]. It is quite often used in practice and is based on two key indicators, namely the coefficient of current liquidity of Rcl and the indicator of a share of borrowed funds in the liabilities of Rd:

$$Bp = \alpha + \beta Rcl + \gamma Rde \quad (6)$$

where α, β, γ - permanent coefficients, find in the empirical way;

Rcl = CA / CL;

Rle = LC / L;

CA - current assets;

CL - current liabilities;

LC - loan capital;

L - liabilities of the enterprise.

If the calculation result with the use of dependence (6) is negative, i.e. if Bp<0, the probability of the enterprise bankruptcy is lower than 50%. Positive value of Bp, e.i. Bp>0 points to a high probability of bankruptcy, which is more than 50% and increases with the increase in Bp value.

In practice of the American enterprises work the following values of experimentally received permanent coefficients entering model (6) are used: α = - 0.3877; β = - 1.0736; γ = 0.0579. Taking into account these values the model (6) has the following form:

$$Bp = (-0.3877) + (-1.0736)Rcl + 0.0579\ Rde \quad (7)$$

That is rather convenient for the practical use of the method.

The specific results, received with use of model (7) can be considered as follows:

Bp(-0.583) - bankruptcy does not threaten the enterprise;

Bp = (+0,3) (-0,3) the uncertainty zone;

Bp (+0.648) - the enterprise is a potential bankrupt.

The offered rating scale looks as follows:

Bp (-0.583) - 5 points;

Bp = (+0,3) (-0,3) 1...4 points;

Bp (+0.648) - 0 points.

The data of the enterprise balance are presented in Table 2 for the calculation of necessary indicators.

Table 2. *Data of the enterprise balance sheet*

Indicators	For the end of the reporting year, million rubles	For the end of the previous year, million rubles	For the beginning of the previous year, million rubles
Current assets	1440	1285	1160
Current obligations	700	570	580
Loan capital	100	100	100
Liabilities	2950	2670	2480
Current liquidity ratio	2,057	2,25	2,0
Ratio of debt and equity capital	0,034	0,037	0,04
Bankruptcy probability	-2,399	-2,8012	-2,5326

Such a laconically carried out analysis allows to draw a quick conclusion that this enterprise is not threatened by bankruptcy since its index of bankruptcy is much lower than the boundary index.

As we consider this two-factor model as a component of the developed technique of carrying out the express analysis for determination of the possibility of investment in addition to the algorithm of the project attractiveness assessment, offered earlier, not for the purpose of determination of the possibility of bankruptcy of the enterprise for holding any rehabilitation measures, we consider this two-factor model to be quite sufficient for this purpose.

4. Results

Thus, a group of experts (the employees of BM Ukraine public stock company), including three persons was attracted for the primary (superficial) assessment of the opportunity of receiving investments by the enterprise and for testing the method of primary "superficial" assessment of the investment project of building of the "Evropeika" housing complex, offered by the author. The builder for project finish needs long-term investment (6 years) in the amount of 100000000 rubles.

The materials specified in item 2.2, Table 2 and the rating scale, developed by the author which is provided in Table 3 were used during the "superficial" project evaluation by the experts.

Table 3. *Rating scale, offered by the author*

Indicators	Standard value	Actual value, natural expression, points	Rating scale, points	Appropriated point (average arithmetic)
Subjective indicators:				
Assessment of utility level of the project	-	8 8 7	1…10	7.67
Formalization of the project (business plan assessment)	-	4 5 4	1…10	4.33
Marketing plan assessment	-	3 3 4	1…5	3.33
Objective indicators:				
Project payback period	reduction	5.41 years 3 -3 -4	1…5	2.5
Profitability	reduction	18.5%/ 5 4 4	1-5	4.33
Net present value of the creditor	reduction	19,780,115 roubles 4 4 4	1…5	4.0
Coefficient of current liquidity (Kcl)		2.57	for reference	
Coefficient of the share of borrowed funds in the liabilities		0.034	for reference	
Bankruptcy probability	$Bp \leq (-0.583)$ - the enterprise is not threatened by bankruptcy; $Bp = (+0.3):(-0.3)$- uncertainty zone; $Bp \geq (+0.648)$ - the enterprise is a potential bankrupt.	-2.399 5 5 5	1-5	5
Greatest possible number of points			45	
Minimum quantity of points			7	

Average expert evaluation				31.16
Offered rating scale for adoption of the expert decision	0…15 points - the project is rejected; 16…30 points - the project needs completion and additional assessment; 31-45 points - the project is approved to further more complete examination and submitted for consideration of interested persons.			
The made decision				The project is subject to consideration as a having potential one.

Thus, the experiment proved that using the minimum possible volume of information, time and the calculated indicators, the achievement of the object set by the research became possible. It is developed the algorithm of primary (superficial) assessment of investment attractiveness of the project.

The need of the development of the technique of investment attractiveness of the enterprises analysis on the example, of the enterprises of the construction industry is proved. Both internal and external investing in the enterprises of the construction industry are the most relevant in modern conditions. The technique which supposes groups of the indicators characterizing production financial activities is offered for the purpose of determination of rating of investment attractiveness of the enterprises. The results of the carried-out simplified calculations allow to reveal the level of investment attractiveness almost instantly, to define weak and strong aspects of of the enterprise activity. Application of our technique will allow potential investors to give an assessment to investment attractiveness of the project offered by the enterprise, without passing a stage of the careful analysis. The offered technique is simple in calculations, it does not demand the use of additional information sources, characterizes both production and financial aspects of the enterprise activity and even gives the chance to provide the probability of bankruptcy of the enterprise in the future, using the simplest two-factor model.

5. Discussion and Conclusion

Having summed up the results of the carried-out analysis it is possible to generalize and group the valuation methods of investment projects, according to the signs presented in Table 3.

Table 3. *Classification of methods and criteria for evaluation of investment projects*

Classification signs	Types of methods and evaluation criteria
Depending on the possibility of quantitative assessment	- quantitative; - partially quantitative; - qualitative.
Depending on the cost of money in time	- dynamic; - static.
Depending on the use of mathematical methods	- formal; - informal.
Depending on the scale of the investment project	- for a small project; - for a average project; - for a large project.

The article proves, that the procedure of primary efficiency evaluation of the investment project does not provide the use of a large number of methods and indicators, since in our opinion, it does not promote significant improvement of the investment decisions quality at all. The main task for the project analyst is to choose such valuation methods of efficiency, which application will allow to estimate the main properties of the project for the minimum period.

Besides, as the involved experts' experience (the experience of the employees of the bank of Moscow in Ukraine) proves, banks (as investors) deviate about 40% of the projects, represented for examination. Nevertheless, the specialists spend their working hours on the detailed analysis of these projects, as they are forced to perform these examinations on the process charts, developed in banks, which do not provide "superficial" project evaluation. Moreover, as it was already emphasized, the factor of time often plays the major role in this or that project implementation. As investors make their decision on the possibility of providing investments for rather long time (frequently for several months), the enterprise which needs them, refuses the project or loses a partner supplier, because its management is tired to wait. The option of "superficial assessment", offered by us, will allow to receive the answer about the opportunity or impossibility of receiving funds just next day (after providing all the documents, necessary for investment, by the enterprise).

The author is going to continue the research and to develop an algorithm for the subsequent actions of the specialists, who are carrying out the assessment of investment projects after carrying out "superficial assessment" for the purpose of implementation of more detailed, but the simple analysis.

We insist, that the existing techniques of the evaluation of projects investment attractiveness are very bulky and they demand not only the high level of training of specialists, but also rich life experience. Therefore, the purpose of our further research is to find any ways for simplification of the procedure of the investment projects evaluation and to develop a simple and clear algorithm with the simultaneous increase in quantity and quality of the estimated indicators. The choice of indicators, acting as criteria for evaluation of the investment projects efficiency, is influenced by such factors as:

- the purpose of the investment project evaluation;
- scales of activity of the investment project owner;
- restriction for resources for the project financing;
- belonging of the investment project to a certain category of institutes which are the owner, the creditor or the appraiser of this project, with their valuation methods, procedures and rules.

Taking into account the specified structure of the choice of criteria for evaluation projects investment attractiveness and efficiency, one can prove, that we have rather large number of approaches and methods of the analysis of influence of possible risk situations on the project implementation success. Studying and the use of such approaches will considerably reduce risks of not achievement of the ultimate project purpose. At the same time any of the known valuation methods of investment risks does not yield precise results. So, only accumulated experience and intuition of the investment manager allow to use these methods effectively, when choosing a method of the analysis. Therefore, the investor has to choose a method to use in order to minimize the project risk.

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Russian-Chinese Humanitarian Cooperation in the Aspect of Public Diplomacy

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Abstract

Peace and development are the main topics of the modern world, China sticks to a peaceful path of development and on this basis forms an independent peaceful foreign policy and its fundamental principles. After the policy of "reform and opening up", humanitarian cooperation significantly contributed to the development of China's soft power, and made a great contribution to the development of the domestic economy and social stability. In recent years the Chinese government has been actively developing public diplomacy striving to strengthen the relationship between China and the world, increase mutual understanding and trust in each other. This article is devoted to the study of Russian-Chinese humanitarian cooperation. The author pays special attention to the study of cooperation between countries in the field of public diplomacy.

Keywords: China. Russia, Cooperation, The humanitarian field, Public diplomacy, Soft power, Concept, People's diplomacy.

Introduction

The relevance of this study consists in the necessity to study the unique experience of Russian-Chinese humanitarian cooperation. At present time the People's Republic of China (hereinafter referred to as the PRC) is advancing actively the foreign policy initiatives aimed at the dynamic development of various forms of cooperation. The importance, prospects and mutual benefit of this kind of work was noted in the speech of the President of the Russian Federation V.V. Putin (April 2019).

It is public diplomacy that occupies a special place in the cooperation between the PRC and the Russian Federation. It should be noted that the term "public diplomacy" with the methodic component is not identical to "shirk diplomacy" and is not an antonym of the term "quiet diplomacy". A. Velikaya quite rightly notes that: "Only a state that offers an attractive development model to its own citizens, but at the same time having enough resources for exertion of " conscious influence" abroad is able to perform a real humanitarian policy, " [1].

That's why the purpose of this research is to study Russian-Chinese humanitarian cooperation in the aspect of public diplomacy.

Research Methods

In the research process, the following methods were used:

-*System analysis method.* It was used in the study of the theoretical material used in this article;

-Methods of working with statistical sources. They were used in the analysis of statistical sources for the truth of the information contained.

Each country, with all the similarities of the tools, chooses its own variations and interpretations of the "foreign policy developer". For example, the United States uses a combination of the following:

1. *Traditional techniques and technology.* Literature, radio, television, cinema, exhibitions, information propaganda, etc.

2. Digital technologies *(digital diplomacy)* Internet, monitoring of web pages, analysis and promotion of sites, support of forums, discussion panels, calculated nuggets of information, creation of "public" pages of officials and institutions, placement of thematic videos, sending via mobile phones and other communicators.

3. *Communication events:* study placements, training on their territory of national leaders, representatives of business and government officials, young leaders, training and retraining, conferences, seminars, forums, etc.

4. *Exchange of delegations and their mental re-orientation.* An component part of this tooling is "public diplomacy".

Public diplomacy is an activity aimed at *researching the population of the country* of the partner (or opponent), studying of his interests, likes, dislikes, expectations, establishing of the contacts with the interested groups and purposeful activities with the task of informing the audience about their own vision of the problem and prospects its development.

It's generally accepted that the technology of "public policy" began to develop in the United States in the second half of the 70s XX century. The American "agenda" was done the rounds widely by the radio stations "Freedom", "Free Europe", "Voice of America", etc. This platform has often been referred to as: "non-governmental diplomacy."

The American model is the "base" for the so-called "*Western or humanitarian*" model. This model is positioned as a collective vision of the contemporary tasks of the USA and the European Union. This concept is characterized by:

1.*Monopolization of decisions of "humanitarian issues"* (from protecting the humanitarian rights of minorities *to humanitarian military interventions*).

2. Active *use of non-governmental humanitarian organizations*, on the basis of reports of which (independent, that's why supposedly objective), the consolidated decisions of the participating countries are taken.

3. The universal *"broad" interpretation (rendering) of the concept of protecting human rights.* Especially in terms of translating it to the concept of "regulating human behavior" and "regulating the state" of the political regime of any state.

With a tendency to legitimize the so-called "*nation-building*" or "*state-building*".

4. Constant attempts *to reform and transform the UN and individual institutions and mechanisms* under the pretext of "obsolescence and inefficiency."

It should be noted that in the USSR, attempts were also made to construct their own version of public policy.

For example, part of the above-mentioned techniques and technologies in the USSR was called *"political propaganda"*. Both versions (Soviet and American) were based on active information influence on the population of another country.

The fundamental difference in technology was the fact that the Soviet methodology assumed a complex action, primarily on the communist and labor parties and the sympathetic population, and the American one on wider sections of society. The American version had a more detailed segmentation of the population and more effective communication channels and technologies.

As a result of work with the population of the USSR, American technologists gained considerable practical experience. It should be noted that the Russian Federation in 1991-1999 was, in fact, outside of the develop practice of these techniques and technologies. One can speak of the formation of the *Russian model* of public diplomacy itself from the beginning of the 2000s. It was then that the Russian Federation was faced with the necessity to position carefully its own goals in foreign and domestic policy and a audible (distinct) argumentation of its results.

The result of which was the adoption on November 7, 2000 of the "Concept of the Foreign Policy of the Russian Federation" [7; 10]. At the same time, the term "public policy" itself was widely used in the Russian Federation no earlier than 2008. An updated version of the "Concept" is contained in the version dated November 30, 2016.

Thus, to date, the Russian Federation has taken the following steps to create its own version of the concept of "public policy".

In 2005 "RT" (Russia Today), the first specialized round-the-clock channel broadcasting to the foreign audience was created. The creation of the channel did not carry elements of aggressive information expansion, since, in fact, it provided only the opportunity *to get acquainted with the Russian version of news events.* Moreover, similar media analogues themselves have long been created by almost all world political players.

In 2007, a project : «*Russia Beyond the Headlines» was opened as part of The Rossiyskaya Gazeta.*

According to analysts, the total audience of the project was more than 33 million people. In 2013, by decree of the President of Russia V.V. Putin "International News Agency Russia today" was created. In 2014,the Sputnik project (a news agency broadcasting in more than 30 languages of the world) was launched by the same media group. For the support of numerous projects on the promotion of the world projects on popularization of the Russian language, culture, art, science, etc. in 2007, the Russkiy Mir Foundation was established. Which, in turn, contributed to the opening of the Russian cultural centers in 45 countries. In 2010, the«Public Diplomacy Support Fund named after A.M. Gorchakov» was created. the "Federal Agency for the Commonwealth of Independent States, compatriots living abroad, and international humanitarian cooperation" (Rossotrudnichestvo) does significant work[5]. It should be noted in the detailed analysis of the achievements of the Russian Federation in the construction of "public diplomacy" institutions:

1. *The positive results* of this activity include the fact that this field is developing.

2. *The negative results* are that the development is clearly "catching up" in nature, there are not many elements of this construct themselves, there are not enough experienced specialists, there is no distinct single *consolidated position* in a number of development fields, etc.

The Chinese model of public diplomacy has a *longer history.* According to Foreign Minister Yang Jiechi, the Chinese version of "shirk policy" can be divided into the following components:

1. "*Public diplomacy"* itself;

2. *People's diplomacy* [3]. The concept of "people's diplomacy" was considered especially significant. Since he was the will of the Great Chinese people themselves.

It should be noted that cooperation between China and the Russian Federation in the field of public diplomacy began much earlier. It is fundamentally important that humanitarian cooperation between countries is based on other, partnership and friendly principles and has a long history of effective cooperation. So in 1925, the All Union Society for Cultural Relations was created, transformed in 1958 into the Union of Soviet Societies for Friendship and Cultural Relations with Foreign Countries. In 1957, the "Society of Soviet-Chinese Friendship" was created. With the collapse of the USSR in 1991, a number of areas of cooperation ceased in fact and they had to *be re-created* [4].

In 1992, during the official visit to China the first President of the Russian Federation B.N. Yeltsin signed the "Joint Declaration on the Fundamentals of Relations Between the Peoples Republic of China and the Russian Federation." The document paid great attention to the development of interstate cooperation in the humanitarian field. It was noted that both sides would stimulate and expand mutual relations in the fields of culture, art, education, information, tourism and sports, youth exchanges, encourage direct connections between cultural organizations and contacts between citizens [13, 14].

The document was of fundamental importance, since in addition to the program mapped out, it outlined a wide range of promising topics for cooperation: mutual teaching of languages and literature of Russia and China, general training of personnel in a number of industries for cooperation (culture, protection of the national cultural heritage, translation, publishing and cooperation between educational institutions, etc.) [9].

In 1994, in accordance with previous agreements, the "Russian Center for International Scientific and Cultural Cooperation (Roszarubezhtsentr) under the Ministry of Foreign Affairs (Ministry of Foreign Affairs of the Russian Federation) was established. In Beijing, in turn, the regional representative office of Roszarubezhtsentr was opened. From the Chinese side, a lot of work in this direction was carried out by the China People's Friendship Society with Foreign Countries, the China People's Association for Peace and Disarmament, the All-China Association for Science and Technology, the All-China Women's Association, and the Chinese Association of Soviet Graduates and etc.

The study of E. I. Ganshina was devoted to the interesting, effective and versatile work in the field of public diplomacy [2].

On May 7, 1995, President of China Jiang Zemin arrived in Moscow to celebrate the 50th anniversary of Victory in World War II. This visit was an important marker pole in the development of a new page of Russian-Chinese cooperation. At the meeting of the heads of state of the Russian Federation and China

People's Republic, the decision was made "on the necessity to develop long-term and stable relations of good neighborliness, friendship and mutually beneficial cooperation of the fundamentally new type" [6].

Since the second half of the 90s of XX century, we can note a significant intensification of *Russian-Chinese cooperation in all fields.* A significant part of the joint activities were *precisely the elements of "public diplomacy".*

Russian-Chinese humanitarian cooperation is *characterized by*: the establishment of long-term relations; *mutual understanding work*; mutual promotion of own interests, taking into account the interests of the other side; mutual respect for values, national culture, history, traditions and interests; mutual informing the population of the two countries on the most important world problems with an explanation of the position of each of the sides; expanding opportunities for international exchange, dialogue of citizens of both countries; mutual creation and exchange of cultural and thematic programs, promotion of own culture with respect for the culture and traditions of the partner.

A special place in this cooperation is occupied by "outreach activity", which allows informing the population of both countries about the causes and goals of national foreign policy and joint cooperation, for example, to combat calculated nugget of information, false accusations, political insinuations from third countries.

For example, in the UN Security Council. All this became possible after the signing of the joint Russian-Chinese declaration on April 25, 1996, during which *"the relations of equal trust partnership between the Russian Federation and the People's Republic of China aimed at strategic cooperation in the XXI century"* were proclaimed [12].

In 1997, it was decided to create the "Russian-Chinese Committee of Friendship, Peace and Development". In the same year in Beijing, an agreement "On Guidelines for the Activities of the Russian-Chinese Committee of Friendship, Peace and Development" was signed (November 10, 1997) [15].

It is quite natural that in 1997 large-scale events were held to celebrate the "Days of Chinese Culture in Russia", and in 1998 "Days of Russian Culture in China" were held. The Russian-Chinese Commission for Cooperation in the Field of Education, Culture, Health and Sports was created In 2000, and renamed the "Russian-Chinese Commission for Humanitarian Cooperation". Mutual educational projects are being activated [18].

The Year of the Russian Language was held in China in 2009 and the Year of the Chinese Language was held in Russia in 2010. In 2012 and 2013 The Year of Russian Tourism in China and the Year of Chinese Tourism in Russia were held respectively. The exchange of numerous delegations in various fields of mutual cooperation was established between the countries: culture, science, medicine, art, etc. [11].

On December 6, 2012, in Moscow, a "Memorandum on the implementation of an action plan for the development of Russian-Chinese humanitarian cooperation" was signed, providing for the development of bilateral cooperation until 2020.

In 2013, the Chairman of the PRC, Xi Jinping, proposed to create: "The Economic Belt of the Silk Road and the Maritime Silk Road of the XXI century. The initiative is often referred to abbreviated as: "One Belt and One Road" Experts consider this platform as one of the most important modern foreign policy initiatives. It was supposed to connect the Asia-Pacific and European regions and contribute to the restoration of the global economy. The main idea of the project is the creation of a global world civilization [17].

In 2015, President of the PRC Xi Jinping and President of the Russian Federation V.V. Putin signed the "Joint Declaration on Cooperation in Creating the Silk Road Economic Belt and the Eurasian Economic Union (EAEU)." Especially V.V. Putin dwelled on the mutual benefit of the new Chinese initiative "One Belt and One Road" [19]. In 2016, during the visit in the PRC V.V. Putin signed a new package of documents and announced that a new type of relationship had been created between the Russian Federation and the PRC aimed at achieving of fundamentally new prospects for mutually beneficial cooperation [16].

Liu Bo and Chui Hong evaluate the positive and negative results of the first stage of Russian-Chinese humanitarian cooperation in terms of public diplomacy.

Results

the authors attribute *the positive results* to "creating the mechanism of very effective and pragmatic cooperation". However, the past years of cooperation have revealed *a number of issues*:

1. The shortage of cultural products and activities showing the charm of Russian-Chinese civilization.
2. Cultural cooperation and exchanges have been established in various forms, but the form often prevails over the content.
3. From the side of the state mechanism, the focus of cooperation between the two sides remains policy, economy and trade "[8].

Conclusion: the authors identified as promising directions:

1. Extension mutual cooperation regarding the youth of both countries: (mutual exchanges, mutual study of the national languages, extension of the number of projects involving Confucius Institutes, etc.).
2. The development of the so-called "cultural industries" similar to the existing brands of other countries and the subsequent promotion of the created brands.
3. Extension of the exchanges and cooperation at the level of "commons" creating a culture of "public communication".
4. Particular attention should be paid to the development of the mass-media of both countries with the creation of a space for mutual direct communication with the connection of modern Internet technologies, etc.
5. Particular attention needs to be paid to direct interregional development with a focus on humanitarian cooperation and exchanges.

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On the Question of the Implementation of the Function of State Control Over the Activities of Executive and Administrative Bodies of Municipalities

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Abstract

The relevance of the studying problem is due to the issues arising in the implementation of the functions of state control over the activities of Executive and Administrative bodies of local self-government; the current situation in municipalities at the present stage of the development of the Russian state, as well as the difficulties occurring in the standard regulation of these groups of public relations. In this regard, this article is aimed at a comprehensive analysis of the features of legal regulation of control exercised by public authorities of the Russian Federation, state bodies of the Russian Federation, their structural units and territorial bodies; public authorities of the subjects of the Federation, their structural units and territorial bodies, the problems arising while trying to implement control powers. The leading approach to the study of this problem is the analysis of the domestic experience of state control in the field of local self- government. The article summarizes the problematic aspects associated with the search for the optimal domestic model of the implementation of control powers, as well as the doctrinal approach to the discussed topic.

Keywords: sobornost, Russian mentality, Ortho state control, subjects of municipal-legal relations, municipal formations, Executive- administrative bodies of local self-government, control over observance of the Constitution, functions of state control, objects of state control, state administrative control and supervision, control of state bodies over financial and budget activity, control over observance of the legislation on taxes and fees, state control over use and safety of housing stock.doxy, sobornostic consciousness,civilizational legacy of Russia.

Introduction

Based on the Federal Law "On General principles of organization of local self- government in the Russian Federation" № 131 from 2003 , the reform of local self-government has required a significant improvement of state control in the field of local self-government [1].

State control is the control exercised by state authorities of the Russian Federation, state bodies of the Russian Federation, their structural divisions and territorial bodies; state authorities of subjects of the Federation, their structural divisions and territorial bodies. Thus, it is divided into Federal and regional state control.

The exercise of powers of control bodies of state power of the Russian Federation and subjects of the

[1] On the General principles of the organization of local self-government in the Russian Federation: Feder. Law №131 from 06.10.2003 (amended from 03.08.2018) / / Assembly of the Legislation of the Russian Federation. 2003. No. 40, p. 3822.

Federation in respect of municipalities and local authorities, according to the articles 5 and 6 of the Federal Law "On General principles of organization of local self-government in the Russian Federation" is allowed only in cases and order established by the Russian Constitution, Federal Constitutional Laws, this Federal Law, other Federal Laws adopted in accordance with, the laws of subjects of the Federation.

Unfortunately, the overall system of functions and content of state control in the field of local self-government has not been defined in any law or other normative legal act. And what is available in the legislation on this question, has not been generalized and codified [1] yet.

The control from the state has been implemented by local governments of the transferred separate state powers even in the basic Federal Law on local self-government , as well as in General terms without disclosing and has been reduced mainly to supervision of the prosecution authorities of the Russian Federation and other authorized Federal Law enforcement (without specification of such bodies) over the observance of legality, which, is of course, important, but not enough.

In this regard, it is necessary to clarify the main objects (directions, functions) of state control in the field of local self-government to determine the role of the subjects of the Russian Federation in exercising control over the Executive and Administrative bodies of municipalities.

Methodology

The study is based on the dialectical method of cognition of political, legal and socio-economic processes and phenomena, which has made it possible to carry out a comprehensive analysis, generalization, systematization and classification of interrelated relations that make up its object. In addition, the work uses a complex of General scientific (analysis and synthesis, ascent from the abstract to the concrete and from the concrete to the abstract, system) and special (formal-legal, comparative-legal) methods. Their correct application allows to characterize features of legal support of realization of function of the state control over activity of Executive and Administrative bodies of local self-government, and to formulate the offers directed on its improvement in the context of realization of the right of citizens to implementation of local self-suppression.

Based on the Constitution of the Russian Federation and Federal Laws, it follows that the main object of state control in the sphere of local self-government is the control over the observance of legality by the bodies and officials of local self-government of the Constitution. Federal Constitutional Laws, Federal Laws, Constitutions (Charters), laws of subjects of Federation.

The Russian Constitution expressly provides with its supremacy and Federal Laws in all territory of Russia (article 4), the obligation of local self-government bodies officials to comply with the Constitution and laws (article 15) and relates to the jurisdiction of the Russian Federation control over observance of the Constitution and Federal laws (article 71) [2].

The form of power exercising is the control over compliance with the Constitution of Russia, Federal Laws, laws of the subjects of the Federation. It means to verify compliance with the law as the main condition for the publication of acts and actions of all entities, including subjects of municipal legal relations, and aims to implement in the form of compliance (along with the execution, implementation, use, application) contained in the law regulations. As a result, this control acts in the form of the authority of the state authority to exercise control as a state-power function. It has been improved and concretized in the activities of various bodies of all branches of government: legislative, executive and judicial. The executive bodies of local self-government are invariably present as the objects of control of state bodies of subjects of the Russian Federation [3].

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[1] Lotorev E. N., Gridneva O. V., Maltsev V. A., Aleksandrovich N., Klimova A. N., Kuleshova N. N. Cooperation

[2] The Constitution of the Russian Federation (adopted by popular vote 12.12.1993) (including amendments introduced by Laws of the Russian Federation about amendments to the Constitution of the Russian Federation from 30.12.2008 № 6-FKZ, from 30.12.2008 № 7-FKZ, from 05.02.2014 No. 2-FKZ, from 21.07.2014 No. 11-FCL) // collected legislation of the Russian Federation. 2014. No. 31. P. 4398.

[3] Peshin N. D. Features of state control over local self-government / / Constitutional and Municipal Law. 2012. No. 4. Pp. 34.

The Federal Law № 131 from 2003 has established that the supervision of the execution by the Executive bodies of local self-government and officials of local self-government the Constitution of the Russian Federation, Federal Constitutional Laws, Federal Laws, Constitutions (Charters), laws of subjects of Federation, Charters of municipal formations, municipal legal acts are carried out by bodies of Prosecution Office and other authorized Federal Law bodies (article 77).

In the Central Federal district, the actual control over legal compliance of subjects of the Russian Federation by local governments is carried out by departments of the Ministry of Justice of Russia on the corresponding subject. Although, this control is limited to transferred (delegated) state powers.

As the second object (function) of the state control is the control over observance, maintenance and protection by Executive bodies of local self-government and their officials of the rights of the population and citizens on implementation of local self-government. According to the Constitution of the Russian Federation "a person, his rights and freedoms are the highest value. Recognition, legal compliance and protection of human and civil rights and freedoms is the duty of the state" (article 2). This constitutional provision is developed in article 18 of the Constitution, which claims that "the rights and freedoms of a man and a citizen determine the meaning, content and application of laws, activity of legislative and Executive authorities, local self-government and guaranteed by law".

The third object (function) of state control in accordance with the Constitution of the Russian Federation is the control of the state in the performance of local self-government bodies delegated certain state powers (enactment 132).

The fourth object (function) of state control should include control by the state over the implementation by the Executive bodies and their officials of the powers assigned to them for the implementation of local self-government, based on the Constitution of the Russian Federation, the norms of the relevant Federal Laws, in particular the norms of the articles 5, 6, 73 - 75, 85 of the Federal Law "On General principles of organization of local self-government in the Russian Federation", decrees of the President of Russia from October 15, 1999 "on approval of basic provisions of state policy on local self-government development in the Russian Federation"[1].

With certain reservations, the object of state control can include state control over the implementation of the Executive bodies of local self-government and their officials, the powers assigned to them to ensure state guarantees of local self-government, based on the Constitution of the Russian Federation and Federal Laws.

The essence of Prosecution Office`s supervision over the activities of Executive and Administrative bodies of municipalities is the actions of Prosecution Office to prevent, detect, suppress and eliminate violations by Executive bodies of local self-government and their officials of the Constitution of Russia, Federal Constitutional Laws, Federal Laws, Constitutions (statutes) and laws of the subjects of the Federation, statutes of municipalities, municipal legal acts.

The subjects and forms of Prosecution Office`s supervision over the activities of Executive bodies of local self-government and their officials are enshrined in the Federal Law "On the Prosecution Office of the Russian Federation"[2].

State administrative control and supervision is an independent type of control and supervision activity of Federal and regional Executive authorities. It is characterized by the presence of jurisdictional powers aimed at evaluation of the supervised objects only from the point of view of legality and a narrow range of specific issues contained in the normative legal acts (rules, regulations, requirements, standards), the possibility of self-application of administrative coercive measures in case of detection of offences or threats to the security of other objects.

There are significant differences between the concepts of "control" and "supervision".

[1] On approval of Basic provisions of state policy on local self-government development in the Russian Federation: the decree of the President of the Russian Federation dated 15.10.1999, No. 1370 // collected legislation of the Russian Federation. 1999. No. 42. P. 5011.

[2] On the Prosecution office of the Russian Federation: Feder. Law of 17.01.1992 No. 2202-1 (amended from 03.08.2018) / / Assembly of legislation of the Russian Federation. 1995. No. 47. P. 4472.

Control is a means of ensuring legality, enforcement and discipline applied to subordinate or subordinated objects by higher bodies of state administration. Control involves the possibility of operational intervention of the controlling entity in the activities of the controlled object. Control procedures aim is not only to identify the compliance of activities with the requirements of legislation and corporate law, job descriptions, assignments and instructions, but also to assess the rationality, reasonableness, efficiency of actions. Control procedures are carried out in the order of current control, i.e. continuously, as well as selectively during special events.

Supervision is carried out, as a rule, in respect of non-controlled entities, it is not associated with interference in the activities of the subject under supervision and is intended solely to identify violations in the activities of the subject under supervision. Supervision is carried out selectively, it cannot and should not be current, so as not to cause long-term disruptions in the activities of supervised entities.

The control of state authorities over financial and budgetary activities of the Executive bodies of local self-government is regulated by the Russian Federation[1] Budget code and Tax code of the Russian Federation[2]. Thus, the state authorities of the Russian Federation and its subjects have the right to monitor compliance by local governments with the tax and budget legislation of the Russian Federation and the legislation of the subjects of the Federation, the expenditure of funds received by local budgets from Federal and regional budgets, including the effective and targeted use of funds allocated by the municipality to Finance Federal and regional target programs and other activities.

Financial control undertaken by state Executive authorities, is carried out by the Federal service for financial and budget control, Federal Treasure`s Office, financial bodies of subjects of the Federation, the main managers and managers of budgetary funds in the forms and procedure established by the Russian Federation Budget code and other normative legal acts of the Russian Federation and subjects of the Federation.

Control over observance by Executive and Administrative bodies of municipalities of the legislation on taxes and fees, and behind compliance to the specified legislation of the regulatory legal acts accepted by them is carried out by tax authorities. In respect of Executive and Administrative bodies of municipalities as taxpayers, tax control is carried out in the form and procedure established by Chapter 14 of the Tax code of the Russian Federation.

State inspectors in the field of environmental protection in the performance of their official duties within their powers have the right to verify compliance with regulations , state standards and other regulatory documents in the field of environmental protection; the operation of treatment facilities and other disposal devices, controls, as well as the implementation of plans and measures for environmental protection; to check compliance with the requirements, norms and rules in the field of environmental protection during the placement, construction, commissioning, operation and decommissioning of production and other facilities; to bring to administrative responsibility persons who have committed a violation of legislation in the field of environmental protection.

The state control over use and safety of housing stock is carried out according to the Housing code of the Russian Federation[3] irrespective of its form of ownership, including municipal housing stock. State control over the compliance of residential premises and utilities with the established requirements is carried out by the authorized Federal Executive authorities, state authorities of the subjects of the Federation in accordance with Federal Laws and other regulatory legal acts of the Russian Federation.

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[1] Budget code of the Russian Federation: from 31.07.1998 № 145-FZ (as amended from 03.08.2018) / / Collection of legislation of the Russian Federation. 1998. No. 31. p. 3823.

[2] The tax code of the Russian Federation (part one): from 31.07.1998, No. 146-FZ (amended from 03.08.2018) (with ed. and extra, of course. in force since 03.09.2018) / / Assembly of the legislation of the Russian Federation. 1998. No. 31.p. 3824

[3] Housing code of the Russian Federation: from 29.12.2004 No. 188-FZ (amended from 03.08.2018) / / Assembly of the Legislation of the Russian Federation. 2005. No. 1. P. 14.

It does not matter that such control should be exercised by the owners of residential premises, including local authorities. State control is also exercised over the compliance of residential premises and utilities with the established requirements.

We can cite numerous other examples of state control of Executive bodies of state power of the subjects of the Russian Federation in cooperation with local authorities.

As practice shows, such interaction is the most effective form of state control over the activities of Executive and Administrative bodies of municipalities in a particular area of their powers. To receive subsidies from the municipal development Fund, the Executive and Administrative bodies of municipalities provide all the necessary information independently, voluntarily and in volumes often much higher than the requirements of the state bodies of the subject of the Russian Federation.

Conclusion

In conclusion, I would like to point out the following. The subjects of the Russian Federation exercise state control over the activities of Executive and Administrative bodies of municipalities in all areas and in various forms and methods. Normative legal acts of subjects of the Russian Federation establishing the status of public authorities of the subject of the Russian Federation, as a rule, do not contain powers on direct control of activity of Executive and Administrative bodies of municipalities. However, a systematic analysis of the powers of public authorities of the subjects of the Russian Federation indicates that there are enough powers to exercise any kind of control in any sphere of activity of Executive and Administrative bodies of municipalities.

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2. Budget code of the Russian Federation: from 31.07.1998 № 145-FZ (amended from 03.08.2018) / / Collection of legislation of the Russian Federation. 1998. No. 31. p. 3823.
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4. Housing code of the Russian Federation: from 29.12.2004 № 188-FZ (amended from 03.08.2018) / / Collection of legislation of the Russian Federation. 2005. No. 1. P. 14.
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6. About the General principles of the organization of local self-government in the Russian Federation: Feder. the law of 06.10.2003 No. 131 (amended from 03.08.2018) / / Assembly of the legislation of the Russian Federation. 2003. No. 40. p. 3822.
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8. Peshin N. D. Features of state control over local self-government / / Constitutional and municipal law. 2012. No. 4. Pp. 34.
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Opportunities for Improving the Constitutional and Legal Foundations of Lobbying Activities in Russia

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Abstract

The relevance of the studying problem is due to the issues arising in connection with the lack of proper legal regulation at the legislative level of lobbying in the Russian Federation, as well as with the difficulties appearing in the process of theoretical substantiation of these definitions. In this regard, this article is aimed at a comprehensive analysis of the phenomenon of lobbyism as a set of techniques and ways to expand dialogue between the state and society in order to harmonize public and private interests. The leading approach to the study of this problem is to determine the specifics of the mechanism of their application, which allows to identify latent schemes generating corrupt behavior. The article summarizes the problematic issues related to the need to adopt new legislative acts and introduce changes to the system and structure of state authorities, as well as the doctrinal approach to the subject under consideration.

Keywords: lobbyism, pressure groups, methods of lobbying companies, corruption, corruption behavior, the right to receive information about the activities of state authorities and local self-government, lobbying activities.

Introduction

The topic of lobbying today is one of the most discussed both from a political and legal point of view. The problem of advancing their interests by pressure groups is rather serious and attempts to resolve it have been going on for many years.

This is due primarily to the fact that pluralism of interests affecting state power is one of the basic and most important principles of the formation and functioning of a rule of law state.

A modern democratic state is obliged to guarantee everyone the opportunity to ensure the fulfillment of their interests at the political and legislative levels through civilized mechanisms for citizens to appeal to government bodies.

Lobbyism is a combination of methods and technologies that facilitate a dialogue between the population and government to achieve specific goals. In addition, lobbying is an important tool to maximize the inclusion of the population in the political and managerial process and, accordingly, to ensure guaranteed rights of citizens of the state to participate in the political process.

The first country to attempt to introduce political lobbying in the legal field was the United States. Lobbying is a part of American political culture and is a prestigious type of professional activity. There is even the concept of a "fifth branch of government[1]," as some experts call lobbyism.

[1] Dispelling the negative perceptions about lobbying // Association of Accredited Public Policy Advocates to the European Union. 2015. [Electronic resource]. URL: http://www.aalep.eu/dispelling-negative-perceptions-about-lobbying.

Thanks to the development of lobbying activities around the world, the creation of professional organizations, various events on this topic, as well as openness and publicity, the world community is beginning to recognize the need for the right regulation of lobbying, while in the Russian Federation, legislators refuse to recognize lobbying as a factor which needs to be regulated.

The relevance of this study is provided by several factors. Lobbying is one of the necessary elements for the full functioning of the rule of law and for the constitutionally enshrined rights of citizens. Without normative regulation of lobbying, citizens lack legislatively secured mechanisms of pressure on public authorities, which, in turn, leads to weakening of the institution of representation of citizens in the state. S.V. Maslennikova quite rightly speaks about this, outlining the problem of representing the interests of social groups in government in the Russian Federation, and indicating that there are no controlled tools in Russia for the legitimate promotion of the interests of social groups in power structures[1].

And this situation exists throughout the entire period of the formation of post-Soviet statehood, despite the fact that the need to develop regulatory tools for the possibility of interaction between civil society and the government is directly fixed in Art. 32 and 33 of the Constitution of the Russian Federation.

Today more and more diverse studies are appearing both in the Russian and foreign scientific community aimed both at identifying the theoretical foundations of lobbying themselves and at the possibility of its practical use considering the existing legislative features in various countries. Accordingly, there is a significant discrepancy in the opinions of the competent authorities and scientific structures regarding the ways of regulatory regulation of lobbying activities.

In this case, one should take into account the fact that lobbying is not considered as a separate type of activity in Russian legal practice, which is a serious omission. Accordingly, today it is very difficult to distinguish not political science, but legal scientific research, considering the possibility of legislative acts regulating lobbying activities in the Russian legal space.

Speaking about the need for normative regulation of lobbyism in Russia, one should take into account the rich legislative experience of the United States of America and EU countries in regulating lobbying activities. Nowadays, the Russian Federation really needs to use this experience to solve a whole range of problems that have already matured in this area, taking into account the need to ensure the state harmoniously expresses both private and public interest for the purpose of sustained social development.

Lobbying today is one of the important components that play a role in the formation and development of international relations, which means that it is necessary to develop legislation in this area in Russia and bring it closer to international standards.

And finally, the relevance of the study is confirmed by many existing but still not adopted bills to regulate lobbying activities in Russia. Here are just a few: Law № 97801795-2 of June 2, 1997, "On the Legal Basics of Lobbying Activities in Federal Government Agencies[2]"; Law № 396138-3 of November 24, 2003, "On lobbying activities in federal government bodies[3]"; Law № 410475-6 of December 17, 2013, "On the Procedure for Promoting the Interests of Commercial Organizations and Individual Entrepreneurs in State and Local Government[4]"; the reintroduction of this law took place on 07.07.2015 at the initiative of

[1] Maslennikova S.V. The right of citizens to national representation in the Russian Federation: the dissertation Candidte of Legal Sciences: 12.00.02. Moscow, 2001. P.199.

[2] Draft Federal Law No. 97801795-2 "On the Legal Basics of Lobbying in Federal Government Agencies" (amended by the State Duma of the Federal Assembly of the Russian Federation, text dated 02.06.1997) // Consultant Plus. 2018. [Electronic resource]. URL: http://www.consultant.ru/cons/cgi/online.cgi?req = doc & base = PRJ & n = 34479 # 021538903906012008.

[3] Draft Federal Law No. 396138-3 "On lobbying activities in federal government bodies" (amended by the State Duma of the Federal Assembly of the Russian Federation, text as of November 24, 2003) // Consultant Plus. 2018. [Electronic resource]. URL: http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=PRJ&n = 29107 # 05836914224300092.

[4] Draft Federal Law No. 410475-6 "On the Procedure for Promoting the Interests of Commercial Organizations and Individual Entrepreneurs in Government and Local Government" (amended by the RF State Duma, text as of December

Nikolai Levichev, vice speaker of the State Duma of the Federal Assembly of the Russian Federation, but again did not end with the adoption of the legislative act.

In addition, the regulation of the activities of professional lobbyists is provided for by the National Anti- Corruption Plan[1].

Methodology The study is based on the dialectical method of cognition of political, legal and socio-economic processes and phenomena, which made it possible to carry out a comprehensive analysis, generalization, systematization and classification of the interrelated relationships that make up its object. In addition, a complex of general scientific (analysis and synthesis, ascent from the abstract to the concrete and from the

concrete to the abstract, systemic) and special (formal-legal, comparative-legal) methods have been used. Their correct use allows us to determine the theoretical foundations of lobbying in the Russian Federation, to identify patterns of development of the phenomenon under study, ways to improve the regulatory regulation of this group of public relations.

Despite the absence of legislative regulation, lobbyism exists and is developing as a phenomenon in Russia.

The main objects of lobbying efforts in Russia are the Government of the Russian Federation, the Administration of the President of the Russian Federation, ministries, the State Duma of the Federal Assembly of the Russian Federation, as well as the judicial authorities. There are some more objects, but they are significantly less significant. Each of these objects is of interest for different purposes of lobbying and requires a special relationship.

A. Germanovich highlights the three most common methods of lobbying campaigns in Russia.

The first one is the model that is closest to "Western" standards, in which companies create an industry association, realizing the need for representation in state authorities in order to change the situation unfavorable for them. Then money is sent to this association legally.

The second method is a non-public "problem solving" with closed doors in offices, where informal acquaintances and friendships, and often family ties, are used.

And finally, the third option is the use of frankly illegal methods: pressure, bribery and blackmail.

Today, the most common way is the second, that is, informal and informal promotion of their interests in a non-public setting. The first option is still not too common[2]**.** In Russia neither lobbying nor GR management have been very popular for a while, and there are two reasons for this. The first is the fact that in Russia large business has had a huge influence on the government for a long time, and therefore it has not been necessary to spend large sums of money either on hiring lobbyists or on maintaining a staff of GR-management specialists. However, with the advent of Vladimir Putin, the situation has changed. The state ensured dominance in both the political and economic spheres, as a result of which corporations began to lose their positions in influencing key decisions. This has led to the creation of new platforms for socio-political dialogue, and corporations turned to Western experience to advance their interests.

The second reason is the perception by the population of any communication between business and government as corruption activity. In the post-Soviet times lobbying alongside with favoritism, protectionism, nepotism etc. traditionally refers to activities that are judged to be related to corruption. So, for example, domestic researchers note that the basis of the negative attitude towards this and other similar phenomena lies inherently in them to illegally obtain advantages, although not initially material but which in their turn provide access to receive material goods, the size of which can incomparably

17, 2013) // Consultant Plus. 2018. [Electronicresource]. URL: http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=PRJ&n=113740#006128146146251523.

[1] Decree of the President of the Russian Federation of June 29, 2018 No. 378 "On the National Anti-Corruption Plan for 2018 - 2020" // Official network resources of the President of Russia [Electronic resource]. URL: http://www.kremlin.ru/acts/bank/43253.

[2] GR in Russia is more than lobbyism [Electronic resource] // BBC Russian Service http://www.bbc.com/ russian / business / 2011/09 / 110919_gr_russia_lobbying.shtml.

exceed the income from primitive bribery.

The desire of business to direct levers of economic management is the desire to subjugate power, in this desire, business grows together with organized crime, which poses a direct threat to state and national security[1]".

As mentioned above, in Russia since 1995, several attempts have been made to adopt a law on lobbyism (the interaction of business representatives and public authorities). Several bills have widely been discussed at round tables and in committees of the State Duma of the Russian Federation. Of interest in this regard is the statement made by Chairman of the Federation Council Sergei Mironov in 2003 that he did not consider it timely to raise the question of the development of the Russian law on lobbying. "Russia has many other problems, more important than this very narrow, special parliamentary problem - the legitimization and regulation of lobbyism." By the way, he noted that, "there is nothing to worry about lobbyism itself[2]."

In fact, it can be said that despite the lack of clear normative regulation of lobbying activity as such, Russian legislation, which can be used and is already used in practice to advance the interests of entrepreneurs, is quite extensive. It provides for the possibility of organizations to influence the power that was formed back in the Soviet period, but adapted to modern conditions of the development of Russia (for example, citizens' appeals), and also includes relatively new mechanisms for participation in managing state affairs (for example, online discussion of draft acts within the framework of work Open Government Concept[3]).

Besides, today lobbying activities are partially regulated by the Federal Law of December 25, 2008 № 273- FL on Combating Corruption. This law considers the corruption component of exerting pressure on the authorities by groups in order to promote their interests and provides liability for such actions.

An analysis of the provisions of the Federal Law of December 25, 2008 № 273-FL "On Combating Corruption[4]", as well as of one of the latest bills № 410475-6 "[5]On the Procedure for Promoting the Interests of Commercial Organizations and Individual Entrepreneurs in Government and Local Government" allows you to specify to their main problem. They consider lobbying activities exclusively in relation to the commercial sphere, without considering the possibility of using this type of activity in the context of providing citizens with their constitutional rights.

So, in particular, the draft Federal Law № 410475-6 "On the procedure for promoting the interests of commercial organizations and individual entrepreneurs in government and local governments" is intended to regulate public relations related to the promotion of the interests of commercial organizations and individual entrepreneurs in government and local self-government, the activities of self-regulatory organizations of representatives of interests, fill the existing gap in the legislation, established it civilized rules promoting the interests of commercial structures in government, increase the openness and transparency of interaction between business and government, to promote the decriminalization of this interaction as a whole.

At the same time, the bill also considers the constitutional and legal basis (in the field of providing citizens with the opportunity to participate in the political life of the state), but this aspect is only indirectly affected in the bill. The Federal Law "On Combating Corruption" generally considers lobbying

[1] Kirpichnikov A. Bribe and corruption in Russia. St. Petersburg, 2007.p. 152.

[2] Vandenko I. Price request. Speakers of parliamentary chambers did not agree on lobbyism // Novye Izvestia, 2003. Dec 25.

[3] Resource "Open Government" [Electronic resource] // URL: http: //open.gov.ru/event/5598187.

[4] Federal Law of December 25, 2008 № 273-ФЗ "On Combating Corruption" (as amended on December 28, 2017) // Collected Legislation of the Russian Federation. 2008. No. 52 (part 1). Art. 6228.

[5] Explanatory notes to the bill №. 410475-6 "On the procedure for promoting the interests of commercial organizations and individual entrepreneurs in government bodies and local self-government" dated 12/17/2013 // Consultant Plus. 2018. [Electronicresource]. URL: http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=PRJ&n=113740#006128146146251523

activities exclusively through the prism of combating corruption in society, that is, as corruption behavior.

Accordingly, speaking about these acts, it is necessary to more specifically outline the solutions to the problem of the institution of representation in the Russian Federation and to mandatory consider the activities of non-profit lobbying organizations.

To create lobbyism, it is necessary to guarantee the right of citizens to information on draft public-power decisions. The requirement to disclose this information is enshrined in Federal Law of February 9, 2009 № 8-FL "On Ensuring Access to Information on the Activities of State Bodies and Local Self-Government Bodies[1]". Advancing the interests of organizations is possible through appeals to bodies and officials. The right to appeal is substantively regulated in the Federal Law of May 2, 2006 № 59-FL "On the Procedure for Considering Appeals of Citizens of the Russian Federation". Other acts, including regulations of executive bodies, establish the obligations of these structures to disclose information about their activities, and to respond appropriately to citizens' appeals[2].

Another possible method today for the impact of non-governmental organizations on government is the method of "expert opinion". In this case, organizations can advance their interests through participation in specialized examinations, which are carried out in connection with the need for civil assessments of certain types of activities.

Actual legislation also allows individual entities to defend their opinion in the field of contact with authorities, to make proposals for optimizing legislation and to participate in the discussion of draft separate regulatory acts (in particular, Articles 6 and 22 of Federal Law № 315-FL from December 1, 2007 "On Self- Regulating Organizations[3]"; Article 13 of the Federal Law of November 27, 2002 № 156-FL "On the Association of Employers[4] ").

Such technologies can be attributed to lobbying activities, however, it is obviously impossible to consider such a control tool as full-fledged. Some of these mechanisms are part of the institution of public control, within the framework of which lobbyism is obviously also possible. In the literature, public control includes public discussions (hearings), the creation of advisory bodies, conducting public expert reviews, evaluating various programs, developing draft regulatory legal acts, monitoring the implementation of decisions made by public authorities, and applying to citizens with suggestions, statements and complaints[5].

The specificity of lobbyism is that its rooting in the state depends on certain working conditions of the entire power system. This refers, in particular: a sufficient level of openness of this system, a sufficient level of party building, as well as a significant place for parliament in the legislative process. An obligatory component of this system is also an institutionalized opposition. Joseph Wilde, deputy head of the State Service for the Structure of Government Agencies of Canada, at a seminar at the Ministry of Economic Development of the Russian Federation on June 8, 2012 noted the importance of initiating an investigation by the authorized representative of the opposition party of a violation of lobbying

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[1] Federal Law dated 09.02.2009 No. 8-FL "On providing access to information on the activities of state bodies and local authorities" (as amended on 12.28.2017) // Collection of legislation of the Russian Federation. 2009. No. 7. Art. 776.

[2] Federal Law of May 2, 2006 No. 59-FL "On the Procedure for Considering Appeals of Citizens of the Russian Federation" (as amended on November 27, 2017) // Collection of legislation of the Russian Federation. 2006. No. 19. Art. 2060.

[3] Federal law dated 01.12. 2007, No. 315-FL "On Self-Regulatory Organizations" (as amended on July 3, 2016) // Collected Legislation of the Russian Federation. 2007. No. 49. Article 6076.

[4] Federal Law of November 27, 2002 No. 156-FL "On the Association of Employers" (as amended on November 28, 2015) // Collected Legislation of the Russian Federation. 2002. No. 48. Article 4741.

[5] Zabralova O.S. Development of public control in the field of activity of executive authorities: Author. diss..... cand. legal sciences. M., 2012.p. 9; Lipchanskaya M. A. Participation of citizens in the management of state affairs: constitutional and legal research. Abstract. diss. ... Dr. jur. sciences. Saratov, 2012.p. 15.

legislation. Russian literature also recognizes that lobbying is possible only along with improving legislation: it is necessary "to legalize lobbying activity, linking it with the adoption of a system of regulatory legal acts on parliamentary (parliamentary) ethics and anti-corruption laws that provide for the establishment of legal liability measures[1]."

The regulation of lobbyism in Russia is usually considered exclusively in the context of the fight against corruption. This is partly true, since countering the corruption component is an extremely important aspect of this type of legislation. However, it is fundamentally incorrect to consider lobbying regulation exclusively in this vein. Lobbyism is a mechanism for expressing "private" interests in the activities of the political system; development of freedom of influence on the government (proclamation of its guarantees in accordance with a public request). And this also needs to be considered when developing and adopting legal norms.

S.V. Vasilyeva identifies three main areas that should be developed in Russian legislation in order to correctly integrate the institution of lobbying into the existing regulatory system:

- development of the right to information;
- improvement of public examination;
- encouraging various forms of consultation between authorities and organizations.

These areas cover almost all the actions of Russian lobbyists, which they designate as services to promote the interests of organizations in the activities of government bodies[2][3].

Speaking about the right to information in Russia, firstly, it is worth mentioning the Federal Law "On Ensuring Access to Information on the Activities of State Bodies and Local Self-Government Bodies", which includes within its scope of regulation the issues of open functioning of not only executive bodies, but also legislative bodies authorities.

However, this law, for all its importance, does not provide sufficient transparency of information for the population. The importance of the right to information in connection with the influence of citizens on power, based on current legislation, is clearly underestimated. In the Rules of Procedure of the State Duma, for example, the provisions of the Law on Ensuring Access to Information do not find proper development. The Rules of Procedure of the Chamber contain rules on the availability of information to authorized entities of the legislative process. And this guarantees accessibility only to persons with a formal status, and not to citizens and organizations in general.

Thanks to the Automated System for Supporting Legislative Activities, information on meetings held by the State Duma and adopted bills has become much easier to obtain, however, the results of independent examinations are not available on electronic public resources, which significantly reduces the value of the information posted.

Accordingly, the limited right to receive information is one of the obstacles to possible competent lobbying activities.

Another important problem is the lack of proper legislative regulation of the right to examination in Russia.

The participation of organizations in the examination is often limited by unacceptable

[1] Sirotenko S. P. Legal regulation of lobbyism (Russian and foreign experience): Author. diss .....cand. legal sciences. St.Petersburg, 2011.p. 7.

[2] Vasilieva S.V. The legal institute of lobbyism in Russia: an assessment of the legislation and the prospects of formation // Comparative constitutional review. 2013. No. 1. P. 140.

[3] Decree of the Government of the Russian Federation of February 26, 2010 No. 96 "On anti-corruption expertise of regulatory legal acts and draft regulatory legal acts" (together with "Rules for conducting anti-corruption expertise of regulatory legal acts and draft regulatory legal acts", "Methodology for conducting anti-corruption expertise of regulatory legal acts and draft regulatory legal acts ") (amended on July 10, 2017) // Collection of legislation of the Russian Federation. 2010. No. 10. Art. 1084.

administrative barriers. One of them is the accreditation of independent experts by the Ministry of Justice of the Russian Federation (paragraph 4 of the Rules for the conduct of anti-corruption examination of regulatory legal acts and draft regulatory legal acts, approved by Decree of the Government of the Russian Federation № 96 of February 26, 2010 20). But it should be understood that the argumentation of such a restriction on the right to examination does not fit into the format of freedom of influence on the authorities.

We believe that the participation of various organizations can seriously improve both the quality and relevance of adopted bills and their legitimacy in conducting independent examinations when considering a bill through consideration from various points of view.

Also, one should not forget about the relationship of independent examinations with the right of citizens to receive information, which means that such examinations can increase the involvement of the population in the political and legal process and, accordingly, the representation mechanism will be more successfully implemented.

The right of non-governmental associations to independent examinations of the draft laws under consideration is the most important tool that allows society to influence decisions made by authorities.

In addition to the already discussed public discussions, examinations and expert advice, social partnership and the influence on the power of self-regulatory organizations, the complicity of citizens and state bodies in making public-power decisions is actively developing as part of the activities of public councils under government bodies. Moreover, in accordance with Article 15 of the Federal Law "On Ensuring Access to Information", state bodies must ensure the possibility of the presence of citizens (individuals), including representatives of organizations (legal entities), public associations at their collegial meetings. Substantiates a new level of interaction between citizens and public authorities, which can be described as "mutual penetration." This refers to the functioning of these institutions not only as individual or group entities that exercise power, but also as an organized and built network of relations between state structures and society[1].

Accordingly, in order to develop consultations between the authorities and organizations, it would make sense to organize the possibility of consultations between specific employees of the government apparatus and representatives of organizations within the framework of the regulation, and to allow, in certain cases, the initiation of parliamentary hearings by the public[2].

From this we can conclude that any activity related to the society's attempt to influence state or municipal authority in the framework of legislative activity is forced to integrate into the existing system of legislation, which is not only not perfect today, but also does not imply complete tools similar effects. And for the law on lobbying, a primary platform is also needed, enabling non-governmental organizations to participate in decision-making by authorities.

The creation of a modern lobbying institution in Russia will simultaneously "nationalize" and "intellectual class", linking it to creative activity in the name of not abstract tasks, but concrete solutions, which will be followed by interests known to the state and society, much easier to adjust and control.

Accordingly, in order to bring the current legislation of Russia in line with international standards for the participation of society in political decision-making, it is necessary to develop and adopt a specialized regulatory act regulating lobbying activities in Russia. The purpose of this law should be to ensure transparency of lobbying activities within the walls of both houses of the Federal Assembly, harmonizing the system of relations between the state and society, as well as reducing the corruption influence on government bodies. This will significantly strengthen the position of various social groups and will enable civil society to participate in important political decisions.

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[1] Berestovsky A. V. Information and communication technologies for the interaction of the executive branch of the Russian Federation and society: Abstract. diss cand. watered sciences. M., 2009. p. 8–9.

[2] Vasilieva S.V. The legal institute of lobbyism in Russia: an assessment of the legislation and the prospects of formation // Comparative constitutional review. 2013. No. 1. P. 146.

In this case, it is necessary to identify some important aspects that such a bill should regulate.

First, he must establish the defining framework of lobbying activity, in the criteria of which lobbyists will act. Accordingly, the activities of any persons or organizations that fall under these criteria will be regulated not by separate elements of the legislation, but by a separate regulatory act.

Secondly, this bill should implement a system of legal instruments for the interaction of society and government bodies - lobbying technologies. This measure will create a precedent for legally used interaction technologies and outline a range of possible methods (and, accordingly, determine which methods will be illegal).

Thirdly, it is necessary to create a specialized body based on the Ministry of Justice, which will be engaged in the registration of lobbying organizations, monitor their activities, revenues, as well as all contacts with specific representatives of state and local authorities.

Fourth, such a regulatory act should establish rather stringent requirements for companies and individuals practicing lobbying activities, which we can include:

- Mandatory registration of commercial and non-profit organizations and individuals professionally engaged in the promotion of private and public interests in government with the provision of the most complete and reliable information;

- periodic (optimal - twice a year) delivery of full reports: on work done, on customers, on fees received, on production costs, on technologies used and on contact with specific representatives of government bodies;

- the use of exclusively permitted and not contradicting the normative act technologies for promoting interests;

- full openness and public availability of information about the activities the publication of information in the public domain on the Internet, as well as consent to the publication of such information on a specialized electronic resource;

consent to compliance with international law and the code of ethics of lobbying activities;

- introduction of the requirement for lobbyists to submit projects substantiating one or another of the proposed solutions from the point of view of the public good. Such a norm will force many lobbyists to make their activities more intellectual, to pay less attention to attempts to bribe lawmakers and deputies, and at the same time to do more to develop a public justification for their activities.

In addition, it is necessary to tighten legislation on additional earnings for deputies of the State Duma and members of the Federation Council of the Russian Federation[1], as well as for employees of the parliament apparatus. It is necessary to amend the Federal Law of 08.05.1994 № FL "On the status of a member of the Council of the Federation and the status of a deputy of the State Duma of the Federal Assembly of the Russian Federation". It seems appropriate to borrow from the United States the principle that the current legislator or an employee of the parliament apparatus can receive money for scientific and teaching activities only if they obtain the prior written consent of the leader of his faction, the speaker of the house of parliament and the relevant ethics committee. All these authorities should first make an assessment of the availability of opportunities for corruption and conflict of interest in each specific case of scientific and teaching activity based on the presented contract. It is also advisable to adopt the norm that fees for scientific and teaching activities should be transferred to the deputy's special fund, funds from which can be spent only on his political activities (including election campaigns), but not on private purposes[2].

Another important factor falling under the jurisdiction of this normative act is the already mentioned right of citizens to information. Agreeing with Vasilyeva S.V., it can be said that this right has

[1] Federal Law of 05.08.1994 No. 3-FL "On the status of a member of the Council of the Federation and the status of a deputy of the State Duma of the Federal Assembly of the Russian Federation" (amended on July 29, 2017) // Collection of legislation of the Russian Federation. 1999. No. 28. Article 3466.

[2] Terra America Research Group commissioned by the ISEPI Foundation: Lobbying in the USA: How lobbying is carried out in the USA and what can be borrowed for Russia. Moscow, 2013.p. 39.

not been fully realized now in Russia, and the normative act regulating lobbying activities should contain a reference to the mandatory public availability of information on the draft law under discussion[1].

Do not forget that this law should regulate the activities of not only lobbying organizations, but also some aspects of the work of government bodies. Within the framework of this law, it is necessary to talk about forcing deputies, senators, public servants and judges to disclose information about contacts with lobbyists.

Another factor that this law must regulate is the sanctions for its violation. Following the experience of the United States, one should talk about punishments starting with fines of several hundred thousand rubles, and end with criminal liability up to imprisonment.

The development and adoption of a law that meets these criteria will make it possible to regulate lobbying activities in Russia in accordance with international law standards, create effective tools for building relations between society and authorities, give citizens the opportunity to ensure their constitutional right to participate in the political life of the state, optimize work representative office in Russia, and, inter alia, will help implement the National Anti-Corruption Plan.

Conclusion. Lobbying activity exists in one form or another in almost all countries, but legal regulation is far from developed everywhere, which, accordingly, affects the socio-political rights of citizens.

It is important to remember that lobbying is, first and foremost, the most important part of the representative institution necessary for any legal state. It is through lobbying that citizens of the state have the opportunity to exercise their rights to participate in the political life of society.

However, the currently lacking legal regulation of lobbying in Russia is a huge problem for society, as there are virtually no tools for establishing legal contact between non-governmental organizations and government bodies. In fact, the absence of this kind of legal regulation is the reason not only for corruption, but also for the lack of citizens' ability to enjoy basic and inalienable rights.

The above allows us to recommend the following steps to correct the general negative situation with the regulatory regulation of lobbying in the Russian Federation:

1.The legislator should recognize the need to regulate lobbying activities as an important and necessary aspect of the functioning of a democratic state, which enshrines the possibility of citizens exercising their constitutional right to participate in political life, which is guaranteed by Art. 32 and 33 of the Constitution of the Russian Federation.

2.It is necessary to develop and adopt the Federal Law "On Lobbyism", which regulates the boundaries of the work of lobbying organizations, establishing the technology of activity, the rules for registering, working and reporting lobbyists. The purpose of this law should be to ensure transparency of lobbying activities within the walls of both chambers of the Federal Assembly for the state and society, as well as to reduce the corruption influence on public authorities.

In this regard, we should not forget that this law should regulate the activities of not only lobbying organizations, but also some aspects of the work of public authorities and their officials. Within the framework of this law, it is necessary to ensure that deputies, senators, public servants and judges are forced to disclose information about contacts with lobbyists.

Analysis shows that it is necessary to divide lobbying activities into "commercial" and "non-commercial". Commercial must be regulated primarily in order to be able to control contacts between business and government, and non-profit in order to enable various social groups to influence government structures in order to promote their interests and protect rights. These we can include trade unions, NGOs, various foundations. Non-profit entities are extremely important, since lobbying is not always the promotion of business interests, but also the activity of providing citizens with their

[1] Vasilieva S.V. The legal institute of lobbyism in Russia: an assessment of the legislation and the prospects of formation // Comparative constitutional review. 2013. No. 1. p. 159.

inalienable rights. At the same time, both types of lobbying activity are, in any case, the most important guarantee of providing citizens with constitutional rights.

3.It is necessary to amend the Federal Law of 08.05.1994 № 3-FL "On the status of a member of the Federation Council and the status of a deputy of the State Duma of the Federal Assembly of the Russian Federation". It seems appropriate to borrow from the United States the principle according to which the current legislator or an employee of the parliament apparatus can receive money for scientific and teaching activities only if prior written consent is given by the leader of his faction, the speaker of the house of parliament, and the ethics committee. All these authorities should first make an assessment of the availability of opportunities for corruption and conflict of interest in each specific case of scientific and teaching activity based on the presented contract.

4.When adopting the federal law "On lobbyism" in Russia, it is necessary to create a specialized body in the system of federal government bodies based on the Ministry of Justice, which will register lobbying organizations, monitor their activities, revenues, as well as contacts with specific representatives of state and local authorities.[1]

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Studies of Drilling Washing Fluids' Influence on the Reservoirs Filtration Properties

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Abstract

Currently, during opening and testing of productive formations, as well as during repair work in wells, specialized technical fluids are used on a water or oil basis. All of them are characterized by compatibility to varying degrees with the lithological and physical properties of reservoirs in Western Siberia and have different effects on the filtration properties of the pore reservoir of reservoirs

It is known that when using drilling washing fluids made on fresh water, due to the interaction of the fresh water filtrate with rock cement and some rock-forming minerals, the permeability of the bottom-hole zone changes.

The paper presents the results of an experimental study of the effect of drilling washing fluids on terrigenous rocks of one of the fields.

The impact on the core of drilling washing fluids, with the exception of FLO-PRO and NaCl, led to some decrease in the permeability of core samples in oil.

In the core of the terrigenous reservoir, filtering FLO-PRO does not cause a negative result. The curves of permeability changes with increasing filtration pressure before and after FLO-PRO flow are identical in dynamics.

According to the results of the study, it can be concluded that technical fluids FLO-PRO and Invert emulsion mud can be recommended for use as they do not violate the structure of the reservoir pore space and do not lead to a significant decrease in core permeability of all layers in oil.

Keywords: Drilling fluids, terrigenous rocks, change in permeability

Introduction

Currently, during opening and testing of productive formations, as well as during repair work in wells, specialized technical fluids are used on a water or oil basis. The chemical composition of such fluids used for working in wells of multilayer fields is diverse: from simple salt solutions (NaCl and CaCl2) to multicomponent polymer-containing compositions, such as FLO-PRO [1,13]. Common for these liquids is their low viscosity and relatively high specific gravity with almost complete absence of weighting agents in the form of a solid phase (bentonite, barite, etc.).

All of them are characterized by varying degrees of compatibility with the lithological and physical properties of reservoirs in Western Siberia and have different effects on the filtration properties of the pore reservoir of productive formations [2]. Especially during opening of potentially unstable rocks of the Bazhenov and Georgievskaya Formations together with the productive formation SE1, which has a low reservoir pressure anomaly coefficient (0.85-0.9), permeability inhomogeneous across the section (from 1 ÷ 2 to 15 ÷ 20 mD) and high fractured porosity, impose a number of serious restrictions on the choice of the type of drilling flushing fluid [3].

In general terms, the reasons affecting the reservoir properties (FES) of the bottom-hole formation zone (BHP) of pore-type reservoirs when exposed to industrial fluids can be divided into two groups: technological and geological [4]. Technological reasons, caused mainly by the mudding of the bottom-hole formation zone by solid particles of drilling fluids, are not considered in this work, since there is no solid phase in all tested fluids.

The geological reasons for the change in reservoir properties of reservoir rocks during their interaction with drilling washing fluids include [9, 10]:

- swelling of the clay phase of the reservoir when penetrating into it the filtrate of drilling washing fluid, water-based;

- insoluble precipitation in the pores of the formation during the chemical interaction of the formation water with the filtrate of the technical/drilling washing fluid;

- a change in phase permeability to oil when penetrating into the reservoir of drilling washing fluid;

- the formation of oil-water emulsions that reduce the relative permeability of the BHP.

Being inherently a heterogeneous mineral system, reservoir rocks are resistant to various degrees of exposure to various drilling washing fluids. The chemical reagents included in their composition cause physicochemical reactions in the reservoir rocks, the final result of which is a change in the properties of the pore-fissure space [7, 8]. To prevent scree and collapse of the walls of the borehole, taking into account the possibility of other types of complications and ensuring high rates of penetration of the barrel, it is necessary to comprehensively approach the choice of the optimal density [14].

It is established that when using drilling washing fluids made on fresh water, due to the interaction of the fresh water filtrate with rock cement and some rock-forming minerals, the permeability of the bottom-hole zone changes. When using water-based salt drilling washing fluids, such as NaCl and CaCl2, due to the high degree of filtration of water-based drilling fluids into the formation, crystallization and formation of salt crystals in a porous medium occurs. The effect of multicomponent drilling washing fluids, including oil-based invert-emulsion solutions (hydrocarbon-based solutions), minimize the risk of absorption and prevent pollution of the reservoir, as experience with the use of the BARADRIL-N / XP-07 solution when drilling a horizontal section of a well in a producing reservoir SE1 showed minimal repression on the formation [5].

The use of hydrocarbon-based solutions affects the change in reservoir properties of reservoir rocks to a lesser extent, but can lead to hydrophobization of part of their pore space.

The permeability of the rocks in oil after interacting with drilling washing fluid used to work in the bottomhole formation zone of the well will determine the possibility of their application.

Methods for monitoring and controlling the filtration properties of drilling fluids, especially for deep wells, also require clarification. In this case, it is necessary to distinguish between the tasks that arise when developing a drilling fluid as a coagulation-thixotropic system of a certain type (which is associated with the stability of the fluid and the nature of the interaction with drillable rocks) and the task of choosing its formulation (fractional composition) for controlling technological properties [15].

To select the optimal properties of drilling washing fluid, it is necessary to conduct standard petrophysical studies to research their filtration-capacitive properties and chemical composition.

This paper presents the results of an experimental study of the effect of drilling washing fluids on terrigenous rocks of one of the fields. From the total volume of core samples studied in the laboratory, samples were selected that are characterized by average (or close average) values of porosity and permeability (Table 1).

Table 1. *Brief information on the physical properties of core samples.*

Title of indicator		SE1 (1)
1		5
Porosity	min	3.11
	max	20.76
	average	13.19
Klinkenberg corrected permeability	min	0.007
	max	> 200

	average	3.44
Number in a sample		37

The considered reservoir SE1 (1) is represented by siltstone > 70%, sandstone ~ 15%, clay minerals (10-15%), and is complicated by carbonates (Fig. 1). Clay cement (according to the RFCA) is mainly represented by kaolinite and the illite group; it is complicated by chlorite in terms of spar grains. Swelling minerals (smectite and montmorillonite) are practically absent.

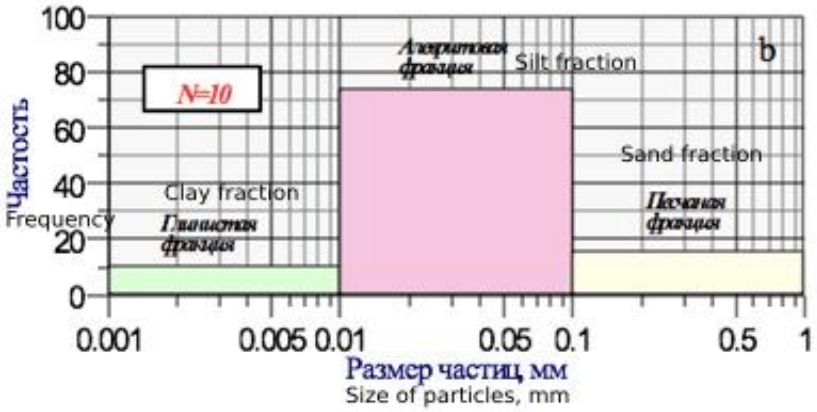
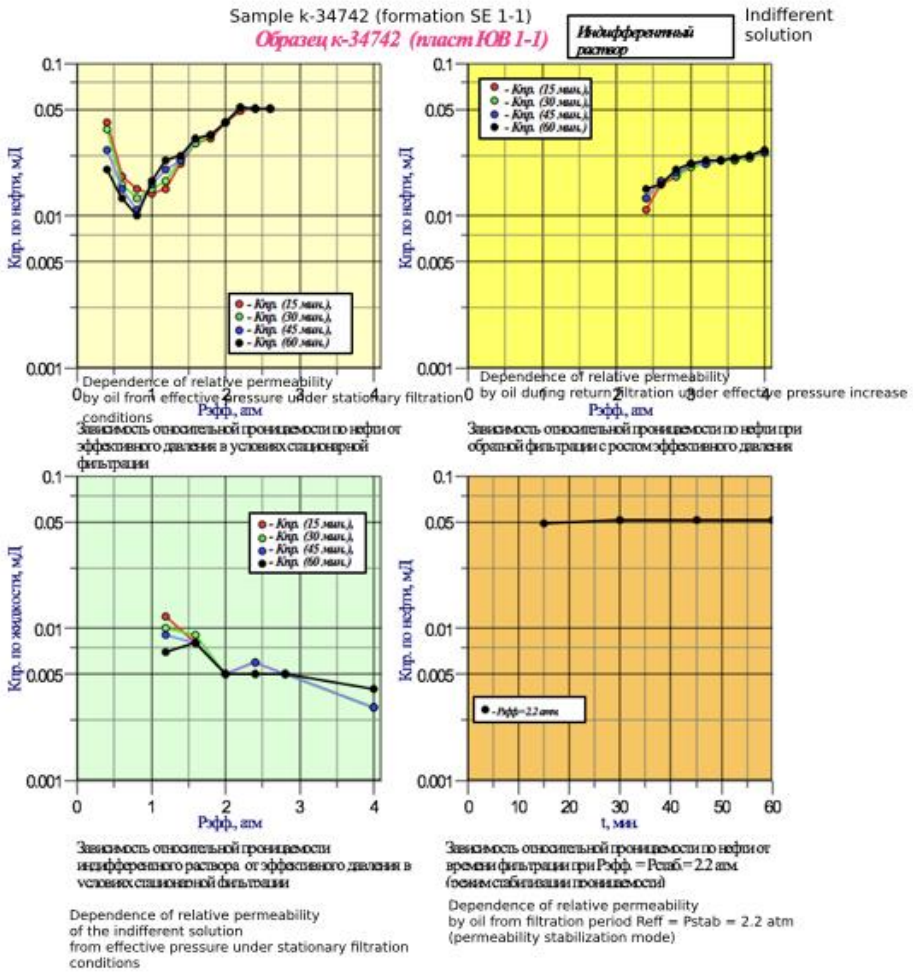


Fig. 1. *Collector Particle Size Histogram*

The porosity of the rocks varies in a wide range from 2% to 22%, low porosity due to the presence of carbonate cement. The average value of porosity is 13.2%. The gas permeability of the formation varies over a very wide range, from hundredths of mD to tens of mD with an average permeability of 0.64 mD. Oil saturation in the reservoir is episodic, with rare interlayers. In practice, the reservoir, if it is a reservoir, has a very low potential in terms of reservoir properties. Obviously, in this section of the field there were the most unfavorable conditions for the formation of the reservoir.

By well 162, the SE1 (1) layer, according to well logging data, had more favorable conditions for the formation of the reservoir, but it was not possible to take out the core sample from the UV1 group. Only one sample with a porosity of 29% and good permeability of 300 mD was selected from the productive part of the formation. This sample was used to study the effect of FLO-PRO drilling washing fluid on the reservoir properties.The rocks of the SE1 formation (1) react to the effect of drilling washing fluid differently than the rocks of the overlying layers. The permeability of core samples, through which NaCl drilling fluids (sample k-34712), CaCl2 (sample k-34715), an indifferent solution (sample k-34742, Fig. 2), and the Invert emulsion mud filtrate (sample k-34743, Fig. 3) were filtered), in the pressure drop range from 0.2 to 0.8 atm. decreased, and with a pressure drop of more than 1.0 atm. stabilized for almost all samples.

Fig. 2. *Change in permeability during injection of an indifferent solution*



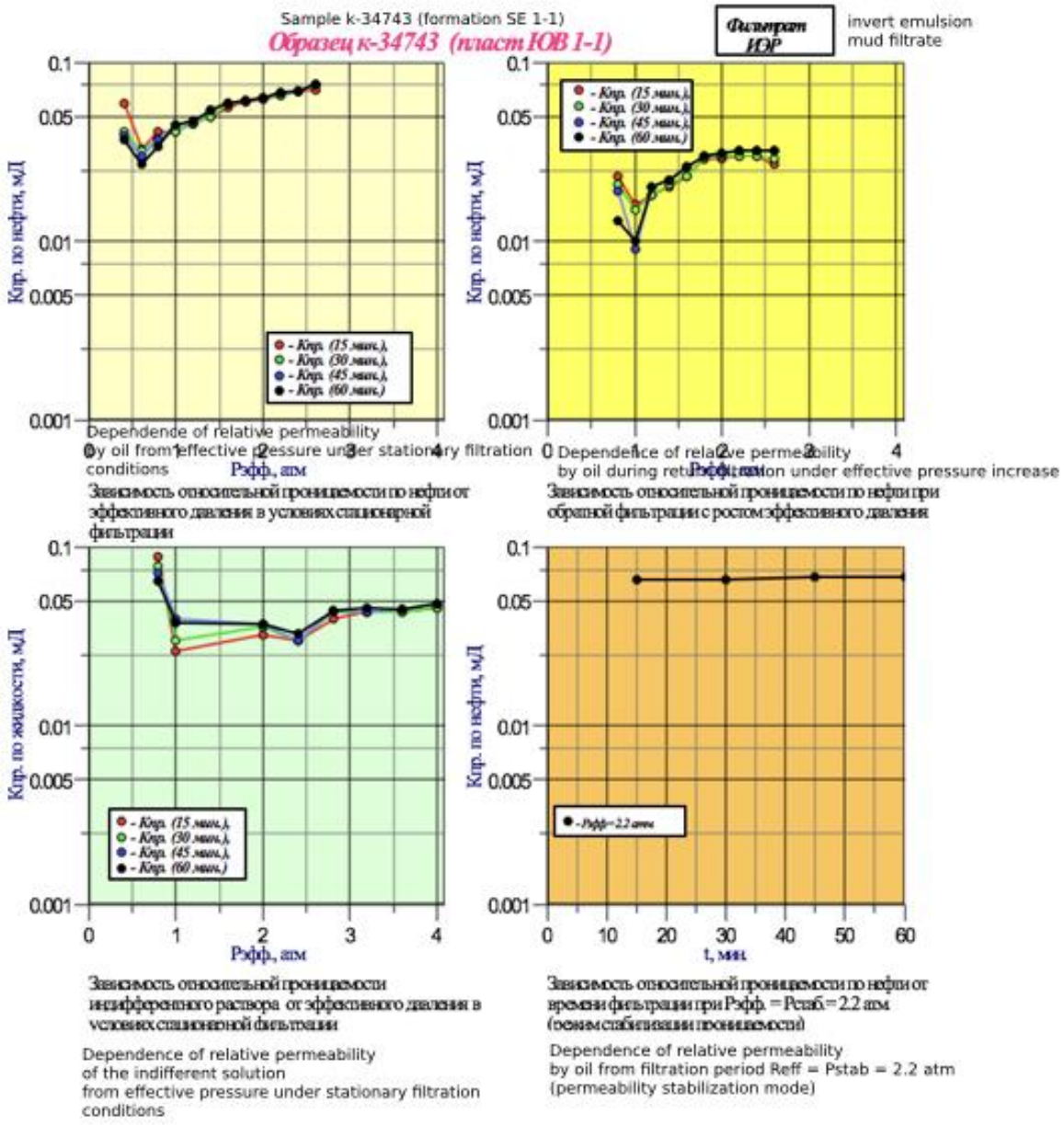


Fig. 3. *The change in permeability during injection of the invert emulsion mud filtrate*

Otherwise, there was a change in the permeability of the core sample through which the process water was filtered (sample k-34744, Fig. 4). Since the start of filtration (at a pressure drop of 1.8 atm.), The permeability of the sample naturally increased, and with repression more than 3.0 atm. showed a tendency to stabilization.

Studies of the filtrate FLO-PRO. In the sample (k-21796), characterized by high reservoir properties (Kp. For gas over 200 mD, Kpr for solution of NaCl 79.6 mD), the permeability of this drilling washing fluid with an increase in pressure drop from 0.2 to 1.4 atm. increased by more than 5 times. At higher pressure drops (above 1.6 atm.), The permeability of the FLO-PRO filtrate is stabilized at 40 mD. For the sample (k-34738), whose reservoir properties are close to average and in the reservoir (Kp. For gas = 5.16 mD, Kp. For NaCl = 2.82), the permeability of the filtrate FLO-PRO slightly decreased (up to 1.0 atm.) Slightly, and with a pressure drop of more than 1.5 atm. stabilized at 0.1 mD (Fig. 5).

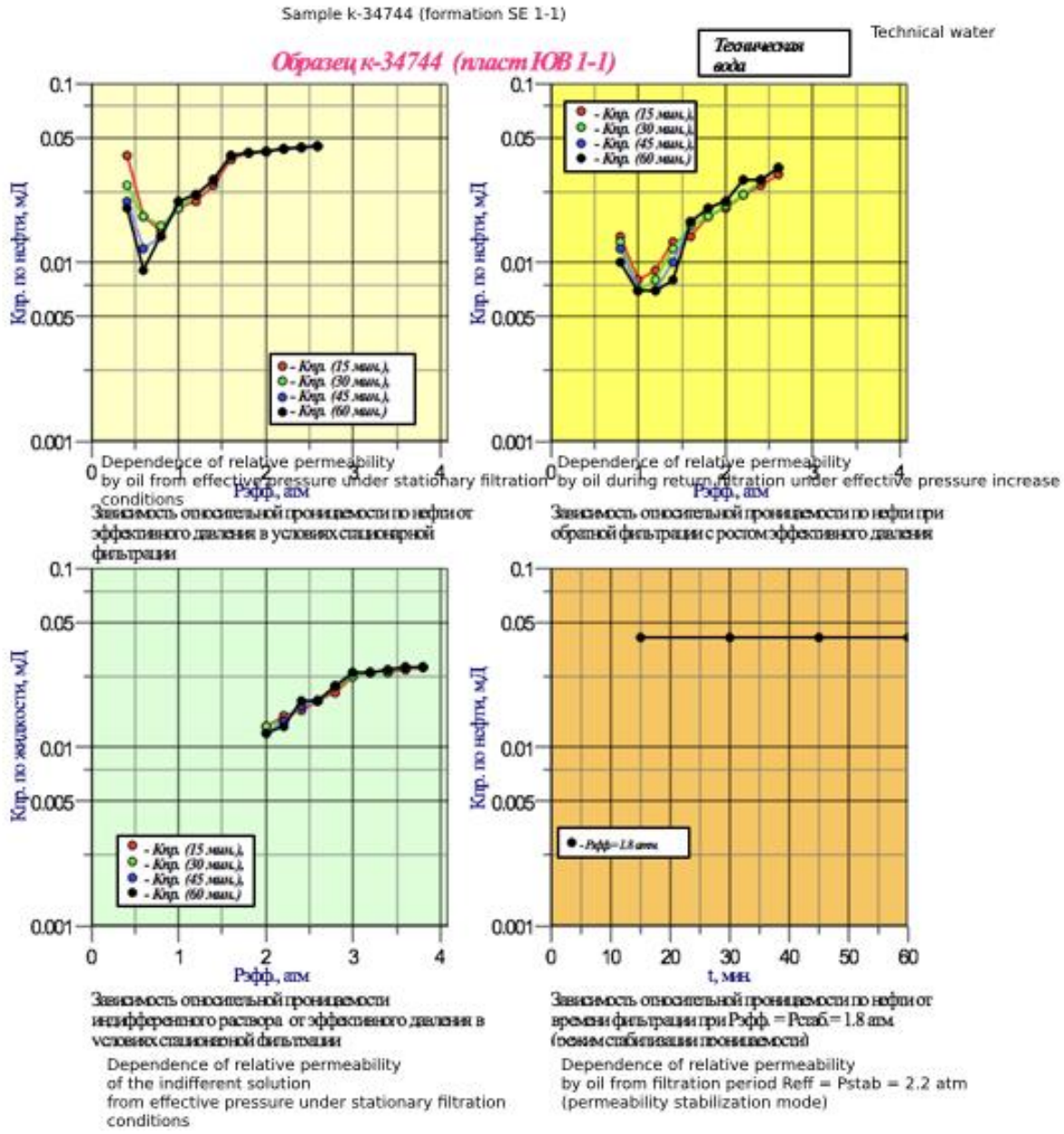
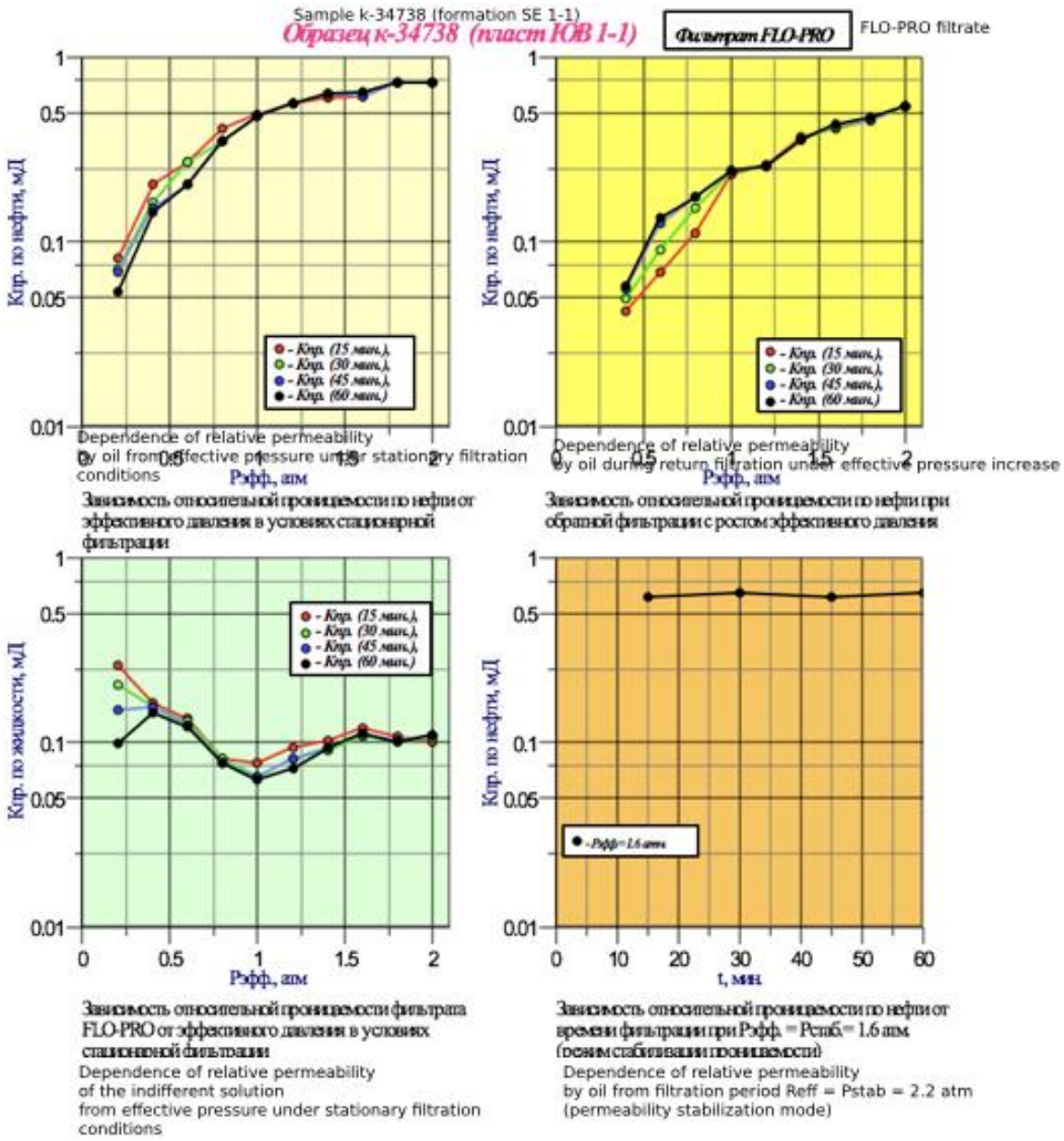


Fig. 4. *Change in permeability when injecting process water*

Exposure of the listed drilling washing fluids to the core, with the exception of FLO-PRO and NaCl, led to a slight decrease in the permeability of core samples in oil.

So for core samples through which an indifferent solution, Invert emulsion mud, CaCl2 and industrial water were filtered, the core permeability during reverse oil filtration decreased by 1.5 - 3.0 times. In this case, the smallest decrease is observed for samples through which CaCl2 solutions and process water were filtered.

Fig. 5. *Change in permeability during injection of the filtrate FLO-PRO*



FLO-PRO drilling washing fluid (samples k-21796, k-34738) and highly mineralized NaCl solution (k-34712) practically did not cause changes in the permeability of core samples in oil. The oil permeability of these samples was intensively and almost completely restored after filtration through the sample of the corresponding technical fluid.

The generalized results of the effect of drilling washing fluids on the SE 1(1) formation are shown in Fig. 6.

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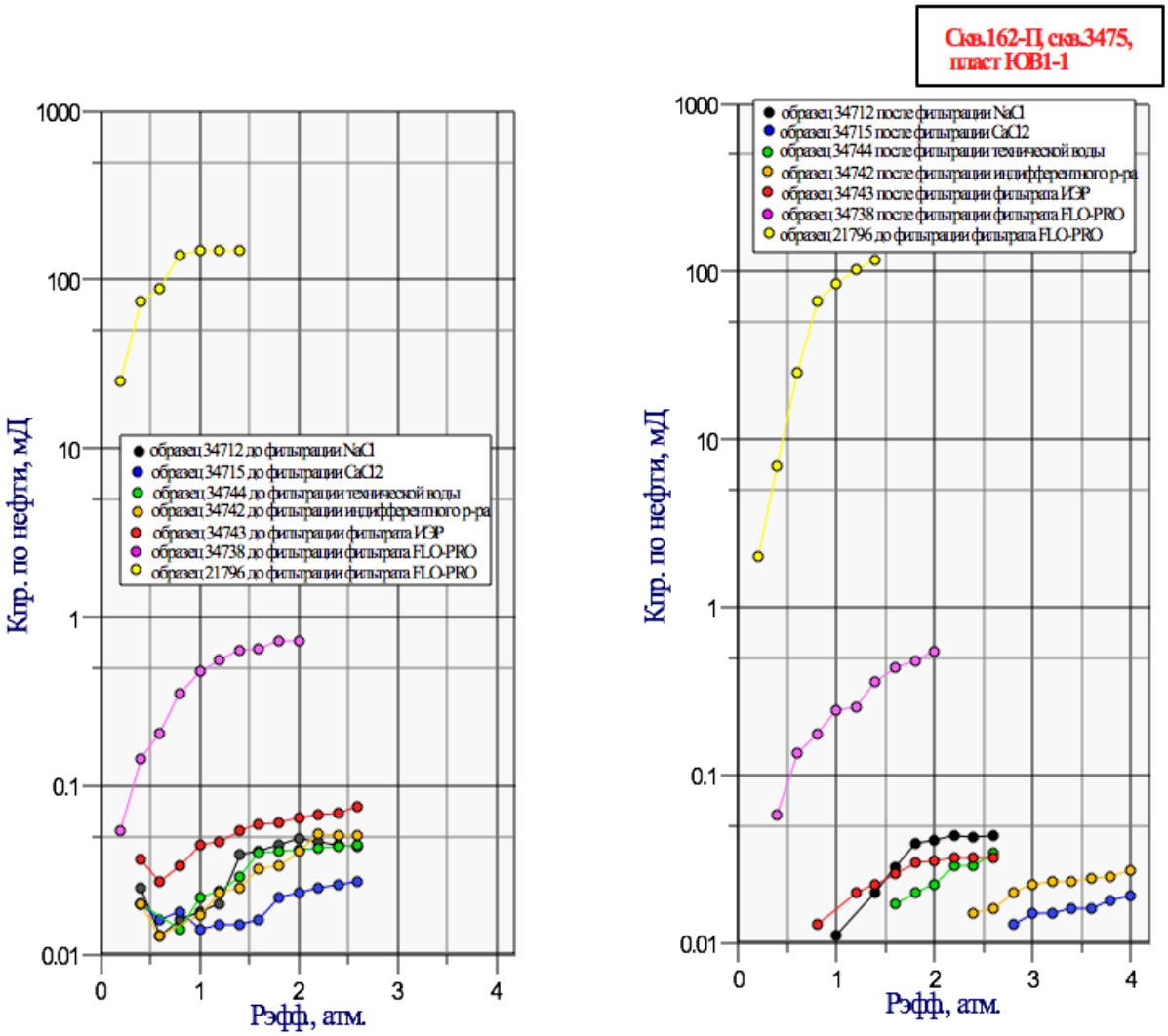

Fig. 6. *The dependence of the relative permeability of the samples in oil from the effective pressure: a - to filter technical fluids; b - after technical fluids. Filtration time 60 min*

Photographs obtained using a scanning electron microscope do not give an unambiguous picture of the reasons for the decrease in the permeability of samples in oil after filtering industrial water, CaCl2 solution, and invert emulsion mud through them. On the one hand, it is clearly seen that the filtration of these liquids did not cause swelling of the soaking clays, and on the other hand, the surface of the mineral grains was even somewhat cleansed of small crystals of the second and third generation.

The pore space is relatively clean. Pore channels are clearly visible. However, this did not lead to a complete restoration of the permeability of core samples during reverse oil filtration. At the same time, in the photographs of the samples (k-34738 and k-34712) (Fig. 7, Fig. 8), through which the NaCl and FLO-PRO solution were filtered, it can be seen that the surface of the large grains remained complicated with small

crystals and scales of clay minerals. Changes in the pore space structure of these samples are not observed [6].

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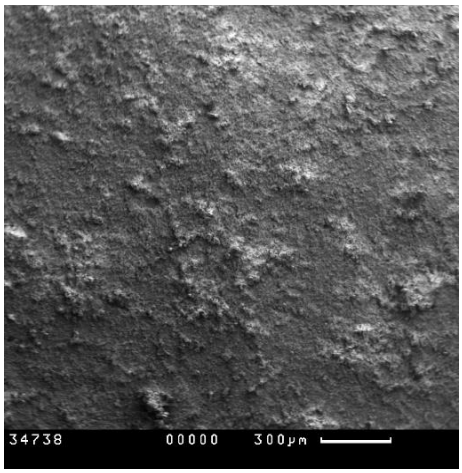
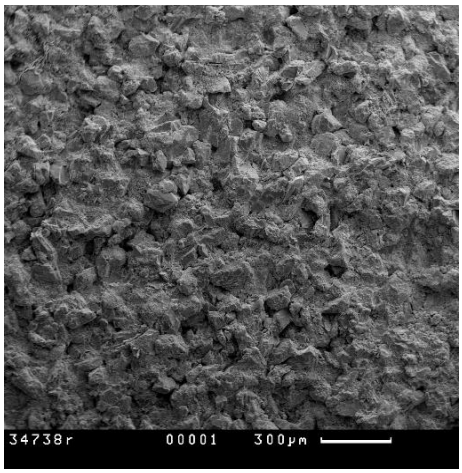
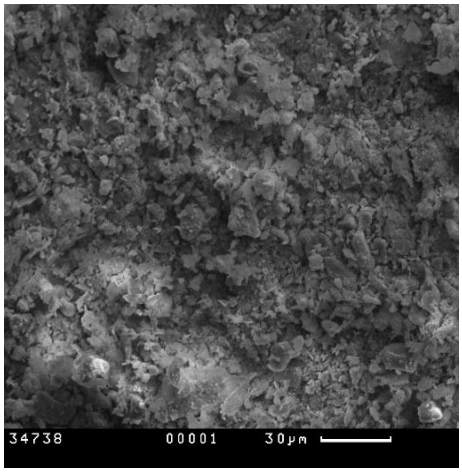
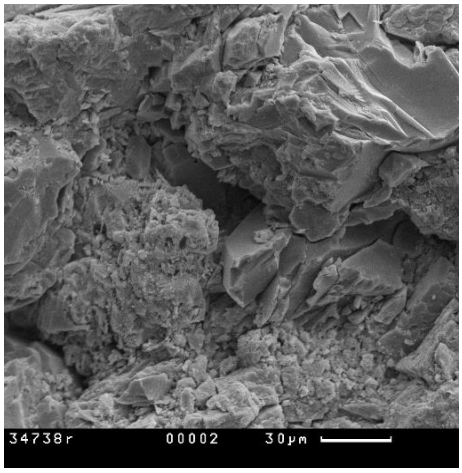
50x





500 x





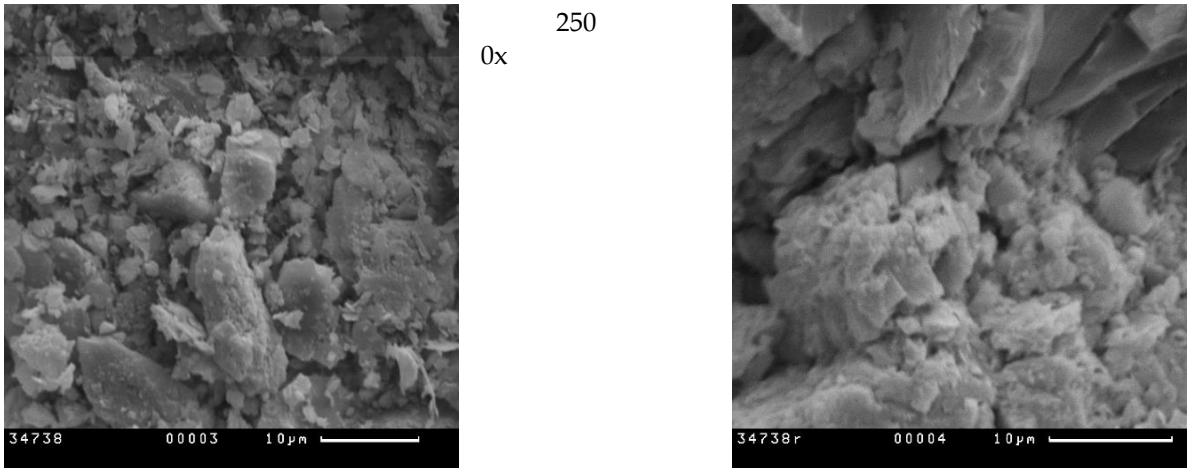
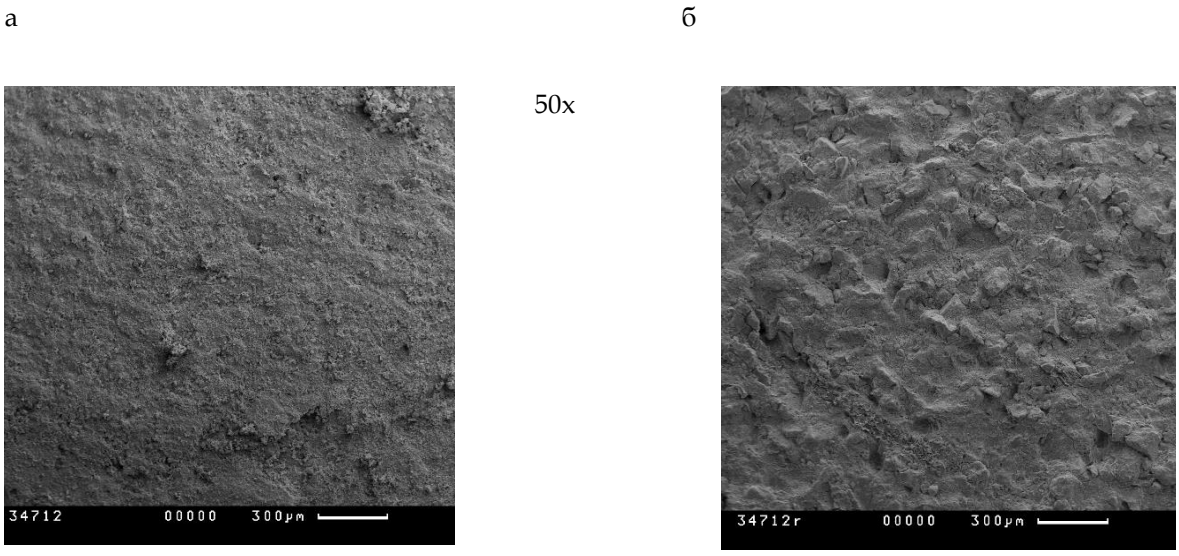


Fig. 7. *Photos of cleaved rocks before and after filtering by FLO-PRO (a) and (b) after it - sample k-34738 - layer SE1 (1) (magnification 50x, 500x, 2500x)*



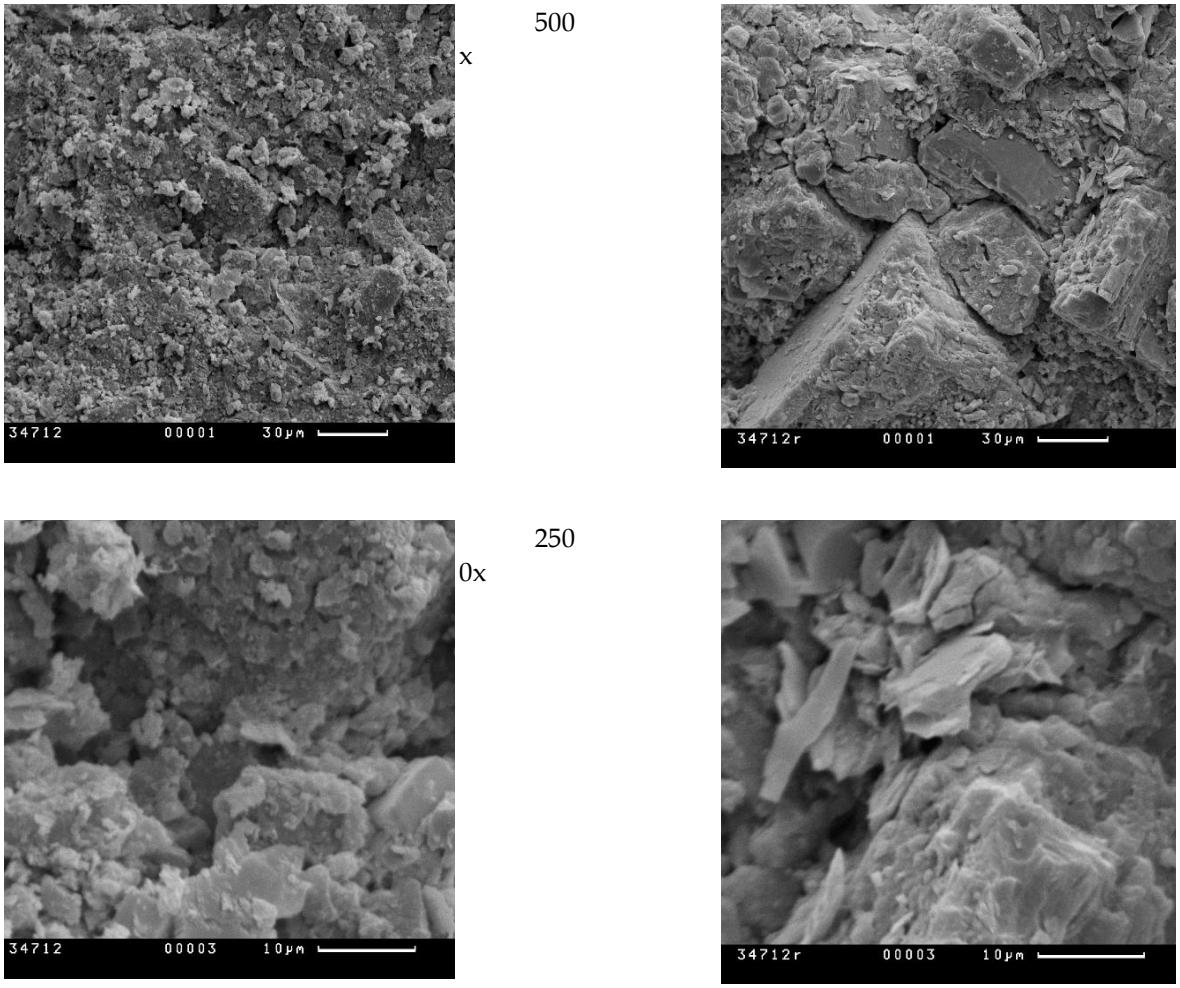


Fig. 8. *Photos of rock chips before (a) NaCl solution filtration and (b) after it - sample k-34712 - SE1 layer (1) (increase 50x, 500x, 1000x, 2500x)*

Conclusions:

In the core of the SE1(1) formation, the FLO-PRO filtering does not cause a negative result. The curves of permeability changes with increasing filtration pressure before and after FLO-PRO flow are identical in dynamics.Technical fluids FLO-PRO and invert emulsion mud can be recommended for use, as they do not violate the structure of the pore space of the reservoir and do not lead to a significant decrease in the permeability of core of all layers in oil.

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An Evaluation of the Energy Productivity of Mass Exchange Contraption (Placing Unit Type)

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Abstract

The article is dedicated to the appraisal of the vitality proficiency of mass exchange gadgets loaded up with riotous putting units utilizing a methodology dependent on the utilization of the vitality coefficient E (V.M. Antufyeva). Utilizing the Owen model of the violent limit layer, considering the constriction of disturbance in the limit layer, an articulation is introduced for computing the normal mass exchange coefficient from the tumultuous stuffed layer in the channel. A calculation for figuring the vitality proficiency of the channel loaded up with putting units for doing the mass exchange procedure is displayed. So as to choose the most vitality productive intensifier of the mass exchange process, a few sorts of sporadic packings have been considered. The vitality coefficient E was determined for a channel loaded up with putting units of different shapes, sizes, and furthermore made of different materials. As per the information acquired, charts of the reliance of the vitality coefficient E on the Reynolds number (method of movement) have been plotted. The upside of the considered methodology is that the procedure of mass exchange requires minimal measure of observational parameters about the object of demonstrating being concentrated to assess the effectiveness from a fiery perspective.

Keywords: mass exchange, intensifiers, stuffed components,vitality coefficient, proficiency

Introduction

The enterprises of the energy and petrochemical complex are the largest consumers of fuel and energy resources and occupy the first place among industrial enterprises in terms of energy intensity of technological processes, which are associated with a high degree of diversity of heat and mass transfer equipment. Among the technological processes in the energy and petrochemical complexes, mass transfer processes are considered to be one of the most energy-consuming [1,2].

At present, industrial enterprises must prove their competitiveness not only in the domestic, but also in foreign markets, which ultimately requires a reduction in energy consumption to reduce the cost of production.

The problem of reducing energy consumption for enterprises of the energy and petrochemical complex is extremely important and requires effective action to solve it.

We can distinguish the transition to energy-saving technologies and the constructive improvement of technological processes and equipment among the main directions of reducing the energy intensity of industrial enterprises [3].

The most effective and balanced decisions to improve technological processes and equipment are made both at the design stage, when compared to promising options for the development of an industrial facility, focused on the use of technically advanced technologies, and at the stage of modernization of existing industries with the maximum involvement of highly efficient intensified equipment.

Highly efficient intensifiers in the form of chaotic packing elements have been used as a tool to intensify of mass transfer processes by developing a contact surface and improving the mixing of flows [4-6]. Currently, there is a large variety of different packing elements [7-9].

However, almost always the transition to new technological equipment with the involvement of various intensifiers is accompanied by an increase in hydraulic resistance, which leads to additional energy costs for overcoming the increased resistance.

A rational approach is required therefore, to select a highly efficient intensifier, which is possible with the use of modern methods of mathematical modeling.

Task Description

Consider the process of stationary mass transfer in the stream from the elements of the fixed packed layer in the channel (column). Examples of such processes can be the following evaporation of solids or evaporation of a liquid from a placing unit, adsorption, etc.

The effectiveness evaluation of various intensifiers, in the form of chaotic placing units, in mass exchangers of the placing unit type we will carry out according to the energy criterion, which will not only make the choice of the best intensifier, but also determine the efficiency of the process with changes in the initial parameters, and use the borderline model to determine average values of mass transfer characteristics of Owen layer with a turbulent viscosity function with allowance for the damping of pulsations in a viscous sub layer [10].

Predicted Result and Discussion

In assessing the energy characteristics of mass transfer apparatus of the placing unit type, we apply a complex similarly obtained on the basis of the energy coefficient introduced by Kirpichev and Antufiev, which characterizes the thermal-hydraulic perfection of heat exchange [11], which takes the form

$$E = \frac{M}{N} = \frac{\beta \cdot F_{\text{p.unit}}}{N} \quad (1)$$

where M is the amount of the transferred substance; N is the energy required to supply the service, Watt; β is the mass transfer coefficient, m/s; $F_{\text{p.unit}}$ is the mass transfer surface for an apparatus (channel) with a packing, m^2.

The energy required to supply the service is defined as

$$N = u_0 \cdot S \cdot \Delta P \quad (2)$$

u_0 - flow velocity in the channel, m/s; S - cross-sectional area of the channel, m^2; ΔP - pressure loss in the channel with a placing unit, Pa.

The mass transfer surface for the apparatus (channel) with a placing unit is written as [12]

$$F_{\text{p.unit}} = a_v \bullet S \bullet H \ (3)$$

where a_v is the specific surface of the placing unit, m^2/m^3; H is the length of the placing unit, m.

Taking into account expressions (2) - (3), the energy coefficient will take the form

$$E = \frac{8 \bullet \beta \bullet \varepsilon_{\text{fr}}}{u_0 \bullet \xi \bullet \rho \bullet u^2_{av}} = \frac{8 \bullet \beta}{\xi \bullet \rho \bullet u^3_{av}} \quad (4)$$

where ξ is the hydraulic resistance coefficient of the packed layer; ρ is the flux density, kg/m^3; u_{av} is the average flow velocity in the channel with a placing unit, m/s; ε_{fr} is the specific free volume of the placing unit, m^3/m^3.

Thus, the task of finding the energy coefficient is reduced to determining the mass transfer coefficients β and the hydraulic resistance of the packed layer ξ.

We use the Owen boundary layer model with a turbulent viscosity function taking into account the damping of pulsations in a viscous sub layer to determine the mass transfer coefficient in a channel filled with chaotic packing elements [10].

As a result of integrating the expression of resistance to mass transfer using the Owen three-layer boundary layer model, an expression is obtained to determine the mass transfer coefficient [13]

$$\beta = \frac{1.85 \cdot \text{Re}_e^{0.75} \cdot (\xi / 2)^{0.25} \cdot \nu}{\text{Sc}^{0.67} \cdot d_e \cdot \left[1.48\,\text{Re}_e^{0.125} / \xi^{0.25} + 2.5 \ln\left(4 \cdot \text{Re}_e^{0.125} \cdot \xi^{0.5}\right)\right]}, \quad (5)$$

where Re_e is the equivalent Reynolds number; Sc is the Schmidt number; d_e is the equivalent placing unit diameter, m; v is the kinematic viscosity coefficient, m^2/s.

The mass transfer coefficient can be written through the dimensionless Stanton complex

$$\text{St}_e = \frac{1.85 \cdot (\xi / 2)^{0.25}}{\text{Sc}^{0.66} \cdot \text{Re}_e^{0.25} \cdot \left[1.48 \cdot \text{Re}_e^{0.125} / \xi^{0.25} + 2.5 \cdot \ln\left(4 \cdot \text{Re}_e^{0.125} \cdot \xi^{0.5}\right)\right]}. \quad (6)$$

Then the numeric expression (4) takes the form

$$E = \frac{8 \bullet St_e}{\xi \bullet \rho \bullet u^2_{av}}. \quad (7)$$

Also, the mass transfer coefficient can be written through the Sherwood dimensionless group

$$Sh_e = \frac{1.85 \cdot Re_e^{0.75} \cdot Sc^{0.333} \cdot (\xi / 2)^{0.25}}{1.48 \cdot Re_e^{0.125} / \xi^{0.25} + 2.5 \cdot \ln\left(4 \cdot Re_e^{0.125} \cdot \xi^{0.5}\right)}. \quad (8)$$

Therefore, numeric expression (4) is written as

$$E = \frac{8 \bullet Sh_e}{\xi \bullet \rho \bullet u^3_{av}}. \quad (9)$$

The coefficient of hydraulic resistance of the placing unit layer ξ, depending on the design of the placing units and the hydrodynamic mode of service movement through the placing unit layers, is found experimentally using ΔP values based on the application of the well-known Darcy – Weisbach formula [14].

Thus, we use the literature data to determine the hydraulic resistance coefficient ξ for various packing elements [15, 16].

Let us apply the obtained expressions to select the most energy efficient intensifier, in the form of chaotic packing elements.

Consider the case where the air is passed through a layer of placing units coated with mothballs.

We accept the following source data [17]:

- Coefficient of kinematic air viscosity is ν = 2,2 • 10^{-5} m^2/s;
- Diffusion coefficient of naphthalene vapor in the gas phase is $D_г$ = 5,1 • 10^{-8} m^2/s;
- Air density is ρ = 0.963 kg/m^3.

When choosing an intensifier in the form of packing elements, it is important to consider the geometric and technical characteristics of the placing units. Comparative assessment of placing units according to such characteristics as shape, size, material of manufacture, seem appropriate to be the first step when choosing placing units for a particular separation process from a number of known placing units.

Table 1 shows the characteristics of the placing units of various shapes, but close in nominal size.

Table 1. *Characteristics of placing units of various shapes but close in size [18,19]*

The shape and size of the placing unit, mm	Equivalent diameter d_e, m	Specific surface a_v, m^2/m^3	Specific free volume ε_{fr}, m^3/m^3
Raschig circular placing unit (8 size)	0,0057	630	0,9
Intallox saddle (size 12,5)	0,005	625	0,78
Round placing unit (size 8)	0,00394	431,25	0,425

Figure 1 presents the results of calculations of the energy coefficient *E* from the Reynolds number Re for intensifiers, in the form of chaotic packed elements of various shapes, but similar in size.

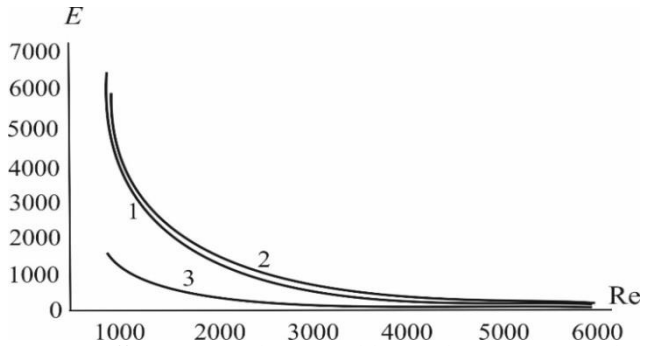

Figure 1. *Dependence of the energy coefficient E on the Reynolds number Re: 1 - Raschig placing unit (size 8 mm); 2 - Intalox saddles (size 12.5 mm); 3 – Round placing unit (size 8 mm).*

As we can see, the spherical placing units show the lowest results compared to the circular-shaped and saddle-shaped placing units, this can be explained by the fact that the spherical placing units do not have an internal cavity and therefore they have a low throughput. Elements of saddle-shaped placing units, as well as spherical placing units, also do not have an internal cavity, but due to the shape features, their surface is wetted better, and therefore even with sufficiently high hydraulic resistance and, accordingly, low ultimate loads, their efficiency is higher than spherical. As for the circular-shaped placing units with an internal cavity, they show good results, not much different from the saddle. Placing units of a circular-shaped and saddle-shaped form of the same size have very similar values of the specific surface a_v, however, their ΔP values differ from each other due to differences in the design due to the nature of the flow resistance in the packed layer. A layer is formed by a chaotic backfilling of placing units, representing voids forming winding channels of irregular shape and variable cross section, while the flow through such a layer is seen as movement between the bodies filling the device along a set of narrow curved channels of variable cross section and shape.

For further analysis, we consider the basic circular shape of the placing unit as the most favorable from the point of view of hydrodynamics. Currently, Raschig units are actively used in industry due to ease of manufacture and low cost. Table 2 shows the characteristics of the placing units in the form of Raschig units of various sizes.

Table 2. *Characteristics of Raschig circular placing units (steel) of various sizes [19]*

The shape and size of the placing unit, mm	Equivalent diameter d_e, m	Specific surface a_v, m^2/m^3	Specific free volume ε_{fr}, m^3/m^3
8×8×0,3	0,0057	630	0,9
15×15×0,5	0,01048	350	0,917
35×35×1,0	0,02053	150	0,7

Figure 2 shows the results of calculations of the energy coefficient *E* from the Reynolds number Re for steel Rashig circular placing units of various sizes.

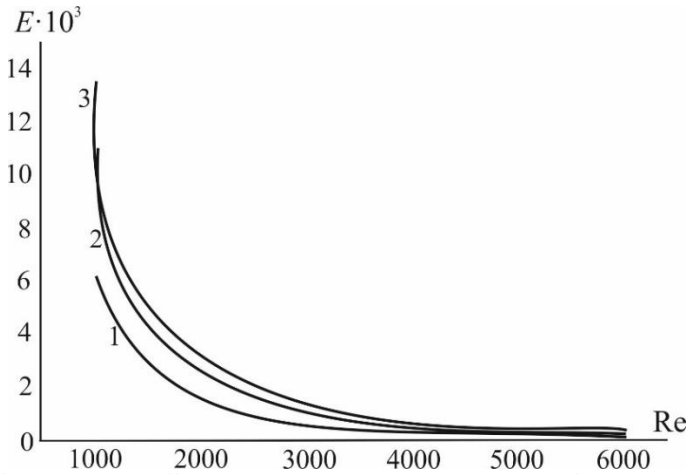

Figure 2. *Dependence of the energy coefficient E on the Reynolds number Re for Raschig circular placing units of various sizes:*
1 - Raschig units (size 8 × 8); 2 - Raschig units (size 15 × 15); 3 – Raschig units (size 35 × 35).

The specific surface and specific free volume of the packing, which largely determine the efficiency of mass transfer, are inherently related to the size of the packing elements. So with a decrease in the size of the placing units, its specific surface area increases and the contribution of the inertial component is increasingly manifested, with the ever-increasing number of curvatures of the inter-channel channels per unit height of the packed layer being one of the reasons for this. With an increase in the size of the placing unit, its specific

surface area decreases, and the hydraulic resistance coefficient of the placing unit layer decreases, and the mass transfer coefficient increases that generally leads to an increase in the energy coefficient. As the results of calculations show, it seems interesting to use rather large placing units from the point of view of the intensification of the process of mass exchange.

In order to increase the efficiency of the placing units, various placing unit configurations are developed; Pall's circular units [20] with rectangular perforations and tongues, circular units bent inward are included among these, which greatly increased efficiency by increasing throughput and reducing hydraulic resistance.

A fairly wide range of materials is used for the manufacture of placing units, so the process conditions and the cost of the placing unit are taken into account when choosing a placing unit material for a particular mass transfer process.

On the basis of the above analysis, we further consider the use of chaotic packing elements consisting of large packing in the form of Pall circular units of different materials. Table 3 gives the characteristics of the placing units in the form of Pall circular units (size 50 mm) of various materials.

Table 3. *Characteristics of the placing units of the Pall circular (size 50 mm) of different material [19]*

Unit material	Equivalent diameter d_e, m	Specific surface a_v, m^2/m^3	Specific free volume ε_{fr}, m^3/m^3
Ceramic	0,0261	120	0,783
Plastic	0,03345	110	0,92
Steel	0,03308	115	0,951

Figure 3 presents the results of calculations of the energy coefficient E from the Reynolds number Re for the Pall circular unit of different material.

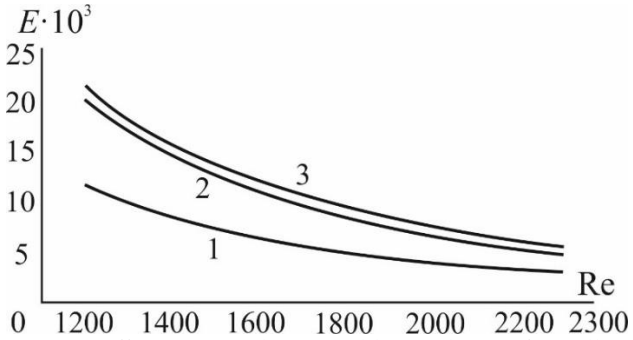

Figure 3. *Dependence of the energy coefficient E on the Reynolds number Re for Pall circular units (size 50 mm): 1 - Pall ceramic units; 2 - Pall plastic units; 3 - steel Pall units.*

Placing units of the same design and size, but made of different materials have similar specific surface values. The values of the specific free volume of the placing units, made of different materials, depend on the thickness of their walls and, therefore, have different values. For example, the wall thickness of the metal placing units of the Pall circular units dims. 50 mm is 1 mm, and in ceramic it is 5 mm, which is due to the large specific gravity of the metal compared to ceramics. For thin-walled metal placing units, the value of ε_{fr} ranges from 0.9 to 0.96, and for ceramic ε_{fr} it varies over a wider range of 0.7-0.8 and has values lower by about 20%.

Ceramic placing units are considered the cheapest, their greater roughness and better wet ability make it possible to intensify mass transfer. However, elements of ceramic placing units have a greater wall thickness than placing units of the same shape made of plastic and especially metal, which reduces the living cross section and, consequently, the throughput.

The bulk density of the ceramic placing units is also very high, which is not unimportant when developing the design of the placing unit type apparatus, its supporting and load bearing structures.

From the presented results, it can be concluded that the steel placing units are the most energy

efficient compared to ceramic and plastic, since they have higher values of the energy ratio.

Thus, the best results have been obtained for circular-shaped packing (size 35 mm), made of steel among the presented packing elements. In all the cases, the value of the energy efficiency coefficient *E* decreases with an increase of the Reynolds number. It is connected with an increasing power of service pumping in proportion to the increase of the average service speed u^3_{av}.

Conclusion

Considered approach to determining the energy ratio allows for a comparison of intensifiers of various shapes and sizes, which is convenient when choosing the most energy-efficient and energy-saving intensifier, which can solve the problems of real production associations in the dynamics of transformations of their structure, including when changing types or design of installed equipment and also take into account the numerous factors affecting the performance of the improved of equipment in various operating modes.

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The Interaction of Educational Organizations to Ensure Professional Identity of Students with Account of Worldskills Competencies

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Abstract

Annotation. The article describes the conditions for choosing promising professions and specialties for students taking into account WorldSkills competencies in a practice-oriented interaction of educational organizations of basic general, additional and vocational education that have a positive impact on the formation of adequate professional identity statuses that are key to the further formation of a holistic professional identity. It is one of the main components in the composition of human ego identity.

Introduction: The focus of the article is the problem of the formation of labor self-determination of adolescents experiencing a crisis in the formation of personal and professional identities, the choice of promising professions and specialties taking into account the competencies of WorldSkills. The purpose of this article is to determine the influence of organizational and pedagogical conditions that are implemented in the context of a practice-oriented interaction between educational organizations of basic general, additional and vocational education, and the organization of early vocational guidance for schoolchildren in WorldSkills competencies, which ensures the formation of adequate professional identity statuses.

Materials and methods: To solve the tasks and verify the starting points, a set of methods of scientific research was used: theoretical: analysis of scientific literature, regulatory and program documentation on the research problem; empirical: pedagogical observation, questionnaires, interviews, survey, experimental work, comparison, analysis of activity products, monitoring; diagnostic methods: scales of socio-psychological adaptation of students; statistical: ranking, scaling, graphical methods of displaying research data.

Results of the study: the organizational and pedagogical conditions for orienting students on the choice of a profession are determined. The model of interaction of educational organizations is presented. The forms of early professional orientation for promising professions and specialties through professional tests on WorldSkills competencies and competitions within the framework of the WorldSkills championship movement that contribute to the formation of their professional identity are determined.

Discussions and conclusions: the interaction of basic, additional and vocational education has a positive effect on the formation of adequate professional identity among schoolchildren, and the organization of early vocational guidance on WorldSkills competences on the choice of promising professions and specialties.

Keywords: professional identity, practice-oriented support for professional self-determination of schoolchildren, WorldSkills competencies, early career guidance, professional tests.

Introduction

The analysis of theoretical sources confirms that in the process of ontogenetic development of a person, adolescence occupies an important place. This is due to the fact that at older school age, young

people are faced with the task of overcoming dependence on the older generation (parents), through achieving a kind of autonomy; the formation of personal identity; self-determination implying the formation of the "self-image".

Identity is a complex structural formation consisting of a large number of identifications: gender identity, national, professional, etc. Some types of identity are given to a young person initially, practically from birth; others become aware only in adolescence. The more diverse the structure of identity, the easier it is for a young person to adapt to constantly changing living conditions [Yarysheva, 2015].

In the framework of the problem of personal identity, professional identity occupies a special place. In the Soviet Union, a stable professional identity was considered an obligatory element of state ideology and an indicator of the civic maturity of an individual. The value orientations of young people, affecting the choice of a profession and the formation of attitudes to the process of its development, have evolved significantly over the past 30-40 years. Many researchers note that when choosing a profession, modern young people mainly focus on three criteria: the prestige of a particular profession, the ability to earn high incomes and, even more primitive value, the easiest training conditions [Zavyalova, 2015].

The incorrect orientation of young people to a future profession demanded by the labor market is largely due to a lack of reliable and up-to-date information, distorted ideas about the prestige of certain professions [Bondarenko, 2018].

Literature Review

American psychologist E. Erickson believes that the formation of identity is the main barrier facing young people on the path to adulthood. By identity, he understood the subjective sense of continuity and identity with oneself, the awareness of one's own length of time, the awareness of the uniqueness of one's own personality, a sense of belonging to the social ideals and values of the group to which the individual relates.

Russian scientists consider professional identity as a kind of integrative psychological phenomenon. In particular, he points to the degree of acceptance of the chosen professional activity as the main means of self-realization, self-determination and the result of a long development of the person under the influence of social conditions (K.A. Abulkhanova-Slavskaya, E.P. Ermolaeva, N.L. Ivanova, Yu .A. Kumyrina, Yu.P. Povarenkov, L.B. Schneider and others) [Albitova, 2011].

D.B. Elkonin, L.S. Vygotsky, A.N. Leontyev in their writings emphasized the importance of the orientation of the adolescent's activity on the assimilation of norms of behavior, labor self-determination, successful socialization in society. In the process of communication and interaction with peers, a teenager seeks self-assertion, tries to understand himself, his positive and negative qualities, and decide on a professional and future life path.
The choice of profession is one of the main life choices made by a young man before graduation. The formation of a new level of development of self-consciousness, the development of one's own worldview, and the determination of a position in life that are characteristic of this period of life activate the processes of personal self-determination and self-designing in the profession [Pryazhnikov, 1996].

In order for a person's professional identity to fully take shape, it is necessary to become familiar with the real content of the profession, working conditions, etc., and this is unattainable without minimal involvement in professional activity, which is not always possible for a high school student [Azbel, 2004]. Along with this, for this age is characterized by an almost complete lack of experience in professional activity in any field. Therefore, a teenager should make a choice only on the basis of awareness of his interests and obtaining exhaustive information about the features and requirements of a particular profession. Sometimes the only criterion by which the dignity of a particular profession is evaluated is its financial prestige.

Studies on the problem of the organization of early vocational guidance and professional tests are presented in the works of P.S. Lerner, S.G. Gellerstein, M.V. Retivev, I.N. Shpilreina, S. Fukuyama, S.N. V.D. Simonenko, T.G. Shitoeva, S.N. Chistyakova, I.A. Sazonova.

The needs of students in personal and professional self-determination and the real conditions of vocational guidance available in a comprehensive school are insufficient to ensure the process of vocational

guidance [Sazonov, 2004]. In order to optimize the professional choice of schoolchildren in modern socio-economic conditions, the process of early vocational guidance involves the use of professional tests at various stages of career guidance. Professional tests for WorldSkills competencies as part of an early career guidance will help students to choose promising professions.

The rationale of the research topic is due to the need to find ways of more effective organizational and pedagogical, psychological assistance to adolescents and youths experiencing a crisis in the formation of professional identity. To solve this issue, a system of actions is needed for a practice-oriented support of the formation of readiness for choosing a profession at the local, municipal and regional level of education management.

Materials and Methods

The theoretical and methodological basis of the study was: domestic and foreign works of researchers of the problems of personality identity in various aspects: ego-identity (J. Mead, E. Erickson); personality development (A. G. Asmolov, A. A. Bodalev, I. S. Kon, D. A. Leontiev); self-awareness (N.V. Antonova, V.V. Stolin, I.I. Chesnokova, E.V. Shorokhova, etc.); professional self-determination (M. A. Bendyukov, E. M. Borisova, E. A. Klimov, I. S. Kon, N. S. Pryazhnikov, I. P. Solomin, P. A. Shavir, V. D. Shadrikov , etc.).

The organization of early career guidance work is devoted to the works of A. D. Sazonov, V. F. Sakharov, N. N. Zakharov, V. D. Simonenko, N. Sh. Shadiev, S. N. Listyakova. Studies of the organization of professional samples are presented in the works of V. D. Simonenko, P. S. Lerner, M. V. Retivykh, S. G. Gellershtein, S. N. Chistyakova, S. Fukuyama, T. G. Shitoeva, I. N Spielreina et al.

Research Results

Considering the experience of the designated scientists, a study was conducted that made it possible to determine the influence of the process of practice-oriented interaction of educational organizations on the formation of adequate statuses of professional identity in high school students, which are of key importance for the further formation of a holistic professional identity, which is one of the main components of ego-human identity.

The interacting organizations were: the municipal budgetary institution of the city of Abakan "Center for Psychological and Pedagogical Medical and Social Assistance", the department of professional self-determination of schoolchildren, as an institution having the functions of additional education, as well as more than a dozen secondary schools of the city, and educational organizations of secondary vocational education as organizers of professional tests on WorldSkills competencies and competitions within the WorldSkills championship movement.

At the formative stage of the experimental work, the following organizational and pedagogical conditions for the formation of professional intentions, as well as adequate statuses of professional identity, were identified. The following has been developed: a model of practice-oriented interaction between educational organizations of basic general, additional and professional education and information and pedagogical support, using practice-oriented technologies, forms and methods;

When developing the model the following tasks were solved:

- the study of the characteristics and problems of educational and educational activities of subjects in the formation of professional intentions among students;

- development of effective organizational and pedagogical conditions, the formation of students' readiness for choosing a profession, which, ultimately, led to a higher level of adaptation of high school students to the learning conditions in professional educational organizations, the formation of professional self-awareness;

- determination of the forms of early vocational guidance that facilitate the selection by students of promising professions and specialties;

- increasing the competitiveness and demand for graduates.

The model we developed is universal and can be implemented and successfully implemented in the process of interaction of other types of educational organizations (Figure 1).

The developed complex of program-methodological and informational support for the practice-oriented interaction of educational organizations included:

- programs of extracurricular activities (in vocational guidance) in the social and general intellectual area ("Kaleidoscope of professions for 5th grade" and "Kaleidoscope of professions for 6-7th grade");
- Methodological manual "Atlas of popular professions and professional tests "Profession pass" for teachers of educational organizations of basic, secondary vocational and additional education;
- Information resource "Atlas of popular professions and professional samples of the Republic of Khakassia "Pass to the profession"" (https://profproba-19.nethouse.ru), for senior students of secondary schools.

At the propaedeutic stage of pedagogical support for the self-determination of schoolchildren (grades 5-8) during the practice-oriented interaction of educational organizations, three integrative programs of extracurricular activities (in vocational guidance) in the social and general intellectual direction, "Kaleidoscope of professions" for grade 5, were implemented Kaleidoscope of professions "for grades 6-7, as well as several modules of the program of continuing education" Proffgid ".

For example, in the 6th grade, the program was designed for 34 hours and provided for the performance of work in five compulsory sections: "People to People", "Keepers of Nature", "Lord of Signs", "Animal Trainers", "Creators of the Beautiful". The principle of constructing the topics of the sections was the classification of types of professions by E. A. Klimov. Theoretical and practical material was aimed at deepening and expanding existing knowledge and ideas about the world of professions and practical skills.

In the 7th grade, the program was also designed for 34 hours and provided for the performance of work in six compulsory sections: "Professions in the branches of education and health care", "Professions in the branches of agriculture and forestry", "Professions in the branches of construction and industry", "Professions in the branches of trade, finance and credit","Professions of public administration and law and order", "Professions of art, culture and mass communication systems", The sense-forming principle of constructing the topics of the sections was the types of branches of professional activity.

At the stages of pedagogical support for self-determination of schoolchildren "development of self-awareness" (grades 8–9) and "refinement of social and professional choice", the program "Prof-guide" of grades 8–9 was implemented.

In the process of mastering the programs, the knowledge of students in the subject of technology was deepened and expanded, as well as advanced training in physics, computer science, geography, biology, and art was conducted.

At the stage of pedagogical support of schoolchildren, called "the development of self-awareness", various forms of professional tests were actively used as practice-oriented methods of professional orientation: game, educational, educational, professional and professional.

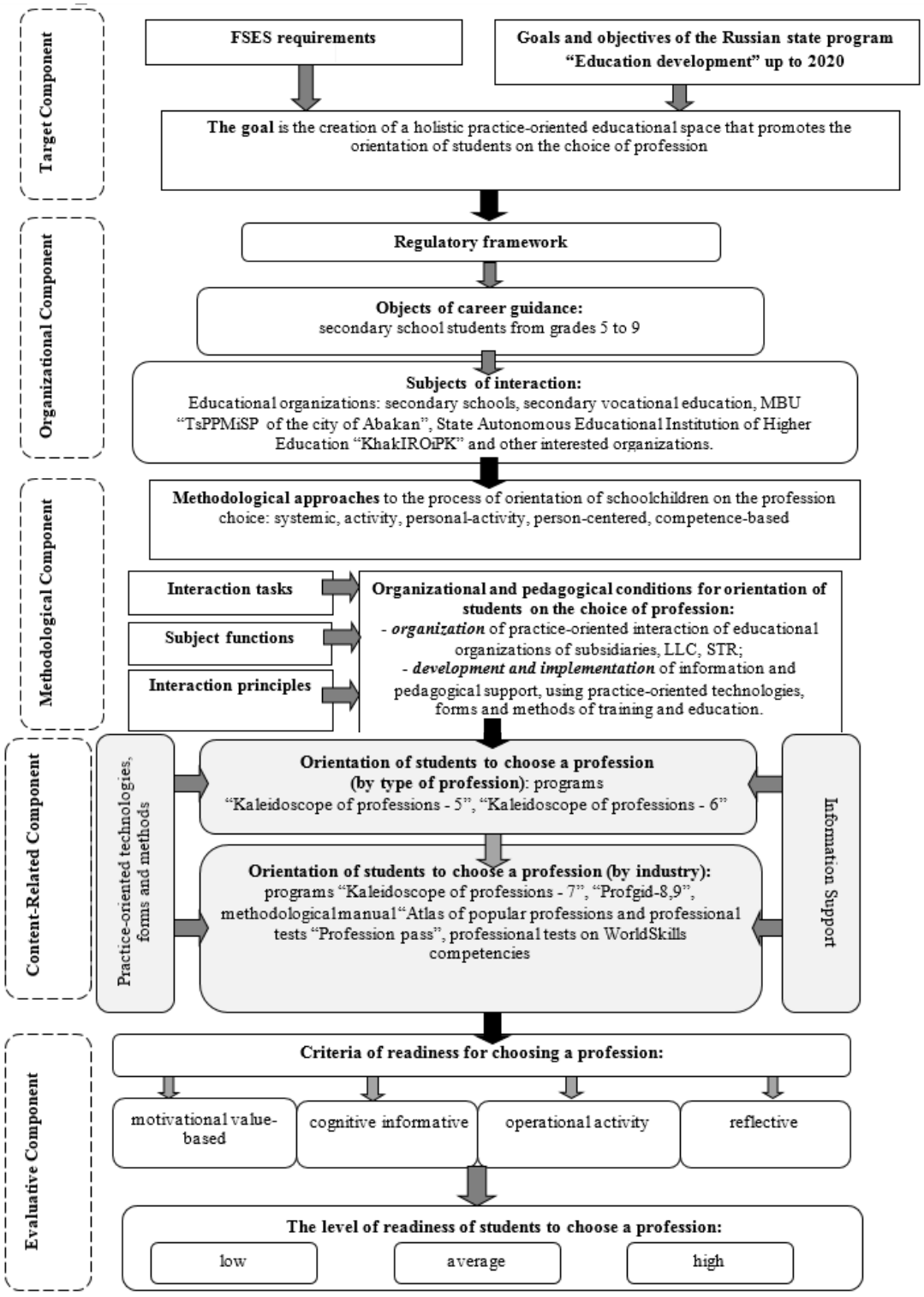

Fig.1. The model of interaction between educational organizations

The cycle of professional tests in the context of the formation of statuses of adequate identity was used to create conditions for the education of students with many assessments of "themselves in the profession". Then, for further comparison of these assessments made on the basis of the results of each of the passed professional tests, to identify the best image of "oneself in the profession", which is the closest to the idea of one's own professional calling.

Professional tests are aimed at: objectification of professional choice (visual practical acquaintance with the cycle of professions); immersion in the environment of practice-oriented educational space and practice-oriented professional activities; development of competence (professional self-determination, professional orientation, professional choice).

Professional grading programs for WorldSkills competencies were offered for students in grades 8–11, which were conducted on the basis of professional educational organizations – WorldSkills competition sites ("Production of solid dosage forms for animals", "Conducting didactic games for preschool children using an interactive whiteboard, "Creation of a business card site", "Modern technologies for installing plumbing pipes", "Work on a welding simulator").

Also, WorldSkills junior competitions are organized as part of the WorldSkills movement. In 2017, competitions were held by competencies - mobile robotics and electrical installation, where students of grades 5-11 took part. In 2018, the competition was held in 4 competencies (entrepreneurship, electrical installation, pre-school education, web design and development), where students in the 14-16 age group participated. Students performed competitive tasks according to WorldSkills standards.

Psychological testing was conducted in two ninth grades of schools in the city of Abakan according to the "Methodology for Studying the Status of Professional Identity" by A. A. Azbel, A. G. Gretsov. The study involved one experimental class of students who had been studying extracurricular activities and additional education programs for five years (MBOU "Secondary School No. 24", 10 "A"), and one control class not included in the integration process of primary and secondary education (MBOU "Secondary school No. 10, 10" A ").

The analysis of the results of the impact of integration on the formation of the status of professional identity in high school students by this methodology showed that:

- in the experimental class, students with the imposed status of professional identity were not identified, in the control class, 8% of students with this status of professional identity were identified;
- in the status of a moratorium (crisis of choice), the number of students in two classes was equal to each other and amounted to 83%;
- students with a formed professional identity in the experimental class revealed 58%, which was 25% more than in the control class.

The results of the interpretation of the diagnostics performed on the reflexive component of professional self-determination of schoolchildren in the experimental classes are presented in Figure 2.

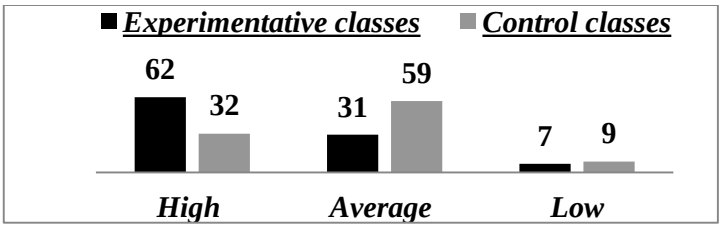

Fig. 2. *Level of formation of adequate statuses of professional identity*

The following indicators are defined: 7% of schoolchildren are not able to give an adequate self-esteem of professionally important qualities, inclinations, individual psychological characteristics and capabilities, are in the status of a diffuse (indefinite) professional identity;

31% of optants are not able, without the help of others, to assess their professionally important qualities, inclinations, individual psychological characteristics and opportunities, are in the status of an imposed (predetermined) professional identity, or in the status of a moratorium, and only 62% are able to

give an adequate self-assessment of professionally important qualities , inclinations, individual psychological characteristics and capabilities, are in the status of achieved professional identity.

In the course of practical training, teachers filled out professional sample cards to analyze satisfaction with the quality of their organization according to WorldSkills competencies and questionnaires in order to determine the degree of interest of a student in this type of activity.

Based on the results of the questionnaire on the quality of professional sample organization, WorldSkills conducted an analysis. The analysis of professional samples showed that 94% of those who passed the test were interested in their professional activities, 95% appreciated the relevance, 70% of students have a desire to attend other professional tests, and 37% plan further professional education in this educational organization.

Discussions and Conclusions

The results obtained made it possible to believe that the practice-oriented interaction of educational organizations of basic general, additional and vocational education has a positive effect on the formation of adequate professional identity statuses, which are of key importance for the further formation of a holistic professional identity, which is one of the main components of ego- human identity.

The results of the analysis of the organization of professional samples according to WorldSkills competencies indicate the effectiveness of practice-oriented forms of support for professional self-determination of students in the selection of promising professions and specialties.

Competitions in the framework of the WorldSkills championship movement provided students with the opportunity to try their hand at a particular profession at the same time as students of secondary vocational education, get information about it directly from representatives of the professional community, understand how the industry works and see career prospects.

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Examination of Body Mass Indexes, Blood Glucose, Hemoglobin A_{1C} and Insulin Resistance Levels of Individuals Applying to Sports Center

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Abstract

The aim of this study was to investigate the relationship between Body Mass Index (BMI), Blood Glucose, Hemoglobin A1C and Insulin resistance levels of individuals who applied to the sports center for regular exercise.

A total of 236 men, 139 males and 97 females, participated in the study. Birey Informed Volunteer Consent Form "was obtained from individuals before participating in the study. SPSS package program was used for the study analysis. "Frequency, Correlation (Spearman's rho)" was used as the analysis. P <0.05 was taken as the value.

There was a positive correlation between BMI values Blood Glucose, Hemoglobin A1C and Insulin resistance levels of the individuals (p <0.05).

As a result of the study, it was found that individuals who are obese and obese in the body mass index also have high blood glucose, hemoglobin A1C and insulin resistance levels due to obesity.

Keywords: Fitness center, BMI, Blood glucose, HbA1C, Insulin resistance

Introduction

Diabetes Mellitus is one of the major health problems in the world (Prentki et al., 2002). Deaths and high problems occur in patients with diabetes over time in the cardiovascular system (Sheu et al., 2000). Glycemic controls to detect and prevent these problems are important (Kurt, 2003). The World Health Organization recommended measuring Hemoglobin A1C (HbA1C, secret sugar) 3-4 times a year in adults, the American Diabetes Association (ADA) at least 2 times a year in patients with constant glycemic control, or 4 times a year in patients whose treatment is not variable or glycemia target (Despres et al. 1996; ADA, 2003). There is a close relationship between HbA1C and blood glucose (fasting sugar) (Marshall & Barth, 2000). HbA1C is an indicator of the level of 2-3 months average glucose (Lowell & Shulman, 2005). The reason for this is that the erythrocytes, which act as a free permeable to glucose, spend about 2-3 months in circulation and glucose concentration (Lundberg, 1999). Insulin is a hormone produced by beta cells in the pancreas, which is necessary for providing energy from carbohydrate, fat and protein molecules and normal metabolism (Larsen, Horder & Mogensen, 1990). On the other hand, insulin resistance produced by the pancreas is called insulin resistance when the fat, muscle and liver cells fail to produce the necessary or sufficient response (Chen et al., 2003). In another definition, Insulin resistance is impaired biological response to exogenous or endogenous insulin. It has been determined that insulin resistance plays an important role in type 2 diabetes and the onset of cardiovascular system diseases (Ahsen et al. 2014; Altunoğlu, 2012). It is reported that insulin resistance plays an important role in cardiovascular diseases that occur in diabetes related problems (Matzoros, 2012; McFarlane et al., 2001). For this reason, determining the presence of insulin resistance is of clinical importance in detecting cases where there is a high risk of type 2 diabetes and cardiovascular disease (Rakugi, Kamide & Ogihara, 2002). Insulin resistance in a number of physiological conditions (puberty, pregnancy, old age, physical inactivity), metabolic diseases (type 2 diabetes, obesity, essential hypertension, atherosclerotic cardiovascular disease, ovarial dysfunction, dyslipidemia) and drug intakes (corticosteroid, some oral contraceptives, diuretics) is a situation seen (Musso et al., 2004; IDF, 2005).

Obesity is one of the main reasons that trigger these ailments. In determining obesity, BMI is a criterion that is easily calculated (weight [kg] / height2 [m]) and accepted as a good indicator of subcutaneous and total body fat in clinical evaluation (Sarria, 2001). According to the World Health Organization (WHO, 2000) classification of Body Mass Index is as follows:

Weak: 0-18.49 (%)
Standard: 18.5-24.49 (%)
Overweight: 25-29.99 (%)
Obese: 30-39.99 (%)
Morbid Obese (fatal): 40 and above (%)

The aim of this study is to examine the relationship between BMI, Blood Glucose, Hemoglobin A1C and Insulin resistance levels of individuals who applied to the sports center for regular exercise.

Material and Method

Participating in the study came from Burdur Olimpia Sports Center. "Informed Volunteer Consent Form" was taken from individuals before participating in the study. The study was conducted with a total of 236 people, including 139 men and 97 women, who applied to the sports center and agreed to participate in the study. Individuals made voluntary blood tests from health institutions voluntarily. Determination of insulin resistance: HOMA-IR (homeostasis model assessment for insulin resistant) was used to show the presence of insulin resistance. HOMA-IR was evaluated according to the formula; HOMA = Insulin x Fasting Blood Sugar (AKŞ) (mg / dl) / 405. HOMA-IR value for insulin resistance was accepted as ≥ 2.5 (Balkau & Charles, 1999).

Analysis of the Data

The evaluation of the data was carried out using SPSS 24.0 statistics program in computer environment. "Kolmogorov – Smirnov Test" was performed for normal distribution of data. In statistical analysis, minimum, maximum, arithmetic mean and standard deviation values were calculated from descriptive statistics. Nonparametric "Spearman Correlation" analysis was performed according to the normality test results of the data. The data were evaluated according to the "0,01" significance level.

Results

Table 1. *Demographic Information of Participants Participating in the Research*

	Gender	N	Minimum	Maximum	Mean±Ss
Age (year)	Male	139	40.00	59.00	44.94±3.62
	Female	97	40.00	59.00	44.86±3.74
Lenght (m/cm)	Male	139	1.50	1.98	1.76±.07
	Female	97	1.49	1.77	1.62±.05
Weight (kg)	Male	139	50.50	143.90	82.77±17.79
	Female	97	45.20	138.00	70.74±16.19

Table 2. *Relationship Between BMI and Glucose Starvation, HbA1c (Secret Sugar) and Insulin of male participants*

Parameters	N	Mean	Std Deviation	r	p
Glucose Starvation (mg/dl)	139	95.67	14.57	,283**	.001
HbA1c (Secret Sugar) (mg/dl)		17.60	12.04	,555**	.000
Insulin (IU/ml)		4.29	3.19	,573**	.000
BMI (kg/m²)		26.40	5.31		

When Table 2 is examined, BMI averages of males participating in the study were determined as 26.40 ± 5.31 (kg / m2), Glucose Starvation averages of 95.67 ± 14.57, HbA1c (Secret Sugar) averages of 17.60 ± 12.04 and Insulin averages of 4.29 ± 3.19. As a result of the analysis performed to determine the relationship

between male participants' BMI and Glucose Starvation, HbA1c (Secret Sugar) and Insulin, a statistically significant positive relationship was found at the level of p <0.01.

Table 3. *The Relationship Between Female Participants' BMI and Glucose Starvation, HbA1c (Secret Sugar) and Insulin*

Parameters	N	Mean	Std Deviation	r	p
Glucose Starvation (mg/dl)	97	92.36	9.86	,409**	.000
HbA1c (Secret Sugar) (mg/dl)		11.77	8.59	,361**	.000
Insulin (IU/ml)		2.74	2.12	,394**	.000
BMI (kg/m²)		26.74	6.17		

When Table 3 is examined, BMI averages of women participating in the study were determined as 26.74 ± 6.17 (kg / m2), Glucose Starvation averages 92.36 ± 9.86, HbA1c (Secret Sugar) averages11.77 ± 8.59 and Insulin averages were 2.74 ± 2.12. As a result of the analysis conducted to determine the relationship between female participants' BMI and Glucose Starvation, HbA1c (Secret Sugar) and Insulin, a statistically significant positive relationship was found at the level of p <0.01.

Discussion

As a result of the study, it has been determined that individuals who are in the body mass index in the position of obese and obese (overweight) also have high levels of Blood Glucose, Hemoglobin A1C and Insulin resistance due to obesity.

The average weight of male individuals applying to the sports center is 26.4% and they are in the fat group in the body mass index classification. Accordingly, it was determined that 139 male individuals in the fat group in the body mass index were found to have a normal level of fasting glucose and fasting insulin (hidden sugar, HbA1c) values, but in a group with a high risk of insulin resistance. According to this result, the fasting sugar and fasting insulin level of a fat male individual may not be impaired, but we can say that the risk of impairment of insulin resistance is high due to obesity. Likewise, the average weight of female individuals applying to the sports center is 26.74% and they are in the fat group in the body mass index classification. Accordingly, 97 female individuals in the body mass index in the fat group were found to have a normal level of fasting glucose and fasting insulin (hidden sugar, HbA1c) at a normal level, but insulin resistance averages were at a risky (high) group. According to this result, the fasting sugar and fasting insulin level of an obese woman may not be impaired due to obesity, but we can say that the insulin resistance is high due to obesity.

Ahsen et al. (2104) found that micro-albuminuria levels, BMI, fat percentages, and CRP levels in patients with insulin resistance were significantly higher than those without insulin resistance in their studies to investigate the relationship between insulin resistance and microalbuminuria in non-diabetic individuals. In their study, Viswanathan et al. (2010) found that as insulin resistance increases in diabetics, kidney damage increases more.

Some studies have identified relationships with microalbuminuria with cardiovascular risk factors that are components of metabolic syndrome such as high blood pressure, obesity, insulin resistance, impaired glucose tolerance, and dyslipidemia (Groop et al., 1993; Hafner et al., 1990). Albumin is a type of protein normally found in the blood. Protein is needed in order to keep the immune system strong, repair and build tissues, build enzymes and hormones, and build muscles. However, protein must be present in the blood, not in the urine. The presence of protein (albumin) in the urine is called "albuminuria" or "proteinuria". If the kidney is healthy, it does not penetrate albumin (protein) into the blood. If it is a damaged kidney, it allows the albumin, the protene, to pass into the kidney. In the study conducted by Mykkanen et al. (1988), it was found that insulin resistance is a precursor of microalbuminuria in individuals

with type 1 diabetes (Orchard et al., 2002) and non-diabetic individuals, and also increased microalbuminuria. Groop et al.), in their study on Type 2 diabetes patients, found that there was a relationship between insulin resistance and microalbuminuria in one part (Vedovato et al., 2004)) and in another part, they could not find a relationship between insulin resistance and microalbuminuria (Nielsen et al., 1995; Jager et al., 1998). In another study, obesity, diabetes, hypertension, hyperlipidemia and atherosclerotic heart diseases were detected and observed in the same patient and it was suggested that these diseases were caused by the same metabolic disorder (Reaven, 1988). In their study, Mayer-Davis et al. (1997) found an inverse relationship between the percentage of fat taken by diet and insulin sensitivity in 1,625 cases, which measured insulin sensitivity with the intravenous glucose tolerance test. In another study, positive effects of exercise on insulin activity have been confirmed Mayer-Davis et al., (1997).

Conclusion

As a result, it can be said that the fasting sugars of individuals who are in a health hazardous position in the body mass index used to determine the ideal weight of the body according to the paint, even if their fasting insulin values do not deteriorate, the insulin resistance will be in a health hazardous position. It is possible that a body that creates insulin resistance will cause problems in the pancreas, the organ that produces the insulin hormone. In addition, taking into consideration the literature, albumin disease may occur in a body that experiences insulin resistance, causing the protein, which increases the likelihood of impaired kidney function, to enter the blood. Considering these results, careful nutrition, regular exercise and healthy lifestyle habits are inevitable for people to avoid such a risk.

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The Effect of Exercise on Quality of Life in Middle-Aged Individuals

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Abstract

The aim of this study was to investigate the effects of exercise on quality of life in middle-aged individuals. The importance is to determine the level of quality of life in individuals who do exercise and not. While the population of the study was composed of middle-agedindividuals who do exercise and do not, the sample was consisted of 62 exercising and 83 non-exercising individuals, living in Keçiören district of Ankara. In this study, the WHO Quality of Life-BREF (WHOQOLBREF) questionnaire, which had validity and reliability studies made in Turkey, was administered. The data of the study were evaluated by using SPSS 23 package program. Frequency and percentage analysis were applied to socio-demographic variables. Quality of life comparisons were made by independent t-test. No significant differences were found in physical health and social relationship domains as a result of comparing the quality of life sub-dimensions of individuals who did exercise and not. Significant differences were found in the psychological and environment domains at $p < 0.05$ level. As a result, it is observed that the quality of life scores of the exercising group is higher. Again, the body weight is lower in those who exercise, and accordingly, BMI values are closer to normal. According to this research, it is possible to say that the exercising group is more satisfied with their quality of life and they are more satisfied with their health.

Keywords: Exercise, Quality of Life, Age

Introduction

Along with ageing, many health problems are being encountered. In order to have a healthy and happy old age, the elderly should take care of themselves. However, the elderly should take some precautionary measures against physical activity, nutrition and some negative habits. As the concepts of senility and ageing cannot be defined with a single definition, ageing is usually defined as chronological, social, physiological and psychological ageing and is divided into sub-groups. The decline in human physiological capacities is an inevitable consequence of biological ageing. With age, most biological functions are damaged over time (Soygüden, 2015).

Nowadays, inactivity is defined as a disease and is shown as the cause of many fatal diseases. Cardiovascular diseases are at the top of this group. With the development of technology, the first reason for physical inactivity is the tools that make our work easier as an indispensable part of daily life. A sedentary lifestyle causes many serious health problems. With obesity and cardiovascular diseases at the top, diseases such as muscular weakness, postural disorder, and diabetes, are considered to be more common in inactive and sedentary patients. At the basis of these diseases, the absence of sports awareness and not having sports as a way of life are the focus points (İnce, 2012).

Physical activity requires a high level of energy (Saygın and Bayrakdar, 2011). Exercises are continuous activities that are planned, structured, voluntary, aiming to develop one or more

elements of physical fitness (cardiovascular fitness, muscle strength and endurance, flexibility

and body composition). So exercises are programmed physical activities aiming weight control or good health (Ardıç 2014).

In general terms, quality of life is defined as "a degree of well-being" (Kılınç et al., 2016). Quality of life is the term that expresses the general level of welfare and access to individuals or societies. Quality of life data is used in a wide range of areas including international improvement, health, politics and employment (İnce 2012).

Keeping the body weight within the normal limits depends on the amount of calories consumed and taken. Today, mechanized social life keeps the energy that needs to be spent by reducing the movement, and this accumulation negatively affects the balance. Especially in developed countries, obesity is considered as a health problem and alternative solutions are trying to be produced. Exercise, sports and healthy nutrition are

the basis of competing for obesity. In societies that have made sports a lifestyle, the interest in various sports and to the sports has increased. The time that individuals give to themselves and their health's value for themselves are at the optimal level (İnce 2012).

It is an inevitable fact that special-purpose exercise programs are used in order to eliminate the negativeness and health problems that occur on the spiritual and physical structure of the people who live a sedentary life. Sport is a factor that assists in maintaining physical fitness. The appropriate quality and quantity of exercise can result in biochemical and physical harmonies in the human organism. Thus, some measure is taken against loss of capacity due to disease and ageing. Most of the medical and exercise scientists accept that doing certain activities for physical fitness and coming through in making sports have a great place among the building blocks of a healthy society in all the countries in the world. In recent years, participation in physical exercises has been increasing. This interest depends on the important effects of exercise onmental and body health. Ince 2012)

Abraham H. Maslow's Needs Hierarchy is one of the most recognizable approaches to motivation. This theory tries to show how a healthy personality evolves over time, grows and expresses itself in its motivated behavior. According to Maslow, a need will continue to affect human behavior until the need is satisfied, and it is possible to group the needs into a hierarchical order from the most basic to the most advanced. According to this hierarchy, it is not possible for the needs of the upper level to direct the behavior of the individual without meeting the needs of the lower level. Satisfied needs have no impact on the individual's behavior.

The two basic assumptions in Maslow's approach are:

Needs give rise, direct and drive behavior.

Needs are in a hierarchical order.

Without the needs at the lower level are satisfied, it is unthinkable that the upper level needs to affect the behavior of people. A satisfied need cannot affect behavior. (Karaca 2007)

In our country, there is no sports complex appealing to the elderly. Middle-aged and older individuals do not give the necessary importance to sports. Elderly individuals should come into the sporting habit because of the decreasing in the mobility of the organism with ageing. Elderly people should make basic philosophies that exercise is the best medicine in order to solve increasing health problems. Their goal of participation in sports should be to make the sport a way of life. The main goal of women who go to sports should be health and mobility while the main goal of women to go to sports is to lose weight. It is a great shortcoming for our country that sports is not a habit of life. There is a significant relationship between the rate of cardiovascular activities and fitness with mortality. Individuals with this consciousness are directed to the sports halls. Going to the gym is an important exercise program for people of all ages and especially women. (Ince 2012)

The aim of this study is to investigate the effects of exercise on quality of life in middle-aged and older patients. The importance is to determine the level of quality of life in individuals who do exercise and not.

Method

The data in this study were collected by survey method. While the population of the study was composed of middle-aged individuals who do exercise and do not, the sample was consisted of 62 exercising and 83 non-exercising individuals, living in Keçiören district of Ankara. Data were collected in May 2018. In this study, the WHO Quality of Life-BREF (WHOQOLBREF) questionnaire, which had validity and reliability studies made in Turkey, was administered. "Cronbach-alpha" values calculated for the internal consistency of the WHOQOL-BREF Scale were; 0.80 in the physical health domain, 0.69 in the psychological domain, 0.59 in the social relationship domain and 0.65 in the environment domain. The Pearson coefficients calculated for each question to calculate test-retest reliability vary between 0.57 and 0.81. The WHOQOL-BREF covers a total of 26 questions, including two questions where one queries the overall perceived quality of life and the other queried health status. The WHOQOL-BREF-TR consists of 27 questions with the addition of a national question during validity studies in Turkish. The questions were asked to be answered by considering the last 15 days. The physical, psychological, social relationship, environment and national

environment domain scores were calculated by using questions other than the first two general questions. The content of the questions by domain is as follows:

Physical health domain: To be able to carry out daily work, addiction to drugs and treatment, vitality and exhaustion, acty, pain and discomfort, sleep and rest, and working power,

Psychological domain: Body image and appearance, negative emotions, self-esteem, positive emotions, spirituality, religion, personal beliefs, thinking, learning, memory and gathering attention, *Social relationship domain:* Relations with other people, social support, sexual life,

Environment domain: Physical resources, physical safety and security, health services and social assistance, accessibility and quality, home environment, opportunity to acquire new knowledge and skills, participation in recreation and leisure opportunities, physical environment (pollution, noise, traffic, climate), transportation.

The data of the study were evaluated by using SPSS 23 package program. Frequency and percentage analysis were applied to socio-demographic variables. Quality of life comparisons was made by independent t-test.

Findings

Table 1. *Exercise status of the participants*

	Frequency	%
Exercising	62	42.8
Non-exercising	83	57.2
Total	145	100.0

It was determined that 42.8% of the participants exercised and 57.2% did not exercise.

Table 2. *Comparison of age, height, body weight and body mass index values of the participants*

	Exercise status	N	Arithmetic Mean	Standard Deviation	t	p
Age (years)	Exercising	62	57.53	5.83	0.68	>0.05
	Non-exercising	83	56.79	6.78		
Height (cm)	Exercising	62	1.62	.06	-1.02	>0.05
	Non-exercising	83	1.63	.07		
Body Weight (kg)	Exercising	62	71.97	11.55	0.94	>0.05
	Non-exercising	83	73.62	8.72		
BMI (weight/height²)	Exercising	62	26.68	3.28	2.13	<0.05
	Non-exercising	83	27.78	2.77		

The mean and standard deviation values of the exercise group according to Table 2 were determined as 57.53 ± 5.83 for age, 1.62 ± 0.06 for body weight, 71.97 ± 11.55 for body weight, and 26.68. ± 3.28 for BMI. The mean of the non-exercising group was determined as 56,79 ± 6,78 for age, 1,63 ± 0,07 for height, 73,62 ± 8,72 for body weight and 27,78 ± 2,77 for BMI. There was no significant difference in age, height and body weight variables according to the t-test, however, a significant difference was found in p <0.05 level.

Table 3. *Comparison of sub-dimensions of WHOQOL-BREF Scale according to exercise status*

	Exercise status	N	Arithmetic Mean	Standard Deviation	t	p
How do you find your quality of life?	Exercising	62	3.64	.85	2.84	<0.05
	Non-exercising	83	3.22	.88		
How glad are you with your health?	Exercising	62	3.16	.72	2.07	<0.05
	Non-exercising	83	2.85	.97		

How much are the challenges of pressure and control in your relationships with people close to you in your life?	Exercising	62	2.67	.69	-2.14	<0.05
	Non-exercising	83	2.93	.75		
Physical Health Domain	Exercising	62	12.11	1.32	1.24	>0.05
	Non-exercising	83	11.80	1.59		
Psychological Domain	Exercising	62	13.26	2.07	2.17	<0.05
	Non-exercising	83	12.51	2.05		
Social Relationship Domain	Exercising	62	12.55	3.29	1.71	>0.05
	Non-exercising	83	11.55	3.65		
Environment Field	Exercising	62	13.00	3.32	2.95	<0.05
	Non-exercising	83	11.41	2.99		

When the arithmetic mean and standard deviation values of the exercising group were examined according to Table 3, these values were; 3.64 ± 0.85 for the question of how you find your quality of life and 3.16 ± 0.72 for the question of how glad are you with your health, 2,67±0,69 for the question of how much are the challenges of pressure and control in your relationships with people close to you in your life, 12,11 ± 1,32 for the physical health domain, 13,26 ± 2,07 for the psychological domain, 12,55 ± 3,29 for the social relationship domain and 13,00 ± 3,32 for the environment domain. When the exercising group were examined, these values were; 3,22±00,88 for the question of how you find your quality of life and 2,85±0,97 for the question of how glad are you with your health, 2,93±0,75 for the question of how much are the challenges of pressure and control in your relationships with people close to you in your life, 11,80±1,59 for the physical health domain, 12,51±2,05 for the psychological domain, 11,55±3,65 for the social relationship domain and 11,41±2,99 for the environment domain. Significant differences were detected at the level of p <0.05 in the question of how you find your quality of life, the question of how glad are you with your health, the question of how much are the challenges of pressure and control in your relationships with people close to you in your life, physical health domain, psychological domain, social relationship domain and environment domain. Although there were differences in physical health and social relationship domains, no statistically significant difference was found.

Discussion and Conclusion

Within the concept of quality of life, there are three basic dimensions closely related to each other. These are the physical, psychological and social dimensions. The physical dimension is related to the person's perception of how much he/she can fulfil the daily work and occupations by spending energy. The social dimension involves the degree to which a person can relate to and interact with individuals in family members, neighbors, colleagues and other communities. Psychological dimension includes emotional and mental conditions such as depression, anxiety, fear, anger, and happiness (Mandzuk and McMillan, 2005).

According to our study, the mean was found in the exercising group to be 12,11 ± 1,32 for physical health domain, 13,26 ± 2,07 for the psychological domain, 12,55 ± 3,29 for social relationship domain and 13,00 ± 3,32 for the environmental domain. The mean was found in the exercising group to be 11,80±1,59 for physical health domain, 12,51±2,05 for the psychological domain, 11,55±3,65 for social relationship domain and 11,41±2,99 for the environmental domain. No significant differences were found in physical health and social relationship domains as a result of comparing the quality of life sub-dimensions of individuals who did exercise and not. Significant differences were found in p<0.05 level in psychological and environmental domains.

The level of exercise is also shown as a changeable behavioral risk factor related to the quality of life and health. Recently, the relationship between quality of life and exercise has been the subject of curiosity

and many researches have been made in this area (Vural et al., 2010; Genç et al., 2011; Gabrielle et al., 2012; Heesch et al., 2015; Husson et al. , 2015).

Among the factors that negatively affect the quality of life, the returns of a stable lifestyle have an important place (Zorba and Saygın, 2013). Inactivelifestyle brings along many health problems. In a study conducted in EU member 27 countries with Turkey and Croatia on a total of 29193 people, it has been reported that leisure-time physical activity is an indication of health and that its use can be supported for monitoring purposes (Genç et al., 2011). One of the determinants of quality of life is health, physical and mental well being. The person will feel better in his free time by performing various activities physically and spiritually. In the studies, it has been stated that the physiological changes caused by ageing in individuals, who are participating in regular physical activities and are active in life, are delayed or seen with less severity (Inal 2003). In our study, the quality of life was found to be low in elderly people with low activity. In his study, Tajvar (2008) stated that factors such as physical structure, age, gender, educational status, economic situation, physical health and mental condition being bad negatively affected the quality of life (Eser 2005). Başkan et al. have obtained similar results to our study, in their 2017 study (Başkan, 2017) The results of this study are parallel with the results of our study.

As a result, it is observed that the quality of life scores of the exercising group is higher. Again, the body weight is lower in those who exercise, and accordingly, BMI values are closer to normal. According to this research, it can be said that the exercise group is more satisfied with their life quality and health.

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Social Appearance Anxiety and Physical Self-Determination of Women

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Abstract

Although there are some differences according to societies, women have existed as an object under the oppression of beauty and aesthetic elements, unlike their ideas, selves or personalities (Saad, 2012). In particular, maintaining the standards of physical charm has become an increasingly important issue. Data were collected by personal information form prepared by the researchers, Physical Self-Description Questionnaire- PSDQ and Social Apprearance Anxiety Scale (SAAS). As a result of the analyzes, there was a positive and low level relationship between SAAS and PSDQ's Appearance subscale. In the second problem of the study, an analysis was made regarding the prediction of PSDQ sub-dimensions with SAAS, and it was concluded that the appearance sub-dimension of PSDQ was a predictor of SAAS. As a result of the analysis conducted to examine the differences in physical self-description according to the status of participating physical activity, it was determined that the scores of those who participating physical activity were higher in the sub-dimensions of coordination, physical activity, body fat, general physical ability and self-confidence, than who did not. In the last sub-problem of the study, it was observed that there was no statistically significant difference in social appearance anxiety and physical self-perception of women according to the duration of physical activity. As a result, it was concluded that SAA and PSDQ appearance subscale were positively related in low-level, the same PSDQ's appearance sub-scale was the predictor of SAAS, and participation in physical activity was a factor causing PSDQ changes.

Keywords: Physical activity, social physical anxiety, physical self-determination, women

Introduction

Although the appraisal and meanings attributed to physical appearance vary according to times and cultural structures of civilizations, the concept of the perfect body shape or appearance has continued to be defined within the process (Solomon et al., 2001; Cusumano and Thompson, 1997; Trans.; Baştuğ et al., 2009). Today, complying with physical attractiveness standards has become an increasingly important subject. That is because making an efficient impression on other individuals or gaining acceptance has been associated with an attractive physical appearance, especially by women (Trekels and Eggermont, 2017). Accordingly, women care about being thin while men attach importance to having a muscular body structure as cultures produced gender-oriented standards based on physical attractiveness, body weight and body shape (Solomon et al., 2001). In this context, when the case is evaluated in terms of different genders, it is thought that women pay more attention to their physical appearance due to social factors. That is because the role of women has long existed or been forced to exist as an object under the pressure of beauty and aesthetics, and their ideas, thoughts, personality and individuality were largely overshadowed by their physical appearance (Saad, 2012; Trans. Uğurlu, 2015). This situation has led to the emergence of anxiety. Anxiety refers to the emotions experienced by the individual in undesirable or unpleasant situations (Spielberger, 1966:9). An individual who thinks they would be unable to make a good impression on other people due to their appearance is likely to be experiencing social appearance anxiety. That is because it was reported that individuals who think themselves unable to meet the expectations of others regarding appearance start experiencing anxiety. (Trekels and Eggermont, 2017) Social appearance anxiety is defined as a concept that encapsulates detailed body image characteristics such as facial features and complexion in addition to general physical properties such as muscle structure, height and weight (Hart et al., 2008). Anxiety in social surroundings emerges as a factor that determines interpersonal relations (Gordon, Heimberg, Montesi and Fauber, 2012) and occurs inevitably in daily life (Leary and Kowalski, 1997). According to the American Psychiatric Association, the fear of negative evaluation by others may also lead to physiological symptoms such as inflammation, shivering, sweating and tongue slips. It is also stated that diseases related to eating disorders such as bulimia nervosa, anorexia nervosa and body dysmorphic disorder are associated with

social anxiety to a large extent (American Psychiatric Association, 2000). Therefore, social appearance anxiety, which is one of the risk factors of social anxiety (Levinson et al., 2013) emerges as an important concept that needs to be examined. It is observed that previous studies in the literature examined social appearance anxiety in conjunction with not only social anxiety but also with variables such as self-respect (Ertuğrul et al., 2014), motivation (Argon, 2014), body gratification (Levinson and Rodebaugh, 2014) and mostly with eating disorders (Koskina et al., 2011; Levinson et al., 2013). In the present study, it was examined in conjunction with physical self-perception, which has an important place in multi-factor self-perception.

The physical self-perception, which has been discussed in detail since the 1990s, is a concept of how the individual perceives and evaluates himself as a psycho-motor (Fox, 1990; Trans: Aşçı, 2004). It is evaluated as a third dimension in addition to the social and emotional dimensions in the scope of the non-academic sub-fields within the hierarchical structure of the phenomenon of self. In addition, physical self-perception is divided into two as perceived physical competence and perceived physical appearance (Shavelson et al., 1976). While perceived physical competence is defined as a central determinant of behavior explained by socio-cognitive theories (Babic et al., 2014), the self-perception of one's appearance is stated as the most important factor that influences their whole self-respect (Harter, 2008). Sonstroem and Potts (1996) discussed physical self-perception from a slightly different perspective by stating that it encompassed specific personal features such as athletic competence and strength. On the other hand, Sonstroem and Potts also consider physical self-perception as a field of the phenomenon of self, which also influences the order of life (Sonstroem and Potts, 1996). When related studies in the literature were examined, it was observed that the subject was studied with physical activity on adults, students and children in addition to developing measuring tools and that the studies were conducted by making comparisons in accordance with gender and various branches of sports (Fox and Corbin, 1989; Page et al., 1993, Aşçı et al., 1999; Crocker et al., 2000; Hu et al, 2001; Aşçı, 2004; Makar, 2016; Kolayiş et al., 2016). Participation in physical activity is an important factor that leads to increased self-perception as a result of supporting the increase in physical fitness and ability (Sonstroem, Akt; Pehlivan, 2010). Additionally, physical self-perception was associated with self-confidence in participation in physical activity (Babic et al., 2014). For this reason, in the present study, both social appearance anxiety and physical self-perception variables were examined along with the subjects' participation in physical activity. Based on the aforementioned variables, the aim of this study is to examine the correlation between physical self-perception and social appearance anxiety and determine whether physical self-perception is a significant predictor of social appearance anxiety. Additionally, it was aimed to examine the differences in both independent variables in accordance with the state and duration of physical activity.

Material and Method

Study Design and Sample

Quantitative research techniques were used in the present study. The study is in a correlational structure where the predictive effect is examined, and it also includes comparative descriptive techniques. The research population, Turkey Statistical Institute(TUIK), according to data for 2018 constitutes 148 778 women living in Denizli Merkezefendi (TUIK, 2016). The sample size of the study was determined as 338 individuals based on "Acceptable Sample Sizes for Given Populations" (Sekaran 1992). The sample of the study was determined using the convenience sampling method (Büyüköztürk, 2012). The female participants who engaged in physical activity were selected from the fitness centers in Central Denizli while the female participants who did not engage in physical activity were selected from the malls, public square and bazaar located in the crowded city center.

Data Collection Tools

Personal Information Form: This form includes questions for the female participants that make up the study sample. The questions are related to age, whether the participants engage in physical activity and how long they have been engaging in physical activity.

Physical Self-Perception (Physical Self-Description Questionnaire): Physical Self-Description Questionnaire –PSDQ was developed by Marsh et al. (1994) as a six-point Likert and translated into Turkish by Aşçı (2000). PSDQ consists of 70 items and 11 sub-scales (health, coordination, physical activity, body fat, sports competence, global physical self-concept, appearance, strength, global esteem, flexibility and endurance/fitness). PSDQ is a 6-point (completely agree - completely disagree) true-false scale. There are 6-8 items in each sub-scale. The Cronbach Alpha internal consistency coefficient of the PSDQ sub-scales that were translated into Turkish range between 87 and 98.

Social Appearance Anxiety Scale (SAAS): SAAS was developed by Hart et al. (2008). The scale was translated into Turkish by Tayfun Doğan in 2010. It is a 5-point Likert scale that consists of 16 items. The scale consists of 5 points that are stated as "Strongly Disagree (1)", "Disagree (2)", "Undecided (3)", "Agree (4)" and "Strongly Agree (5)". The scale is used to measure social appearance anxiety. SAAS scores are calculated as follows: social appearance anxiety increases as the SAAS score increases. High scores from the scale indicate that appearance anxiety is high. The first item of the scale is reverse coded. Tayfun Doğan, who translated the scale into Turkish, performed exploratory and confirmatory factor analyses to reveal the factor structure of SAAS. Based on the factor analysis results, it was observed that the scale had a one-dimensional structure as in its original form. For the scale, the Cronbach Alpha internal consistency coefficient was calculated as 93, the test-retest reliability coefficient was calculated as .85 and the reliability coefficient determined with the split halves method was calculated as .88. It was determined that the total item correlation coefficient of the Turkish scale ranged between .32 and .82. It was determined that there was a .60 correlation between SAAS and Fear of Negative Evaluation Scale (FNE). The internal consistency coefficients of the scale were calculated as .94, .95 and .94 for the three samples, respectively. The test-retest reliability coefficient, which was obtained as a result of two applications performed one month apart, was calculated as .84. The reliability of the scale was calculated using the internal consistency (Cronbach Alpha), test-retest and split halves methods.

Data Analysis

The data were evaluated using the frequency, arithmetic average, Pearson correlation, multiple linear regression (backward), MANOVA and t-test analysis techniques. It was decided whether the data met the preconditions of the parametric tests by examining skewness and kurtosis (normal distribution of data) values, Mahalonobis distance and Levene (homogeneity of variances) test results. It was decided whether the relationship between the variables in the correlation and regression analyses demonstrated a linear relationship by examining the scatter plot. In the MANOVA analysis, Box's Test was used to test the hypothesis that the covariance matrices of the dependent variables are equal across groups. Pillai's Trace test can also be used in cases where covariance matrices are not equal and in cases where covariance matrices were equal, Wilks 'Lambda test was used to test the difference in the mean of dependent variables according to groups in independent variables. Type I error was determined as .05.

Findings

Table 1. *Correlation analysis for the relationship between social appearance anxiety and physical self-perception sub-dimensions and total score*

	Health	Coordination	Physical Activity	Body Mass	Ability	General Phy. Ability	Appearance	Strength	Flexibility	Endurance	Self-Efficiacy	PSDQ
SAAS	.013	.012	.025	.016	.033	.057	.139*	.091	.044	-.028	.037	.053

*p<.05 (2-tailed)

According to Table 1, there is a positive and significant weak relationship between social appearance anxiety and physical self-perception sub-dimensions. Accordingly, as the physical self-perception increases in terms of appearance, anxiety of social appearance also increases. Other sub-dimensions of physical self-perception were not associated with social appearance anxiety.

Table 2. *Results of multiple linear regression analysis of predicting social appearance anxiety according to physical self-perception sub-dimensions*

Variable	B	Standart Hata $_B$	β	t	p
Stabile	2.433	.306		7.952	.000
Appearance	.168	.067	.139	2.484	.014
R=.139; R^2=.019; Corrected R^2=.016 $F_{(1, 309)}$=6.171; p=.014					

When the results of the regression analysis (backward) were examined, it was seen that only the "appearance" sub-dimension was a significant predictor of social appearance anxiety (R = .139; R2 = .019; F (1, 309) = 6.171; p = .014). This variable explains about 2% of the total variance in social appearance anxiety.

Table 3*. The results of MANOVA analysis to examine the differences in physical self-determination according to physical activity*

Source of Varience	**Depended Variable**	**KT**	**sd**	**KO**	**F**	**p**	**Ηp²**
Gender	Health	.905	1	.905	1.221	.270	.004
	Coordination	52.755	1	52.755	78.380	.000	.200
	Physical Activity	92.772	1	92.772	121.105	.000	.279
	Body Mass	6.199	1	6.199	5.037	.026	.016
	Ability	136.089	1	136.089	126.501	.000	.288
	General Phy. Ability	9.536	1	9.536	8.586	.004	.027
	Appearance	.136	1	.136	.175	.676	.001
	Strength	40.379	1	40.379	51.717	.000	.142
	Flexibility	31.814	1	31.814	35.579	.000	.102
	Endurance	88.079	1	88.079	80.539	.000	.205
	Self-Efficiacy	6.134	1	6.134	11.452	.001	.035
	PSDQ	26.449	1	26.449	73.778	.000	.191
Error	Health	232.053	313				
	Coordination	210.670	313				
	Physical Activity	239.771	313				
	Body Mass	385.189	313				
	Ability	336.724	313				
	General Phy. Ability	347.626	313				
	Appearance	242.851	313				
	Strength	244.382	313				
	Flexibility	279.884	313				
	Endurance	342.304	313				
	Self-Efficiacy	167.655	313				
	PSDQ	112.208	313				
Total	Health	5205.188	315				
	Coordination	4641.389	315				
	Physical Activity	3963.750	315				
	Body Mass	5243.833	315				

Ability	4385.417	315
General Phy. Ability	5950.222	315
Appearance	6475.583	315
Strength	5251.694	315
Flexibility	4510.111	315
Endurance	3597.583	315
Self-Efficiacy	6003.516	315
PSDQ	4831.148	315

According to results of the analyses below statistically significant differences were found in coordination ($\overline{X}_{PAParticipate.}$=4.20; $\overline{X}_{PANon-participate.}$=3.37), physical activity ($\overline{X}_{Participate}$=4.03; $\overline{X}_{PANon-participate}$=2.93), body mass ($\overline{X}_{Participate}$=4.08; $\overline{X}_{PANon-participate}$=3.80), ability ($\overline{X}_{Participate}$=4.29; $\overline{X}_{PANon-participate}$=2.96), general physical ability ($\overline{X}_{Participate}$=4.41; $\overline{X}_{PANon-participate}$=4.06), strength ($\overline{X}_{Participate}$=4.38; $\overline{X}_{PANon-participate}$=3.66), endurance ($\overline{X}_{FAYapan}$=3.87; $\overline{X}_{PANon-participate}$=2.71), sel-efficiacy ($\overline{X}_{Participate}$=4.46; $\overline{X}_{PANon-participate}$=4.18) which are sub-scales of the PSDQ. There was no statistically significant difference in health and appearance sub-dimensions. (Pillai's Trace=.373; F=14.947; p=.000).

Table 4. *The results of t-test to determine differences in social appearance anxiety according to physical activity*

Depended Variable	Grup	n	$\overline{X}$	sd	df	t	p
Sacial App. Anx.	PA Participants	133	3.10	1.01	313	1.067	.287
	PA Non-Partic.	182	3.23	1.09			

No significant difference was found in social appearance anxiety according to physical activity participation.

Table 5. *The results of the MANOVA analysis were conducted to investigate the differences in social appearance anxiety and physical perception due to physical appearance.*

Source of Variance	Depended Variable	KT	df	KO	F	p	ηp^2
PA Duration	SAAS	.266	1	.266	.258	.612	.002
	PSDQ	.000	1	.000	.001	.980	.000
Error	SAAS	135.096	131				
	PSDQ	54.949	131				
Total	SAAS	1416.740	133				
	PSDQ	2399.510	133				

According to the results of the analysis, it was observed that there was no statistically significant difference in the social appearance anxiety and physical self-perception of the women according to the duration of physical activity (Wilks' Lambda=.998; F=.129; p=.879). According to the results, the social appearance anxiety and physical self-perception of women who participated to the physical activity for 6 months or more were similar to those who participated it for less than 6 months.

Discussion

In the first hypothesis of the study, the correlation between PSP and SAA was examined, and a low-level significant positive correlation was found between SAA and the appearance sub-dimension of PSP. The

fact that both measuring tools had a significant correlation in relation to appearance has led to the conclusion that women who perceived themselves attractive had low anxiety related to this matter. When the literature was examined, no previous studies were found examining the correlation between the two variables. In the study by Kılıç and Karakuş (2016), the relationship between the social appearance anxiety, self-perception and loneliness levels of university students was examined and it was determined that there was a significant negative correlation between social appearance anxiety and self-respect, and a significant positive correlation between social appearance and loneliness. Özcan et al. (2013) examined the relationship between self-respect, social appearance anxiety, depression and anxiety in women in adolescence and young adulthood, and determined that there was a strong positive relationship between all variables. Köksal et al. (2006) revealed that participation in an eight-week step aerobics-aerobic dancing program had a positive effect on health, coordination, physical activity, body fat, sports competence, global physical self-concept, appearance, strength, global esteem, flexibility and endurance/fitness, which are the sub-dimensions of physical self-perception. Alemdağ and Öncü (2015) revealed that there was a significant correlation between the PA participation status and social appearance anxiety of students. It was observed that the correlation between the PA participation status and social appearance anxiety of students is negative and statistically significant. In this case, it was revealed that the students engaging in PA had low appearance anxiety. In the study conducted by Soylu et al. (2017) on teenagers, it was determined that there was a significant difference between the social appearance anxiety levels of individuals who engaged in sports and those who do not. It was observed that the teenagers who engaged in sports had higher levels of social appearance anxiety compared to the teenagers who did not engage in sports. Vatansever (2017) found a statistically significant difference between the social appearance anxiety levels of teenagers aged between 14-18 based on their PA participation status. It was observed that the teenagers who engaged in sports had lower levels of social appearance anxiety compared to the teenagers who did not engage in sports. All three of the aforementioned studies are consistent with the present study.

In the second sub-problem of the study, an analysis was performed in relation to the prediction of SAA in accordance with the sub-dimensions of PSP, and it was concluded that the appearance sub-dimension of PSP was a predictor of SAA. This result is considered to be important in terms of the synchronization of similar questions in the two scales.

As a result of the analysis conducted to examine the differences in physical self-perception based on physical activity participation status, it was determined that the participants who engaged in physical activity had higher scores in the coordination, physical activity, body fat, global physical self-concept and global esteem sub-dimensions and general physical self-perception compared to the individuals who did not engage in physical activity. In the study conducted by Aşçı, Kin İşler and Koşar (1998) on 45 female university students, it was determined that the eight-week step aerobics and aerobic dance program positively affected physical self-perception scores while Daley and Buchanan (1999) found that the five-week physical education lesson in addition to aerobic dance positively affected physical self-perception scores. McDonald and Hodgdon (1991) performed a meta-analysis study that included 37 studies on the effects of aerobic fitness training programs on physical self-perception and concluded that there was a positive change in physical self-perception post-exercise, that this applied to all individuals of all ages and that the situation occurred independently from the scales used. Aşçı (2004) examined physical self-perception in accordance with the level of physical activity and concluded that physical self-perception differed in the endurance/fitness, coordination, strength, flexibility, sports competence and physical activity sub-dimensions in accordance with the level of physical activity. Aşçı et al. (1998) examined the effects of a ten-week step aerobics and aerobic dance course on physical self-perception with 40 female university students. In the aforementioned study, positive effects were detected in the physical activity, sports competence, flexibility and coordination sub-dimensions of physical self-perception. The results of the sub-dimensions other than physical activity are in parallel with those obtained in present study.

In another study problem where the differences in social appearance anxiety according to participation in physical activity were aimed to be determined, no significant difference was observed between the SAA levels of individuals who participated in physical activity and those who did not. In other

words, it can be said that regular participation in physical activity is not a factor that would create a significant difference between these two variables.

In the last sub-problem of the study, it was observed that there was no statistically significant difference between the physical self-perception and social appearance anxiety levels of the women in accordance with their physical activity time. In contrast to the study conducted, Telli and Ünal (2016) concluded in the study they conducted with university students that the time spent in the same environment significantly affected SAA.

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