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Psychophysiological Factors Of Special Working Capacity In Contact Command Game Kinds Of Sports (Rugby On An Example).

Zhanneta Kozina[1]*, V'acheslav Kalinichenko[1], Marian Cretu[2], Yurii Boichuk[3], Irina Prokopenko[4], Rustam Ahmetov[5], Nataliia Tararak[6], Tamara Kutek[5], Andrey Osiptsov[7], Viktor Kostiukevych[8], Anatolii Guba[9], Mikola Trubchaninov[9], Anton Polianskyi[10], Viktoriya Rostovska[11], Andrii Drachuk[8], and Ivan Stasiuk[12]

[1]Department of Olympic and professional sport and sport games, H.S. Skovoroda Kharkiv National Pedagogical University, Ukraine
[2]Faculty of Science, Physical Education and Informatics, University of Pitesti, Romania
[3]Department of Human Health and correctional education, H.S. Skovoroda Kharkiv National Pedagogical University, Ukraine
[4]Department of Economical Theory,H.S. Skovoroda Kharkiv National Pedagogical University, Ukraine
[5]Department of Theoretical and Methodology of Physical Vichovany Zhytomyr State University of Science and Technology Ivana Franka, Ukraine
[6]Departament of aesthetic education, H.S. Skovoroda Kharkiv National Pedagogical University, Ukraine
[7]Department of Physical Education and Health, Mariupol State University, Ukraine
[8]Mykhailo Kotsyubynskyi Vinnitsa State Pedagogical University, Ukraine
[9]H.S. Skovoroda Kharkiv National Pedagogical University, Ukraine
[10]Department of Criminal Law Disciplines, H.S. Skovoroda Kharkiv National Pedagogical University, Ukraine
[11]Department of Scientific Foundation of Management and Psychology, H.S.Skovoroda Kharkiv Nayional Pedagogical University
[12]Kamianets-Podilskyi National Ivan Ohiienko University, Ukraine

ABSTRACT

The purpose of the work consisted in determining the factor structure of psychophysiological properties and physical preparedness of young rugby players 16-17 years and determining the influence of psycho-physiological properties on the special ability of players. Rugby players of the junior team of the sports club KhTZ (16-17 years old) took part in the study (n=20). The experiment was conducted in September 2017 in the preparatory period at the stage of specialized basic training.To determine the psychophysiological state of athletes in the first and last week of the experiment, psychophysiological indices were recorded using the computer program "Psychodiagnostics". There are 4 factors in the structure of athletes' preparedness - representatives of team contact game sports (on the example of rugby): "The ability to quickly become involved in work", "Special performance", "Mental stability," The ability to adapt". The models of multiple linear regression between results in running at 400 m for athletes - representatives of contact command game sports are drawn up. The most influential indicators for the special (anaerobic-glycolytic) performance of athletes were determined based on the results in running at 400 m: running at 3 km, running at 30 m, time of a simple visual-motor reaction, working time on the second table in the Schulte test. It is shown that the special working capacity of athletes in team game contact sports is determined not only by physical fitness data, but also by psychophysiological functions.

Keywords: rugby, psychophysiological indicators, physical preparedness, working capacity, sports games.

Corresponding author

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INTRODUCTION

Team contact sports games presents high requirements for endurance, strength, speed, mental endurance, etc. [4; 8; 14; 15]. The manifestation of these physical qualities requires a high level of psychophysiological state of the players [17; 18; 30; 31].

A number of studies found that most team contact sports games is a variable work with different periods of load and rest [27; 28]. For example, in basketball, football, rugby on the duration of the game the athlete runs to 5-7 km and loses in weight to 3 kg [34; 35; 36], then at different interval indicators of functional shifts of players are different. For example, it has been established [27] that contact sports games are a variable work of aerobic-anaerobic orientation. Contact team sports games are from the point of view of physiological characteristics of the continuous alternation of "active" and "passive" phases. During "active" phases, the athlete performs short spurts (for example, when he or she goes out to get a ball, fight for a ball, active protective actions, etc.), while during "passive" - a relative rest is taking place: an athlete does not take part in active tactical actions (for example, not engaged in a rapid break in, waiting for the moment of entering a separate zone, resting for a few seconds after throws or transfers, as well as during free throws and minute breaks). On average, the duration of one another behind the active and passive phases of the game is approaching 30 s [13,78,107,126], which is the work of the variable intensity.

The study of the variable of work was carried out by many authors. Thus, Astrand P. [1] showed that a variable work with load and rest periods of 5-10 sec is more difficult for an organism than continuous work of equal total capacity and less productive. However, shift work with thirty second periods of activity and rest is more load-carrying for the body than work with a uniform load and work with 5-10 second periods [1]. The load in team contact game sports is a variable work with 30 second periods, so you can conclude that the game puts higher requirements to the body than, for example, uniform run of average intensity [9; 10: 11; 31]. However, many athletes, depending on the role of the game, have lower relative indices of the lung capacity, the maximum use of oxygen, systolic volume, and others. [24; 25], despite the fact that by absolute indicators of respiratory and circulatory systems, they surpass the representatives of other sports. The authors [25], who investigated this problem, link such a backlog of representatives of individual gaming roles in basketball, rugby in the relative values of functional development with higher weight-bearing rates, which naturally leads to a decrease in relative indicators of physical development.

Rugby, like other game sports, is a job that exhibits rather high requirements for the level of functional training, such as the loading of the variable intensity [2; 7; 37; 38]. This is a factor in the increased influence on the cardiovascular system [32]. If to compare the contact team playing sports with loads in cycling sports, then the most suitable comparison is running at medium distances, and in particular, running at 400 m [5; 6; 41; 42; 43]. Team playing sports with the necessity of glycolytic development are similar to running on average distance in athletics. Famous coaches and sports teams use running at 400 m to develop a special endurance in contact team game types of spted. Scientific research shows that contact team game types, such as running on medium distances, are anaerobic-glycolytic [5; 6; 22; 42; 43]. In the first minutes of the game, all players, regardless of the role, oxygen consumption is 50-70% of the maximum, heart rate rises to the maximum values (180-190 beats / min, and even more than 200 beats / min.) [27] .

Another feature of the team playing sports is the need for manifestation of psycho-physiological properties: the speed of reaction to visual and auditory stimuli, the efficiency of thinking, the ability to switch attention and others [2; 3; 21; 24]. This is due to the fact that for contact team sports games characterized by a constant change of situations. This needs an instant reaction to her body. According to the leading sports game specialists [27; 44; 45], for a competent construction of a training process, a wide range of indicators of preparedness, modern methods of analysis of the obtained data [16; 26; 31; 40]. On the basis of synthesis of a wide range of indicators of preparedness, in particle, psychophysiological indicators, it becomes quite realistic to create training techniques [12; 13; 31; 33]. Psychophysiological indices are hereditary [19; 20; 23; 29; 33]. Detection of the fact whether psychophysiological indicators are associated with the development of special ability of players, is of great relevance for understanding the patterns of development of the level of preparedness of athletes and the construction of training programs.

The work posed the question: are psychophysiological properties associated with the special ability of athletes in team contact gaming sports? What psycho-physiological indicators are the most crawl with the

special endurance of players?

The purpose of the work was to determine the factor structure of psychophysiological properties and the physical preparedness of young rugby players 16-17 years and determine the impact of psychophysiological properties on the special ability of players.

MATERIAL AND METHODS

Participants.

Rugby players of the junior team of the sports club KhTZ (16-17 years old) took part in the study (n=20).Средний возрастспортсменов составил 16,3 года, средний рост 181±3,12 см и средний вес – 78±6,8 кг.

The study was carried out in accordance with the principles of the Helsinki Declaration and approved by the Ethics Committee of the University.

Organization of the study.

The experiment was conducted inSeptember 2017 in the preparatory period at the stage of specialized basic training.

To determine the psychophysiological state of athletes in the first and last week of the experiment, psychophysiological indices were recorded using the computer program "Psycho diagnostics"(Application, video “Psyhodiagnost’). The following parameters were fixed [26; 28; 30; 33]:

- Complex indicators on the speed of a simple visual-motor reaction (mean of 30 attempts (ms), the standard deviation (ms), the number of errors); duration of exposure (signal) - 900 ms;
- Complex indicators of a complex visual-motor reaction of selecting 1 element from three and selecting two elements from three (mean value of 30 attempts (ms), standard deviation (ms), number of errors); duration of exposure (signal) - 900 ms;
- Complex indicators of a complex visual-motor reaction to the selection of two elements of three in the feedback mode, i.e. As the response time changes, the signal delivery time changes; "Short version" is carried out in the feedback mode, when the duration of exposure changes automatically depending on the response of the subject: after the correct answer, the duration of the next signal is reduced by 20 ms, and after the wrong one - increases by the same amount. The range of the signal exposure change during the test subject's operation is within 20-900 ms with a pause between exposures of 200 ms. The correct answer is to press the left (right) mouse button while displaying a certain exposure (image), or during a pause after the current exposure. In this test, the time to reach the minimum exposure of the signal and the time of the minimum exposure of the signal reflect the functional mobility of the nervous processes; the number of errors reflects the strength of the nervous processes (the lower these parameters, the higher the mobility and strength of the nervous system). The duration of the initial exposure is 900 ms; the amount of change in the duration of the signals with correct or erroneous responses is 20 ms; pause between the presentation of signals - 200 ms; the number of signals is 50. The indicators are fixed: the average value of the latent period (M), ms; standard deviation value (σ), ms; number of mistakes; time of test execution, s; minimum exposure time, ms; time of exposure to the minimum exposure, sec.
- Complex indicators of a complex visual-motor reaction to the selection of two elements of three in the feedback mode, i.e. As the response time changes, the signal delivery time changes; "Long version" is carried out in the feedback mode, when the duration of exposure changes automatically depending on the response of the subject: after the correct answer, the duration of the next signal is reduced by 20 ms, and after the wrong one - increases by the same amount. The range of the signal exposure change during the test subject's operation is within 20-900 ms with a pause between exposures of 200 ms. The correct answer is to press the left (right) mouse button while displaying a certain exposure (image), or during a pause after the current exposure. In this test, the time to reach the minimum exposure of the signal and the time of the minimum exposure of the signal reflect the functional mobility of the nervous

processes; the number of errors reflects the strength of the nervous processes (the lower these parameters, the higher the mobility and strength of the nervous system). In addition, the total time of the test reflects a combination of strength and mobility of the nervous processes. The duration of the initial exposure is 900 ms; the amount of change in the duration of the signals with correct or erroneous responses is 20 ms; pause between the presentation of signals - 200 ms; the number of signals is 120. The indicators are fixed: the average value of the latent period (M), ms; standard deviation value (σ), ms; number of mistakes; time of test execution, s; minimum exposure time, ms; time of exposure to the minimum exposure, sec.

- The indicators of mental working capacity were also determined according to the Schulte test (Video "Test Shult 1"). In this test, the subject needs in the 5X5 tables of 25 digits (from 1 to 25) arranged in random order, in order to mark the numbers from 1 to 25. After passing the first table, the second with a different order of digits immediately appears, and so on. In total, the subject passes 5 tables. Fixed the running time on each table of five (min.), The work efficiency as the arithmetic mean of the running time on five tables (min.).

To determine the level of general and special physical preparedness the following tests were used: running 30 m; running 400 m; bench press (maximum value); running 3 km.

As the main indicator of special endurance, the result was chosen in running at 400 m, since running for medium distances is similar in energy supply mechanisms with team contact sports games, including rugby.

Statistical analysis.

The digital material obtained during the research was processed using traditional methods of mathematical statistics. For each indicator, the arithmetic mean X, the standard deviation S (standard deviation), the standard error (m).

Based on the results of testing for special physical preparedness and psychophysiological indicators, a factor analysis was carried out using the method of principal components with Varimax rotation with Kaiser normalization. Based on the results in running for 400 m and psychophysiological indicators, a multiple regression analysis was carried out by the type of a linear model in a step-by-step method.

Mathematical processing of data was carried out using programs for processing the results of scientific research Microsoft Exel "Data Analysis", SPSS. Influence of index were considered significant at a significance level of $p<0.05$.

RESULTS

Average group values of indicators of psychophysiological functions and indicators of physical readiness were determined (Table 1). In general, the test indicators for the special physical and technical preparedness of players characterize the level of athletes' preparedness as average (Table 1). Psychophysiological indicators indicate that the test group represents athletes primarily with moderate psychophysiological capabilities (Table 1).

The results of factor analysis showed that the number of factors whose eigenvalue is greater than one is 4 (Table 2). On the chiselled diagram of the eigenvalues of the factors, which is also called the "slope of the hill" (Figure 1), we can distinguish 4 main factors that form the so-called "slope" in the diagram.

Thus, 4 main factors were identified, the percentage of which from the total dispersion was 36.8% for the first factor, 23.0% for the second factor, 22.2% for the third factor, 18.0% for the fourth factor (Table 2).

The first factor included the following indicators:The time of the reaction of choice, ms; The work time on Table 1 in the Schult test, s; Reaction selection in feedback mode, exit time to minimum exposure, s; The reaction time of the choice in the feedback mode, ms; Degree of training on the Schultt test (c.u.) (Tabl. 3). All these indicators reflect the ability of the nervous system to respond quickly to changing testing conditions, the ability to quickly become involved in work. Based on these indicators, the first factor was called "The ability to quickly join the work".

The second factor included the following indicators: "Time worked on table 3 in the Schult test, s; Running 400 m, s; Running 30 m, s, Time of simple reaction, ms, Reaction selection in feedback mode, total test run time, s, Bench press, kg, Reaction selection in feedback mode minimum exposure time, ms. These indicators reflect special endurance (running at 400 m), mental endurance (Time worked on table 3 in the Schult test, s; Reaction selection in feedback mode, total test run time, s), as well as speed and strength (Running 30 m, s; Bench press, kg) and the rate of a simple reaction (Time of simple reaction, ms) (Tabl 3). On the basis of the received data, the second factor was named "Special working capacity". It should be noted that this factor included indicators of both physical performance (Running 400 m) and mental performance (Time worked on table 3 in the Schult test, s, Reaction selection in feedback mode, total test run time, s). This indicates that physical and mental (mental) endurance have common neurodynamic mechanisms. This factor also includes speed-strength and simple reaction. This also indicates the common neurodynamic mechanisms of physical and mental processes.

The third factor included the following indicators:Reaction of choice, errors, quantity; The time of the reaction of choice, the mean square deviation, ms; The work time on table 5 in the Schult test, s; Mental Stability Test by Schult (c.u.). Reaction of choice, errors иThe time of the reaction of choice, the mean square deviation reflect the stability of the nervous system. The work time on table 5 in the Schult test and Mental Stability Test by Schult reflect the endurance of the nervous system. Therefore, the third factor was called "Mental stability".

The fourth factor includes the following indicators: Reaction selection in feedback mode, errors, number; The response time of the choice in the feedback mode, the mean square deviation, ms; Reaction selection in feedback mode, exit time to minimum exposure, s; The work time on Table 2 in the Schult test, s; Running 3 km, min (Tabl. 3). Reaction selection in feedback mode, errors reflects the strength of the nervous system; Running 3 km, min reflects the overall physical endurance of the body and the strength of the nervous system. Reaction selection in feedback mode, exit time to minimum exposure, and the work time reflect the ability of the nervous system to adapt. Therefore, the fourth factor was called "Ability to adapt."

Table 1: Indicators of psychophysiological functions and physical readiness of young rugby players aged 16-17 (n = 20)

Indicators	Mean Statistic	Std. Error	Std. Deviation
Time of simple reaction, ms	227,60	8,17	51,67
Simple reaction, error, quantity	0,55	0,17	1,08
Time of simple reaction, mean square deviation, ms	2,79	0,01	0,06
The time of the reaction of choice, ms	458,60	3,20	20,27
Reaction of choice, errors, quantity	10,30	0,35	2,24
The time of the reaction of choice, the mean square deviation, ms	3,46	0,03	0,21
The reaction time of the choice in the feedback mode, ms	388,90	3,17	20,07
Reaction selection in feedback mode, errors, number	22,30	0,34	2,15
The response time of the choice in the feedback mode, the mean square deviation, ms	3,83	0,02	0,12
Reaction selection in feedback mode minimum exposure time, ms	334,00	5,37	33,95
Reaction selection in feedback mode, total test run time, s	89,65	0,54	3,41
Reaction selection in feedback mode, exit time to minimum exposure, s	64,30	2,30	14,52
The work time on Table 1 in the Schult test, s	33,60	0,92	5,85
The work time on Table 2 in the Schult test, s	36,02	2,26	14,29
Time worked on table 3 in the Schult test, s	36,15	1,39	8,81

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The work time on Table 4 in the Schult test, s	37,65	1,93	12,21
The work time on table 5 in the Schult test, s	41,65	2,36	14,92
Efficiency of the Schultt test (c.u.)	37,86	1,24	7,86
Degree of training on the Schultt test (c.u.)	0,90	0,02	0,12
Mental Stability Test by Schult (c.u.)	0,98	0,03	0,17
Running 30 m, s	4,35	0,02	0,14
Running 400 m, min	1,05	0,00	0,02
Bench press, kg	93,13	1,22	7,72
Running 3 km, min	12,10	0,12	0,77
Test on a special performance, s	173,40	3,26	20,64

Table 2: Total Variance Explained(a) (n=20)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10,187	37,73	37,73	10,187	37,73	37,73	9,948	36,844	36,844
2	8,34	30,889	68,619	8,34	30,889	68,619	6,211	23,005	59,849
3	6,008	22,25	90,869	6,008	22,25	90,869	5,984	22,163	82,012
4	2,465	9,131	100	2,465	9,131	100	4,857	17,988	100
5	8,54E-16	3,16E-15	100						
6	6,73E-16	2,49E-15	100						
7	6,33E-16	2,35E-15	100						
8	4,52E-16	1,67E-15	100						
9	4,18E-16	1,55E-15	100						
10	2,96E-16	1,10E-15	100						
11	2,59E-16	9,60E-16	100						
12	2,42E-16	8,97E-16	100						
13	1,81E-16	6,69E-16	100						
14	1,20E-16	4,45E-16	100						
15	1,02E-16	3,79E-16	100						
16	2,25E-17	8,32E-17	100						
17	-1,96E-17	-7,27E-17	100						
18	-9,03E-17	-3,35E-16	100						
19	-1,23E-16	-4,57E-16	100						
20	-1,58E-16	-5,86E-16	100						
21	-2,31E-16	-8,56E-16	100						
22	-2,62E-16	-9,72E-16	100						
23	-3,36E-16	-1,24E-15	100						
24	-3,70E-16	-1,37E-15	100						
25	-5,36E-16	-1,99E-15	100						
26	-5,46E-16	-2,02E-15	100						
27	-6,96E-16	-2,58E-15	100						

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Extraction Method: Principal Component Analysis.

a. Only cases for which пер.тест = 1 are used in the analysis phase.
b.

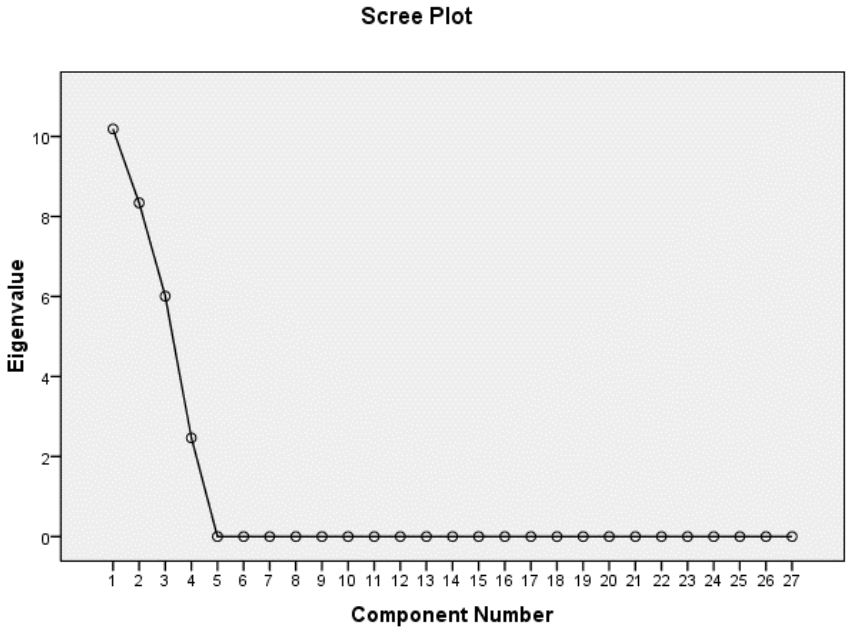

Fig 1: Own factors factor values

Table 3: Rotated Component Matrix(a)(b)

	Component			
	1	2	3	4
The time of the reaction of choice, ms	0,916			
The work time on Table 1 in the Schult test, s	0,912			
Reaction selection in feedback mode, exit time to minimum exposure, s	0,894			
The reaction time of the choice in the feedback mode, ms	0,892			
Degree of training on the Schultt test (c.u.)	0,828			
Time worked on table 3 in the Schult test, s		0,993		
Running 400 m, s		0,975		
Running 30 m, s		0,971		
Time of simple reaction, ms		0,805		
Reaction selection in feedback mode, total test run time, s		0,722		
Bench press, kg		-0,721		
Reaction selection in feedback mode minimum exposure time, ms		0,899		

Reaction of choice, errors, quantity			0,937	
The time of the reaction of choice, the mean square deviation, ms			0,932	
The work time on table 5 in the Schult test, s			0,816	
Mental Stability Test by Schult (c.u.)			0,747	
Reaction selection in feedback mode, errors, number				0,937
The response time of the choice in the feedback mode, the mean square deviation, ms				0,933
Reaction selection in feedback mode, exit time to minimum exposure, s				0,894
The work time on Table 2 in the Schult test, s				0,73
Running 3 km, min				0,72

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.
b. Only cases for which пер.тест = 1 are used in the analysis phase.

The results obtained make it possible to conclude that there is an interrelation between the indicators of special working capacity and psychophysiological indices. Special endurance of athletes in team contact game sports is associated with the ability to maintain mental performance. The overall endurance of athletes is also associated with the endurance of the nervous system and the ability to adapt quickly to work.

The hypothesis of the ball is also verified using multiple regression analysis.

To determine the degree of influence of psychophysiological functions on the special endurance of athletes, which was determined by the test "Running at 400 m," multiple regression analysis was carried out in a step-by-step method. The dependent variable was the result of running 400 m. Independent variables were 25 indicators according to the applied methods of investigation (Table 1). With the step-by-step method of multiple regression, the analyzed variables are involved in the analysis in turn. The algorithm of multiple regression analysis, provided by the SPSS program, allows selecting the most significant variables at each step in terms of the degree of influence on the sporting result. As a result, only those multiple regression models that contain the most significant coefficients are selected. The remaining variables are placed by the program in the table "Excluded variables". In our study, we focus on the analysis of multiple regression models containing variables included by the program as variables of multiple regression models with reliably significant coefficients.

Judging by the values of the coefficients R, R^2 and biased R^2, all five models are reliable and describe the relationship between physical fitness indicators, psychophysiological indicators and running time of 400 m for athletes specializing in rugby with a high degree of accuracy (Tables 4-6). Since in all six models the values of R, R^2 and displaced R^2 are close to 1, one can judge the high degree of influence of physical psychophysiological indices on the results in running for 400 m in athletes - rugby players.

The high significance of all six regression models (Table 5) also attests to the high degree of influence of physical and psychophysiological indices on the running time of a segment of 400 m.

The step-by-step method of multiple regression analysis allows one to involve the analyzed indicators in the model in turn. In our study, in the first step, i.e. in the first model, one indicator was involved - bench press (kg) (Table 6). In the second step (model 2), in addition to bench presses, the time of running 3 km was involved in the analysis. In the third step, the following parameters were involved in the third step as variables affecting the running time of the 400 m interval: bench press, running 3 km, running at 30 m. In the fourth step, in the fourth model, the bench press was influenced by the bench press, running for 3 km, running for 30 m, time for a simple visual-motor reaction. The fifth model is represented by variables: bench press, running 3 km, running at 30 m, time of a simple visual-motor reaction, working time on the second table in the Schulte test (Table 6).

In addition to the variables that reflect the psycho-physiological indicators, each model contains a constant that reflects other factors that affect the running time of 400 m by rugby players (Table 6). Other factors affecting the running time of 400 m are also reflected in the dispersion of the otatoks (Table 5).

An analysis of the reliability of the multiple regression coefficients in the calculated models shows that in all models all the coefficients and the constant are reliable ($p < 0.05$) (Table 6). Judging by the values of the Beta value for regression coefficients, the most influential for a running time of 400 m are the bench press and run ratios of 3 km, that is, the indicators of hardiness and speed-strength qualities. In the fourth and fifth models, the influence of psychophysiological indices (the speed of a simple reaction and the operating time on the second table in the Schulte test) can be traced for a time of 400 m (Table 6).

Based on the results of the analysis of the coefficients in the multiple regression models obtained, we chose the fifth model to describe the influence of physical qualities and psychophysiological functions on the special performance of the rugby players (running time 400 m), it contains 5 indicators (the largest number of all the models obtained) with reliable coefficients As a result, the following regression equation was obtained:

$$y=0,569-0,001x_1+0,018x_2+0,068x_3+0,001x_4+0,001x_5, \quad (1)$$

Where:

y - rugby players run time 400 m, min;
x1 - bench press, kg
x2 - running time 3 km, min
x3 - running time 30 m, s
x4 - time of simple reaction, ms;
x5 - time of work on the second table in the Schulte test, s.

Substituting the average values of the results of psycho-physiological testing of the athlete (Table 6) in this equation, we obtain:

Running 400 m (s) = 0,37-0,001*93,13+0,018*12,10+0,068*4,35+0,001*227,60+0,001*36,02
Running 400 m (s) = 1.05 min = 63 s

Table4: Summary table of regression models of the influence of physical fitness indicators and psycho-physiological indicators on the time of 400 m distance run by young rugby players aged 16-17 years (n = 20)

		Model Summary		
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,679a	0,461	0,447	0,018
2	0,791b	0,625	0,605	0,015
3	0,824c	0,678	0,651	0,014
4	0,866d	0,75	0,721	0,013
5	0,896e	0,802	0,773	0,011

a. Predictors: (Constant), Bench press, kg
b. Predictors: (Constant), Bench press, kg, Running 3 km, min
c. Predictors: (Constant), Bench press, kg, Running 3 km, min, Running 30 m, s
d. Predictors: (Constant), Bench press, kg, Running 3 km, min, Running 30 m, s, Time of simple reaction, ms
e. Predictors: (Constant), Bench press, kg, Running 3 km, min, Running 30 m, s, Time of simple reaction, ms, The work time on Table 2 in the Schult test, s

Table5: Summary table of sources of variance and significance of regression models of the influence of physical fitness indicators and psychophysiological indices on the time of running a distance of 400 m by young rugby players aged 16-17 (n = 20)

			ANOVA(f)			
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0,011	1	0,01	32,485	,000a
	Residual	0,013	38	0,00		
	Total	0,024	39			
2	Regression	0,015	2	0,01	30,836	,000b
	Residual	0,009	37	0,00		
	Total	0,024	39			
3	Regression	0,016	3	0,01	25,299	,000c
	Residual	0,008	36	0,00		
	Total	0,024	39			
4	Regression	0,018	4	0,00	26,185	,000d
	Residual	0,006	35	0,00		
	Total	0,024	39			
5	Regression	0,019	5	0,00	27,544	,000e
	Residual	0,005	34	0,00		
	Total	0,024	39			

a. Predictors: (Constant), Bench press, kg
b. Predictors: (Constant), Bench press, kg, Running 3 km, min
c. Predictors: (Constant), Bench press, kg, Running 3 km, min, Running 30 m, s
d. Predictors: (Constant), Bench press, kg, Running 3 km, min, Running 30 m, s, Time of simple reaction, ms
e. Predictors: (Constant), Bench press, kg, Running 3 km, min, Running 30 m, s, Time of simple reaction, ms, The work time on Table 2 in the Schult test, s
f. Dependent Variable: Running 400 m, min

Table6 : Coefficients of multiple regression equations with stepwise involvement of indicators (n = 40)

			Coefficients(a)			
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	1,256	0,036		35,126	0,000
	Bench press, kg	-0,002	0,000	-0,679	-5,7	0,000
2	(Constant)	1,025	0,065		15,82	0,000
	Bench press, kg	-0,002	0,000	-0,491	-4,425	0,000
	Running 3 km, min	0,014	0,004	0,447	4,024	0,000
3	(Constant)	0,738	0,132		5,582	0,000

	Bench press, kg	-0,001	0,000	-0,316	-2,501	0,017
	Running 3 km, min	0,015	0,003	0,474	4,526	0,000
	Running 30 m, s	0,051	0,021	0,284	2,441	0,020
4	(Constant)	0,621	0,124		5,01	0,000
	Bench press, kg	0,000	0,000	-0,306	-2,706	0,010
	Running 3 km, min	0,017	0,003	0,527	5,531	0,000
	Running 30 m, s	0,062	0,019	0,342	3,236	0,003
	Time of simple reaction, ms	0,000	0,000	0,278	3,156	0,003
5	(Constant)	0,37	0,113		5,03	0,000
	Bench press, kg	-0,001	0,000	-0,336	-3,276	0,002
	Running 3 km, min	0,018	0,003	0,56	6,462	0,000
	Running 30 m, s	0,068	0,017	0,374	3,896	0,000
	Time of simple reaction, ms	0,001	0,000	0,324	4,005	0,000
	The work time on Table 2 in the Schult test, s	0,001	0,000	0,241	3,002	0,005

a. Dependent Variable: Running 400 m, min

Thus, multiple regression analysis made it possible to reveal the indicators most influencing the special (anaerobic-glycolytic) performance of athletes according to the results in running for 400 m: bench press, running 3 km, running at 30 m, time of simple visual-motor reaction, time of work on the second table in the Schulte test. It is shown that the special working capacity of athletes in team game contact sports is determined not only by physical fitness data, but also by psychophysiological functions.

DISCUSSION

The obtained results confirmed the hypothesis put forward in this study that athletes - representatives of contact command game sports have a high correlation between special physical performance and psychophysiological indicators. The purpose of the work, which was in definition of factor structure of psychophysiological properties and physical preparedness of young rugby players 16-17 years and determination of influence of psychophysiological properties on special ability of players.As a result of factor analysis by the method of the main components, it was discovered that most psychophysiological indicators were included in various factors. This testifies to the high structurization of the work of the body of qualified athletes - representatives of contact gaming sports (for example, rugby). Similar data were obtained earlier by us [31] in studies of the structure of the training of basketball players of different qualifications. It has been revealed that with the increase in the level of athletic skill athletes, the number of correlations between different types of preparedness increases; There are interconnections between those indicators that were not previously interrelated. This is consistent with the laws of the development of self-organizing systems, in which, as the development progresses, the structure of their structure and functioning [45] becomes more complicated. Since the athlete is a self-organizing system, a high number of interconnected indicators indicates a high level of functioning of his organism as a self-organizing system [33; 45].

In our case, the investigated indicators are included in four factors, which indicates the existence of a high correlation between: psychophysiological indicators among themselves; indicators of special work capacity and psychophysiological indicators. This confirms the hypothesis of our study that psychophysiological indicators are closely related to the indicators reflecting the manifestation of the physical and functional state. In addition, according to the factors that entered into the factors, one can conclude that athletes - representatives of contact team playing sports - are equally contributing to the general structure of preparedness by all four factors reflecting various aspects of special training of athletes. The Factor "The ability to quickly get involved in work" covers psychophysiological indices and indicates the leading role of the nervous system in shaping the athlete's fitness structure, one of the main aspects of which is the ability to quickly become involved.

Particular attention deserves the second factor "Special working capacity", which combines indicators of the result in running at 400 m, running at 30 m, bench press and psychophysiological indicators that characterize the mental working capacity, the reaction rate and the mobility of the nervous system. These indicators are determinants of the special working capacity of athletes - representatives of team contact sports. They reflect speed and strength qualities (run at 30 m, lying down) and special (anaerobic - glycolytic) endurance (running at 400 m). With these indicators correlate psychophysiological functions: the speed of a simple reaction, mobility of the nervous system, mental working capacity. The relationship between the indicators of special physical fitness of athletes and mental performance is a reflection of the specifics of mental and physical stress in team contact gaming sports.

These results are also confirmed by multiple regression analysis. In the regression model of the dependence of special functioning on the indicators of physical fitness and psychophysiological functions, in addition to the indicators of speed-strength training and general endurance, included psychophysiological indicators (the speed of a simple reaction and the ability to develop a high mental capacity for work in a short period of time, recorded by the time of work on the second table in the Schult test)

The third and fourth factors also reflect strength, stability of the nervous system and the ability to adapt. In the literature data, it is emphasized that the strength of the nervous system is more characteristic of the representatives of sports for endurance. In our study, it has been shown that for athletes, representatives of contact team sports, special performance is manifested in a complex of interconnected indicators of physical fitness and psychophysiological functions. These indicators can reflect different mechanisms of energy supply and properties of the nervous system (speed-strength qualities and overall endurance, reaction rate and stability of the nervous system to long stimuli). These mechanisms are antagonists. Therefore, the development of special performance at athletes - representatives of team contact gaming sports requires a comprehensive approach. This approach should include a comprehensive development of various energy supply physical characteristics of athletes in combination with the development of mental capacity for work [39; 40], the ability to quickly get involved in work, reaction speed and other psychophysiological functions.

The obtained data are supplemented by the results of investigations by Ilyin Ye.P. [12; 13], Lyzogub V.C. [33], Korobeinikov G.V. [23] about the presence of psychophysiological features of representatives of various sports. For the first time, the influence of psychophysiological indicators characterizing the working capacity (force) of the nervous system on the result in running at 400 m (special working capacity of athletes - representatives of team contact gaming sports). The structure of athletes' preparedness was also revealed for the first time. The results obtained allow us to make the following recommendations for practical work. The development of special working capacity in team contact gaming sports requires a comprehensive approach. This approach should include a combination of mental development, the ability to quickly engage in work, reaction speed and other psycho-physiological functions and the development of various energy-supplying physical characteristics of athletes. Further research requires the development of means for improving mental performance in combination with the special physical fitness of athletes.

CONCLUSIONS

- There are 4 factors in the structure of the preparedness of athletes - representatives of team contact game sports (with the example of rugby), whose contribution to the total total variance was 36.8% for the first factor ("The ability to quickly join the work"), 23.0% for the second factor ("Special working capacity"), 22.2% for the third factor ("Mental stability"), 18.0% for the fourth factor ("Ability to adapt").
- High interrelation between psychophysiological indicators and special working capacity of athletes - representatives of command contact game kinds of sports is shown. The high contribution to the factor structure of athletes 'readiness for indicators reflecting the qualities characteristic for various aspects of the athletes' preparedness is revealed: high-speed strength (running at 30 m, bench press) and special (anaerobic-glycolytic) endurance (400 m run). These indicators correlate psychophysiological functions: the speed of a simple reaction, the mobility of the nervous system, mental performance. Interrelation of indicators of special physical working capacity of athletes and mental working capacity is a reflection of the specifics of mental and physical loads in team contact game sports.

- The models of multiple linear regression between the results in the 400 m run of athletes - representatives of contact command game sports. The chosen model of multiple regression is represented by the following variables: bench press, running 3 km, running at 30 m, time of a simple visual-motor reaction, working time on the second table in the Schulte test. The most effective for the special (anaerobic-glycolytic) performance of athletes was determined based on the results in running at 400 m. It is shown that the special working capacity of athletes in team game contact sports is determined not only by physical fitness data, but also by psychophysiological functions.

FINANCING

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- the consolidating plan of research work in the sphere of physical culture and sport for 2011-2015 on a subject 2.4 «Theoretical and methodical bases of individualization in physical training and sport» (№ of the state registration 0112U002001);
- the research work of Ministry of Education and Science of Ukraine for 2013-2014. «Theoretical and methodical bases of application the information, pedagogical and medical-biological technologies for formation of healthy lifestyle» (№ of the state registration 0113U002003);
- the research work of Ministry of Education and Science of Ukraine for 2015-2016. «Theoretical and methodical bases of means application the information, pedagogical, medical-biological orientation for motor and spiritual development and formation of healthy lifestyle» (№ of the state registration 0115U004036);
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