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Factors determining high efficiency of cyber athletes' preparation for competitions

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Abstract. The conducted research identified factors that determine the high efficiency of cyber athletes' preparation for competitions. The key factors that determine the high efficiency of cyber athletes' preparation for competitions reported by the respondents included the availability of a scientifically justified training and preparation program for the cyber athletes, as well as psychological tools and methods to relieve high-level tension during the competition. The respondents also paid attention to such factors as monitoring the expenditure of functional reserves of the body during competitive activities, as well as recovery activities after the competitions, taking into account the individual features of the cyber athlete's body. Important factors also include objective assessment of the dynamics of the mental activity level during the training process, as well as the implementation of measures to combat adverse factors that affect cyber athletes in the course of their preparation for competitive activities. An analysis of the performance of athletes at various competitions in the period from 2016 to 2018 was conducted. The survey involved 73 respondents, including athletes and coaches.

1. Introduction

Competitive activity and preparation make high demands on the level of physical and functional fitness of athletes [1, 3]. This fully applies to the preparation of cyber athletes. The content of cyber athletes' training for competitions requires improvement and search for new effective training tools and methods [5, 7]. The cyber athletes' preparation for competitions is aimed at solving multiple tasks. The main focus should be placed among the variety of tasks on the task of preparing and expanding the functional capabilities of their body for competitive activity [2, 6]. The solution of this task is due, first of all, to the peculiarities of competitive activity of cyber athletes, which is characterized by high mental and emotional tension [4, 8]. It is also necessary to take into account the influence of adverse factors that affect cyber athletes in the course of their preparation for competitive activities [9, 10].

It is known that the preparation of cyber athletes for competitions is associated with many hours of training at their computers. Computer games have a negative effect on the body of cyber athletes as a whole [11, 13]. They negatively affect the cardiovascular system of the body, as well as the activity of the visual analyzer. Therefore, from a scientific point of view, it is very important to know the factors that determine the high efficiency of cyber athletes' preparation for competitions [14, 15].

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Scientific literature offers little data on the features of the preparation of cyber athletes for competitive activities. This indicates a contradiction between the need to increase the level of functional preparedness of cyber athletes and the lack of data on factors determining the high efficiency of cyber athletes' preparation for competitions.

2. Research materials and methods

The following methods were used to solve the tasks: analysis of scientific and methodological literature; survey of coaches and athletes; testing; functional tests; mathematical statistics methods.

The analysis of scientific and methodological literature included the study and synthesis of domestic and foreign experts' works on the problem of cyber athletes' preparation for competitive activities. This analysis studied the performance ability of cyber athletes; the impact of adverse factors that affect cyber athletes in the course of their preparation for competitive activities; body response to competitive load.

A survey of coaches and athletes was carried out in order to identify factors that determine the high efficiency of cyber athletes' preparation for competitions.

Testing of cyber athletes' body reserves was carried out using the "Sources of Health" ("Istoki Zdorovya") hardware-software complex, where the level of functional reserves of their bodies was assessed, as was the blood pressure (BP) and the heart rate (HR).

A portable device was used in the course of psychophysiological research of cyber athletes. For the athletes psychodiagnostics, the following tests were used: traffic lights, snake, tremor and tapping test.

"Traffic Light" Test (determined complex visual-motor reaction of cyber athletes in ms). At the "Go!" command, red lights start blinking erratically, the subject must quickly respond to the switching off of the left light by pushing the left button with the left hand, to the switching off of the right light – with the right hand and to the switching off of the middle light – simultaneously with both hands, with the hand on the button at all times. The subjects were given three attempts for each hand, the best and the worst attempts were discarded, and the intermediate result was recorded into the test.

"Snake" Test (determined dynamic tremor, which is associated with the attention properties, visual acuity of cyber athletes, etc.). At the "Go!" command, the subject put a stylus at the beginning of the "snake" maze and at the first touch began to move along the snake with the timer being activated. In the course of the test, touch record was performed. When performing the test, the subject had to try to outline all the figures over the entire length of the maze with a length of 60 cm and a width of 3 mm, and touch the edges as little as possible. The scoreboard showed the time in seconds and the number of edge touches. When performing this test, the needle of the stylus should not go beyond the edges of the maze.

"Tremor" Test (determined static tremor). At the "Go!" command, the subject inserted a stylus needle into a 3 mm hole, and the timer was activated when the edge of the hole was first touched. This test was performed for 30 seconds. At the end of time, the number of touches was displayed on the board. When performing this test, the needle of the stylus should not come out of the hole.

"Tapping-Test" (lability, mobility, nature of arousal state, as well as speed of the neuromuscular system were determined). At the "Go!" command, the subject began to beat a 2.5 by 2.5 cm square with a stylus in the form of a needle-pen for 30 seconds at a maximum rate.

A system for statistical processing of the results was used for the quantitative analysis of the experimental data of the study. Mathematical-statistical processing of the results was carried out using a standard software package Microsoft Excel 7.0.

3. Results and analysis

The study showed that the effectiveness of the process of preparing cyber athletes for competitive activity is largely determined by the functional capabilities of their body. Practice has shown that a low level of performance ability and functional capabilities of the body creates negative prerequisites for high-quality performance at competitions.

One of the most important issues in the cyber athletes training is the problem of identifying factors that determine the high efficiency of cyber athletes' preparation for competitions. Therefore, survey of coaches and athletes was conducted. A total of 73 respondents took part in the survey. The results of this study are shown in Table 1.

Table 1. Ranking of the factors determining the high efficiency of cyber athletes' preparation for competitions (n = 73).

Rank (significance)	Factors	Rank indicator (%)
1	Availability of a scientifically justified training and preparation program for the cyber athletes	28.7
2	Availability of psychological tools and methods to relieve a high level of nervous tension during competition	21.3
3	Monitoring of the use of functional reserves of the body during competitive activities	15.5
4	Conducting recovery activities after the competition, taking into account the individual features of the cyber athletes' bodies	14.5
5	Objective assessment of the dynamics of the mental performance level during the training process	10.8
6	Carrying out activities to combat adverse factors that affect cyber athletes in the course of their preparation for competitive activities	9.2

The key factors that determine the high efficiency of cyber athletes preparation for competitions reported by the respondents included the availability of a scientifically justified training and preparation program for the cyber athletes, as well as psychological tools and methods to relieve high-level tension during the competition. The respondents also paid attention to such factors as monitoring the expenditure of functional reserves of the body during competitive activities, as well as recovery activities after the competitions, taking into account the individual features of the cyber athlete's body. Important factors also include objective assessment of the dynamics of the mental activity level during the training process, as well as the implementation of measures to combat adverse factors that affect cyber athletes in the course of their preparation for competitive activities.

The survey showed that the availability of scientifically justified training and preparation program for the cyber athletes is the most important factor determining the high efficiency of cyber athletes' preparation for the competitions.

The analysis of competitive activities of cyber athletes allows us to conclude that they are under considerable emotional and psychological pressure during the game and all competitive activities. This adversely affects their mental and functional state. The heart rate and blood pressure tended to increase both during training and during competitions. Moreover, these changes were of reliable nature in the course of competitive activity (table 2). This leads to fatigue and reduced performance of the cyber athletes. Therefore, it is necessary to select psychological tools and methods to relieve a high level of nervous tension during competition. This factor, according to respondents, is the most important in determining the rehabilitation focus of cyber athletes training after competitions.

Table 2. Indicators of the functional status of cyber athletes during the game.

No.	Parameters	Periods	Training	Competition
1	HR (beats / min)	Before the game	66.7±2.4	68.8±2.1
		During the game	74.4±2.2	86.8±2.7

		P	>**0.05**	**<0.05**
2	Systol. BP (mm Hg)	Before the game	122.7±5.4	121.9±5.1
		During the game	130.9±5.3	147.9±5.4
		P	>**0.05**	**<0.05**
3	Diastol. BP (mm Hg)	Before the game	80.3±4.5	81.4±5.0
		During the game	93.0±5.1	99.5±5.1
		P	>**0.05**	**<0.05**

Monitoring of the functional body reserves spent during competitive activity is one of the major factors that determine the high efficiency of the preparation of cyber athletes for the competition.

The studies have shown that a significant expenditure of the body's functional reserves during competitive activities is also one of the most important factors determining the effectiveness of the training process (table 3). With respect to competitive activity, a significant expenditure of functional reserves of the body during the competition is the main reason for the decline in performance of cyber athletes. It should be noted that special stamina during the competition reflects the most important aspect of the performance of cyber athletes as opposed to fatigue. The normal process of fatigue implies a decrease in the functional capacity of the body of cyber athletes. This can be caused by changes in the functional activity of the nerve centers, as well as depletion of the functional reserves of the body of cyber athletes.

Table 3. Indicators of the functional status of cyber athletes during the game.

No.	Parameters	Periods	Training	Competition
1	Total reserves (c.u.)	Before the game	41.45±3.76	43.81±2.11
		After the game	38.10±3.75	26.83±2.71
		P	>**0.05**	**<0.05**
2	Mental reserves (c.u.)	Before the game	62.85±1.60	64.83±1.67
		After the game	59.85±1.46	57.85±1.32
		P	>**0.05**	**<0.05**
3	Adaptation reserves (c.u.)	Before the game	75.85±4.16	76.87±3.86
		After the game	69.35±3.71	67.33±3.67
		P	>**0.05**	**<0.05**

The need to relieve a high level of nervous tension in cyber athletes after competitions is the most important factor determining the high efficiency of cyber athletes' preparation for the next competition. It was found that the parameters of cyber athletes' mental performance directly depend on the level of their nervous tension. It has been established that objective assessment of the dynamics of the mental performance level during the training process is very important.

The studies have shown that the performance of cyber athletes is determined by the adaptation reserves of their body (table 3). Performance ability is an indicator of the cyber athletes body's capability. Therefore, for effective competitive activities a high level of mental performance is required.

It should be noted that it is necessary to carry out activities to combat adverse factors that affect cyber athletes in the course of their preparation for competitive activities.

4. Conclusion

The studies revealed a pronounced tendency of cyber athletes performance level to decrease after five years of intense competitive activity. Obviously, this is due to intensification of competitive activities

in recent years, and increase in emotional stress – the above made increased demands on the optimization of the training process. It also required the identification of factors that have a negative impact on their health. It was found out that the load experienced by cyber athletes in the period of competitive activities, regardless of age, definitely resulted in a decrease in their mental performance, as well as a significant expenditure of functional reserves of the body, had a negative impact on their mental state. It is necessary to select psychological means and methods to relieve a high level of nervous tension obtained during the competition.

References

[1] Pityn M, Briskin Y, Perederiy A, Galan Y, Tsyhykalo O and Popova I 2017 *Journal of Physical Education and Sport* **17 (**3) 988–994
[2] Bakayev V, Vasilyeva V, Kalmykova S, and Razinkina E 2018 *Journal of Physical Education and Sport* **18** (1) 293–297
[3] Bolotin A and Bakayev V 2016 *Journal of Physical Education and Sport* **16** (2) 413–417
[4] Van Hilvoorde I and Pot N 2016 *Sport, Ethics and Philosophy* **10** (1) 14–27
[5] Lehenbauer-Baum M and Fohringer M 2015 *Computers in Human Behavior* **45** 345–351
[6] Kalinina O, Suschenko V, Shchegolev V and Barykin S 2018 *MATEC Web Conf.* **193** 05063
[7] Llorens M R 2017 *Sport, Ethics and Philosophy* **11** (4) 464–476
[8] Martoncik M 2015 *Computers in Human Behavior* **48** 208–211
[9] Hilvoorde I V and Pot N 2016 *Sport, Ethics and Philosophy* **10** (1) 14–27
[10] Pogodin S N, Piskun O E, and Samorukov V I 2018 *Theory and practice of physical culture* **4** 96–98
[11] Holt J 2016 *Sport, Ethics and Philosophy* **10** (1) 5– 13
[12] Jonasson K and Thiborg J 2010 *Sport in Society* **13** (2) 287–299
[13] Kalmykova S V, Pustylnik P N, and Razinkina E M 2017 *Advances in Intelligent Systems and Computing* **545** 427–432
[14] Whalen S J 2013 *Cyberathletes' lived experience of video game tournaments* (Cambridge: MIT Press)
[15] Witkowski E 2012 *Games and Culture* **7** (5) 349–374