

Development of psychophysical and technical and tactical potential of student martial arts athletes

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Abstract

Objective of the study was to experimentally substantiate the methodology for developing the psychophysical and technical-tactical potential of student martial arts athletes.

Methods and structure of the study. The experiment, which was conducted at Peter the Great St. Petersburg Polytechnic University, involved 114 students involved in martial arts, who made up the control (CG) and experimental (EG) groups. During the study, an original methodology was developed aimed at improving the construction of movements through sensory-cognitive, motor-functional and motor-coordination components in the process of educational, training and competitive activities.

Results and conclusions. It was found that classes according to the developed program made it possible to increase indicators in the EG, characterizing the level of development of mental (5.04- 18.68%), physical (5.12-20.35%) and technical-tactical (12.38-21.38%) of students' potential in comparison with indicators in the CG - mental (3.25- 12.38%), physical (3.69- 15.26%) and technical-tactical (7.25- 12.38%) potential.

Thus, the conditions for the development of psychophysical and technical-tactical potential among student martial artists during training sessions are: the use of special exercises in changing conditions with modeling situations of alternative uncertainty associated with varying the motor composition of response actions; reduction of time for solving a psychomotor task in a certain sequence (situation - attacking actions - defensive actions - plot of the fight - task being solved).

Keywords: *psychophysical potential, psychophysical qualities, methodology, algorithm, psychomotor, conditioning and coordination abilities, students, martial arts athletes.*

Introduction. In the current conditions of reforming higher education, the importance of the psychophysical potential of student-athletes is being significantly updated, the basis of which, first of all, is the optimal level of development of their psychomotor, conditioning and coordination abilities [8]. The integration of these abilities represents a complex structural and functional system of the psychophysical potential of students involved in martial arts. Thus, according to many authors, martial arts students must have a high level of development of psychophysical qualities in order to effectively implement technical and tactical actions in competitive wrestling [5, 7].

The limiting component of the psychophysical qualities of martial arts students in the aspect of readiness for competitions is the level of systemic-structural interrelation of mental and physical components that

characterize motor and functional readiness, mental processes, sensorimotor and the ability to control motor actions in different conditions of solving technical and tactical problems [2, 8].

In the structure of the psychophysical qualities of martial arts students' readiness, the main integrator of mental and physical potential is coordination abilities, the high level of which ensures the effective implementation of technical and tactical tasks in a sports match [1, 6]

During competitive wrestling, a combat sportsman must effectively and variably perform technical and tactical actions in symbiosis with speed of reaction, accuracy of movements, restructuring of motor actions, orientation in space, coordination of movements, a sense of balance, which, in turn, will allow him to react rationally to changes during the confrontation [3, 4].



Modern approaches to determining the psychophysical potential of martial arts athletes are based on methods for diagnosing abilities that make it possible to obtain the necessary predictive information in order to individualize the approach to the educational and training process. At the same time, experience shows that it is unreasonable to expect a highly qualified martial artist to enter the university, an already formed one whose psychophysical readiness is at a high level, and therefore it is important to “assess, develop, develop” the necessary psychophysical qualities of the student in the process of practicing martial arts at different stages studying at a university.

Objective of the study was to experimentally substantiate the methodology for developing the psychophysical and technical-tactical potential of student martial arts athletes.

Methods and structure of the study. The ascertaining experiment was conducted at Peter the Great St. Petersburg Polytechnic University with the participation of 3rd-4th year students ($n=114$) involved in martial arts. Based on the experimental data obtained, two groups were formed (experimental - EG ($n=30$) and control - CG ($n=30$). Educational and training sessions in the EG were conducted according to the developed author's methodology, and in the CG - in accordance with traditional approaches to physical training of martial arts athletes.

During the study, to determine the level of psychophysical and technical-tactical potential of martial arts athletes, control tests were used that meet the requirements of sports metrology (reliability and validity) and are widely used in practice:

- to assess the level of the **mental component** of the psychophysical potential of martial arts athletes, the complex computer psychodiagnostic program Effecton Studio 2007 was used: sensorimotor abilities and functional state of the neuromuscular system: idle visual-motor reaction “Shooting Range”, ms; complex visual-motor reaction “Taxi”, ms; reaction to a moving object “Stuntman”, ms; tapping test “Woodpecker”; mental cognitive processes: switchability and distribution of attention “Red-black table”, p. stability of attention under time pressure “Navigator”, %; accuracy of time perception “Fishing”, %; accuracy of dimensional perception (RD) “House”, %;

- to assess the level of the **physical component** of the psychophysical potential of martial arts athletes, the following tests were used: speed abilities (running 10 m and 20 m, sec); general endurance (1500 m run, s); speed endurance (10x10 m, s); speed-strength abilities (standing jump, Watt/ms/%); strength abilities

(pull-ups while hanging on a bar, n; dynamometry, kg); flexibility (FMS-test, n); coordination abilities (rhythm, s; balance, %; restructuring and adaptation of motor actions, s; speed of response, cm; coordination, %; orientation in space, %; differentiation, %));

- to assess the level of **technical and tactical potential** of martial arts athletes, the following tests were used: throw of a dummy through the hip for 1 minute (effectiveness of the throw for a while), 10 throws of a dummy by bending backwards (speed of implementation of a technique), throw of a dummy (of greater weight) through the hip within 1 minute” (rationality of technique, taking into account weight); attacking techniques, cu; deceptive attacking techniques, c.u.; deceptive attacking techniques during a fight; defensive techniques, cu; deceptive defensive techniques, c.u.; deceptive defensive techniques during a fight, c.u.; speed of transition from defensive techniques to attacking actions, c.u.

The experimental methodology includes four interconnected stages (see table):

Stage 1 – diagnostic, includes diagnostics of psychophysical and technical-tactical potential at different stages of training (based on the algorithm of the information and diagnostic system);

Stage 2 – analytical, involves building an individual profile of martial artists and selecting means and methods for their improvement;

Stage 3 – correctional, contains an individual set of means and methods (polystructural and multifunctional physical exercises);

Stage 4 – control stage, aimed at assessing the effectiveness of the training process using the proposed methodology for developing psychophysical and technical-tactical potential.

The developed author's methodology is based on the individualization of sports training methods using variable means of various motor orientations. The percentage of training agents is basic and may vary depending on the results of diagnosis and control.

The presented approach to the construction of the author's methodology using means of different directions, in our opinion, should lead to an increase in the reserve level of the psychophysical and technical-tactical potential of martial arts athletes, which can be the basis for building the functional basis of competitive motor action.

Results of the study and discussion. At the beginning of the pedagogical experiment, the comparative level of development of the psychophysical and technical-tactical potential of martial arts athletes in the EG and CG was statistically unreliable ($p>0.05$).



Experimental methodology for developing the psychophysical and technical-tactical potential of martial arts athletes

Algorithm of the experimental technique			
Stage 1 «diagnostic»	Stage 2 «analytical»	Stage 3 «corrective»	Stage 4 «control»
Stage 3 correctional (variable approach of psychophysical and technical-tactical potential) 2 times a week for 60 minutes at all stages of preparation			
1 block – psychophysical potential (psychomotor, conditioning and coordination abilities) – 30% (1440 min)		Block 2 – technical and tactical potential (attacking and defensive technical and tactical actions) – 30%(1440 min)	
Block 3 – Conjugate psychophysical and technical potential – 40% (1920 min)			
Variability of task formulation and conditions for performing basic movements (2 times a week for 60 minutes at all stages of preparation) – 4800 minutes			

During the pedagogical experiment, it was found that the martial arts athletes from the EG significantly ($p < 0.05 - < 0.001$) improved the dynamics of indicators characterizing the level of development of psychophysical and technical-tactical potential in 38 out of 44 indicators, in contrast to the CG in 10 indicators out of 44. This circumstance allows us to say that classes according to the developed program allowed us to increase indicators in the EG, characterizing the level of development of mental (5.04-18.68%), physical (5.12-20.35%) and technical -tactical (12.38-21.38%) potential of students in comparison with indicators in the CG - mental (3.25-12.38%), physical (3.69-15.26%) and technical-tactical (7.25-12.38%) potential.

Conclusions. The conditions for the development of psychophysical and technical-tactical potential among student martial artists during training sessions are: the use of special exercises in changing conditions with modeling situations of alternative uncertainty associated with varying the motor composition of response actions; reduction of time for solving a psychomotor task in a certain sequence (situation - attacking actions - defensive actions - plot of the fight - task being solved).

The author’s methodology, aimed at improving the construction of movements through sensory-cognitive, motor-functional, and motor-coordination components in the process of educational, training and competitive activities, contributes to increasing the psychophysical and technical-tactical potential of martial arts athletes’ readiness.

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