

Selection criteria for service sports based on the indicators of cadets of the Russian Ministry of Internal Affairs

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Abstract. *The development of service sports that are significant for the professional growth of employees of the Ministry of Internal Affairs necessitates the selection of cadets with essential qualities. The purpose of this article is to find the model characteristics of cadets that determine the effectiveness of an obstacle course with shooting: physical, physiological, psychophysiological factors. Materials and methods. Cadets (n = 158) from the Law Institute of the Russian Ministry of Internal Affairs took part in the experiment based on informed voluntary consent. A set of standard tests was used to assess morphofunctional status, strength and coordination abilities of cadets. Psychophysiological parameters were evaluated using the NS-PsychoTest equipment; selective visual attention was studied according to the author's computer version of the Weston test. Cardiointervalogram was recorded on the VNS-Micro equipment. Statistical processing of research data was performed using Microsoft Excel 2010. Results. The model characteristics of cadets (group model) are found, which determine the effectiveness in service sports: high mobility of nervous processes against the background of their balance; sensory coordination; pronounced balance of sympathetic and parasympathetic activity of the segmental regulation pattern. It was established that increasing selective visual attention in extreme conditions (obstacle course) was the dominant success factor in this sport. Conclusion. When selecting cadets for service sports (obstacle course with shooting), it is recommended to take into account the combination of neuro-dynamic and neuro-vegetative indicators of applicants. The statistical values of the indicators presented in this paper can be used as selection criteria.*

Keywords: *obstacle course with shooting, cadets, selection criteria, neurodynamic and neuro-vegetative indicators.*

I. INTRODUCTION

Medical supervision of athletes is based on taking into account health status, the body's response to loads and the adaptive abilities of athletes and has not lost its relevance to date [9, 12].

The development of service sports contributes to the improvement of professional physical and psychophysiological qualities necessary for successful professional activities [5]. In particular, an obstacle course with shooting requires a high level of special endurance and high motor coordination abilities, expressed in accuracy of movements when shooting [6]. Selection for coordination sports also requires taking into account psychophysiological abilities and analyzing the basic characteristics of the athlete's nervous system [10, 11]. To achieve high sports results, scientifically based selection criteria are developed

based on model characteristics [8], including the regulatory and psychophysiological parameters of the body. Selection objectivity can be ensured by a comprehensive assessment of the athlete's prospects.

In sports science, requirements (model characteristics) have been developed for physical development, body systems, and the mental stability of young and qualified athletes of various specializations [1-4, 7] However, the development of new sports necessitates further study of selection criteria based on the modern technologies of assessment. The purpose of the study is to establish the model characteristics of cadets that determine the effectiveness of an obstacle course with shooting: physical, physiological, psychophysiological factors.

II. MATERIALS AND METHODS

The study is based on informed voluntary consent. Cadets of a law institute participated in the study (n = 158). The group of athletes was selected based on the best results of the control race (an obstacle course with shooting). Measurements were performed in standard laboratory conditions in compliance with ethical standards for research in this field. A set of standard tests was used to obtain all necessary data such as body length (cm), body weight (kg), vital capacity (VC, l), wrist dynamometry, body mass index (BMI), pull-up test, Boom test and Romberg test. Psychophysiological parameters were studied using "NS-PsychoTest" equipment (Neurosoft, Ivanovo, <http://www.neurosoft.ru>).

Assessment of selective visual attention was carried out according to the author's computer version of the Weston test (certificate No 2000610097 of the Russian Agency for Patents and Trademarks).

The cardiointervalogram was recorded for 5 minutes in the supine position, in the second standard lead using the VNS-Micro equipment (Neurosoft, Ivanovo, Russia).

The temporal indicators of the cardiac rhythm were analyzed: the average duration of the R-R intervals (RRNN, ms); standard deviation of normal R-R intervals (SDNN, ms); the distribution of cardiac intervals with a range of more than 50 ms (pNN50, %); coefficient of variation (CV, %). The spectral characteristics were also investigated: the total spectrum power (TP, ms² / Hz), the very low-frequency range of the spectrum (VLF, ms² / Hz); low-frequency oscillations (LF, ms² / Hz); high-frequency oscillations (HF, ms² / Hz); their percentage in the total spectrum; vagosympathetic interaction index (LF / HF, c.u.).

Statistical processing and analysis of the results was performed using Microsoft Excel 2010 software. The significance of differences was determined using nonparametric methods with the Mann-Whitney (U) and Wilcoxon (T) criteria. The individual distribution of the characteristic was compared using the Pearson χ^2 -test. The differences were considered statistically significant at $p \leq 0.05$.

III. RESULTS AND DISCUSSION

Data on the functional and psychophysiological status of cadets with different sports experience allowed to reveal indicators that determine success in such a service sport as an obstacle course with shooting.

In the study, objective indicators of morphological and psychodynamic characteristics, as well as indicators of selective attention and neuro-vegetative regulation were obtained which can be used for assessing the effectiveness in a service sport. Table 1 shows generalized model characteristics of cadets that determine the effectiveness of an obstacle course with shooting.

IV. CONCLUSION

Based on the analysis of the data in the table, actual indicators are established that determine the effectiveness of the obstacle course with shooting:

- high coordination abilities;
- high functional mobility against the background of balanced nervous processes;
- high sensory coordination;
- high speed of selective attention and analysis of visual information;
- a pronounced balance of sympathetic and parasympathetic activity of the segmental regulation pattern.

The quantitative data obtained during the research can be used in the system of professional selection for a service sport such as an obstacle course with shooting.

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Table 1

Model characteristics of cadets determining the effectiveness of an obstacle course with shooting ($M \pm m$)

Parameter	Range	
Morphofunctional data		
Anthropometric and physiometric data	BMI, kg/m ²	21.7±0.96
	VC, l	4.5±1.26
	Dominant arm dynamometry, kg	49.5±1.29
Speed-strength criteria	Standing long jump, m	2.46±0.03
	Pull-ups, times	17.27±0.76
	Boom test, s	1.81±0.05
	Romberg test, s	37.65±1.93
Neuro-dynamic indicators		
Mobility of nervous processes	Simple Visual-Motor Response, ms	187.57±5.86
	Complex Visual-Motor Response, ms	304.88±6.36
Balance of nervous processes	Reaction to a moving object, ms (average response time)	-43.93±29.24
	Number of accurate responses	17.73±1.19
	Advanced responses, ms	More than -128
	Delayed responses, ms	Less than 48
Functional status of the CNS	Functional level of the system, c.u.	5.12±0.11
	Response stability, c.u.	2.48±0.11

	Level of functional abilities, c.u.	4.23±0.12
Coordination	Test duration, s	18.52±2.62
	Number of touches, units	31.63±1.51
	Total time of touches, s	1.85±0.16
	Sensorimotor coordination, c.u.	11.70±1.22
Selective attention		
Volume-speed indicators	Volume of attention, bit	45.37±3.18
	Speed, bit/s	0.89±0.05
Selective attention indicators	Effectiveness of the analysis of visual information, c.u.	0.12±0.25
	Mistakenly selected characters, c.u.	6.44±1.81
	Missed characters, c.u.	5.39±1.04
	Concentration, c.u.	44.44±7.12
	Accuracof selective attention, c.u.	6.19±0.37
Neurovegetative regulation		
Time-domain analysis	RRNN, ms	824.76±24.78
	SDNN, ms	75.67±8.68
	RMSSD, ms	63.95±10.10
Spectral analysis	TP, ms ² /1000	4.92±0.87
	VLF, ms ² /1000	1.41±0.37
	LF, ms ² /1000	1.90±0.35
	HF, ms ² /1000	1.61±0.31
	LF/HF	1.18±0.49
	%VLF	30.26±2.96
	%LF	40.42±3.10
	%HF	29.32±3.91