

**INFLUENCE OF PSYCHOPHYSIOLOGICAL AND
MORPHOFUNCTIONAL INDICATORS OF HIGHLY QUALIFIED
ATHLETES ON THE RESULT OF SWIMMING THE DISTANCE OF 400
METERS FREESTYLE**

Olga Pilipko

Alina Pilipko

*Kharkiv State Academy of Physical Culture,
Kharkiv, Ukraine*

Purpose: to determine the influence of psychophysiological and morphofunctional indicators of highly qualified athletes on the result of swimming the distance of 400 meters freestyle.

Material and methods: analysis and generalization of literature sources, anthropometric and physiological measurements, testing of psychophysiological indicators, methods of mathematical statistics. The surveyed group consisted of finalists of the Championships and Cups of Ukraine in swimming at the distance of 400 meters freestyle, who had the level of sports qualifications Master of Sports of Ukraine.

Results: the authors characterized psychophysiological and morphofunctional indicators of highly qualified athletes who specializing in freestyle swimming at the distance of 400 meters, determined the degree of their influence on the result of overcoming a competitive distance of 400 meters.

Conclusions: indicators of morphological and functional development of swimmers are more important for achieving high results at the distance of 400 meters freestyle than psychophysiological parameters; the construction of the training

process of highly qualified athletes who have various distance specialization should be carried out taking into account the degree of influence of the morphofunctional and psychophysiological indicators of the structure of special preparedness on the competitive result.

Keywords: highly qualified swimmers, freestyle, 400 meters, psychophysiological and morphofunctional indicators, influence.

Introduction

The constant growth of results, rapidly growing competition in modern swimming dictates the need to find the most promising ways to optimize training and competitive activities [3; 9; 14; 17].

The comprehensive analysis of the indicators of the structure of special preparedness of athletes allows to determine the most significant parameters by their influence on the result. Taking them into account in the process of construction the training process will improve the preparation of highly qualified athletes, which in turn will lead to improved sports results.

Currently, indicators of technical and tactical skills, anthropometric development, functional training of skilled swimmers, which are significant at distances of different lengths were fully considered by experts in the field of sport swimming [1; 6; 7; 8; 10; 13; 15; 16]. However, the study of psychophysiological parameters is relatively stay away, and the morphofunctional characteristics of athletes need continuous updating [2; 4; 5; 11; 12].

Carrying out of researches in this direction will allow to open new prospects in the decision of a problem of improvement of training activity taking into account distances specialization of highly skilled sportsmens-swimmers.

The purpose of the study: to determine the influence of psychophysiological and morphofunctional indicators of highly qualified athletes on the result of swimming the distance of 400 meters freestyle.

Objectives of the study:

1. To explore the features of morphofunctional development of highly qualified

athletes who specialize in freestyle swimming at the distance of 400 meters.

2. To characterize the psychophysiological parameters of highly qualified swimmers who successfully overcome the competitive distance of 400 meters freestyle.

To determine the degree of correlation between psychophysiological and morphofunctional indicators of highly qualified athletes and the result of overcoming the distance of 400 meters.

Material and Methods of the research

The following methods were used to solve the tasks: analysis and generalization of literature sources, anthropometric and physiological measurements, testing of psychophysiological indicators, methods of mathematical statistics.

Experimental data were collected at the Swimming Championships and Cups of Ukraine. The surveyed group consisted of finalists on the distance of 400 meters freestyle in the amount of 12 people. All athletes who took part in the experiment were members of the Ukrainian swimming team and had the level of qualification of the Master of Sports of Ukraine.

Results of the research

The result in swimming is determined by many factors, among which an important place is given to morphofunctional and psychophysiological parameters.

Peculiarities of morphofunctional development of stayer swimmers were evaluated by us on the basis of measurement of longitudinal, transverse and embracing body dimensions and indicators of functional development.

A total of 34 parameters were considered.

Based on the obtained digital material, it became the possible to build a morphofunctional profile of athletes who specialize in the distance of 400 meters freestyle (Figure 1).

Swimmers of this specialization have average values of length ($185,58 \pm 7,69$ cm) and mass of body ($75,42 \pm 5,92$ kg), girth of the chest (at rest: $98,17 \pm 4,28$ cm, on the breath: $104,95 \pm 5,49$ cm, on exhalation: $95,00 \pm 4,73$ cm). They have long limbs and their segments, strong physique, normosthenic type of

constitution.

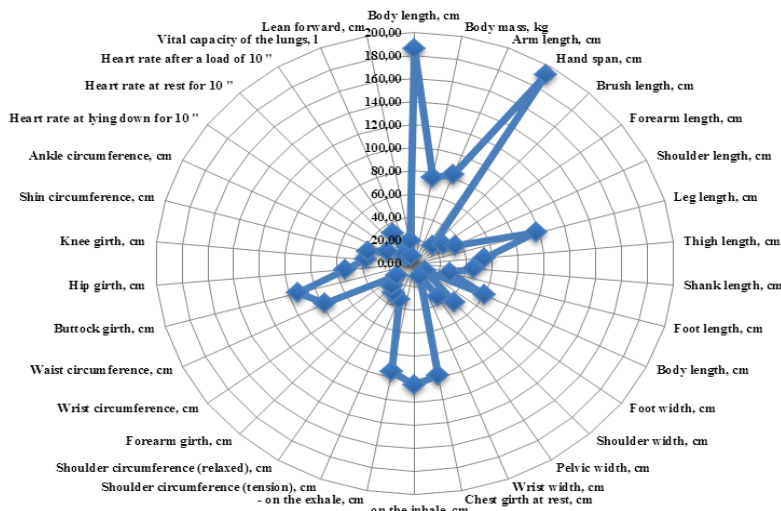


Figure 1. Morphofunctional profile of highly qualified athletes who specialize in freestyle swimming at the distance of 400 meters

These athletes have good flexibility, as evidenced by the results of the test «tilt forward» ($20,07 \pm 5,04$ cm).

The parameter of vital capacity of the lungs, which is one of the main indicators of the state of the external respiratory system, is at the level of $6,89 \pm 1,49$ liters.

These features are explained by the performance of work mainly in the area of aerobic energy supply, which places high demands on the functionality of swimmers and their morphotype.

The lack of large coverage of stayers, compared to sprinters, is explained the increased requirements for their hydrodynamic qualities — body balance in water, flow, buoyancy.

Assessment of psychophysiological characteristics of highly qualified swimmers who specialize in the distance of 400 meters freestyle, was carried out on the indicators: time of motor reaction to a sound stimulus; sense of time, concentration of the attention; frequency of movements for a given period of time; determination of extroversion and introversion of personality.

The average values of the studied parameters recorded in athletes in the tests are presented in the table 1.

Psychophysiological indicators of highly qualified athletes who specialize in freestyle swimming at the distance of 400 meters (n = 12)

№	Name	Test results					
		Reaction to a sound stimulus (s)	Sense of time (s)	Tapping-test (movements/10 s)	Aizenk questionnaire		Schulte test (number of digits for 15 s)
					Extraversion - Introversion (points)	Neuroticism (points)	
1	2	3	4	5	6	7	8
1.	Sh-ts K.	0,149	28,744	65,50	15	6	11
2.	R-k M.	0,168	24,5	56,83	15	5	16
3.	Sh-v M.	0,129	25,6	63,00	17	12	11
4.	M-y P.	0,151	28,59	61,33	18	14	11
5.	S-y O.	0,133	24,5	57,83	18	7	15
6.	V-ko V.	0,182	29,94	37	15	10	14
7.	G-v A.	0,163	23,42	34,33	15	16	13
8.	T-ko I.	0,174	30,84	42	19	11	14
9.	D-ko Ya.	0,198	31	39	19	12	12
10.	D-v D.	0,174	40	38,5	16	13	14
11.	K-ko M.	0,155	31,84	38	19	17	15
12.	K-y K.	0,147	34,2	50,33	10	11	13
The average values		0,16	29,43	48,64	16,33	11,17	13,25
The standard deviation		0,02	4,72	11,67	2,61	3,74	1,71

As can be seen from table 1, the results that characterize the speed of response to a sound stimulus are in the study group at the level of $0,16 \pm 0,02$ s on average, at the same time the most athletes showed the relatively stable values in each of the 10 attempts.

50% of the surveyed swimmers have a well-developed sense of time, 33,3% show a difference with the sense of real time to a lesser extent, in turn 16,7% have a slow sense of time.

The results of the Schulte test indicate that athletes of this specialization have both medium and high levels of concentration, because in the allotted time, swimmers found a relatively large number of digits. The average values in the group

were $13,25 \pm 1,71$ digits/15 s.

The first attempt during performing the tapping-test was the most effective in the surveyed swimmers (Figure 2).

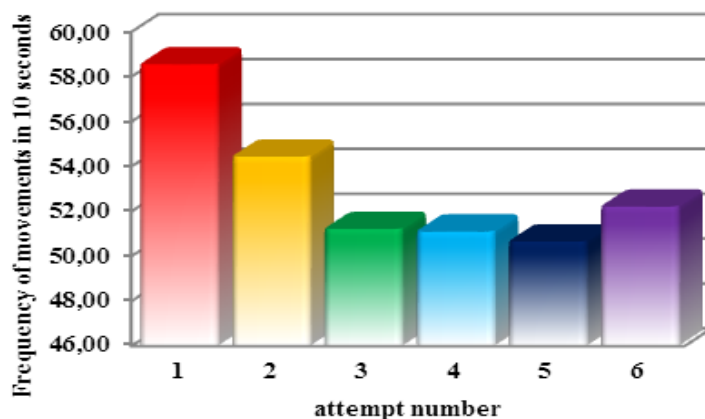


Figure 2. The results of the tapping test by highly qualified athletes who specialize in swimming at the distance of 400 meters freestyle

After a sharp deterioration in the second and third attempts, there was a relative stabilization with further improvement in the final attempt.

The results of testing on the Aizenk questionnaire allowed to reveal that almost all athletes in the surveyed group have an extroverted personality type.

In turn, the definition on the scale «emotional stability – neuroticism» revealed in 83.3% of swimmers the predominant features of emotional stability. Only two athletes, namely K-ko M. and G-v A., have indicators at the level of 17 and 16 points respectively, which indicates a pronounced neuroticism.

The analysis of the degree of correlation between morphofunctional development and sports results at the distance of 400 meters freestyle allowed us to conclude that the most important indicators for the demonstration of high sports results are arm span, torso length, shoulder girth in tension, ankle girth and vital capacity of the lungs (R is -0,53, -0,54, -0,63, -0,55, -0,50 respectively) (Figure 3).

Also significant indicators are the length of the arm (R=-0,45) and shin (R=-0,43), wrist circumference (R=-0,48) and resting heart rate (R=0,47).

Thus, the result of overcoming the distance of 400 meters by freestyle is

largely determined by the parameters of the girth size of the limbs and arm length, which provides a large «step» of the cycle of rowing movements, and the high rates of functional development.

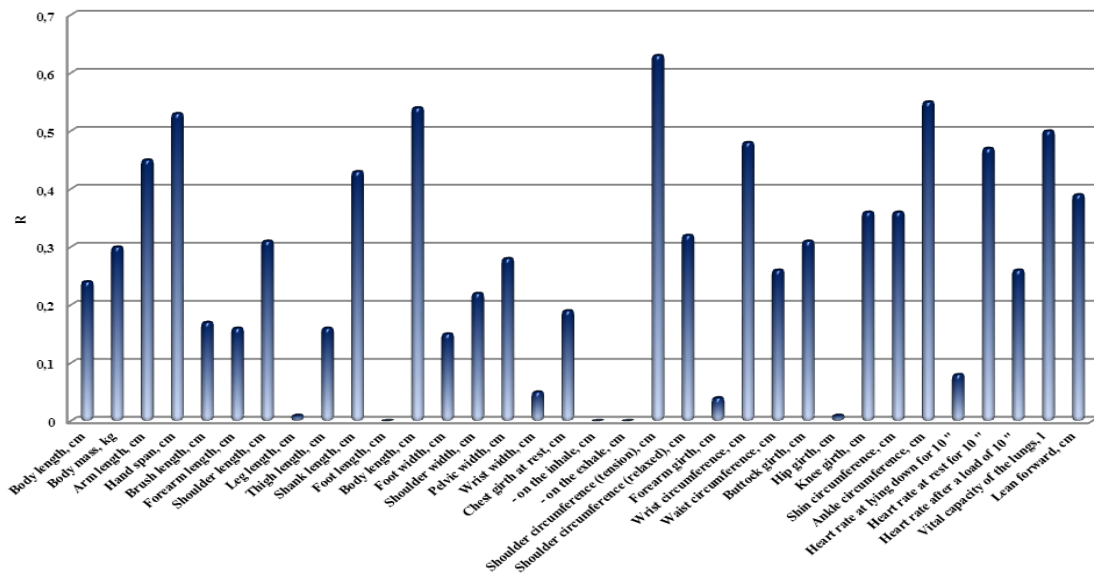


Figure 3. The degree of correlation between the morphofunctional indicators of highly qualified swimmers and sports result at the distance of 400 meters freestyle

In turn, the psychophysiological indicators of athletes insignificantly affect on the result of overcoming the distance of 400 meters (Fig. 4). Significant influence was recorded only in the parameter «response to a sound stimulus» ($R = -0,50$).

Swimmers-stayers should have a strong type of nervous system, which in turn is a necessary condition for the effective transfer of long-term monotonous loads.

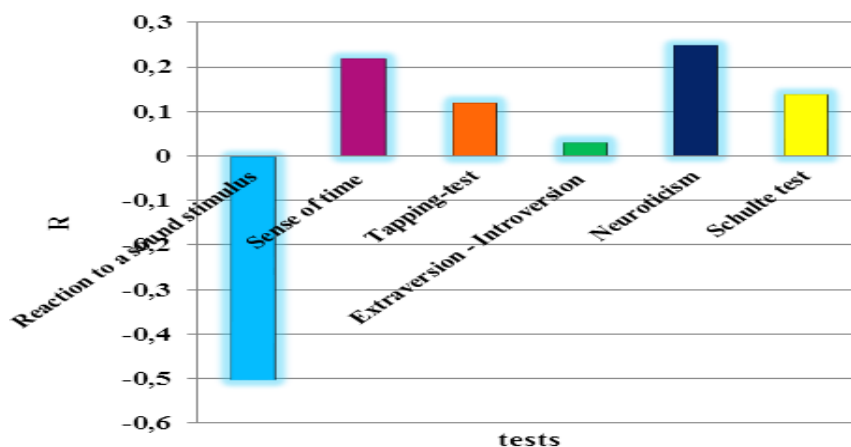


Figure 4 The degree of correlation between the psychophysiological parameters of highly skilled swimmers and sports results in the distance of 400

meters freestyle

The identified relationships should be taken into account during construction of the training process of athletes of this distance specialization, which will affect the achievement of high sports results.

Conclusions / Discussion

The results of the study confirm the existing opinion that the distance specialization of swimmers leaves an imprint on their morphotype.

It is proved that highly qualified athletes who specialize in freestyle swimming at the distance of 400 meters have: average values of length, mass and girth dimensions of the body, long limbs and their segments. They are characterized mainly by a strong type of nervous system, a well-developed sense of time, a high degree of concentration, extroverted personality type, emotional stability.

It was found that among the studied parameters of the structure of special preparedness of highly qualified swimmers the most influential on the result of overcoming the distance of 400 meters freestyle are indicators of morphofunctional development, while the relationship of psychophysiological parameters is quite insignificant except of the reaction to a sound stimulus.

Prospect of further research is to develop of model characteristics of the most important parameters of the structure of special preparedness of highly qualified athletes who specialize in freestyle swimming 400 meters.

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Information about the Authors

Olga Pilipko: PhD (Pedagogical), Professor; Kharkiv State Academy of Physical Culture: Klochkivska 99, Kharkiv, 61058, Ukraine.

ORCID.ORG/0000-0001-8603-3206

E-mail: pilipkoolga@meta.ua

Alina Pilipko: graduate student; Kharkiv State Academy of Physical Culture: Klochkivska 99, Kharkiv, 61058, Ukraine.

ORCID.ORG/0000-0001-5637-9070

E-mail: alin4ik209@gmail.com