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Somatotype and Psychophysiological Properties of Sportsmen

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Abstract

The article presents the relationship of physical qualities (relative strength, speed and stamina) and psychological qualities athletes (neuro-and psychodynamic features). Dynamic somatotip is defined through linkages between the somatic and psychophysiological properties of the athletes-swimmers on how Sheldon Heath-Carter. Identified the specific relationship of physical qualities and psychological qualities athletes-swimmers given the sport of specialization, qualification, age and gender differentiation.

Keywords Physical quality; Nejrodinamika; Psychodynamics; Dynamic somatotip; Sprinters and stayers; Sportsmanship; Morphology of the athletes

Introduction

In sports science, the question of the combination of physical qualities and psychological properties of athletes remains topical. Separately, neither the physical qualities nor the psychological properties of athletes can lead to the achievement of high results and athletic skill. The athlete can achieve sports achievements only when combined and interrelated technical, physical, functional and psychological preparedness [1].

The purpose of our study is to establish a connection between physical qualities (strength, speed, endurance) and the psychophysical properties of athletes (for example, sports swimming and swimmers) [2].

Methodology

We examined the features of neurodynamics and psychodynamics of 70 sportsmen-swimmers of high sports qualification at the age of 17-20 years (the most favourable for achieving a high sporting result in swimming) according to the qualification criteria ("master"-master of sports and master of sports of international class and "non-Masters"-candidates for masters of sports and first-class athletes) and gender (for 35 men and women) differentiation.

To study the neurodynamic characteristics of athletes, a questionnaire was used. With the purpose of duplicating the methodology of "vital indicators" we used an instrumental method of studying the neurodynamic properties of athletes. The strength of the nervous system was determined by the ratio of the reaction time to the last ten of the 100 light stimuli at the time of the reaction to the second 10 light stimuli according to the method. The dynamism of inhibition was determined by the ratio of the reaction time to the second 10 light stimuli at the time of the reaction to the first 10 stimuli; mobility of nervous processes was determined by the method of B.M. Teplova: the sensitivity of the nervous system was taken into account as a ratio inversely proportional to the strength of the nervous system. The balance (balance) was determined by the ratio of the indices of the first 50 stimuli to the second 50 stimuli. This method was used to examine 25 (15 sprinters and 10 stairers) swimmers who did not participate in the first series of the study. To investigate extraversion-introversion, neuroticism and self-evaluation, a questionnaire was used. For the study of anxiety, a questionnaire was used to study the plasticity-rigidity of the questionnaire [3-5]. In addition, we have analysed the literature data on this problem. To assess the dynamic somatotype of athletes, the Sheldon-Hit-Carter method was used [6-9].

The obtained data were subjected to mathematical processing with the help of Student's criterion and Pearson's linear correlation.

Results and Discussion

In our previous works it was found that among the men-masters and non-masters, and among the women-masters and non-masters were athletes with high, medium and low degree of excitation, mobility, inhibition, balance, extraversion, introversion, neuroticism, self-esteem. All the differences are statistically unreliable. Informativeness of neurodynamic and psychodynamic characteristics of swimmers by the criterion of "master-non-master" is insufficient and does not reflect the fullness of the essence of the features of these properties of swimmers [10,11]. The most informative was the criterion "sprinters-stayer", taking into account qualification, age and gender differentiation.

Swimmers are characterized by relative strength, speed, endurance. Sprinter and stayer perform different time work on speed, speed and endurance, so they are characterized by a specific relative strength, speed and endurance. The physical qualities of athletes depend on many factors (biochemical, physiological, maximum strength, reaction time, etc.), which are integrated into the morphological characteristics of athletes.

Thus, Bulgakova [1] believes that for success in swimming, growth (length of the body) is of great importance, the speed of navigation is closely linked with the strength of the athletes, the mobility of joints plays an important role, which helps most effectively to realize power capabilities, speed, and endurance. She writes that the strengths of swimmers are closely related to the characteristics of the physique, primarily with total dimensions (height and weight), girth characteristics and body composition. Those swimmers who have an

advantage in these indicators have a higher level of strength development [1].

We analysed the anthropometric characteristics of swimmers by the method of V. Sheldon in the modification. Carter recognized as a very convenient scheme for determining the dynamic somatotype, i.e. communication of somatic with psychophysiological characteristics of the subjects. By the degree of development of organs and systems, Sheldon identified three components, of which the somatic type is composed - endomorph, mesomorph and ectomorphy. The degree of expression of each of the three components, he estimated values from 1 to 7 points. Affiliation to the somatic type was determined by the dominant component of the formula, which was a scale of scores at equal intervals. The first component determines the degree of obesity. The second component determines the relative development of muscles and skeleton and assesses the degree of development of the musculoskeletal system. The third component determines the relative elongation of the human body. The extreme variants of each component are located on both sides of the distribution. Low scores for the first component determine a physique with a low amount of fat, and high-a physique with an increased fat content. At low scores of the second component, the skeletal and muscular systems are not developed enough, with high scores a good development of the musculoskeletal system takes place. The low scores of the third component are associated with the truncated segment of the body and a small value of the height-weight index. To determine the dynamic somatotype, the following morphological characteristics were measured: the total thickness of the fat folds (triceps, subscapular, upper podzpozvdoshnaya), shoulder diameters, hips, perimeters of the shin, shoulder, height, weight [7].

So, from the 20 morphological indices obtained, the differences between twelve of them are statistically significant. The analysis of intracorrelation connections of the studied indicators shows that the total number of connections turned out to be: for men - master sprinters-3, for non-men sprinters-8, for women: for master sprinters-5, for non-men sprinters-2. The analysis of intracorrelation connections of the morphology of swimmers ensures the identification of leading indicators that contribute to achieving a high result in swimming. In this study, the greatest number of connections (including mutual) was found in the diameter of the shoulder [11], weight [10], hip diameter and skin-fat fold [7]. It can be assumed that the most diagnostic for achieving a high result in swimming were indicators related to the 1 component (the total value of skin-fat folds), as well as the diameters of the shoulder, thighs and height-weight index. The diameters of the shoulder and hip reflect the bone structure of the body and more evidence of the effect on achieving a sporting result in swimming than the envelope values.

The distribution of the indices of component 1 indicates that swimmers have average scores; the highest scores were found among women and non-master sprinters, they have a slightly above average physique with a small body fat content. The distribution of the indicators of component 2 indicates that only perimeter data of the shin in men - masters and nemasterov and sprinters-exceed the average. The height-weight index is higher for men and stays. As for the relationship of somatic characters with psychophysiological methods of Sheldon-Heath-Carter, the master-sprinters are dominated by such qualities as confidence in posture and movements, energy, aggressiveness in competitions, striving for primacy, somatotonic extraversion compared to non-masters, and master-stayer prevail such qualities as restraint of movements, secretiveness of feelings, control over emotions, introversion, tolerance. Due to the fact that achieving athletic skill in swimming is impossible s sufficiently developed physical qualities, the subjects in this study achieved its highest results (MSIC, MS) for the development of physical qualities of both the sprint and in the stayers distances: to sprint-relative strength, speed, distance to the stayers-endurance.

The correlation analysis between physical qualities and psychological properties revealed a positive correlation between the relative strength as the physical quality of the sprinters (50, 100 m) and the excitation force (r=0.84), mobility (r=0.82), increased sensitivity (r=0.75), dynamic braking (r=0.54), on the balance-unbalance scale, the predominance of imbalance (r=0.67), reduced inhibition force (r=0.58), extraversion (r=0.88), neuroticism (r=0.77), anxiety (r=0.57), plasticity (r=0.69) and increased self-esteem (r = 0.48) as the psychological properties of athletes at a 0.01 level of significance.

The correlation analysis revealed positive links between speed endurance as the physical quality of athletes specializing in a distance of 200 m, with an average degree of excitation (r=0.71), sensitivity (r=0.54), mobility (r=0.67), strength (r=0.51), dynamism of inhibition (r=0.49), balance (balance between strength and weakness of nervous processes) (r=0.56), ambiguity (r=0.82), normosthenia (r=0.78), anxiety (r=0.58), plasticity (r=0.66) and increased self-esteem (r=0.55) as psychological properties of athletes at 0.01 level chimosti.

The correlation analysis revealed positive links between endurance as physical quality of the stayer (400,800,1500 m) with reduced excitation strength (r=0.87), sensitivity (r=0.72), decreased dynamics of inhibition of nervous processes (r=0.54) , the average degree of mobility (r=0.61) and the inhibitory force (r=0.53), balance (balance between strength and weakness of nervous processes) (r=0.86), introversion (r=0.93), emotional (r=0.89), decreased anxiety (r=0.75), rigidity (r=0.82) and self-esteem within the norm (r=0.77) as psychological properties and athletes at the 0.01 level of significance.

Conclusion

1. Physical qualities of swimmers are integrated in the morphological characteristics associated with the psychophysiological properties of athletes.

2. The most diagnostic to achieve a high result in swimming were indicators related to the I component (the total value of skin-fat folds), as well as the diameters of the shoulder, hips and height-weight index. The diameters of the shoulder and hip reflect the bone structure of the body and more evidence of the effect on achieving a sporting result in swimming than the envelope values.

3. In connection with the somatic characteristics of psychophysiological found that the master sprinters are dominated by such qualities as confidence in posture and movements, energy, aggressiveness in competitions, the desire for primacy, somatotonic extraversion in comparison with nemasterov, and among the master-stayer predominate such quality, like restraint of movements, concealment of feelings, control over emotions, introversion, tolerance.

4. A positive correlation was established between the relative strength as the physical quality of the sprinters (50, 100 m) and the excitation force, mobility, increased sensitivity, dynamism of inhibition, on the balance-unbalance scale by the predominance of unbalance, decreased braking force, extraversion, neuroticism, anxiety, plasticity and increased self-esteem.

5. The positive correlation between speed endurance as the physical qualities of athletes specializing in the distance of 200 m, with an average degree of excitation, sensitivity, mobility, braking force, balance (balance between strength and weakness of nervous processes), ambiguity, normosthenia, plasticity and increased self-esteem .

6. A positive correlation was established between hardiness as physical quality of the stayer (400,800,1500 m) with reduced excitation power, sensitivity, decreased dynamism of inhibition of nervous processes, moderate mobility and braking power, balance (balance between strength and weakness of nervous processes), introversion, emotional stability, decreased anxiety, rigidity.

7. We can assume that the optimal formation of physical qualities of swimmers is possible with the revealed psychological properties and vice versa, the psychological properties of athletes with the physical qualities of swimmers can be most adequately manifested. A specific relationship between the physical qualities and psychological properties of swimmers has been identified, taking into account sports specialization, qualification, age and gender differentiation.

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