ФІЗИЧНА КУЛЬТУРА І СПОРТ

PREDICTION OF SPORTS RESULTS IN YOUNG SWIMMERS

ПРОГНОЗУВАННЯ СПОРТИВНИХ РЕЗУЛЬТАТІВ У ЮНИХ ПЛАВЦІВ

Bakiko I. V.[1], Dmytruk V. S.[2], Romaniuk A. P.[3]

[1, 2]*Lutsk National Technical University, Lutsk, Ukraine*
[3]*Lesya Ukrainka Volyn National University, Lutsk, Ukraine*
[1]*ORCID: 0000-0002-8835-8781*
[2]*ORCID: 0000-0002-4778-010X*
[3]*ORCID: 0000-0001-7157-6929*

Abstracts

Background and Study Aim. Study of stability of results of the morphofunctional condition, physical fitness and competitive activity is the main predictor of an athlete's individual development: if these indicators are stable, then the development can be predicted the prediction will be inaccurate due to the high variability of the results of multi-year observations. This will allow to determine the potential movement capabilities of those who are engaged, this will make it possible to more rationally plan the volume of training loads in the annual training cycle, choose adequate training means. **The aim of the study** – to determine the criteria for predicting sports results in freestyle swimming at a distance of 100 m in young swimmers aged 16 years. **Material and Methods.** 35 young swimmers aged 10–16 years took part in the research. The research was conducted in the sports complex of Lutsk National Technical University (LNTU) in April 2024. The following methods were used in the work: theoretical analysis of literary data, methods of determining the morphofunctional state, methods of identifying hydrodynamic qualities, methods of determining the biological maturation of an organism; pedagogical control tests (swimming distances – 25 m, 50 m, 100 m, 200 m freestyle); methods of mathematical statistics. **Results.** The stablest indicators are the body length, length of a foot, a hand and foot. During all analyzed age periods the reliable interrelation between length of sliding and the maximum speed of swimming which considerably increases with age is revealed. Initial sports results with different level of maturing of an organism make unequal impact on sporting achievements of young swimmers at the age of 16 years at various distances. In process of increase in length of a distance stability of indicators of competitive activity increases. During predicting sports results in freestyle swimming at the age of 16, the initial results, the rates of their growth during the period of the first two years of training, the level of biological development of young swimmers were taken into account. **Conclusions.** The presented materials can be used for forecasting of expected development of physical readiness of young swimmers.

Key words: forecasting, sports result, morphological and functional indicators, hydrodynamic qualities, level of biological maturing of an organism.

Передумови та мета дослідження. Вивчення стабільності результатів морфо-функціонального стану, фізичної підготовленості та змагальної діяльності є основним прогнозуванням індивідуального розвитку спортсмена: якщо ці показники стабільні, то розвиток можна прогнозувати, прогноз буде неточним за високої варіативності результатів багаторічних спостережень. Це дозволить визначати потенційні рухові можливості спортсменів, дасть можливість більш раціонально планувати обсяги тренувальних навантажень у річному циклі підготовки, підбирати адекватні тренувальні засоби. **Мета дослідження** – визначити у юних спортсменів віком 16 років критерії прогнозування

спортивних результатів у плаванні вільним стилем на дистанції 100 м. **Матеріал та методи.** У дослідженні взяли участь 35 юних плавців віком 10–16 років. Дослідження проводили у спортивному комплексі Луцького національного технічного університету (ЛНТУ) у квітні 2024 року. У роботі були використані такі методи, як: теоретичний аналіз літературних даних, методи визначення морфо-функціонального стану, методи виявлення гідродинамічних якостей, методи визначення біологічного дозрівання організму; педагогічні контрольні випробування (пропливання дистанцій – 25 м, 50 м, 100 м, 200 м вільним стилем); методи математичної статистики. **Результати.** Найбільш стабільними показниками є довжина тіла, стопи та кисті. Протягом усіх проаналізованих вікових періодів виявлено достовірний взаємозв'язок між довжиною ковзання та максимальною швидкістю плавання, яка значно зростає з віком. Вихідні спортивні результати з різним рівнем дозрівання організму неоднаково впливають на спортивні досягнення юних плавців віком 16 років на різних дистанціях. У міру збільшення довжини дистанції підвищується стабільність показників змагальної діяльності. У разі прогнозування спортивних результатів у плаванні вільним стилем у віці 16 років враховувалися початкові результати, темпи їхнього приросту за період перших двох років занять, рівень біологічного розвитку юних плавців. Після двох років занять плаванням з'являється можливість певною мірою прогнозувати спортивні результати 16-річних юнаків. **Висновки.** Представлені матеріали можуть бути використані для прогнозування очікуваного розвитку фізичної підготовленості юних плавців.

Ключові слова: прогнозування, спортивний результат, морфо-функціональні показники, гідродинамічні якості, рівень біологічного дозрівання організму.

Introduction. The results of performances of world-class swimmers show that the highest attainments in swimming are achieved only by especially gifted athletes who possess a certain morphological structure of the body, the highest level of physical and mental abilities, as well as the perfection of technical and tactical skills [2; 6; 21].

Swimming as a sport is characterized by the following features: first of all, it is a special environment in which a person lies horizontally, almost in a weightless condition [9; 20]. The thermal conductivity of water is much higher than that of air – this activates biochemical processes that are associated with the release of heat, and muscle activity increases them even more, thereby hardening a person, developing his physical capabilities [1; 7; 10].

Swimming is one of the most widespread and popular modern sports, it belongs to cyclic sports and includes six disciplines – freestyle, breaststroke, backstroke, butterfly, complex swimming, relay swimming [4; 14; 16]. Sports swimming is, first of all, a struggle for the speed of overcoming certain distances [5; 13]. To do this, it is necessary to master such a swimming technique that allows you to show the highest speed and at the same time spend energy sparingly [3; 12].

The study of the stability of the results of the morphofunctional state, physical fitness and competitive activity is the main predictor of the individual development of an athlete: if these indicators are stable, then the development can be predicted, the prediction will be inaccurate due to the high variability of the results of many years of observations [15; 18]. This will make it possible to determine the potential movement capabilities of those who practice, will make it possible to more rationally plan the amount of training loads in the annual training cycle, to select adequate training equipment means [17; 19].

The purpose of the research is to determine the criteria for predicting sports results in freestyle swimming at a distance of 100 m among young athletes aged 16.

Material and Methods.

Participants: 35 young swimmers aged 10–16 took part in the study. The study was conducted according to the Declaration of Helsinki (2013) and approved by the host university ethics committee.

Procedure: the research was conducted in the sports complex of the Lutsk National Technical University (LNTU) in April 2024. Research methods: theoretical analysis of literary data, methods of determining the morphofunctional state, methods of identifying hydrodynamic qualities, methods of determining the biological maturation of an organism; pedagogical control tests (swimming distances – 25 m, 50 m, 100 m,

200 m freestyle); methods of mathematical statistics.

Statistical analysis: informed consent for participation in this experiment was obtained from all participants. Systematization of the received data was carried out in Microsoft Office Excel spreadsheets. Statistical analysis was performed using the SPSS 22 program.

Results. We studied the dynamics of indicators of physical development of young swimmers aged 10–16 by generalizing method. The most stable indicators are the length of the body, the length of the leg, arm and foot. Thus, already at the age of 10–11 years, it is possible to predict with sufficient probability the body length of high school students, which play an important role in this sport.

Body weight, the vital capacity of the lungs and bone dynamometry have less stability, as indicated by the correlation indicators between juvenile and definitive signs. These indicators are more influenced by environmental factors. In the period of puberty, there is a decrease in the correlations between the analyzed indicators, which complicates the possibility of forecasting in this period of the child's development. Streamlining, buoyancy and balance of the body in water depends on the features of the physique and body weight and vital capacity of the lungs. The length of gliding in the water is the main indicator of the fluidity and buoyancy of the body. In all analyzed age periods, a reliable relationship between the length of the slide and the maximum swimming speed was found ($r = 0.520$–0.661). The relationship between repeated measurements of the length of the glide in swimmers 10–16 years old reaches reliable values. With age, the correlation of these indicators increases noticeably, and with the growth of sportsmanship, the informativeness of this characteristic increases. Mobility indicators in the shoulder and ankle joints are the most stable in the analyzed age range ($r = 0.666$–0.995). As age increases, the correlation of these indicators increases. The results of static strength are more stable compared to the strength of traction in water, indicating that the special strength fitness of swimmers is largely determined by the

indicators of training activity. According to our data, breath retention indicators are less stable: the correlation between ages 10 and 16 is only 0.276, and between 15 and 16 years – 0.674. In the accelerated type of development, an intensive increase in sports results was found at the age of 10–12 years, the normal type – at 12–13 years, and the retarded type – at 13–15 years. Initial sports results with different levels of maturation of the body have a different effect on the sports achievements of young swimmers at the age of 16 in different distances (Table 1).

Table 1

The value of the initial results of young swimmers with different levels of body maturation

Distance length, m	Value of initial results, %		
	Retardants	Normal type	Accelerate
25	9.1	15.4	22.2
50	12.6	17.7	25.8
100	11.7	19.5	24.6
200	13.3	18.6	30.4

Retardant swimmers have the lowest significance (from 9.1 to 13.3%) of initial results at distances of 25–200 m, and accelerated swimmers have the highest significance of initial results (from 22.2 to 30.4%). Swimmers with a normal type of development occupy an intermediate position in the significance of the initial results. We also found a pattern of increasing significance of the initial results as the swimming distance lengthened.

High increases in sports results among young swimmers aged 10–12 years are replaced by their significant decrease ($r = -(0.38$–$0.74)$), with an average level of increase in these indicators, stable changes are noted in the future, with a low level of increase in sports results contradictory changes of the studied characteristic appear. According to our data, at the age of 10–13 years, the anthropometric indicators of young swimmers significantly affect the sports results at distances of 25–200 m, the highest correlation was found with body length ($r = -0.56$–0.72). As age increases, the importance of height and weight indicators gradually decreases. This

shows that at primary school age high sports results are shown by accelerated children who have a temporary advantage over peers with a lower level of physical development. At the age of 14–15, there is a clear decrease in correlation indicators, indicating the influence of the puberty jump. Up to the age of 16, the dependence of the sports result on the size of the total dimensions increases slightly again at distances of 25–200 m freestyle. So, when choosing a specialization in short-distance swimming, it is necessary to take into account the size of the total body size.

The results of the study convincingly prove that it is difficult to predict the potential opportunities of young swimmers based on the initial indicators of competitive activity. As the length of the distance increases, the stability of competitive activity indicators increases. It is only after two years of swimming lessons that it becomes possible to predict the sports results of 16-year-old boys to a certain extent. When predicting sports results in swimming, initial results, rates of their growth over the period of the first two years of training, and the level of biological development of young swimmers were taken into account. The regression equations have the following form: $y = AX_1 + BX_2 + C$, where y is the predicted result in swimming 100 m freestyle at the age of 16, s; X_1 – result in swimming 100 m in 10 years, s; X_2 – result at 12 years old, p. For retarded (a = 0.02; b = 0.37; c = 32.21), normal (a = 0.14; b = 0.32; c = 26.52) and accelerated (a = 0.22; b = 0.33; c = 10.31) types of development.

Example: at the age of 10, a young athlete showed a result in 100 m freestyle swimming of 1.14.7, and at the age of 12 – 1.06.3. This swimmer has a normal type of biological development. The calculated result at the age of 16 should be 58.20 s, the actual result is 58.7 s. Therefore, the actual and predicted results are marked by 0.5 s (0.9%). Undoubtedly, such a difference in sports results allows us to consider such a forecast quite accurate. The presented materials can be used to predict the expected sports result at the distance of 100 m freestyle in young swimmers.

Discussion. Individual forecasting is based on the processing of a large number of materials,

revealed average indicators from all aspects of the swimmer's training and comparing them with a specific person. So, for example, the analysis of 137 qualified freestyle swimmers revealed the main indicators of the special preparedness of swimmers, on the basis of which standards were determined for different levels of sports achievements. Comparing individual data with these model characteristics helps to assess the strengths and weaknesses of a swimmer's preparation, to give a forecast of his capabilities, and, accordingly, to implement a training strategy in planning. Prediction of physical fitness is based on the existing reference variants of correct movements. Thus, according to R. Haljand [11], in swimming, the requirements and guidelines are detailed in detail regarding the swimmer's main actions, limiting phases, movements in each phase separately and coordination of movements (R.B. Khalyand, 2011) [11]. In addition to the quantitative analysis of characteristics, there is also a substantive side of the technique. At the same time, certain deviations will be characterized by the physique, functional data, willpower qualities of the athlete-swimmer. The complex of morpho-functional model characteristics of high-class swimmers, depending on specialization, was developed by M.Yu. Yachnyuk et al. (2020) [22]. Comparison of individual data of a specific athlete with model indicators allows to determine their correspondence. Based on this correspondence, forecasting /determining the potential of the swimmer/ is carried out.

The analysis of the scientific and methodological literature has come to the conclusion that the prediction of sports results should be based on the study of a whole set of indicators. Among these indicators, an important role is played by the morphofunctional parameters of athletes (I.H. Hlukhov, 2021) [6]. In the works of I. Hruzevych et al. (2017) [8] it is noted that athletes of various swimming methods have certain features of morphofunctional development. Our research confirms the facts about the significance of predicting a competitive result to competitions in competitive swimming. The authors of the article supplemented the

information about the predicting role of a competitive result, which is of great importance for the preparation of athletes for sports competitions.

Conclusions. When predicting sports results in freestyle swimming for boys at the age of 16 (the level of multiple regression was calculated), the initial sports results at the age of 10, their growth rates during the first two years of training, and the level of their biological development were taken into account.

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