Methodology for determining model characteristics based on the study of weight and height indicators of highly qualified women wrestlers

https://doi.org/10.65149/eajss.2026.v6i5.a010

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Abstract

This scientific work analyzes modern approaches to selecting and guiding athletes in women's wrestling. The study examines the level of physical development, abilities, and anthropometric indicators (height, weight, and body proportions) of young athletes as the primary criteria. When predicting sports results, individual characteristics and their interdependence are scientifically substantiated. During the work, optimal age periods, morpho-functional indicators, and selection criteria for the effective selection of female wrestlers are determined. The results obtained serve to develop scientific and practical recommendations aimed at improving the training process and achieving high results in sports schools and specialized institutions. Additionally, during the research process, indicators of speed, agility, strength, special endurance, coordination abilities, and technical-tactical training of young athletes were comprehensively evaluated. It is scientifically substantiated that in determining promising athletes in women's wrestling, alongside anthropometric indicators, factors such as their psychological stability, level of adaptation to competitive conditions, stress resistance, and decision-making speed are of great importance. The study developed a multi-stage selection system for athletes, which proposes evaluation criteria corresponding to the stages of preliminary selection, specialized orientation, and high athletic mastery. Based on the obtained data, the possibilities of early identification of individual capabilities of athletes, their correct distribution by weight categories and forecasting future sports results are highlighted. The results of the study will serve as the basis for developing methodological recommendations for coaches aimed at organizing the selection process for female wrestlers on a scientific basis, individual planning of training loads, and increasing the effectiveness of athlete training. Furthermore, the developed scientific and practical recommendations play an important role in improving the selection system in sports schools, specialized Olympic reserve colleges, and centers of higher sports mastery, as well as in training female wrestlers who are competitive in the international arena. The research results provide a theoretical and practical basis for determining the development prospects of women's wrestling, improving selection criteria, and implementing innovative approaches in the system of long-term athlete training.

Keywords: women's wrestling, sports, selection, age, athletes, ability, anthropometric, height, weight, prediction.

Introduction

The methodology for selecting young female wrestlers for women's wrestling has been improved by developing model characteristics based on the study of the height of highly qualified female wrestlers. In this case, when determining the model characteristics of 234 highly qualified female wrestlers, their height was determined, and height growth indicators at various age periods were determined.

In women's wrestling, the system for the effective selection and proper orientation of athletes largely depends on their anthropometric indicators, specifically their weight-to-height ratio. In modern sports science, identifying the model characteristics of highly qualified female wrestlers and conducting their comparative analysis with young athletes ensures the scientific validity of the selection process.

In the process of transitioning the system of competitions held worldwide in wrestling disciplines and the requirements for athlete training to a new level, as well as the selection and orientation of participants to various stages of long-term training, the use of scientifically significant methods and the most advanced technologies is becoming increasingly important. Large-scale measures are being organized to correctly organize the selection and orientation of young athletes in women's wrestling.

Today, one of the most priority tasks facing specialists in all sports is conducting scientific research aimed at identifying the main methods and factors for selecting and orienting girls in sports, developing modern methods aimed at finding scientific solutions to these problems, and implementing them into sports practice. Extensive scientific research is being conducted worldwide to study the contribution of women's wrestling to human physical development, the full expression of sports ethics, the proof of its effectiveness, and its further development, as well as the scientific substantiation of the system for training girls in women's wrestling. In particular, when selecting girls for all types of kurash, a selection system has been

created based on the development of their functional and physical fitness, technical and tactical actions, and physical qualities. Nevertheless, there is a need for scientific and practical research aimed at popularizing the study and teaching of wrestling at the global level, selecting and guiding young athletes in this sport, and forecasting the period of achieving high results in this field.

The main reforms in the field of physical culture and sports in our republic are aimed at popularizing this field and ensuring that the population regularly engages in sports. In this regard, this direction of state policy is aimed at solving tasks such as the "scientific study and monitoring of the physical development and fitness, functional state, technical-tactical, and psychological preparation of members of the Uzbekistan women's national wrestling team, as well as student-athletes and students of sports and educational institutions." To date, scientific research has not fully covered issues such as assessing the state of general and special physical fitness based on gender, age, and weight-height indicators in the process of selecting children for wrestling disciplines. The lack of mechanisms for the selection and orientation of children in wrestling requires the development and practical implementation of comprehensive tests to identify gifted children in wrestling. Based on the aforementioned data, it is considered relevant to conduct scientific research on involving children in regular sports, determining their inclination toward wrestling, and selecting gifted children.

The aim of the study is to develop proposals and recommendations for improving the methodology of selection and orientation in women's wrestling for various stages of long-term preparation.

Research objectives. Development of a specialized computer program (Web) aimed at automating control test results during selection and referral to women's wrestling, as well as assessing physical capabilities and fitness standards by weight category;

development of a specialized computer program (Web) aimed at automating control test results during selection and referral to women's wrestling, as well as assessing physical capabilities and fitness standards by weight category;

selection of highly qualified girls for various stages of long-term training and development of a mechanism for their orientation to women's wrestling based on the study of model characteristics of anthropometric indicators;

development of criteria for assessing physical qualities to determine general physical fitness indicators during the selection process for women's wrestling;

development of evaluation criteria for the selection and orientation of women's wrestlers of various categories in freestyle, judo, kurash, and belt wrestling.

development and experimental substantiation of the effectiveness of mechanisms for comprehensive control of technical indicators during the targeted selection of participants for various stages of preparation.

development of model characteristics and descriptions of functional fitness indicators for highly qualified girls in the selection and orientation of women's wrestling athletes toward multi-year training stages;

Methods

Scientific analysis of scientific and methodological literature, pedagogical experiments, questionnaires, pedagogical observations, pedagogical tests, instrumental methods ("Vmen rep," "Spirometer spiro usb," "Special hanging doll wrestler") and mathematical statistics formulas and methods were used.

In modern sports science, identifying the model characteristics of highly qualified female wrestlers and conducting their comparative analysis with young athletes ensures the scientific validity of the selection process.[2]

Results and discussion

In modern sports science, identifying the model characteristics of highly qualified female wrestlers and conducting their comparative analysis with young athletes ensures the scientific validity of the selection process. Among the anthropometric parameters, height and body weight are considered among the primary factors determining a wrestler's technical and tactical capabilities. For example, in athletes with relatively high height, arm and leg segments predominate, which gives them an advantage in grip and distance control. Conversely, athletes who are shorter in height but have a correspondingly higher weight gain stability and the ability to offer strong resistance due to the lower location of the

Table 1. .**Model characteristics of weight and height indicators of highly qualified female wrestlers (n=234)**

№	Weight categories (n=121)	Height (cm)							
		18 young $\bar{X}$ ±σ)	17 young $\bar{X}$ ±σ)	16-15 young $\bar{X}$ ±σ)	14 young $\bar{X}$ ±σ)	13 young $\bar{X}$ ±σ)	12 young $\bar{X}$ ±σ)	11 young $\bar{X}$ ±σ)	10 young $\bar{X}$ ±σ)
1	Lightest weight 50 kg. (n=27)	162±5,2	161,7±4,3	159,6±3,7	155,8±5,7	143,9±3,5	137,4±2,9	131,8±4,5	127,2±2,9
2	Welterweight 53 kg (n=24)	164±5,1	163,8±4,9	161,7±6,1	157,9±3,6	145,3±3,5	139,9±2,7	133,4±5,4	129,8±3,7
3	Lightweight 55 kg. (n=29)	166±3,8	164,8±4,2	162,6±3,8	159,8±4,9	146,1±5,6	140,6±3,9	135±4,5	130,4±3,6
4	Welterweight 57 kg (n=20)	168±5,7	167,7±6,3	165,6±3,6	161,8±5,2	148,9±3,9	142,4±3,5	137,8±4,6	132,2±4,2
5	Middleweight 59 kg. (n=28)	169±3,5	168,7±4,8	166,5±5,3	162,6±3,6	150,4±4,7	143,6±4,8	138,9±5,8	133,1±4,7
6	Welterweight 62 kg. (n=22)	172±3,6	171,7±4,5	169,5±5,2	165,6±6,3	152,4±4,8	145,6±5,6	140,9±6,2	135,1±5,3
7	Middle Heavyweight 65 kg. (n=26)	171±5,2	170,7±5,2	167,6±4,7	164,8±5,6	151,9±3,9	144,4±5,8	139,8±6,4	134,2±5,7
8	Heavyweight 68 kg. (n=17)	173±6,7	172,7±6,8	170,5±5,4	166,5±4,9	153,1±5,3	146,3±4,7	141,5±6,2	136,7±4,9
9	Top weight 72 kg. (n=13)	177±5,6	176,7±6,7	174,4±6,4	170,3±6,5	156,5±4,6	150,5±5,9	144,6±5,9	139,6±4,4

central point of gravity. The study of highly qualified female wrestlers shows that there is an optimal height-to-weight ratio for each weight category, and these indicators are closely related to the athlete's functional capabilities, speed, strength, and endurance qualities. On this basis, the concept of an "athlete model" is formed; that is, the average anthropometric indicators of athletes who achieved the highest results in a specific weight category are adopted as a benchmark. Analyses indicate that female wrestlers in the lightweight category are observed to be taller than their body weight, which enhances their speed and mobility characteristics. In the middle and heavyweight categories, on the contrary, the share of body mass increases, and the strength component prevails. At the same time, the balance between height and weight serves as a crucial factor determining an athlete's biomechanical efficiency. The use of these model indicators in the process of selecting girls for wrestling allows for the identification of promising athletes. Especially during the period of growth and development (10–18 years), constant monitoring of height growth rates and body weight dynamics is necessary. This helps to predict in which weight category the athlete will achieve high results in the future.[3]

Furthermore, during the orientation process, not only static indicators but also the morphological characteristics of the body structure (muscle

Fig 1. .**Model characteristics of weight and height indicators for highly qualified female wrestlers in the lightest weight category**

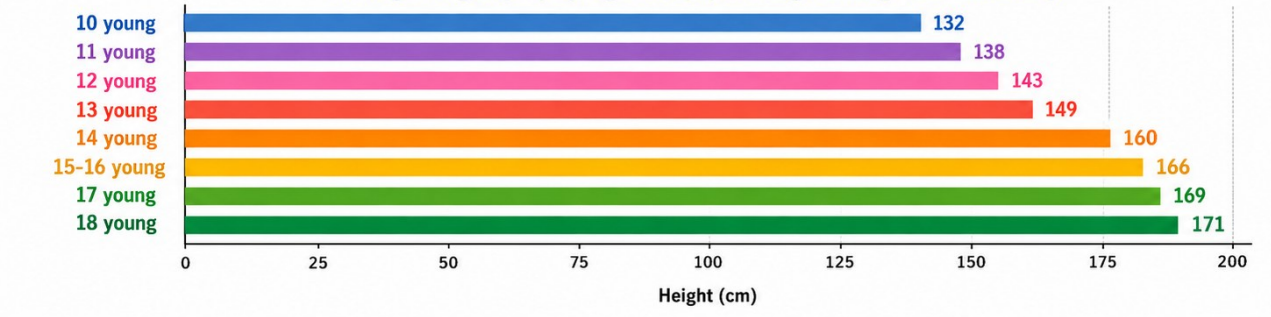
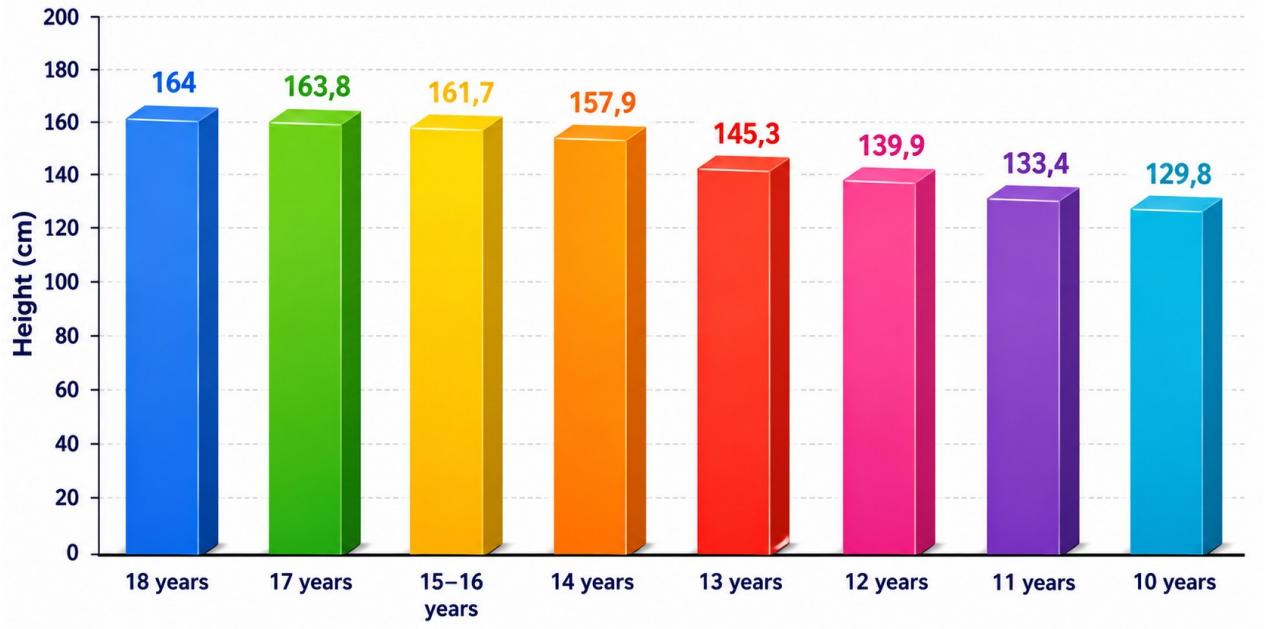


Fig 2. .Model characteristics of weight and height indicators for highly qualified female middleweight wrestlers



mass, fat layer, segment lengths) must be comprehensively evaluated (see Table 1).

Identifying these indicators using modern technologies, including biomechanical analysis and digital monitoring systems, further enhances sorting efficiency. The model characteristics developed based on the weight and height indicators of highly qualified female wrestlers serve to scientifically substantiate the process of selecting and guiding girls. This, in turn, plays an important role in the qualitative formation of the sports reserve and the training of competitive athletes in the international arena.

Specifically, in women's wrestling among adults, the lightest weight was 50 kg; the height of 27 highly qualified female wrestlers was studied and analyzed, and it was established that

Fig 3. Model characteristics of weight and height indicators for highly qualified female middleweight wrestlers

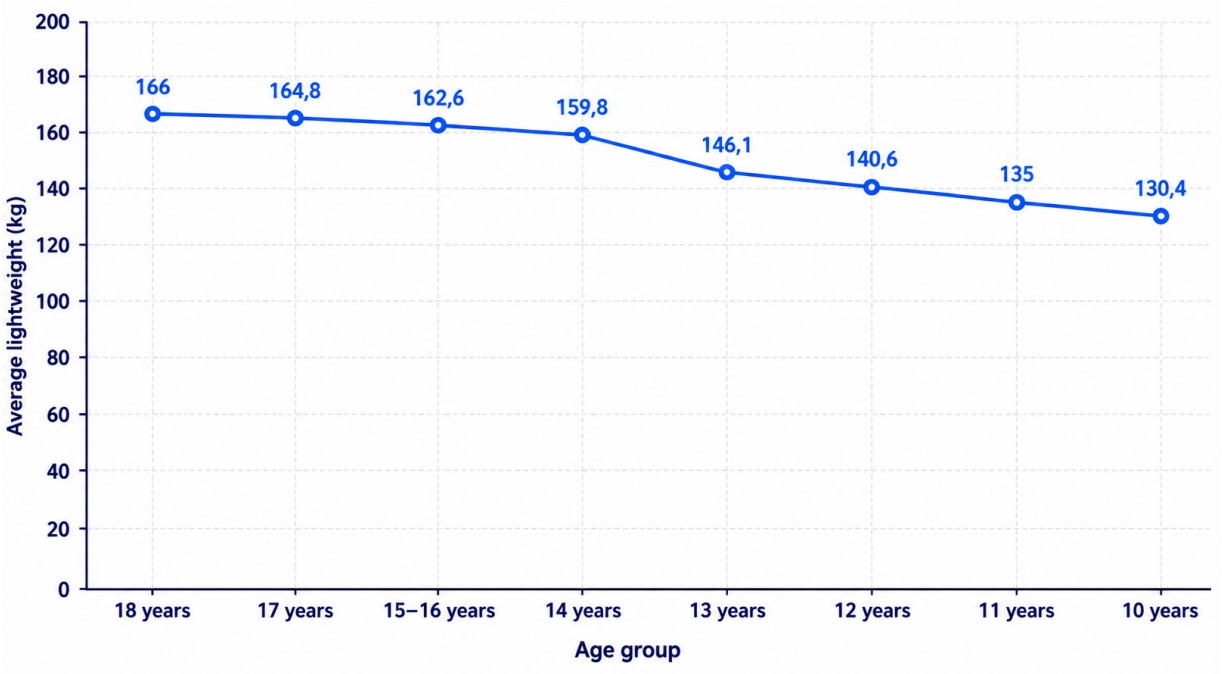


Fig 4. Model characteristics of weight and height indicators for highly qualified female semi-middleweight wrestlers

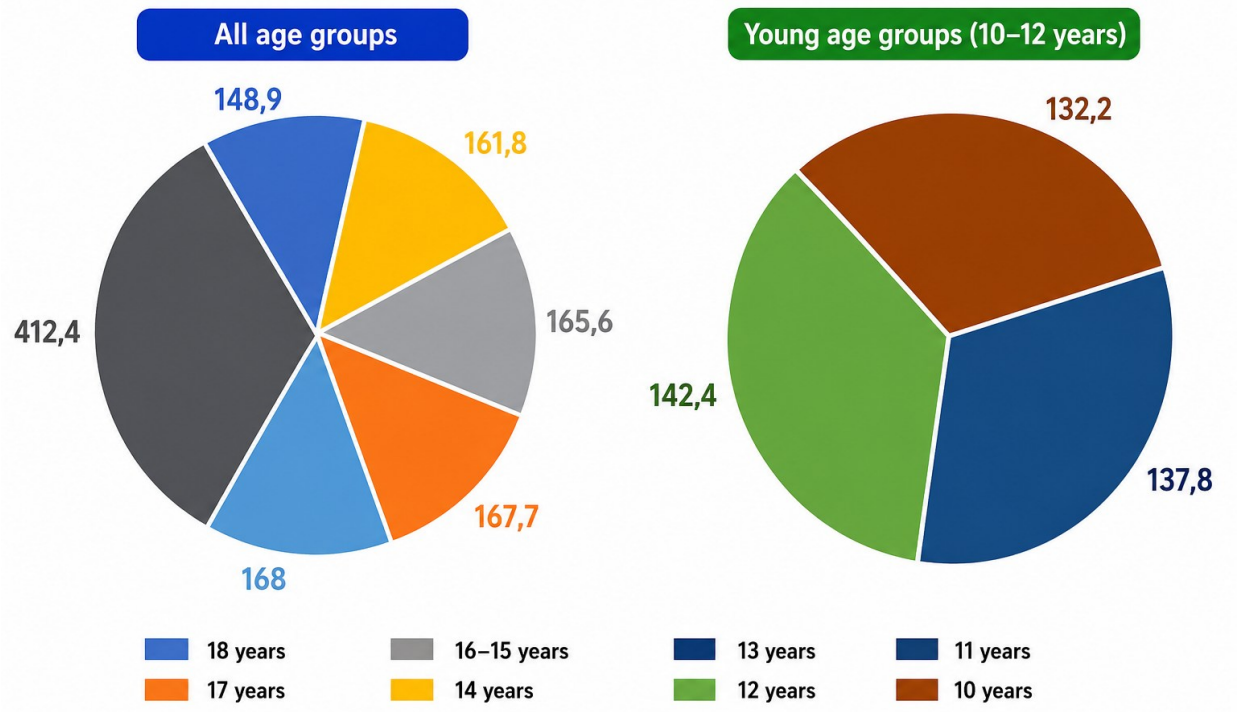
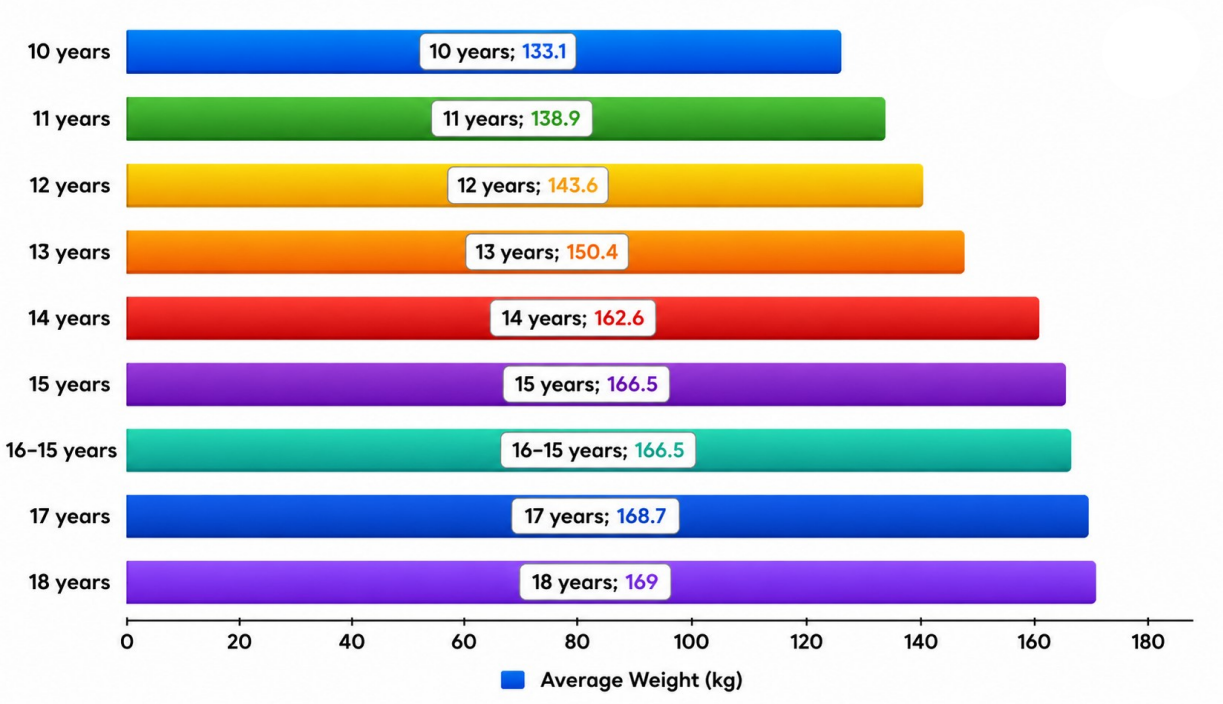


Fig 5. Model characteristics of weight and height indicators for highly qualified female middleweight wrestlers



the average height of female wrestlers at this time was 162±5.2 cm.

At 17 years of age, height increased by 161.7±4.3 cm; at 15-16 years, height increased by 159.6±3.7 cm; at 14 years of age, height increased by 155.8±5.7 cm; and at 13 years of age, height increased by 143.9±3.5 cm. By the age of 12, their height reached 137.4±2.9 cm; by the age of 11, it was 131.8±4.5 cm; and by the age of 10, it was 127.2±2.9 cm. It was estab-

Fig 6. .Model characteristics of weight and height indicators for highly qualified female wrestlers in the welterweight category

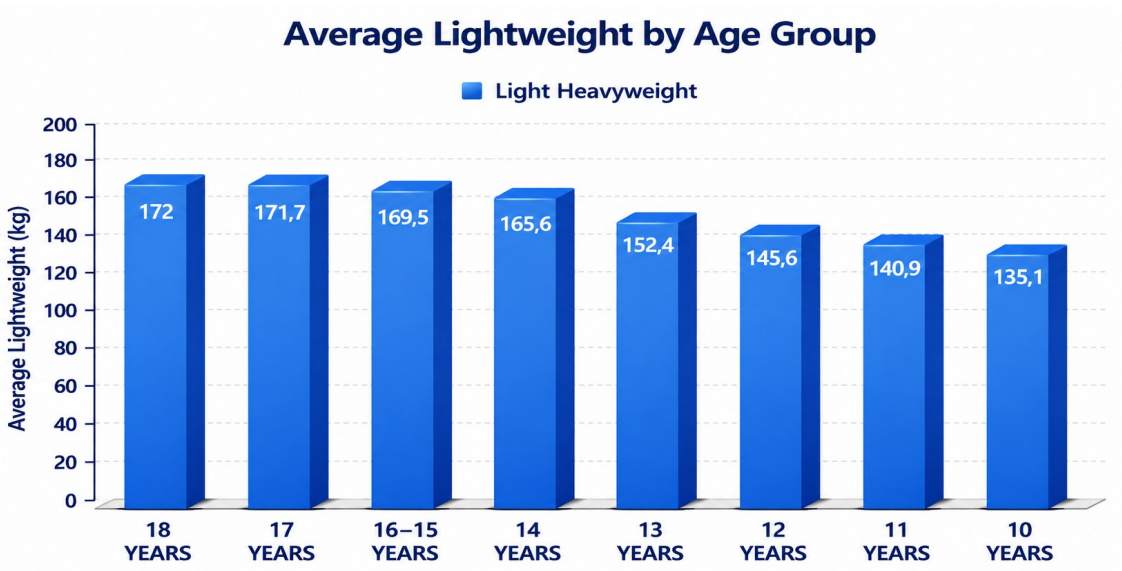
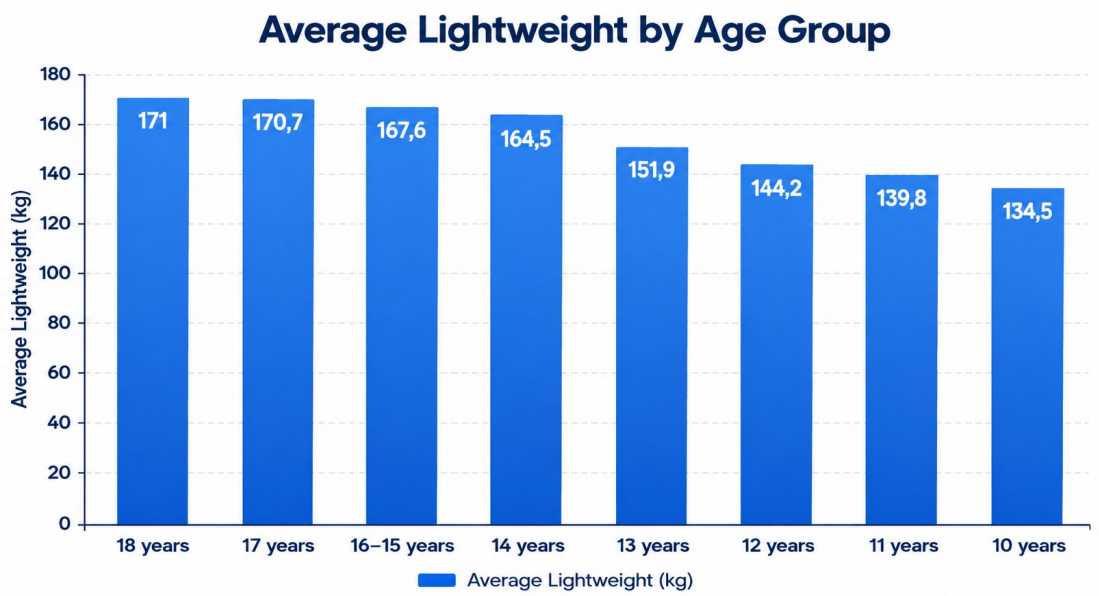


Fig 7. .Model characteristics of weight and height indicators for highly qualified female middleweight wrestlers

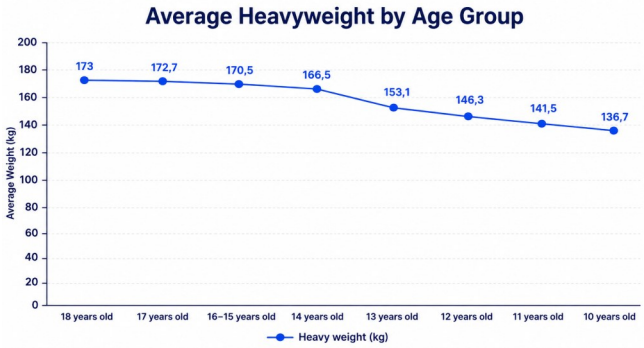


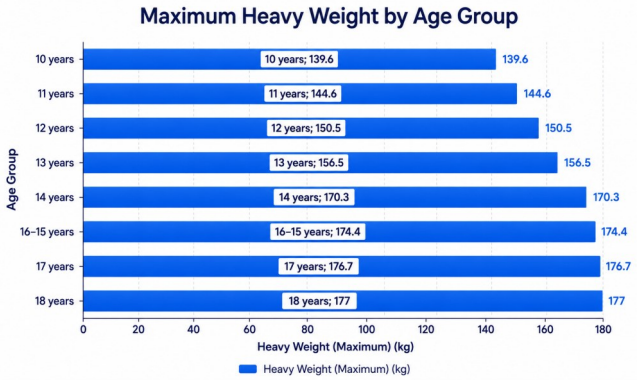
lished that the weight-height index of this wrestler is 28.3 (see Fig. 1).

The middleweight category was 53 kg, and the average height indicator of 27 highly qualified female wrestlers in this weight category was determined. When analyzing the results obtained, the total average height was 164±5.1 cm; according to our analysis of the age category, it was established that at 17 years of age, the height was 163.8±4.9 cm; at 15–16 years of age, the height was 161.7±6.1 cm; at 14 years of age, the height increased by 157.9±3.6 cm; and at 13 years of age, the height was 145.3±3.5 cm. By the age of 12, their height was 139.9±2.7 cm; by the age of 11, their height reached 133.4±5.4 cm; and by the age of 10, their height increased by 129.8±3.7 cm. It was established that the weight-height index of this wrestler is 24.5 (see Fig. 2).

Furthermore, when studying and analyzing the height of 29 highly qualified female wrestlers in the lightweight category of 55 kg, it was established that the total average height was 166±3.8 cm; according to our analysis of height growth in the age category, it was established that body length increased by 164.8±4.3 cm at

Fig 8. a) **Model characteristics of weight and height indicators for highly qualified female wrestlers in the welterweight category**
b) **Model characteristics of weight and height indicators for highly qualified female wrestlers in the heavyweight category** *(from left to right)*





age 17, and by the time they reached 15–16 years of age, their total average height increased by 162.6±3.8 cm. at the age of 14
159.8±4.9 cm. By the age of 13, it was 146.1±5.6 cm; by the age of 12, it was 140.6±3.9 cm; by the age of 11, it was 135±4.5 cm; and by the age of 10, it was 130.4±3.6 cm. It was established that the weight-height index of this wrestler is 28.3 (see Fig. 3).

The weight category for the welterweight category was 57 kg; based on the weight and height indicators of 24 highly qualified female wrestlers in this weight category, their total average height indicators were analyzed. 168±5.7 cm, and at 17 years of age, their height was 167.7±6.3 cm; at 15-16 years of age, their height was 165.6±3.6 cm; at 14 years of age, their height was 161.8±5.2 cm; and at 13 years of age, their height was 161.8±5.2 cm. 148.9±3.9 cm; by the age of 12, their height was 142.4±3.5 cm; by the age of 11, their height increased by 137.8±4.6 cm; and by the age of 10, their height increased by 132.2±4.1 cm. It was established that the weight-height index of this wrestler is 27.5 (see Fig. 4). The weight-height indicators of 22 highly qualified female wrestlers in the welterweight category were 62 kg; the average height indicator at this time was 172±3.6 cm, and according to the age-related analysis of height growth, this indicator was 17 years old.An increase of 171.7±4.5 cm was identified. And at 15-16 years of age, height 169.5±5.2 cm, and by the age of 14, their height was 165.6±6.3 cm; by the age of 13, it was found that the height of this age category was 152.4±4.8 cm, By the age of 12, the height increased by 145.6±5.6 cm. At 11 years of age, height increased by 140.9±6.2 cm, and at 10 years of age, height increased by 135.1±5.3 cm. It was established that the weight-height index of this wrestler is 25.4 (see Figure 6).

The weight category of the middleweight category was 59 kg; when studying and analyzing 28 highly qualified female wrestlers, the average height indicator was 169±3.5 cm; at age 17, this indicator increased by 168.7±4.8 cm; at age 15–16, it was 166.5±5.3 cm; at age 14, it was 162.6±3.6 cm; at age 13, it was 150.4±4.7 cm; at age 12, it was 143.6±4.8 cm; at age 11, it was 138.9±5.8 cm; and at age 10, it was 133.1±4.7 cm.

Also, the middleweight weight was 65 kg, and the height of 26 highly qualified female wrestlers in this weight category was studied and analyzed. According to the results of the analysis, the average indicator of total height length

171±5.2 cm, and in our analysis of the age category, it was found that at 17 years of age, this indicator increased by 170.7±5.2 cm. At 15–16 years of age, their height was 167.6±4.7 cm; at 14 years of age, their height was 164.8±5.6 cm; at 13 years of age, the height of this age group was 151.9±3.9 cm; and at 12 years of age, the height increased by 144.4±5.8 cm. 11 years old

139.8±6.4 cm, and by the age of 10, their height was 134.2±5.7 cm. An increase in height was observed. The weight-height index of this wrestler was 27.5 (see Fig. 7).

Additionally, the weight category was 68

kg, and the height of 17 highly qualified female wrestlers in this weight category was studied and analyzed. According to the results of the analysis, the average indicator of total height length

173±6.7 cm, and in our analysis of the age category, it was found that at 17 years of age, this indicator increased by 172.7±6.8 cm. At 15–16 years of age, their height was 170.5±5.4 cm; at 14 years of age, their height was 166.5±4.9 cm; at 13 years of age, the height of this age group was 153.1±5.3 cm; and at 12 years of age, it was 146.3±4.7 cm. 11 years old

141.5±6.2 cm, and by the age of 10, their height was 136.7±4.9 cm. An increase in height was observed. It was found that the weight-height index of this wrestler is 27.5.

Based on the above data, we determine the weight and height of young athletes entering wrestling and predict which weight they will show high results in the future based on weight-height indicators (see Figure 8).

The heaviest weight was 72 kg, and the height of 13 highly qualified female wrestlers in this weight category was studied and analyzed. According to the results of the analysis, the average indicator of total height length

177±5.6 cm, and in our analysis of the age category, it was found that at 17 years of age, this indicator increased by 176.7±6.7 cm. At 15–16 years of age, their height was 174.4±6.4 cm, and at 14 years of age, their height was 170.3±6.5 cm; at 13 years of age, the height of this age category was 156.5±4.6 cm. By the age of 12, the height increased by 150.5±5.9 cm. 11 years old 144.6±5.9 cm, and at 10 years of age, their height was 139.6±4.4 cm. An increase in height was observed.

The morphological characteristics of highly qualified female wrestlers were studied, and they were selected as models for each weight category. Furthermore, model characteristics were identified by studying the height and chest circumference of highly qualified female wrestlers. Based on this information, the selection of young girls for women's wrestling and their orientation to various weight categories are carried out from the moment they enter the sport, depending on the stages of long-term preparation.

Conclusion

It can be said that the process of selecting and guiding athletes in women's wrestling requires a scientifically grounded approach. In wrestling, the correct distribution of athletes across 9 weight categories is an important factor in achieving maximum results. The research results showed that the abilities, level of physical development, and anthropometric indicators (height, weight, build) of young athletes serve as the primary criteria for orienting them into the appropriate weight category.

When predicting athletic results, it is necessary to consider the interdependence of morphofunctional indicators. Determining the optimal height-to-weight ratio and physical fitness level for each weight category increases the effectiveness of athletes' long-term training. Thanks to a scientifically grounded selection system, it will be possible to identify talented athletes early, guide them correctly, and achieve high athletic results. The results of this study will be applied in the activities of sports schools and coaches, contributing to the development of women's wrestling, the optimal placement of athletes by weight category, and the full realization of their individual capabilities.

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