



Analysis of the age dynamics of competitive activity in athletics all-around in the aspect of sexual dimorphism

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Abstract

Objective of the study was to identify the specific features of the age dynamics of competitive activity in track and field all-around events in terms of sexual dimorphism.

Methods and structure of the study. The competitive activity of the strongest all-around athletes of the world, women and men, was analyzed throughout the entire sports career of each of the athletes. 221 results in the heptathlon disciplines for women (n=25) and 276 results for men (n=30) in the decathlon were subjected to statistical processing, shown by them throughout their sports career at the age of 18 to 33 years.

Results and conclusions. Women three years earlier than men reach the zone of realization of individual abilities, maintaining a high level of sports performance up to 27 years, and in men at the age of 30, 57% of the respondents are included in the top list of 50 strongest decathletes in the world.

At the beginning of a sports career for men, the highest total points are scored by those athletes whose physical fitness prevails over technical. For women at this stage, the priority is training in disciplines that make the maximum contribution to the total score. At all stages of sportsmanship in women, the greatest contribution to the final result is made by achievements in high jumps, and in men - in long jumps. Common to the two types of all-around is the significant contribution of the result in hurdling to the total points and the indicators achieved in throwing are less significant.

Keywords: *all-around, competitive activity, decathlon, heptathlon, points, result, sexual dimorphism.*

Introduction. Complex all-around is an independent specific sport, and not the sum of performances in several different types [4, 6]. In this regard, in order to design an optimal plan for the multi-year training of athletes, it is necessary to fully understand what is required for the success of an individual athlete at each stage of multi-year improvement.

Currently, there is a growing interest in the structure of competitive activity of highly qualified athletes who specialize in various sports [3, 4, 7], as well as in the peculiarities of training athletes in terms of sexual dimorphism [1, 2]. A search is being made to optimize the process of managing the training of all-around athletes, based on identifying the strengths and weaknesses of their preparedness and timely correction of training effects. At the same time, following the strategic goals of training, it is recommended to take into account the individual characteristics of a particular

all-rounder and rely more on his leading motor abilities [3, 4, 5, 10]. At the same time, the analysis of the literature showed the absence of works on the problem of studying the age dynamics of the competitive activity of elite all-around athletes and their gender differences.

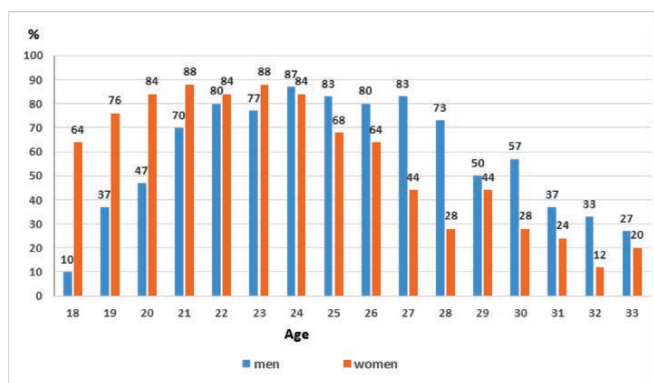
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Results of the study and their discussion. In elite sport, there is a whole range of various problems that do not allow an athlete to demonstrate world-class results every year, throughout his entire sports career. This is especially pronounced in women, due to a break in the training process associated with pregnancy and childbirth. So, of all the athletes we studied, seven female representatives (28%) and eight male representatives (27%) had no breaks in their sports career.

Analysis of the number of competing athletes at each age (figure) made it possible to identify trends in the age dynamics of the maximum realization of the individual capabilities of all-around athletes, depending on gender. So, we can say that women three years earlier than men reach the zone of realization of individual capabilities, and women lose the ability to maintain a high level of sports performance by the age of 27. At this age, only 44% of the athletes we studied show world-class results. While for men at the age of 30, another 57% of the studied athletes are included in the top list of the 50 strongest decathletes in the world.

To compare the age dynamics of sports performance of men and women specializing in track and field all-around events, the contribution of individual types to the total amount of the best competitive results shown by athletes aged 18, 23 and 27 years was carried out. These are the most significant, from our point of view, years in the career of all-around athletes. So, 18 years old is the age when international competitions with standard equipment begin. 23 years old is the age of reaching the zone of optimal opportunities, and at 27 years old comes the age where representatives of both sexes show maximum results in their careers (see figure).



The ratio of the number of studied all-around athletes who are in the annual top lists, depending on gender and age (%)

The table shows the structure of competitive results in the studied ages for men and women.

The data obtained indicate that at the beginning of a sports career in men, the greatest total amount of points is scored by athletes whose physical fitness prevails over technical ones. They manage to realize their functional capabilities to the fullest extent in such simple, technical exercises as running 1500 meters and long jump. For women at this stage, the priority direction of the training process is technical training in the disciplines that give the maximum contribution to the total score.

At the age of 23, for men, the total amount of points is generated randomly, in contrast to women, who at this age equalize the significance of the contribution of individual disciplines to the total amount of the heptathlon. By this age, athletes significantly raise their level of speed-strength fitness, acquire the necessary level of technical skill in throwing.

Based on this, we can conclude that by the age of 23, the leaders among women are those who have fully mastered the technique of performing all types of heptathlon, which allows them to “collect” the results in individual disciplines close to personal records, in the total amount of all-around. For men, the process of developing technical mastery has not yet been completed, there is no stability in performance in technically complex exercises.

The culmination age, when the average competitive result reaches its maximum in men and women, is 27 years. Since the result in jumps depends on the speed of the run, it can be argued that in the men’s all-around at the peak of their career, as a rule, the one who has the best speed abilities wins. This is confirmed by the results of the correlation analysis - in women, as well as in men, a statistically significant relationship ($p \leq 0.05$) of the total score with sprint distances and jumping disciplines was revealed.

Conclusions. Thus, the study made it possible to reveal certain features of the age dynamics of competitive activity in track and field all-around events in terms of sexual dimorphism.

An analysis of the age dynamics of the competitive performance of men and women showed that athletes do not always achieve their best results in certain disciplines at the peak of their competitive activity. Thus, men in the high jump and 1500 m run show high results at a younger age. In women, this is observed only in javelin throwing.

The difference in the structure of the competitive activity of men and women specializing in track and field all-around events is also the contribution to the total amount of points in jumping events. At all stages of sportsmanship for women, the greatest contribu-



The structure of competitive activity in the types of decathlon and heptathlon

Age	Men (decathlon)		Women (heptathlon)	
	Result	Contribution, %	Result	Contribution, %
100 m, s				
18 years old	11,12±0,19	10,85±0,51	-	-
23 years old	10,83±0,21	10,74±0,50	-	-
27 years old	10,75±0,23	10,72±0,50	-	-
Long jump, m				
18 years old	7,24±0,16	11,32±0,42	6,00±0,20	14,83±0,90
23 years old	7,49±0,20	11,12±0,49	6,27±0,17	14,64±0,58
27 years old	7,56±0,23	11,10±0,54	6,42±0,23	15,02±0,79
Shot put, m				
18 years old	12,97±0,67	8,64±0,59	11,89±0,96	11,03±0,89
23 years old	14,66±0,71	9,17±0,52	13,62±1,14	12,03±0,93
27 years old	15,25±0,84	9,41±0,60	14,04±0,99	12,23±1,14
High jump, m				
18 years old	2,00±0,05	10,56±0,67	174,00±4,60	16,05±1,13
23 years old	2,05±0,05	10,10±0,56	182,00±5,45	15,72±0,85
27 years old	2,03±0,06	9,82±0,68	183,00±4,36	15,55±0,53
400 m, s				
18 years old	49,73±0,66	10,74±0,36	24,75±0,31	15,96±0,54
23 years old	48,49±0,84	10,57±0,29	24,24±0,51	15,02±0,70
27 years old	48,22±0,93	10,51±0,44	24,21±0,61	14,73±0,74
110m hurdles, s				
18 years old	14,66±0,28	11,57±0,40	14,16±0,29	17,00±0,63
23 years old	14,27±0,29	11,22±0,38	13,52±0,19	16,44±0,62
27 years old	14,09±0,27	11,26±0,32	13,36±0,31	16,41±0,49
Discus throw, m				
18 years old	39,55±1,76	8,52±0,54	-	-
23 years old	45,31±2,50	9,23±0,59	-	-
27 years old	46,39±2,58	9,31±0,60	-	-
Pole vault, m				
18 years old	4,47±0,26	9,76±1,02	-	-
23 years old	4,80±0,23	10,13±0,78	-	-
27 years old	4,97±0,21	10,54±0,72	-	-
Javelin throw, m				
18 years old	56,95±5,12	8,98±0,88	38,79±4,80	11,06±1,45
23 years old	61,98±3,52	9,22±0,63	45,63±4,62	12,12±1,16
27 years old	62,72±4,11	9,11±0,72	45,58±2,86	11,86±0,94
1500 m, min, s				
18 years old	4.36.36±6,75	9,13±0,48	2.20.75±2,59	14,07±0,73
23 years old	4.34.45±8,03	8,56±0,62	2.14.40±2,90	14,03±0,63
27 years old	4.36.21±7,74	8,26±0,62	2.12.74±2,62	14,21±0,56
200 m run, s				
100m hurdles, s				

tion to the final result is made by achievements in high jumps, and for men - in long jumps. Common to the two types of all-around is a significant contribution of the result in hurdling to the total points and less significant indicators achieved in throwing.

Thus, dimorphic features in the structure and functions of the female body have an impact on the performance of competitive activity, which determines the necessity of constant clarification of the content of training influences, adequacy to the current state of the athlete's body during training sessions [8, 9].

References

1. Asinkevich R., Sevdalev S.V., Vrublevskiy E.P. Osobennosti proyavleniya polovogo dimorfizma u vysokokvalifitsirovannykh sportsmenov, spetsializiruyushchikhsya v sovremennom pyatiborye [Features of the manifestation of sexual dimorphism in highly qualified athletes specializing in modern pentathlon]. Teoriya i praktika fizicheskoy kultury. 2022. No. 1. pp. 17-19.
2. Balakhnichev V.V., Vrublevskiy E.P., Mirzoev O.M. Otkor i podgotovka sportsmenov v legkoy atletike s pozitsii polovogo dimorfizma [Selection and preparation of athletes in light athletics from the position of sexual dimorphism]



- tion and training of athletes in athletics from the position of sexual dimorphism]. *Teoriya i praktika fizicheskoy kultury*. 2007. No. 4. pp. 11-15.
3. Borovaya V.A. Vozrastnaya dinamika struktury sorevnovatelnoy deyatelnosti zhenshchin, spetsializiruyushchikhsya v legkoatleticheskom semiborye [Age dynamics of the structure of competitive activity of women specializing in track and field heptathlon]. *Izvestiya Gomelskogo gosudarstvennogo universiteta im. F. Skoriny*. 2021. No. 2 (125). pp. 12-Dobrynskaya N., Kozlova E. Modelirovaniye sorevnovatelnoy deyatelnosti kak osnova individualizatsii postroyeniya mnogoletney podgotovki v legkoatleticheskom mnogoborye (zhenshchiny) [Modeling of competitive activity as a basis for individualization of building long-term training in athletics all-around (women)]. *Nauka v olimpiyskom sporte*. 2013. No. 3. pp. 31-37.
 4. Mekhrikadze V.V., Slavkina E.V., Ermolaev B.V. Vzaimosvyaz vidov v zhenskom legkoatleticheskom semiborye [The relationship of species in the women's track and field heptathlon]. *Vestnik sportivnoy nauki*. 2019. No. 2. pp. 9-13.
 5. Sevdalev S.V., Kozhedub M.S., Aleinik E.A. Individualizatsiya v podgotovke kvalifitsirovannykh sportsmenok, spetsializiruyushchikhsya v kompleksnykh vidakh mnogoboriy [Individualization in the preparation of qualified athletes specializing in complex types of all-around events]. *Izvestiya Gomelskogo gosudarstvennogo universiteta im. F. Skoriny*. 2021. No. 2 (125). pp. 31-37.
 6. Lashkevich S.V., Vrublevskiy E.P., Chitaikina N.B., Mitusova E.D. Footballers' competitive activity criteria. *Teoriya i praktika fizicheskoy kultury*. 2021. 5. pp. 88-90.
 7. Sevdalev S.V., Kozhedub M.S., Vrublevskiy E.P., Mitusova E.D. Biorhythm-based individualization of training of female different distance runners. *Teoriya i praktika fizicheskoy kultury*. 2020. 5. pp. 83-85.
 8. Sevdalev S., Skidan A., Vrublevskiy E. Organizational and methodical aspects of individualization of health improving female training. *Human. Sport. Medicine*. 2020. 20(S1). pp. 69-76.
 9. Vrublevskiy E.P., Khorshidakhmed K.H., Albarkaii D.A. Focused strength and speed-strength trainings of sprinters. *Teoriya i praktika fizicheskoy kultury*. 2019. 4. pp. 3-5.