ORIGINAL ARTICLES. SPORT

Competitive activity of weightlifters at the XXXII Olympic Games 2020 in Tokyo: results and prospects

Oleshko V.G.^{1ABCD}, Tangxun Yang^{2ACD}, Torokhtiy O.P.^{1ABCD}, Putsoff S.O.^{1ABCD}

¹National University of Physical Education and Sports of Ukraine

²Chendu Sport University, China

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

DOI: <https://doi.org/10.34142/HSR.2021.07.04.06>

Corresponding author: V.G. Oleshko. ORCID: 0000-0003-4798-9090, Fizkultury str., 1, Kyiv, 03150, Ukraine valentin49@ukr.net

How to Cite

Oleshko VG, Yang T, Torokhtiy OP, Putsoff. SO. Competitive activity of weightlifters at the XXXII Olympic Games 2020 in Tokyo: results and prospects. *Health, Sport, Rehabilitation*. 2021;7(4):69-83. <https://doi.org/10.34142/HSR.2021.07.04.06>

Abstract

Purpose: to study the indicators of the competitive activity of the strongest weightlifters in the world at the Games of the XXXII Olympiad 2020 and to identify trends for further increasing their sports results, taking into account weight categories and gender differences.

Material and methods. By studying scientific literature, Internet resources, competition protocols, pedagogical observations, video recordings of competitions, we analyzed the achievements of 140 weightlifters who took part in the Games of the XXXII Olympiad 2020 in Tokyo and the number of countries they represented. All indicators of competitive activity and age characteristics were grouped according to the following principle: among the top 10 weightlifters in each weight category, as well as separately among the prize-winners of competitions among men and women.

Results. The sports results of the top 10 weightlifters of each weight category among men and women who took part in competitions, age characteristics, the rate of achievements in a sports career, the level of approaches implementation and international competition were analyzed.

Conclusions. Based on the analysis of the number of countries and licenses received by the athletes of these countries, world and Olympic records, the effectiveness of the performances of the world's leading weightlifters at the Olympic Games is shown. The optimal age for achieving the highest results, the age of the beginning of the sport for the prize-winners of the competition, the rate of achieving maximum results in a sports career, sports results, the level of implementation of competitive approaches, the rate of increase in achievements in competitive exercises, the value of starting results, the level of international competition in each weight category in men and women, the characteristics of the dynamics of the results of the most titled athletes during their sports career, who took part in the Olympic Games, are given.

Key words: dynamics of results, realization of achievements, age and sex differences, weightlifters, indicators of competitive activity

Анотація

Олешко В.Г., Яанг Тангксун, Торохтій О.П., Пуцов С.О. Змагальна діяльність важкоатлетів на XXXII Олімпійських Іграх 2020 у Токіо: підсумки і перспективи

Мета. Вивчити показники змагальної діяльності найсильніших важкоатлетів світу на Іграх XXXII Олімпіади 2020 та визначити тенденції подальшого підвищення їхніх спортивних результатів із урахування вагових категорій й статевих відмінностей.

Матеріал та методи. Шляхом вивчення наукової літератури, Інтернет ресурсів, протоколів змагань, педагогічних спостережень, відеозаписів змагань нами аналізувались досягнення 140 важкоатлетів, які брали участь у Іграх XXXII Олімпіади 2020 в Токіо та кількість країн, котрі вони представляли. Усі показники змагальної діяльності та вікові характеристики групувались за таким принципом: у 10 кращих важкоатлетів у кожній ваговій категорії, а також окремо у призерів змагань серед чоловіків та жінок.

Результати. Проаналізовано змагальні результати у 10 кращих важкоатлетів кожної вагової категорії у чоловіків та жінок, що брали участь у змаганнях, вікові характеристики, темпи досягнень за спортивну кар'єру, рівень реалізації спроб та міжнародної конкуренції.

Висновки. На засадах аналізу кількості країн та ліцензій, отриманих спортсменами цих країн, світових та олімпійських рекордів показана ефективність виступів провідних важкоатлетів світу на Олімпійських іграх. Встановлено оптимальний вік досягнення найвищих результатів, вік початку занять видом спорту у призерів змагань, темпи досягнення максимальних результатів за спортивну кар'єру, спортивні результати, рівень реалізації змагальних спроб, темпи зростання досягнень у змагальних вправах, величини стартових результатів, рівень міжнародної конкуренції у кожній ваговій категорії у чоловіків та жінок, наведено характеристику динаміки результатів у найбільш титулованих спортсменів протягом спортивної кар'єри, які брали участь в Олімпійських іграх.

Ключові слова: динаміка результатів, реалізація досягнень, вікові та статеві відмінності, важкоатлети, показники змагальної діяльності

Аннотация

Олешко В.Г., Яанг Т., Торохтий А.П., Пуцов С.А. Соревновательная деятельность тяжелоатлетов на XXXII Олимпийских Играх 2020 в Токио: итоги и перспективы

Цель. Изучить показатели соревновательной деятельности сильнейших тяжелоатлетов мира на Играх XXXII Олимпиады 2020 и выявить тенденции дальнейшего повышения их спортивных результатов с учетом весовых категорий и половых отличий.

Материал и методы. Путем изучения научной литературы, Интернет ресурсов, протоколов соревнований, педагогических наблюдений, видеозаписей соревнований нами анализировались достижения 140 тяжелоатлетов, принявших участие в Играх XXXII Олимпиады 2020 в Токио и количество стран, которые они представляли. Все показатели соревновательной деятельности и возрастные характеристики группировались по следующему принципу: у 10 лучших тяжелоатлетов в каждой весовой категории, а также отдельно у призеров соревнований среди мужчин и женщин.

Результаты. Проанализированы спортивные результаты у 10 лучших тяжелоатлетов каждой весовой категории у мужчин и женщин, которые принимали участие в соревнованиях, возрастные характеристики, темпы достижений за спортивную карьеру, уровень реализации подходов и международной конкуренции.

Выводы. На основе анализа количества стран и лицензий, полученных спортсменами этих стран, мировых и олимпийских рекордов показана эффективность выступлений ведущих тяжелоатлетов мира на ОИ. Установлен оптимальный возраст достижения наивысших результатов, возраст начала занятий видом спорта у призеров соревнований, темпы достижения максимальных результатов за спортивную карьеру, спортивные результаты, уровень реализации соревновательных подходов, темпы повышение достижений в соревновательных упражнениях, величины стартовых результатов, уровень международной конкуренции в каждой весовой категории у мужчин и женщин, дана характеристика динамики результатов у наиболее титулованных спортсменов на протяжении спортивной карьеры, принявших участие в ОИ.

Ключевые слова: динамика результатов, реализация достижений, возрастные и половые отличия, тяжелоатлеты, показатели соревновательной деятельности

Introduction

Weightlifting, as an Olympic sport, has always attracted the attention of specialists and scientists all over the world with the high sporting achievements of weightlifters of men and women. This also applied to the indicators of competitive activity among athletes of different sexes and groups of weight categories, especially at the largest world forum of the four years - the Olympic Games [1, 2, 3, 4]. Such competitive activity of the world's strongest weightlifters has always been accompanied by a large number of world and Olympic records set at these competitions [5, 6, 7, 8]. In addition, over the past 20 years, weightlifters of China, who are constantly among the leaders and win the largest number of Olympic medals, amaze with their successes at the Olympic Games [9, 10, 11, 12].

Many specialists from various sports have been involved in the study of the competitive activity of highly qualified athletes at the main competitions for four years [13, 14, 15, 16]. However, the influence of external factors (the COVID-2019 epidemic and the intensive work of the IOC to identify unscrupulous athletes who used pharmacological drugs prohibited by WADA made adjustments to the results of the competitive struggle at the Olympic Games. Many countries and athletes were unable to obtain licenses for these Games and were missing. Therefore, the weightlifting competition at the Games of the XXXII Olympiad 2020 in Tokyo (Japan) contained many unforeseen situations and brought interesting, and in many ways, unexpected results. weight and height differences, which will help many coaches and specialists to find hidden reserves for increasing athletes' athletic achievements in future competitions.

Weightlifting competitions at the Games of the XXXII Olympiad 2020 in Tokyo were held in a difficult period for the world sports community due to some external influences that influenced their results and the training of many athletes. Here are some of them [17, 18, 19, 20]:

1. They passed a year later than they should have been in 2020 due to the COVID-2019 epidemic in the world.

2. The selection system for weightlifters for the Games of the XXXII Olympiad 2020 in Tokyo was violated due to the postponement of many international competitions, therefore the number of licenses issued for athletes and individual countries was constantly adjusted until the start of the Games.

3. Athletes who were previously disqualified due to positive doping tests were not admitted to the Games of the Olympics.

3. The number of official delegations from countries was greatly reduced, so not all athletes' coaches were able to help them during these competitions.

Purpose: to study the indicators of the competitive activity of the strongest weightlifters in the world at the Games of the XXXII Olympiad 2020 and to identify the prospects for further increasing their sports achievements.

Material and methods

Methods

Analysis of scientific literature, Internet resources, competition protocols, pedagogical observations, video recordings of competitions, analysis and synthesis of age indicators, sports results; methods of mathematical statistics.

We have analyzed the following indicators of weightlifters' competitive activity [3, 5, 10, 11].

1. The number of countries that took part in the Games of the Olympics and the number of licenses received by athletes from these countries.

2. The number of medals won by individual countries and athletes.

3. Sports results shown at the Olympic Games and their dynamics.

4. The number of world and Olympic records set by weightlifters at the Olympic Games.

5. Age of achievement of the highest results and the beginning of the sport among the prize-winners of the competitions among men and women.

6. The rate of increase in achievements in individual exercises, starting results and the level of implementation of competitive approaches among the winners of the Olympic Games of different sex and groups of weight categories.

7. The level of international competition among athletes in weight categories, depending on gender differences.

8. Characteristics of the dynamics of results among the most titled athletes who took part in the Olympic Games.

To participate in the 2021 Olympics. The Tokyo IOC provided the IWF with a quota of 196 weightlifters (98 men and 98 women) to compete in 7 weight classes for men and women. The maximum number of athletes in a discipline is 14, provided that the NOCs will single out only one athlete in each weight category.

Athletes who applied for participation in the Olympic Games had to take part in at least 6 international starts according to the IWF calendar.

The IWF qualifiers were divided into three levels: gold, silver and bronze. For participation in qualifying competitions at each level, athletes received certain points, which then allowed them to enter the 14 best athletes of their "own" weight category: for men they were up to 61, 67, 73, 81, 96, 109, +109 kg; in women up to 49, 55, 59, 64, 76, 87, +87 kg [9]:

We analyzed the indicators of competitive activity and age characteristics of the 10 best weightlifters of each weight category, the total number of athletes was 140 people.

Statistical analysis

Since the sample sizes of the winners of the XXXII Olympic Games in Tokyo among men and women in each weight category I, II and III were very small ($n = 9$ and $n = 6$), the study used nonparametric statistics. The following statistical indicators were determined: arithmetic mean, standard deviation S , median, lower and upper quartiles of Me (25%;

75%). The statistical significance of the difference p between the results of men and women in weight categories I and II, II and III, as well as between men and women in each weight category I, II and III was determined using the Mann-Whitney U-test, as the most powerful among the nonparametric for two independent samples. The applied statistical program Statistica 10.0 (StatSoft, USA) was used.

Results

The results of competitive activity at the Games of the XXXII Olympiad 2020 among men and women are presented below. First, we analyzed the number of licenses obtained by the leading weightlifting countries in preparation for the Games of the XXXII Olympiad in 2020, since they reflect the level of preparatory work of the coaches of the national teams of these countries, as well as the effectiveness of this work (Table 1).

Table 1

Number of licenses obtained by leading countries in weightlifting and their implementation

Country	Men	Women	Total licenses	Number of medals won	The level of their implementation, %
China	4	4	8	8	100
USA	4	4	8	2	25
The Republic of Korea	3	4	7	-	0
Taiwan	3	4	7	2	28
United Kingdom	-	4	4	1	25
Canada	-	4	4	1	25
Ecuador	-	4	4	2	50
Georgia	4	-	4	2	50
Japan	4	3	7	1	14
Italy	3	-	3	2	67
Indonesia	3	-	3	2	67
Spain	3	-	3	-	0
Tunisia	3	-	3	-	0
Turkmenistan	3	-	3	1	33
France	-	3	3	-	0
Dominican Republic	-	3	3	2	67
Cuba	-	3	3	-	0
Australia	-	3	3	-	0

Data analysis table 1 shows that in terms of the number of licenses received and the level of their implementation at the Games of the XXXII Olympiad 2020 in Tokyo, the national teams of the following countries performed most successfully among men: China (100% of medals from the number of licenses), Italy, Indonesia, the Dominican Republic (67.0 %), Ecuador and Georgia (50.0% each). The most unsuccessful athletes at the 2020

Olympics were athletes from such countries: the Republic of Korea, Spain, France, Cuba, although the athletes of these countries have always been winners of world weightlifting forums.

Further, the number of medals won by male and female weightlifters at the Games of the XXXII Olympiad 2020 is analyzed (Tables 2 and 3).

Table 2

Prize-winners of the XXXII Olympic Games 2020 in Tokyo among men

Country	Medals			Total:
	Gold	Silver	Bronze	
China	4	-	-	4
Georgia	1	-	1	2
Qatar	1	-	-	1
Uzbekistan	1	-	-	1
Venezuela	-	2	-	2
Indonesia	-	1	1	2
Colombia	-	1	-	1
Dominica	-	1	-	1
Armenia	-	1	-	1
Iran	-	1	-	1
Italy	-	-	2	2
Kazakhstan	-	-	1	1
Latvia	-	-	1	1
Syria	-	-	1	1

Weight category up to 61 kg

Men. The Olympic champion was 28-year-old athlete Li Fabin (China) with a combined result of 313.0 kg. Eleven kg in total was lost to him by a 32-year-old athlete from Indonesia - Eko Yuli Irvan - 302.0 kg. He was a medalist at four Olympic Games: at the age of 19, he won a bronze medal at the Olympic Games in Beijing (2008), then again a bronze medal at the Olympic Games in London (2012), then silver in Rio de Janeiro (2016) and now in Tokyo - silver medal. Igor Son from Kazakhstan won a bronze medal in this weight category - 294.0 kg, respectively.

Weight category up to 67 kg

The 28-year-old athlete Chen Lijun (China) became the champion of the Olympic Games with the result in the combined combined event - 332.0 kg. Only 1 kg was lost to him by an athlete from Colombia - Luis Mosquera Lozano - 331.0 kg, he was already the bronze medalist of the Games of the XXXI Olympiad in Rio de Janeiro (2016) with the result in the combined event - 338 kg. The bronze medal was won by Mirko Zanni from Italy - 322.0 kg, respectively.

Weight category up to 73 kg

The 27-year-old athlete Shi Jiyun (China) became the champion of the Olympic Games with the maximum result in the combined event in his sports career - 364.0 kg and a new world record. For 18 kg less was lifted by the silver medalist of the Games from Venezuela - Julio Ruben Mayora Pernia - 346.0

kg and the bronze medal was received by Rahmat Erwin Abdulla from Indonesia - 342.0 kg, who lost 22 kg to the champion in the combined event.

Weight category up to 81 kg. One of the oldest athletes of the Games, 37 years old Liu Xiaojong (China), became the champion of the Olympic Games with the result in the combined event - 374.0 kg. He is a participant in two more Olympic Games: in London (2012) he had a gold medal (379 kg), in Rio de Janeiro (2016) a silver medal (379 kg), and he had his first international start back in 2009. The silver medal was won by an athlete from the Dominican Republic - Zacarias Bonnat Michel - 367.0 kg, a bronze medal from Antonio Pizzolato from Italy - 365.0 kg, respectively.

Weight category up to 96 kg

The 23-year-old athlete Fares Ibrahim Elbach (Qatar) became the champion of the Olympic Games with the result in the combined event - 402.0 kg. By 15 kg less than the champion showed a 21-year-old athlete from Venezuela - Keidomar Vallenilla Sanchez - 387.0 kg. And a bronze medal with the same result was won by Anton Plesnov from Georgia - 387.0 kg.

Weight category up to 109 kg

The Olympic champion was 21-year-old athlete Akbar Dzhuraev (Uzbekistan) with the result in the combined combined event - 430.0 kg. The second silver medal in his sports career was won by an athlete from Armenia - Simon Martirosyan - 423.0 kg, he received the first at the Olympic Games in Rio de Janeiro (2016). He is also the 2014 Youth

Olympic Games champion. Bronze medal for Arturs Plesnieks from Latvia - 410.0 kg, he is also a participant in two more Olympics: in London - he took 5th place, in Rio de Janeiro - 8th place, respectively.

Weight category over 109 kg

The Olympic champion became a 27-year-old athlete, 197 cm tall Lasha Talakhadze (Georgia) with the result in the combined event - 488.0 kg, simultaneously setting three world and Olympic records in the snatch - 223.0 kg, clean and jerk - 265.0 kg and the sum of the double event. A 22-year-old athlete from Iran, Ali Davudi, showed 47 kg less, he had a silver medal - 441.0 kg and a bronze medal from a 27-year-old athlete Man Asaad from Syria - 424.0 kg, respectively.

Table 3

Winners of the XXXII Olympic Games 2020 in Tokyo among women

Country	Medals			Total:
	Gold	Silver	Bronze	
China	3	1	-	4
Ecuador	1	1	-	2
Taiwan	1	-	1	2
Philippines	1	-	-	1
Canada	1	-	-	1
USA	-	1	1	2
India	-	1	-	1
Turkmenistan	-	1	-	1
Italy	-	1	-	1
United Kingdom	-	1	-	1
Indonesia	-	-	1	1
Kazakhstan	-	-	1	1
Japan	-	-	1	1
Mexico	-	-	1	1
Dominican Republic	-	-	1	1

Weight category up to 49 kg. Hu Jihai (China) became the champion of the Olympic Games with the result in the combined event - 210.0 kg, at the same time setting three OPs in the snatch - 94.0 kg, clean and jerk - 116 kg and the combined event. The silver medal was won by an athlete from India - Chanu Saykom Mirabai - 202.0 kg and a bronze medal from Windy Kantika Aisah from Indonesia - 194.0 kg, respectively.

Weight category up to 55 kg

The 30-year-old athlete Hidilin Diaz (Philippines) became the champion of the Olympic Games with the result in the combined event - 224.0 kg, simultaneously setting two OP in the clean and jerk - 127.0 kg and in the combined event. The athlete was a participant in three more Olympic Games: in Beijing (2008) she took 10th place, in London (2012) she received a zero mark, in Rio de Janeiro (2016) - she won a silver medal. The silver medal in Tokyo was won by the Chinese woman Liao Cuyun - 213.0 kg, and the bronze medal from Zulfiya Chinshanlo from Kazakhstan - 213.0 kg. In this weight category, an athlete from Ukraine Kamila Konotop competed, who took the honorable fifth place with a result in the combined combined event - 206.0 kg.

Weight category up to 59 kg

27-year-old Go Xing-Chun (Taiwan) became the champion of the Olympic Games with the result in the combined event - 236.0 kg, simultaneously setting three Olympic records in the snatch - 103.0 kg, clean and jerk - 133.0 kg and the total of biathlon. This athlete already had a bronze medal at the Olympic Games in Rio de Janeiro (2016). An athlete from Turkmenistan, Polina Guryeva, lost nineteen kg in total in the combined event - 217.0 kg, and the bronze medal from Mikiko Ando from Japan - 214.0 kg, respectively.

Weight category up to 64 kg

The Olympic champion was 28-year-old athlete Made Sharron (Canada) with a combined combined result of 236.0 kg. The silver medal was won by a 34-year-old athlete from Italy - Georgia Bordignon - 232.0 kg, for her it was already the second Olympics: in Rio de Janeiro (2016) she took 6th place. Chen Wen-Hu from Taiwan lost only 2 kg to the second place - 230.0 kg, respectively.

Weight category up to 76 kg

The Olympic champion was Nacy Dahomes Barrera (Ecuador) with a combined combined result of 263.0 kg. This was her second Olympics: at the Games in Rio de Janeiro, she took 7th place. The silver medal was won by the athlete from the United States - Catherine-Elizabeth Nye - 249.0 kg, and the bronze medal from Aremi Fuentes Zavala from Mexico - 245.0 kg, respectively.

Weight category up to 87 kg. 27-year-old athlete Wang Joyu from China became the champion of the Olympic Games with the result in the combined event - 270.0 kg. The silver medal was won by a 24-year-old athlete from Ecuador - Tamara Salazar

Arche - 263.0 kg, and the bronze medal from Crismeri Santana Peguero from the Dominican Republic - 256.0 kg, respectively.

Weight category over 87 kg

The Olympic champion was a 21-year-old athlete from China Li Wenwen with the result in the combined event - 320.0 kg, simultaneously setting three Olympic records in the snatch - 140.0 kg, clean

and jerk - 180.0 kg and in the combined event. Silver medalist from Great Britain - Emily Campbell - 283.0 kg lost 37 kg in total. One kg less and the third place was taken by Sara Robles from the USA - 282.0 kg.

Below are the indicators of the competitive activity of the winners of the Games of the XXXII Olympiad in Tokyo among men and women (Tables 4 and 5).

Table 4

Indicators of the competitive activity of the winners of the XXXII Olympic Games in Tokyo among men

Weight category, kg	Position	Age, years	Start of sports, years	The rate of achievement of the maximum result, years
up to 61 kg	1	28	10	16
	2	32	12	11
	3	22	10	13
$\bar{x}$		27	11	13
up to 67 kg	1	28	10	16
	2	26	7	19
	3	23	14	10
$\bar{x}$		26	10	15
up to 73 kg	1	27	12	14
	2	25	10	15
	3	31	11	20
$\bar{x}$		28	11	16
up to 81 kg	1	37	14	14
	2	25	16	9
	3	24	16	9
$\bar{x}$		29	15	11
up to 96 kg	1	23	9	12
	2	21	11	11
	3	25	11	12
$\bar{x}$		23	10	12
up to 109 kg	1	21	10	12
	2	24	12	9
	3	29	9	20
$\bar{x}$		25	10	14
over 109 kg	1	27	11	17
	2	22	11	11
	3	27	10	17
$\bar{x}$		25	11	15

Table 5

Indicators of the competitive activity of the winners of the XXXII Olympic Games in Tokyo among women

Weight category, kg	Position	Age, years	Start of sports, years	The rate of achievement of the maximum result, years
up to 49 kg	1	24	12	12
	2	26	14	12

	3	19	9	10
$\bar{x}$		23	12	11
up to 55 kg	1	30	11	19
	2	26	11	13
	3	28	9	12
$\bar{x}$		28	10	15
up to 59 kg	1	27	10	18
	2	21	12	10
	3	28	16	11
$\bar{x}$		25	13	13
up to 64 kg	1	28	19	8
	2	34	15	19
	3	24	8	16
$\bar{x}$		29	14	14
up to 76 kg	1	23	11	12
	2	22	16	6
	3	28	14	11
$\bar{x}$		24	14	10
up to 87 kg	1	27	11	14
	2	24	16	8
	3	29	14	9
$\bar{x}$		27	14	10
over 87 kg	1	21	12	8
	2	27	20	7
	3	33	20	10
$\bar{x}$		27	17	8

Analysis of the rate of increase in achievements in individual exercises among the winners of the Olympic Games of different sexes and groups of weight categories allows coaches to determine which of the exercises lags behind in the preparation of an athlete or has an advantage. We calculated the ratio of competitive results (snatch to clean and jerk taken as 100%) among the winners of

the 2020 Olympics in three groups of weight categories: for men, group 1 - weight categories up to 61, 67 and 73 kg; 2nd group - up to 81 and 96 kg; 3rd group - up to 109 and over 109 kg; for women - 1st group - up to 49, 55 and 59 kg; 2nd group - 64 and 76 kg; 3rd group - 87 and over 87 kg (Table 6).

Table 6

The ratio of competitive results among prize-winners Olympic Games 2020 in Tokyo (1-3 position), %

Weight category group	Results in snatch, clean and jerk, %							
	Men, n = 21				Women, n = 21			
	n	$\bar{x}$	S	Me (25%; 75%)	n	$\bar{x}$	S	Me (25%; 75%)
First, n = 18	9	81.5	2.1	81.9 (80.3; 83.0)	9	77.2	2.2	76.9 (76.4; 78.3)
Second, n = 12	6	82.1	2.3	82.9 (80.6; 84.0)	6	80.5	1.0	80.8 (80.2; 81.2)
Third, n = 12	6	82.7	2.6	83.5 (81.6; 84.1)	6	79.2	3.4	78.9 (76.3; 82.2)
$\bar{x}$	21	82.0	2.2	82.5 (80.3; 83.9)	21	78.7	2.7	78.8 (76.4; 81.0)
Statistical significance of the difference between men and women							U	74.5
							p	0.001

Data analysis table 6 indicates that the ratio of achievements in snatch to clean and jerk among men of different groups of weight categories is $82.0 \pm 2.2\%$ in the middle. Whereas in women this ratio

decreases by 3.3% towards the push and is $78.7 \pm 2.7\%$ ($p < 0.001$). Thus, in men, the increase in the results in competitive exercises is carried out mainly due to the increase in achievements in the snatch and

clean and jerk, and in women, on the contrary, to a greater extent due to the results in the clean and jerk. Earlier V.G. Oleshko [10] developed model ratios of achievements in competitive exercises for highly qualified weightlifters, which amounted to 82-84%, and for women 78-81%, which corresponds to the achievements of the winners of the Games of the XXXII Olympiad.

We analyzed the starting results of the winners of the Games of the XXXII Olympiad in Tokyo, which were calculated as the difference between the athlete's initial approach and his maximum achievement in the exercise at these competitions (Table 7).

Table 7
Starting result of weightlifters-prize-winners Games of the XXXII Olympiad 2020 in Tokyo, %

The exercise	Gender	Group	Starting result of athletes in groups of weight categories, %									
			Statistical indicator				Significance of the difference between:					
							I и II		II и III		men and women	
			n	$\bar{x}$	S	Me (25%; 75%)	U	p	U	p	U	p
Snatch	Men	I	9	95.3	2.5	96.1 (94.0; 97.2)	11.0	0.066	5.0	0.041	35.50	0.666
		II	6	97.4	0.5	97.4 (97.0; 97.7)						
		III	6	95.3	1.7	95.6 (94.3; 95.8)						
	Women	I	9	95.6	1.7	95.7 (94.7; 97.1)	14.0	0.145	18.0	1.000	14.5	0.589
		II	6	96.2	1.8	96.1 (95.1; 97.8)						
		III	6	95.1	1.6	95.7 (94.6; 95.8)						
Clean and jerk	Men	I	9	95.5	1.4	95.8 (94.8; 96.7)	20.0	0.456	13.5	0.485	30.0	0.387
		II	6	94.3	0.6	94.2 (94.1; 94.4)						
		III	6	94.7	1.6	94.7 (93.4; 95.8)						
	Women	I	9	94.3	2.7	93.9 (93.6; 95.8)	15.5	0.181	11.0	0.310	13.0	0.485
		II	6	95.8	1.7	95.7 (94.6; 97.4)						
		III	6	94.3	2.7	94.5 (93.2; 96.3)						

Data analysis table. 7 shows that in men of three groups of weight categories, the value of starting results is less than the achieved achievement in the snatch - by 4.7–7.6%, and in the clean and jerk, respectively - by 3.4–4.9%. For women, the difference between the results in the snatch is slightly less than for men - 4.5–5.7%, but this difference is slightly larger in the clean and jerk - 4.2–5.8%.

The values of the starting results in men significantly differ in the snatch between the athletes of the II and III groups of weight categories - 2.1% ($p < 0.05$), respectively. In clean and jerk, both between male athletes, as well as between athletes of groups II and III, statistically significant differences were not noted ($p > 0.05$). There are also differences between men and women: but only among the athletes of the II group in the snatch - 1.2% ($p < 0.05$).

One of the important components of the stability of technical and tactical actions of weightlifters in the structure of competitive activity is the level of implementation of the planned results at the main starts of the annual macrocycle. Below are the indicators of the level of implementation of competitive results among the winners of the Games of the XXXII Olympiad 2020 in Tokyo in each weight category (Table 8).

Table 8
Realization of competitive results among weightlifters-prize-winners of the Games of the XXXII Olympiad 2020 in Tokyo, %

Weight category, kg	Implementation of approaches	
	snatch	clean and jerk
men		
up to 61	55.0	55.0
up to 67	44.0	55.0
up to 73	77.7	66.0
up to 81	55.0	66.3
up to 96	77.3	55.0
up to 109	66.0	66.3
over 109	88.7	77.3
$\bar{x}$	66.2	62.9
women		
up to 49	66.3	88.7
up to 55	66.3	77.7
up to 59	66.0	77.3
up to 64	88.7	66.3
up to 76	77.3	77.3
up to 87	77.3	66.3
over 87	77.3	77.3
$\bar{x}$	74.2	75.8

Further, the indicators of the level of international competition among weightlifters who took part in the Games of the XXXII Olympiad 2020 in Tokyo are analyzed (Table 9).

Table 9

Indicators of international competition among weightlifters at Games of the XXXII Olympiad 2020 in Tokyo

Weight category, kg	Performance in the top 10 athletes in the weight category			
	density of results		places in the combined event with a difference of 1 kg	their number, %
	absolute, kg	relative, %		
men				
up to 61	48,0	15,3	6,7;	20
up to 67	34,0	10,3	1,2; 3,4,5; 8,9	70
up to 73	41,0	11,3	3,4; 4,5	40
up to 81	57,0	15,3	5,6;	20
up to 96	52,0	11,5	2,3,4; 7,8,9	60
up to 109	59,0	13,7	4,5; 7,8	40
over 109	107,0	22,0	4,5; 7,8	40
women				
up to 49	43,0	20,5	4,5; 6,7,8	50
up to 55	38,0	17,0	1,2; 3,4; 5,6; 8,9	80
up to 59	38,0	16,1	3,4; 6,7; 8,9,10	70
up to 64	19,0	8,1	4,5,6; 7,8,9	60
up to 76	60,0	22,8	4,5; 8,9	40
up to 87	45,0	16,7	5,6	20
over 87	100,0	31,3	2,3; 6,7	40

Analysis of the tributes table. 9 shows that male weightlifters had the highest density of competitive results at the Olympics in the weight categories up to 67, 73 and 96 kg, with a difference

between the results from 1st to 10th place - 10.3; 11.3 and 11.5%, and in the first category there were 70% of the results in the combined event with a difference of 1 kg. Among female weightlifters, the highest density of competitive results is observed in weight categories up to 64, 59 and 55 kg, respectively, with a difference in results from 1 to 10 places - 8.1; 16.1 and 17.0%. In the weight category up to 55 kg, 80.0% of the results were found, with a difference of 1 kg between them.

Discussion

Data analysis table 4 shows that the average age of the winners of the XXXII Olympic Games in Tokyo among men ranges from 23 to 29 years. Moreover, in this group of weightlifters, the youngest medalists of the Games were Akbar Juraev from Uzbekistan and an athlete from Venezuela - Keidomar Valenilla Sanchez - 21 years old, and the 37-year-old athlete Liu Xiaojong from China became the oldest medalist of the Games.

As for the age of starting to practice the sport, the fluctuations here are from 10 to 15 years.

Moreover, most of the athletes who began to practice at the age of 15-16 came to the sport substantially prepared, i.e. from other sports. So, for example, the silver medalist of the Tokyo Games -

Zacarias Bonnat Michel from the Dominican Republic played baseball, taekwondo and wrestling before weightlifting. The data obtained are consistent with the research results obtained by the authors earlier [5, 10, 17, 21].

The pace of achieving maximum results in the shortest possible time characterizes the prospects of this or that weightlifter. For winners of the Tokyo Games, they range from 11 to 16 years. The most promising weightlifters among the winners of the Olympic Games in Tokyo are representatives of the weight categories up to 81 and 109 kg: this is an athlete from the Dominican Republic - Zacarias Bonnat Michel and Antonio Pizzolato from Italy, as well as an athlete from Iran Ali Davudi, respectively. They spent 9 years on achieving their maximum results, respectively. According to the data of other authors [5, 10, 17, 22], the terms of achieving maximum results for a sports career among the most talented weightlifters range on average from 8 to 12 years. In other cases, some athletes exceed these deadlines significantly. So, for example, Rahmat Abdulla from Indonesia and Arturs Plesnieks from

Latvia spent 20 years to achieve their maximum results, respectively.

Data analysis table. 5 shows that the average age of the winners of the XXXII Olympic Games in Tokyo among women ranges from 23 to 29 years. Moreover, the youngest medalist of the Games was Windy Eisah from Indonesia - 19 years old, and the oldest athlete Georgia Bordignon from Italy - 34 years old. As for the age of starting weightlifting, in women, on average, it becomes from 10 to 14 years. At the age of 8, she began weightlifting Chen Wen-Hu from Taiwan, and among those who later began to practice the sport, one can note the champion of the Games in the category up to 64 kg Made Sharron from Canada, she began classes at the age of 19, although before that for three years she was engaged in a circus, and then cross-fit. Catherine-Elisabeth Nye from the USA also became involved in weightlifting at the age of 16, after doing gymnastics and cross-fit.

The rate of achievement of maximum results in women ranges from 8 to 15 years, they are somewhat lower than in men. The most promising weightlifters among the winners of the Tokyo Olympics are representatives of weight categories up to 76 and over 87 kg: these are athletes from the United States - Catherine-Elisabeth Nye (6 years to achieve maximum result) and Emily Campbell from Great Britain (7 years, respectively). Whereas the champion of the Games in the category up to 55 kg Hidilin Diaz from the Philippines spent 19 years on this path, and the champion of the Games Gu Xing-Chun from Taiwan, respectively, 18 years. These data are consistent with the results obtained by other authors earlier [5, 10, 17].

Data analysis table. 7 shows that the values of starting results for athletes of different groups of weight categories have a greater number of differences than between athletes of different sex. Moreover, athletes, both men and women, order a lower starting weight for the first approach in the clean and jerk of the bar than in the snatch. These data are consistent with the results of studies carried out by other authors [5, 12, 22].

Data analysis table. 8 shows that men performed more consistently in the snatch than in the clean and jerk (66.2 versus 62.9%), while women, on the contrary, performed better in the clean and jerk than in the snatch (75.8 versus 74.2%). The highest level of realization of competitive approaches is observed among men in the snatch in the weight categories up to 73, 96 and over 109 kg, and at the point - up to 81, 109 and over 109 kg, i.e. predominantly in medium and heavy weight categories. Among women, the most stable performance in the snatch was shown by the athletes

in the weight categories up to 64, 76, 87 and over 87 kg (i.e. in the medium and heavy categories), and in the clean and jerk - up to 49, 55, 59, 76 and over 87 kg (in light, medium and heavy categories). It should also be noted that women's level of implementation in the snatch and clean and jerk is on average much higher than that of men. This is due to the significantly higher weight that men lift at competitions by 1 kg of body weight. Our data confirm the trend obtained by other researchers [4, 7, 18, 22].

Data analysis table. 9 shows that the highest level of international competition at the Games of the XXXII Olympiad 2020 in Tokyo was among men and women in the light and middle weight categories. The most interesting thing is that the lowest level of international competition at these Games was for men and women in the heavy weight categories - over 109 and 87 kg, respectively, they had the greatest difference in results between 1 and 10 places - 107 and 100 kg, respectively. Practical experience shows that the level of international competition varies significantly, depending on the rank of the competition. At the Games of the Olympics, it is significantly higher than at other international competitions [2, 4, 8, 12].

During the Games, 55 Olympic records were set by weightlifters: 30 Olympic records were set by men, including 4 world records (3 world records were set by Lasha Talakhadze from Georgia – in snatch, clean and jerk and total combined), women set 25 Olympic records, but not one world.

The study of the indicators of the competitive activity of the world's strongest weightlifters at the Games of the XXXII Olympiad 2020 made it possible to reveal the hidden reserves of elite athletes and showed the prospects for further increasing their sports achievements.

Conclusions

1. The number of licenses received and the level of their implementation shows the level of preparedness of weightlifters from the leading national teams of the world for the Games of the XXXII Olympiad 2020 in Tokyo. The most successful teams were from China (out of 8 licenses, 100% sold), Italy, Indonesia, and the Dominican Republic (out of 3 licenses, 2 were sold at 67.0%, respectively). The most unsuccessful athletes at these Olympic Games were: the Republic of Korea (7 licenses, 0 implementation), Spain, France, Cuba (3 licenses each, 0 implementation).

2. Among the countries of medalists in men, weightlifters from China were the most successful -

4 gold medals, Georgia, Venezuela, Indonesia, Italy - 2 medals, respectively. Among women, the most successful teams were from China - 4 medals (3 gold and 1 silver), Ecuador, Taiwan, USA (2 medals each).

3. The average age of the winners of the XXXII Olympic Games in Tokyo among men ranges from 25 to 29 years. The youngest winners of the Games were Akbar Juraev from Uzbekistan and Keidomar Valenilla Sanchez from Venezuela at the age of 21, and the 37-year-old athlete from China Liu Xiaojong became the oldest medalist of the Games. The average age of Olympic winners in Tokyo among women ranges from 23 to 29 years. Among the winners of the Games, the youngest was Windy Eisah from Indonesia - 19 years old, and the oldest athlete Georgia Bordignon from Italy - 34 years old. If we compare the average age of all winners of the Games among men and women, then it is the same and amounts to 26.1 years.

4. The age at which men begin weightlifting ranges on average from 10 to 15 years. Moreover, most of the weightlifters who began to engage in the sport at the age of 15-16 came substantially prepared, thanks to classes in other sports. For example, the silver medalist of the Tokyo Games - Zacarias Bonnat Michel from the Dominican Republic before weightlifting was involved in baseball, taekwondo and wrestling. The age at which women start weightlifting is on average 10 to 14 years. Earlier than everyone else, Chen Wen-Hu from Taiwan began weightlifting (at the age of 8), and later of all - the champion of the Games in the category up to 64 kg Made Sharron from Canada (at the age of 19), although before that she was engaged in a circus for three years, and then cross-fit.

5. The rate of achievement of maximum results indicates the prospects of this or that weightlifter. For the winners of the Tokyo Games among men, they range from 11 to 16 years old. The highest rates of achieving maximum results were among weightlifters in weight categories up to 81 and 109 kg: these are athletes from the Dominican Republic - Zacarias Bonnat Michel and Antonio Pizzolato from Italy, as well as an athlete from Iran Ali Davudi for 9 years, respectively. Whereas, Rahmat Abdulla from Indonesia in the weight category up to 73 kg and Arturs Plesnieks from Latvia in the weight category up to 109 kg spent 20 years to achieve their maximum results, respectively.

6. Increase of achievements in snatch and clean and jerk among highly qualified weightlifters should take place proportionally on the basis of the following model ratios: for men - 82 84%, and for women - 78 81% (VG Oleshko [4]). The ratio of achievements in the snatch to clean and jerk among

men of different groups of weight categories among the Olympic winners in Tokyo in the middle is $82.0 \pm 2.2\%$, for women it is less by 3.3% and is $78.7 \pm 2.7\%$ ($p < 0.001$). Thus, in men, the increase in results in competitive exercises occurs proportionally both in the snatch and in the clean and jerk, and in women, on the contrary, to a greater extent due to the increase in the results in the clean and jerk.

7. The values of the starting results for the Olympic winners in Tokyo among men and women have some differences. In men, they are in three groups of weight categories less by 4.7–7.6%, from the achieved achievement in the snatch, and by 3.4–4.9%, respectively, from the realized achievement in the clean and jerk. For women, the starting results are slightly lower in the snatch than for men - 4.5–5.7%, but more in the clean and jerk - 4.2–5.8%. In men, they significantly differ in the snatch between athletes of the II and III groups - 2.1% ($p < 0.05$), in the clean and jerk both between men and women of the I, II and III groups, statistically significant differences were not noted ($p > 0, 05$). Differences in starting results were established between men and women: among athletes of the II group in the snatch - 1.2% ($p < 0.05$). Thus, it can be noted that male athletes are more careful in determining the starting results in the snatch than in the clean and jerk, while women reduce the starting results in the snatch and clean and jerk by the same amount.

8. Olympic winners in Tokyo in men showed more accomplished approaches in the snatch than in the clean and jerk (66.2 versus 62.9%), and women, on the contrary, achieved more accomplishments in the clean and jerk than in the snatch (75.8 versus 74, 2%). The highest level of realization among men in the snatch was obtained in the weight categories up to 73, 96 and over 109 kg, and at the point - up to 81, 109 and over 109 kg, i.e. in medium and heavy weight categories, respectively. Among women, the most stable performance in the snatch was shown by athletes in the weight categories up to 64, 76, 87 and over 87 kg (i.e. in the middle and heavy categories), and in the clean and jerk - up to 49, 55, 59, 76 and over 87 kg (in light, medium and heavy categories). In women, the level of realization in the snatch and clean and jerk is, on average, significantly higher than that of men, this is due to the significantly higher weight that men lift at competitions by 1 kg of body weight.

9. For male weightlifters, the highest density of competitive results at the Olympic Games in Tokyo was in the weight categories up to 67, 73 and 96 kg, with the smallest difference between the results from 1st to 10th places - 10.3; 11.3 and 11.5%, respectively. Moreover, in the first weight category, 70% of the results were with a difference of 1 kg.

Among women, the highest density of competitive results was observed in weight categories up to 64, 59 and 55 kg with a minimum difference in results from 1st to 10th places - 8.1; 16.1 and 17.0%, respectively. In the weight category up to 55 kg, 80.0% of the results were found with a difference of 1 kg. Thus, the highest level of international competition at the Games of the XXXII Olympiad 2020 in Tokyo was among men and women in the light and middle weight categories. And the lowest level of international competition at these Games was for men and women in the heavyweight weight categories - over 109 and 87 kg, respectively, where there was the greatest difference in results between 1 and 10 places - 107 and 100 kg, respectively.

Acknowledgments

The authors would like to thank all the participants involved in this study for their time and effort.

Conflict of interests

The authors declare that they have no conflict of interest with any financial institution regarding the material presented in this study.

Financing

This study did not receive external funding.

References

1. Bubka SN. The Olympic sport: ancient Greece heritage and modern state: Doctoral dissertation in Physical Education and Sport. Kiev, *NUPEU*. 2013.
2. Platonov VN, Pavlenko YA, Tomashevsky VV. Preparation of national teams for the Olympic Games history and modernity. K. Ed. Houst of D. Burago. 2012. 252.
3. Huebner M, Perperoglou A. Performance development from youth to seniors and age of peak Performance in Olympic weightlifting. *Frontiers. Physiol.* 2019. 1: 1121. DOI:10.3389/fphys.2019.01121.
4. Huebner M, Perperoglou A. Sex differences and impact of body mass on performance from childhood to senior athletes in Olympic weightlifting. *Published: September 2020.* 3. <https://doi.org/10.1371/journal.pone.0238369>.
5. Oleshko V, Dekha N, Young TanSung. Dynamics of sports achievements of world level weightlifters after new weight category introduction. *Theory and Methods of Physical education and sports.* 2019; 1: 36–42. DOI:10.32652/tmfvs.2019.1.36–42.
6. Dwight JT, Ploutz-Snyder LL. Age, Body Mass and Gender as Predictors of Masters Olympic Weightlifting Performance. *Medicine & Science in Sports & Exercise.* 2003. 35(7): 1216-24 DOI: 10.1249/01.MSS.0000074582.55220.1C.
7. Solberg P, Hopkins W, Paulsen G, Haugen T. Age and Performance Progression in World-Class Weightlifting and Powerlifting Athletes. *International Journal of Sports Physiology and Performance.* 2019; 14 (10): DOI: 10.1123/ijsp.2019-0093.
8. Yang Tangxun. Research on the selection of chinese olympic champions and cross-event selection. *Sichuan sports science.* 2021; Vol. 40 (1): 58-62. DOI: 10.13932/j.cnki.sctyx.2021.01.13
9. Phylactou P. Inside the mind of weightlifters: The mental preparation of Greek-Cypriot Olympic-style weightlifting athletes. *Journal of European Psychology Students.* 2019; Vol. 10. Iss.1: 1-15.
10. Oleshko VG., TanSung Yang, Vasilishyn IP. Dynamics of Formation of Sport Skill China Weightlifting Elite Group. *Ukrainian Journal of medicine, biology and sports.* 2020; T.5, 5(27): 413-18. DOI: 10.26693/jmbs05.05.413rs
11. Kollars J, Taber C, Beyer K. Relative age effects in elite Olympic weightlifters. *Strength Cond Res.* 2021; 1;35 (5): 1223-8. DOI:10.1519/JSC.0000000000003882.
12. Mochernyuk V, Khomenko R, Antropova E, Belenkov A. Pace of performance enhancement and its effect on sports career (on the example of weightlifting). *Journal of Physical Education and Sport.* 2020; 20: 2417 – 22. DOI:10.7752/jpes.2020.s4330.
13. Rykalov IV, Goncharova NM. Approaches to assessing the effectiveness of the team's performance in international athletics competitions (on the example of endurance). *Health, sport, rehabilitation.* 2020; 6(12): 73-82. DOI: <https://doi.org/10.34142/HSR.2020.06.02.08>
14. Kozina ZhL, Gushchin SA, Safronov DV, Khrapov SB, Vasilyev YuK. Identify patterns of individual dynamics of competitive performance of athletes as a basis for predicting results (qualified basketball players for example). *Health, sport, rehabilitation.* 2019; 5(2): 36-43. doi:10.34142/HSR.2019.05.02.04.
15. Kostyukovich V, Imas Y, Borysova O, Dutchak M, Shynkaruk O, Kogut I, Voronova V, Shlonska O, Stasiuk I. Modeling of the athletic training process in team sports during an annual macrocycle. *Journal of Physical Education and Sport.* 2018; 18(S.1): 327-334. doi:10.7752/jpes.2018.s144.
16. Latyshev M, Korobeynikov G. and oth. The analysis of the results of the Olympic free-style wrestling champions. *Journal of Human Sport and Exercise.* 2020; 15 (2): 400-10.

17. Oleshko V, Yang Tangxun. Age dynamic of achieving sports results of the world best weightlifters at the stages of long-term perfection. *Theory and methods of physical education and sports*. 2020; 1: 15-25.
18. Huebner M, Meltzer D, Perperoglou A. Age-associated performance decline and sex differences in Olympic weightlifting. *Medicine and science in Sports & Exercise*. 2019; 51(11): 2302-2308. DOI: 10.1249/MSS.0000000000002037.
19. Gorzi A, Khantan M, Khademnoe O, Eston R. Prediction of elite athlete's performance by analysis of peak-performance age and age-related performance progression. *European Journal of Sport Science*. 2021. 1-15. DOI: 10.1080/17461391.2020.1867240.
20. Tünnemann H, Curby DG. Scoring analysis of the wrestling from the 2016 Rio Olympic games. *International Journal of Wrestling Science*. 2016; 6(2): 90–116.
<https://doi.org/10.1080/21615667.2017.1315197>.
21. Oleshko VG. Forecasting the effectiveness of highly qualified weightlifters based on modeling the components of their preparedness. *Science in Olympic Sports*. 2009; 2: 87-92.
22. Yankova N. Bulgarian weightlifters women' achievements at European championships and analysis of medalists' sports profile. *Research in kinesiology*. 2017; vol. 45, 1: 39-42.

Information about authors

Oleshko V.G.

valentin49@ukr.net

<https://orcid.org/0000-0003-4798-9090>

PhD in Ph. Ed. and Sp. Professor of the Department of Combat Sports and Power Sports
National University of Ukraine on Physical Education and Sport,
Fizkultury str., 1, Kyiv, 03150, Ukraine

Yang Tangxun

sus2008@msn.com

<https://orcid.org/0000-0002-4584-9433>

Chendu Sport University

№ 2, Tiyyuan Road, Chengdu, Sichuan Province, China

Torokhtiy O.P.

ap@torokhtiy.com

<https://orcid.org/0000-0001-9252-7253>

Postgraduate student of the Department of Combat Sports and Power Sports
National University of Ukraine on Physical Education and Sport
Fizkultury str., 1, Kyiv, 03150, Ukraine

Putsoff S.O.

putsoff@gmail.com

<https://orcid.org/0000-0002-8970-5706>

Can. Sc. Ph. Ed. and Sh., Teacher of the Department of Combat Sports and Power Sports
National University of Ukraine on Physical Education and Sport
Fizkultury str., 1, Kyiv, 03150, Ukraine

Інформація про авторів

Олешко В.Г.

valentin49@ukr.net

<https://orcid.org/0000-0003-4798-9090>

д.фіз.вих., професор кафедри Спортивних єдиноборств і силових видів спорту
Національний університет фізичного виховання і спорту
вул. Фізкультури, 1, Київ-150, 03150, Україна

Яанг Тангксун

sus2008@msn.com

<https://orcid.org/0000-0002-4584-9433>

Спортивний університет Ченду

№ 2, ул. Тиюань, Ченду, провінція Сичуань, Китай

Торохтій О.П.

ap@torokhtiy.com

<https://orcid.org/0000-0001-9252-7253>

аспірант кафедри Спортивних єдиноборств і силових видів спорту

Національний університет фізичного виховання і спорту

вул. Фізкультури, 1, Київ-150, 03150, Україна

Пуцов С.О.

putsoff@gmail.com

<https://orcid.org/0000-0002-8970-5706>

к.фіз.вих., викладач кафедри Спортивних єдиноборств і силових видів спорту

Національний університет фізичного виховання і спорту

вул. Фізкультури, 1, Київ-150, 03150, Україна

Информация об авторах

Олешко В. Г.

valentin49@ukr.net

<https://orcid.org/0000-0003-4798-9090>

д.физ.вос., профессор кафедры Спортивных единоборств и силовых видов спорта

Национальный университет физического воспитания и спорта

ул. Физкультуры, 1, Киев-150, 03150, Украина

Яанг Тангксун

sus2008@msn.com

<https://orcid.org/0000-0002-4584-9433>

Спортивный университет Ченду

№ 2, ул. Тиюань, Ченду, провинция Сычуань, Китай

Торохтий А.П.

ap@torokhtiy.com

<https://orcid.org/0000-0001-9252-7253>

аспірант кафедри Спортивних єдиноборств і силових видів спорту

Національний університет фізичного виховання і спорту

ул. Фізкультури, 1, Киев-150, 03150, Украина

Пуцов С.А.

putsoff@gmail.com

<https://orcid.org/0000-0002-8970-5706>

к.физ.вос., преподаватель кафедры Спортивных единоборств и силовых видов спорта

Национальный университет физического воспитания и спорта

ул. Физкультуры, 1, Киев-150, 03150, Украина

This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) (CC BY 4.0)

Received: 2021-09-12 Accepted: 2021-09-28 Published: 2021-12-25