ANALYSIS OF OLYMPIC FINAL COMPETITIONS RESULTS IN WOMEN'S ATHLETIC JUMPING EVENTS IN THE YEARS FROM 1968 TO 2012

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- Olympic Games,
- finals,
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- time series.

Abstract:

The purpose of this study is an analysis of results achieved in women's athletic jumping events during Olympic finals from 1968 (Mexico) to 2012 (London). Results of both Olympic champions and medalists as well as those of athletes outside medal positions were taken into consideration. Disproportion rates between the above-mentioned groups and trends occurring in this area during the considered research period were defined. The average result values of all narrow finals female participants in the individual events were also analyzed. The final result of the analysis it an attempt to define the indicators of result development in the individual groups of female athletes.

INTRODUCTION

The dynamics of world athletics development takes various shapes [4, 5]. In some events, after a very dynamic period of results growth, some stagnation or even a regression in results values can be usually observed; in other events, the initial period of stabilization is compensated by a dynamic growth in the following years [2,9]. That problem concerns both record results and their direct background.

The analysis of athletic results indicates that after establishment of a new world record, there follows a relatively long period during which the leading athletes reach the record level, and the record itself remains unchanged for a very long time. The level of those results is impacted by many factors. The most important ones include: recruitment and selection as well as training loads optimization, continuous improvement of technique and adjusting it to athlete's individual morphofunctional parameters or last but not least, improvement of sports facilities and sports equipment as well as making use of modern psychomotor control methods [3, 8,12].

Olympic Games are governed by their own rights. During Olympic finals, the leaders of lists containing names of world's best athletes in individual events are very often classified far behind the medal zone. It results of course from the very balanced level of training featuring the world's top athletes. The level of Olympic finals results takes different shapes, and in the final classification, centimeters or hundredths of a second are decisive [7,11,13]. Different are also the rates of upward trends as well as the predicted limit values of results in individual events [8,9,10].

Athletic jumping is regarded as speed & strength events and athletes' results are impacted by making an effective use of their predispositions in those areas in combination with appropriate technique [1,11,13].

The purpose of this study is an analysis of Olympic final competitions results in women's athletic jumping events at Olympic Games from 1968 to 2012.

MATERIAL AND METHOD

Material for this study includes results of 12 Olympic final competitions in women's long and high jump from Olympics in 1968 in Mexico to 2012 in London, as well as in triple jump from 1996 (Atlanta) and in pole vault from 2000 (Sydney) [6]. The analysis of collected material includes results achieved by Olympic champions and average results of female medalists, athletes from places IV-VIII as well as average results of all narrow finals medalists in particular events. In every one of the above-mentioned events, the distance rate between Olympic medalists and other athletes was calculated. Based on calculation results, approximated regression lines and determination coefficients were determined, illustrating trends occurring in this area. At the final stage of the analysis, result growth rates between the successive Olympic finals for particular groups were calculated and based on those data the average rate of growth during the considered research period was computed [2].

$$\text{GRR} = \frac{results_i - reselts_{i-1}}{reselts_{i-1}} * 100\%,$$

where: GRR - growth rates of results, $results_i$ – results of Olympic finals, $reselts_{i-1}$ – results of previous Olympic finals.

DISCUSSION OF RESEARCH RESULTS
Long jump

Long jump is one of the athletic speed & strength events, in which very good results are achieved by both female jumping specialists and representatives of sprint races or hurdles. From Olympic Games in Mexico to Olympics in Montreal, the results of female Olympic finalists feature a clear downward trend. It concerns all four analyzed groups of athletes. For the first time in a final competition, the 7-meters-limit was exceeded in 1980 in Moscow. That limit was also exceeded in that competition by other medalists. Record results in that event were also achieved during Olympics in Seoul (1988). The Olympic champion Joyner-Kersse, achieved the result of 7.40 m and the average result of medalists was at the level of over 7.20 m, whereas the average result of all narrow final participants was over 6.90 m. It seems symptomatic, that at those Olympics, the distance between medalists and athletes from places IV-VIII (almost 7%) is the greatest during the considered research period. The highest growth rate features the group of medalists, whereas the group of Olympic medalists features the lowest growth rate. The course of the regression line indicates that the distance between those two groups of female athletes, i.e. medalists and athletes from places IV-VIII remains generally at a constant level (Table 1, Fig.1).

High jump

In that event, the final results feature a significant growth dynamics. During the considered research period, the average results growth rate in all separated groups of athletes amounted to approx. 1%. The 2.00 m limit was for the first time exceeded by Olympic champion from Los Angeles (Meyfarth). At those Olympics, the athletes' average result was at the level of that limit. The highest average level of final competition was obtained by athletes at Olympic Games in Beijing (2.01m), whereas at Olympics in Athens (2004) the gold medalist, Slesarenko obtained the best result so far (2.06m). Based on the analysis of regression line course, it can be said that disproportions between the top athletes (medalists) and athletes from places IV-VIII are of permanent nature, with a clear trend to become deeper (Fig. 2).
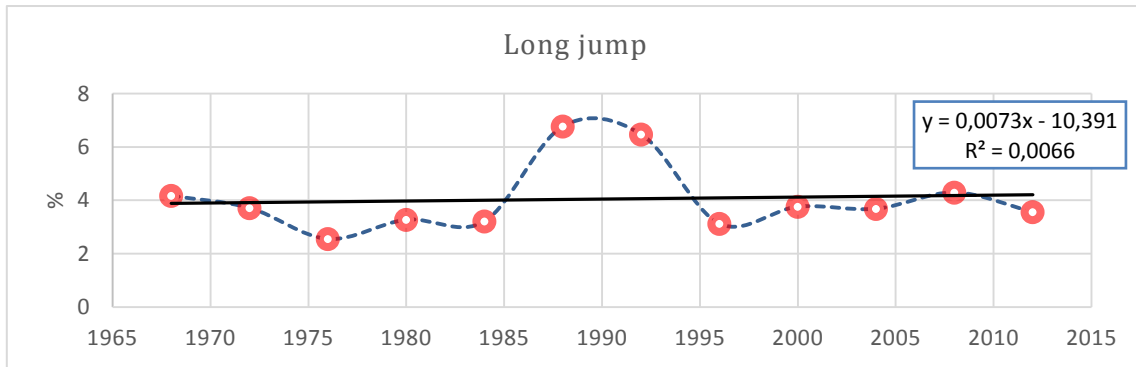
Figure 1. Percentage differences between the long jump results achieved by medalists and athletes from positions 4-8 (women's)
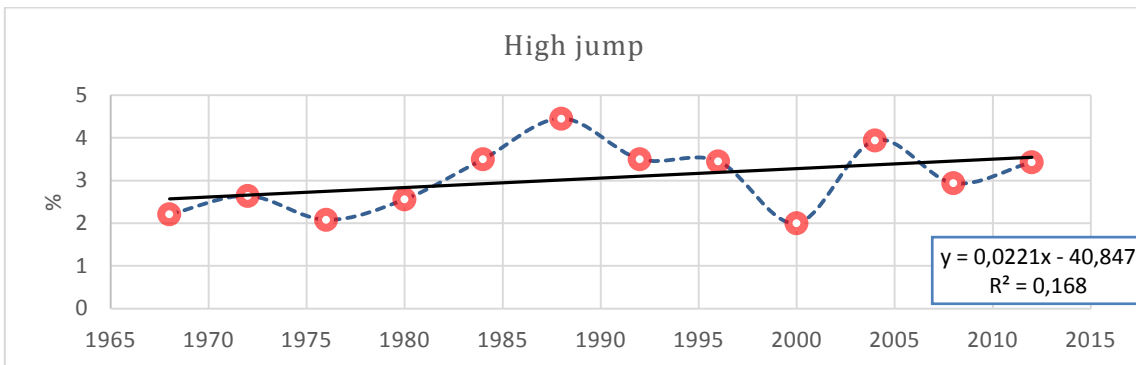

Figure 2. Percentage differences between the high jump results achieved by medalists and athletes from positions 4-8 (women's)
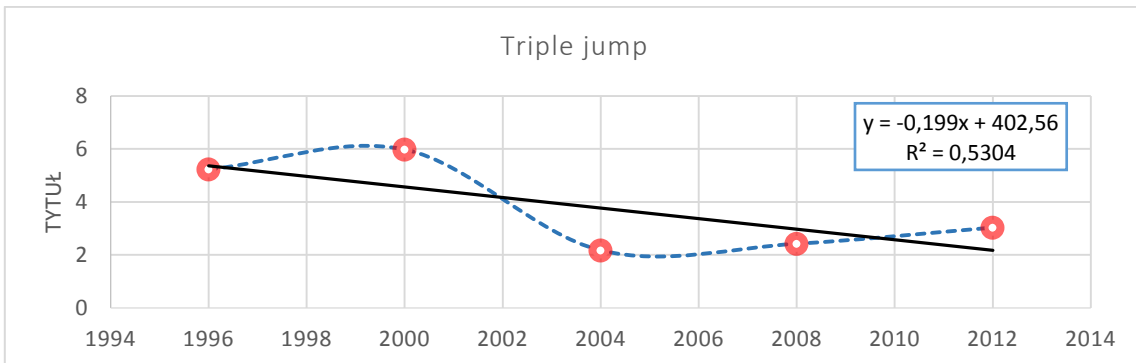

Figure 3. Percentage differences between the triple jump results achieved by medalists and athletes from positions 4-8 (women's)
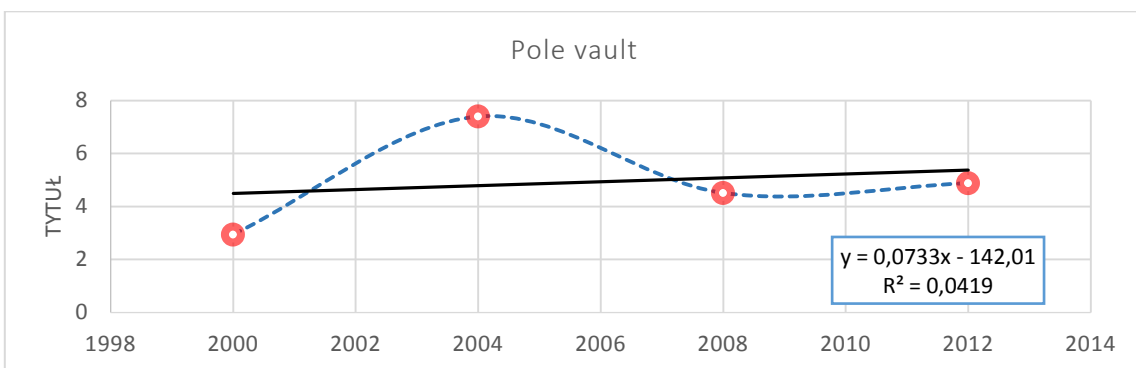

Figure 4. Percentage differences between the pole vault results achieved by medalists and athletes from positions 4-8 (women's)
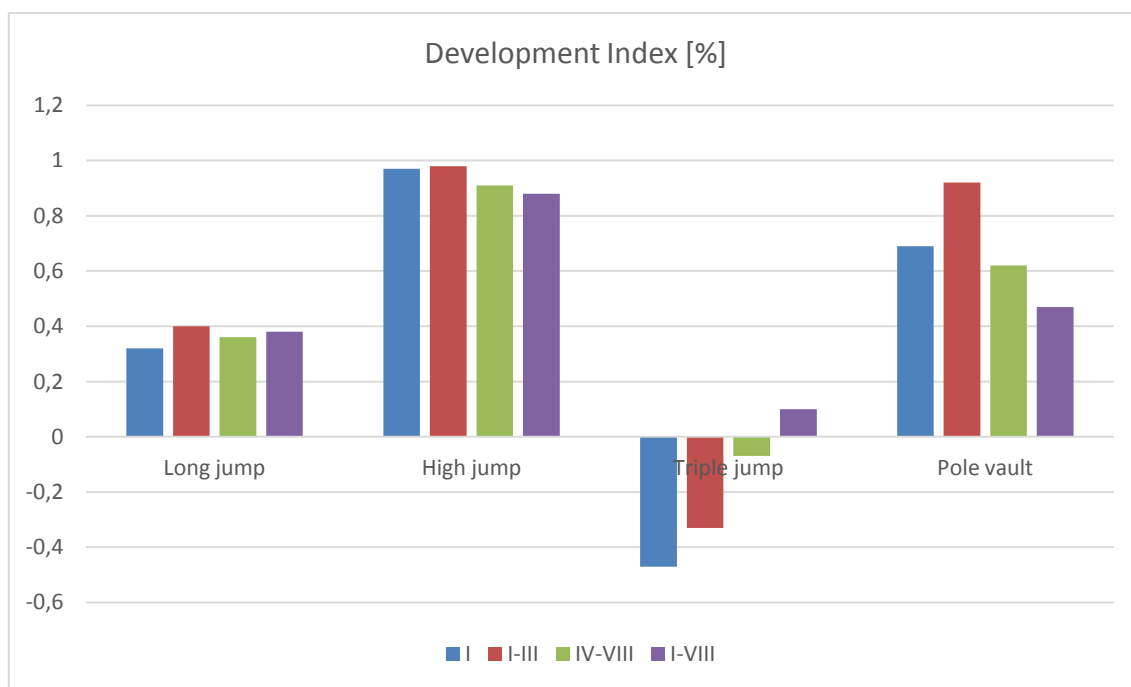
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Figure 5. The average women's athletic jumping development index in the respective groups of athletes (in %)

Triple jump

Triple jump is one of the relatively new women's Olympic events. Its debut falls on Olympic Games in Atlanta (1996). With the exception of the latest finals in London (2012), Olympic champions exceeded the 15.00 m barrier with the record result (15.39) in Beijing. Similar situation can be observed in the case of female medalists. Except for the average results of all narrow final competitions participants, in other analyzed groups a clear decrease of results development rate in that event can be noted. At Olympics in Sydney (2000), greater disproportions between medalists and other finals participants were noted. Those disproportions however, – as shown by regression analysis – have a clear downward trend, what can indicate a significant equalization of training level of the world's top athletes (Fig.3).

Pole vault

Pole vault is an even newer women's athletic event. For the first time, the Olympic pole vault finals took place in 2000 in Sydney, and the result of 4,60 m was sufficient to win the gold medal. Not much worse was also the average result of medalists (4.55). At those Olympics, female participants of final competition presented the most even training level. The distance between athletes from places I-III and IV-VIII did not exceed 3%, contrary to the following Olympics, where the above-mentioned disproportions were more than two times greater. The highest sports level feature female athletes participating in Olympics in Beijing (2008), at which the Olympic champion exceeded the barrier of 5.00 m (exactly 5.05 m). Based on the course of regress line, one can conclude, that at the next Olympic finals the distance between medalists and other athletes should significantly decrease (Fig. 4).

The final stage of the analysis is an attempt to answer the question which event features the greatest development rate during the considered research period. For this purpose, the growth rates of results between the successive Olympic competitions were calculated and based on them, the average magnitude of the growth rate index for the groups of athletes specified in the analysis was computed. Based on the obtained data, it can be concluded that the greatest development dynamics feature the high jump and pole vault. It concerns both medalists and other participants of final competitions. In triple jump, in turn, since it is a relatively

new women's event, a decrease of development rate among both medalists and athletes from positions IV-VIII can be observed. Only the average level of all narrow final competition participants featured a slight increase of results (Fig.5).

Tabela 1. Results Olympic finals in the years 1968-2012

	Place	1968	1972	1976	1980	1984	1988	1992	1996	2000	2004	2008	2012	GRR
Long jump	I	6,82	6,78	6,72	7,06	6,96	7,40	7,14	7,12	6,99	7,07	7,04	7,12	0,32
	I-III	6,72	6,74	6,66	7,04	6,86	7,24	7,11	7,05	6,91	7,06	6,99	7,03	0,40
	IV-VIII	6,44	6,49	6,49	6,81	6,64	6,71	6,65	6,83	6,65	6,80	6,69	6,78	0,36
	I-VIII	6,54	6,59	6,56	6,90	6,72	6,91	6,83	6,91	6,75	6,89	6,81	6,86	0,38
	%		3,71	2,55	3,27	3,21	6,77	6,47	3,12	3,76	3,68	4,29	3,56	
High jump	I	1,82	1,92	1,93	1,97	2,02	2,03	2,02	2,05	2,01	2,06	2,05	2,05	0,97
	I-III	1,81	1,89	1,92	1,95	2,00	2,01	2,00	2,03	2,00	2,03	2,04	2,04	0,98
	IV-VIII	1,77	1,84	1,88	1,90	1,93	1,92	1,93	1,96	1,96	1,95	1,98	1,97	0,91
	I-VIII	1,78	1,86	1,89	1,92	1,96	1,96	1,95	1,99	1,98	1,98	2,01	1,99	0,88
	%	2,21	2,64	2,08	2,56	3,50	4,45	3,50	3,45	2,00	3,94	2,94	3,43	
Tiple jump	I								15,33	15,20	15,30	15,39	14,98	-0,47
	I-III								15,10	15,05	15,23	15,31	14,86	-0,33
	IV-VIII								14,31	14,15	14,90	14,94	14,41	-0,07
	I-VIII								14,61	14,49	15,03	15,08	14,58	0,10
	%								5,23	5,98	2,17	2,42	3,03	
Pole valut	I									4,60	4,91	5,05	4,75	0,69
	I-III									4,55	4,79	4,87	4,73	0,92
	IV-VIII									4,42	4,46	4,66	4,51	0,62
	I-VIII									4,47	4,58	4,74	4,59	0,47
	%									2,94	7,40	4,51	4,88	

CONCLUSSION

The analysis conducted in this study allows for drawing the following conclusions:

1. During the considered research period, the long jump and the pole vault feature the greatest growth rate of Olympic final competitions results.

2. Triple jump belongs to events, in that continuous decrease of results obtained both by medalists and other final competitions participants.

3. Long jump proved to be the event featuring the most balanced sports level; the observed disproportions between groups remain basically on the same, unchanged level.

4. The fastest rate of decline of differences between groups can be observed in triple jump and pole vault; in those events, the distance between the Olympic top athletes and other ones shows a distinct upward trend.

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