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## SPORT REALIZATION IN AGE ASPECT OF ELITE ATHLETES IN THE DISCIPLINE 100 M MEN

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### ABSTRACT

Sport realization in elite sport is of interest both for the people in the practice (athletes and coaches) and for sport theory. In athletic competitions the discipline 100 m for men has its special place as one of the most popular ones. From there is our interest in sport realization of elite sprinters in age aspect. The aim of the following study is to analyze the performance of the world elite sprinters in age aspect. For our study, we analyze top 60 athletes in the all-time rank – retired from elite sport. We use the group of retired athletes is used to created sport results models in age aspect and reveal in details tendencies in sport performance. Presented data can be used as an optimization tool for optimization of training programs for optimal sport realization in age aspect.

**Key words:** 100 m, men, elite athletes, sport realization

### PURPOSE

Achieving high sport results and the path taken to reach them were of interest to sport professionals, but often remain behind the scenes and are not available to the general public (1, 2). The question of the appropriate age to achieve peak sport performance in sprint also remain unclear (3).

The aim of the following study is to analyze the performance of the world elite sprinters in age aspect.

By achieving the main aim of the study we will present actual information regarding the process of sport realization of elite athletes in a key athletic discipline such as 100 m for men. Also, indirectly this will add light into speed and strength abilities utilization.

### METHODS

For achieving the main aim and idea of the study we accomplished the following tasks:

1. Analysis of accessible methodical literature related to studies theme.
2. Collection of research information and creation of a database.
3. Mathematical and statistical analysis of gathered information.
4. Expert analysis and conclusions for sport theory and practice.

After reviewing the available literature on the research theme, we found that the information on the topic is fragmentary.

The research database was collected using elite athletes personal sport profile in World athletics official web site presenting their best sport results year by year since in their professional sport career. In the all-time top 113 athletes 56% can be part of our study (60 athletes) who ended their professional sport career. Among the respondents we find former Olympic, World and European champions and world record holders in the studied discipline.

For the purpose of the study, we used several mathematical and statistical methods incl. descriptive statistics, frequency analysis, and

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signal method for development of evaluation tables. All data was processed using SPSS 22.0 and Microsoft Excel software.

## RESULTS

One of the main questions seeking for answers is the longevity of an elite athlete sport career. Among studied respondents (60 in total) we find

average value of 12 seasons (years) as elite athlete. This is long period for a discipline closely related to manifestation of speed abilities. The longest recorded career as elite sprinter is 24 competition seasons which is a fact worthy of respect. We find high value of variance coefficient which indicates heterogeneity in sport career longevity among respondents.

**Table 1.** Descriptive statistics of professional sports career longevity

| Professional sports career longevity | N  | Range | Minimum | Maximum | Mean      |            | Std. Deviation | Variance (V%) | Skewness | Kurtosis |
|--------------------------------------|----|-------|---------|---------|-----------|------------|----------------|---------------|----------|----------|
|                                      |    |       |         |         | Statistic | Std. Error |                |               |          |          |
|                                      | 60 | 23    | 1       | 24      | 12        | 0,52       | 4,03           | 32,69         | 0,03     | 0,72     |

In order to gain a complete picture of the level of sport qualification of respondents, we present the descriptive analysis (**Table 2**) revealing sprinters personal best sport results. Average value of personal best result is 9,91 sec., with fastest

recorded time and actual world record of 9,58 sec., and slowest recorded personal best result of 9,97 sec. All this data reveals the exclusivity of studied sample of retired from active competing athletes.

**Table 2.** Respondents personal best result descriptive statistics.

| PB result | N  | Range | Minimum | Maximum | Mean      |            | Std. Deviation | Variance (V%) | Skewness | Kurtosis |
|-----------|----|-------|---------|---------|-----------|------------|----------------|---------------|----------|----------|
|           |    |       |         |         | Statistic | Std. Error |                |               |          |          |
|           | 60 | 0,39  | 9,58    | 9,97    | 9,91      | 0,01       | 0,06           | 0,63          | -2,84    | 12,53    |

Of interest for sport selection and training methodology is the origin of the best sprinters in the world. This data is presented by the help of frequency analysis in **Table 3**. Almost 50% of the best sprinters in the discipline 100 m, already retired from competing, come from United States, followed by significantly fewer representatives from Jamaica, Nigeria, etc.

The data presented on **Table 4** deepens the analysis of sport realization in age aspect of studied athletes. It sums the information of directly connected to their performance as sprinters and sport result absolute value.

**Table 3.** Best sprinters nation frequency analysis (retired from elite sport).

| Nation              | Frequency | Percent |
|---------------------|-----------|---------|
| USA                 | 29        | 48,3    |
| Nigeria             | 6         | 10,0    |
| Jamaica             | 6         | 10,0    |
| Great Britain       | 4         | 6,7     |
| Canada              | 3         | 5,0     |
| Trinidad and Tobago | 3         | 5,0     |
| Australia           | 1         | 1,7     |
| Antigua and Barbuda | 1         | 1,7     |
| Barbados            | 1         | 1,7     |
| Bahamas             | 1         | 1,7     |
| Bahrein             | 1         | 1,7     |
| Cayman Islands      | 1         | 1,7     |
| Ivory Coast         | 1         | 1,7     |
| Namibia             | 1         | 1,7     |
| Nevis               | 1         | 1,7     |
| Total               | 60        | 100,0   |

Table 4. Descriptive statistics of sport performance.

| Index  | N  | Range | Minimum | Maximum | Mean      |            | Std. Deviation | Variance (V%) | Skewness | Kurtosis |
|--|----|-------|---------|---------|-----------|------------|----------------|---------------|----------|----------|
|  |    |       |         |         | Statistic | Std. Error |                |               |          |          |
| Season in competing as elite athlete           | 60 | 23    | 1       | 24      | 12        | 0,52       | 4,03           | 32,69         | 0,026    | 0,724    |
| Personal best result                           | 60 | 0,39  | 9,58    | 9,97    | 9,91      | 0,01       | 0,06           | 0,63          | -2,839   | 12,535   |
| Weakest result as elite athlete                | 60 | 1,35  | 9,95    | 11,3    | 10,55     | 0,04       | 0,28           | 2,65          | 0,634    | 0,188    |
| Range of sport result as elite athlete         | 60 | 1,34  | 0       | 1,34    | 0,64      | 0,04       | 0,27           | 42,88         | 0,618    | 0,041    |
| Average sport result as elite athlete          | 60 | 0,65  | 9,8     | 10,45   | 10,16     | 0,01       | 0,12           | 1,13          | 0,135    | 1,146    |
| Standard deviation as elite athlete            | 59 | 0,33  | 0,08    | 0,41    | 0,20      | 0,01       | 0,08           | 40,29         | 1,016    | 0,534    |
| Variance (V%) of sport result as elite athlete | 59 | 0,16  | 0,01    | 0,17    | 0,05      | 0,01       | 0,04           | 85,22         | 1,762    | 2,881    |
| Valid N (listwise)                             | 59 |       |         |         |           |            |                |               |          |          |

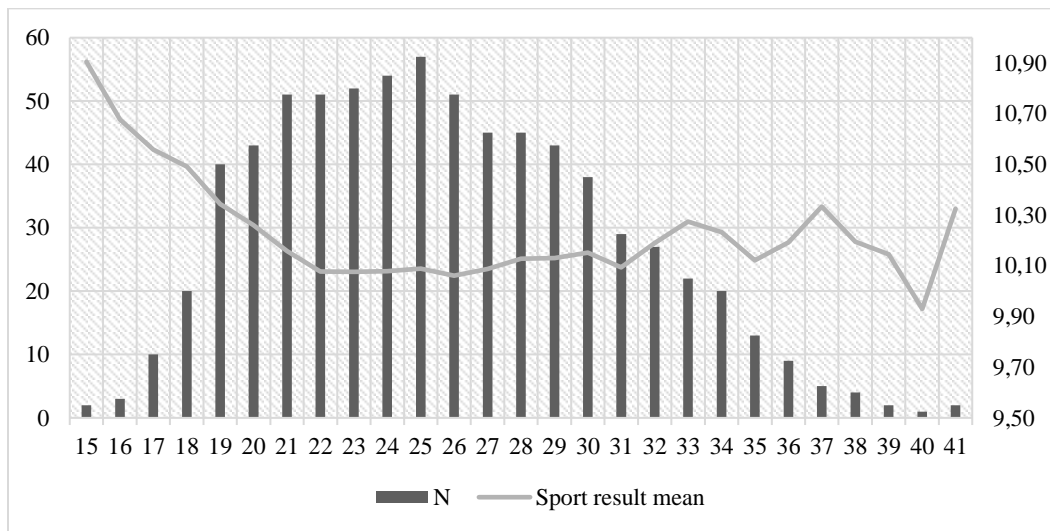
Table 5. Descriptive statistics of sport performance in age aspect.

| Age | N  | Range | Minimum | Maximum | Mean      |            | Std. Deviation | Variance (V%) | Skewness | Kurtosis |
|-----|----|-------|---------|---------|-----------|------------|----------------|---------------|----------|----------|
|     |    |       |         |         | Statistic | Std. Error |                |               |          |          |
| 15  | 2  | 0,79  | 10,51   | 11,30   | 10,91     | 0,40       | 0,56           | 5,12          |          |          |
| 16  | 3  | 0,77  | 10,33   | 11,10   | 10,68     | 0,23       | 0,39           | 3,66          | 0,849    |          |
| 17  | 10 | 0,68  | 10,27   | 10,95   | 10,56     | 0,07       | 0,23           | 2,14          | 0,752    | -0,655   |
| 18  | 20 | 0,92  | 10,08   | 11,00   | 10,49     | 0,06       | 0,25           | 2,37          | 0,698    | 0,155    |
| 19  | 40 | 1,06  | 10,05   | 11,11   | 10,34     | 0,04       | 0,24           | 2,33          | 1,310    | 1,480    |
| 20  | 43 | 1,10  | 9,97    | 11,07   | 10,26     | 0,03       | 0,21           | 2,06          | 1,503    | 4,027    |
| 21  | 51 | 0,63  | 9,88    | 10,51   | 10,16     | 0,02       | 0,15           | 1,52          | 0,530    | -0,233   |
| 22  | 51 | 0,80  | 9,69    | 10,49   | 10,08     | 0,02       | 0,15           | 1,46          | 0,517    | 1,401    |
| 23  | 52 | 0,88  | 9,58    | 10,46   | 10,08     | 0,02       | 0,17           | 1,65          | 0,055    | 0,568    |
| 24  | 54 | 0,77  | 9,82    | 10,59   | 10,08     | 0,02       | 0,15           | 1,44          | 1,279    | 2,684    |
| 25  | 57 | 1,16  | 9,76    | 10,92   | 10,09     | 0,03       | 0,19           | 1,90          | 1,886    | 5,885    |
| 26  | 51 | 0,89  | 9,63    | 10,52   | 10,06     | 0,02       | 0,17           | 1,64          | 0,634    | 1,092    |
| 27  | 45 | 0,96  | 9,77    | 10,73   | 10,09     | 0,02       | 0,16           | 1,63          | 1,421    | 4,277    |
| 28  | 45 | 1,04  | 9,88    | 10,92   | 10,13     | 0,03       | 0,19           | 1,84          | 1,906    | 6,198    |
| 29  | 43 | 1,19  | 9,79    | 10,98   | 10,13     | 0,03       | 0,22           | 2,13          | 1,294    | 4,404    |
| 30  | 38 | 1,06  | 9,81    | 10,87   | 10,15     | 0,04       | 0,24           | 2,39          | 1,146    | 1,154    |
| 31  | 29 | 0,78  | 9,89    | 10,67   | 10,09     | 0,03       | 0,17           | 1,72          | 1,526    | 3,369    |
| 32  | 27 | 0,75  | 9,84    | 10,59   | 10,19     | 0,04       | 0,20           | 1,96          | 0,175    | -0,682   |
| 33  | 22 | 1,05  | 9,87    | 10,92   | 10,28     | 0,06       | 0,28           | 2,71          | 0,967    | 0,413    |
| 34  | 20 | 0,79  | 9,91    | 10,70   | 10,23     | 0,05       | 0,23           | 2,25          | 0,500    | -0,804   |
| 35  | 13 | 0,44  | 9,94    | 10,38   | 10,12     | 0,04       | 0,15           | 1,53          | 0,562    | -1,207   |
| 36  | 9  | 0,50  | 10,00   | 10,50   | 10,19     | 0,06       | 0,19           | 1,82          | 0,489    | -1,394   |
| 37  | 5  | 1,13  | 9,97    | 11,10   | 10,33     | 0,21       | 0,46           | 4,49          | 1,528    | 1,984    |
| 38  | 4  | 0,42  | 9,96    | 10,38   | 10,20     | 0,09       | 0,18           | 1,74          | -0,767   | 0,923    |
| 39  | 2  | 0,33  | 9,98    | 10,31   | 10,15     | 0,17       | 0,23           | 2,30          |          |          |
| 40  | 1  | 0,00  | 9,93    | 9,93    | 9,93      |            |                | 0,00          |          |          |
| 41  | 2  | 0,25  | 10,20   | 10,45   | 10,33     | 0,13       | 0,18           | 1,71          |          |          |

The foundation of the following study is presented on **Table 5**. It sums all result divided by age, which is the most actual information regarding sport performance in sprinting in different age periods. According to the average sport result value the age in we must expect maximum realization of talent and accumulation of training means and methods is between 23 and 27. This is confirmed by the low values of standard deviation and variance coefficient. This statement is also supported by biggest number of observations (ranging from 45 to 57 cases). With these statements we do not deny that

in the remaining age periods cannot be expected personal best results or high level of sport performance. But based of research data this period is highlighted as the most favorable.

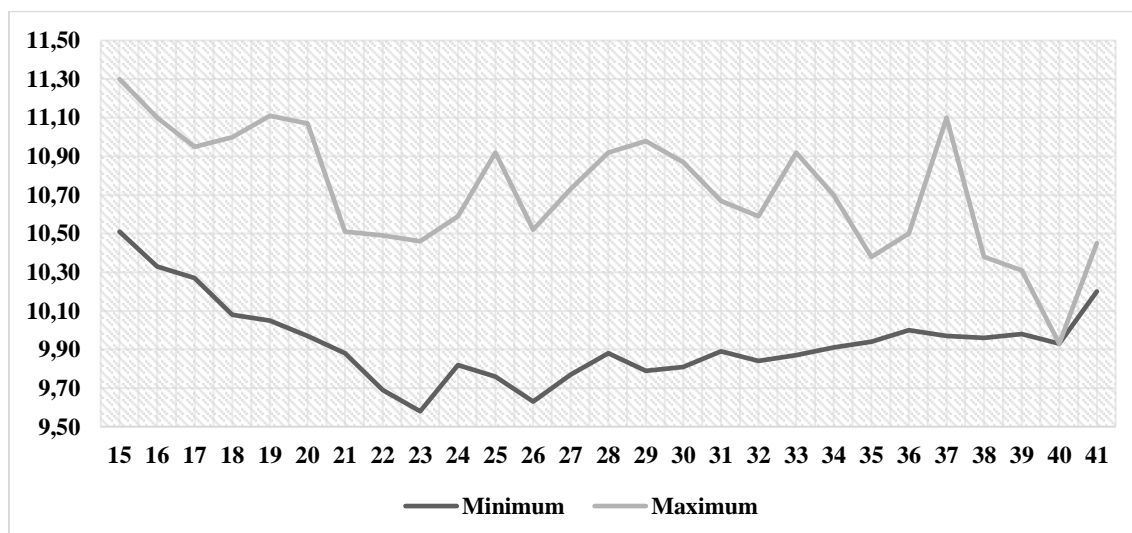
**Figure 1** gives us easier insight regarding number of studied cases in different biological age period and the average sport result of respondents. All these backups the statements presented in the analysis above. With the drop of observed cases, we can note the level of validity of finding is also lowering.



**Figure 1.** Sport result average value and number of studied cases in age aspect.

Interest data is visible on **Figure 2** which present the best and the weakest sport results from age aspect. We clearly see tendency of lowering both indexes until 23-24 years of age. After that is very

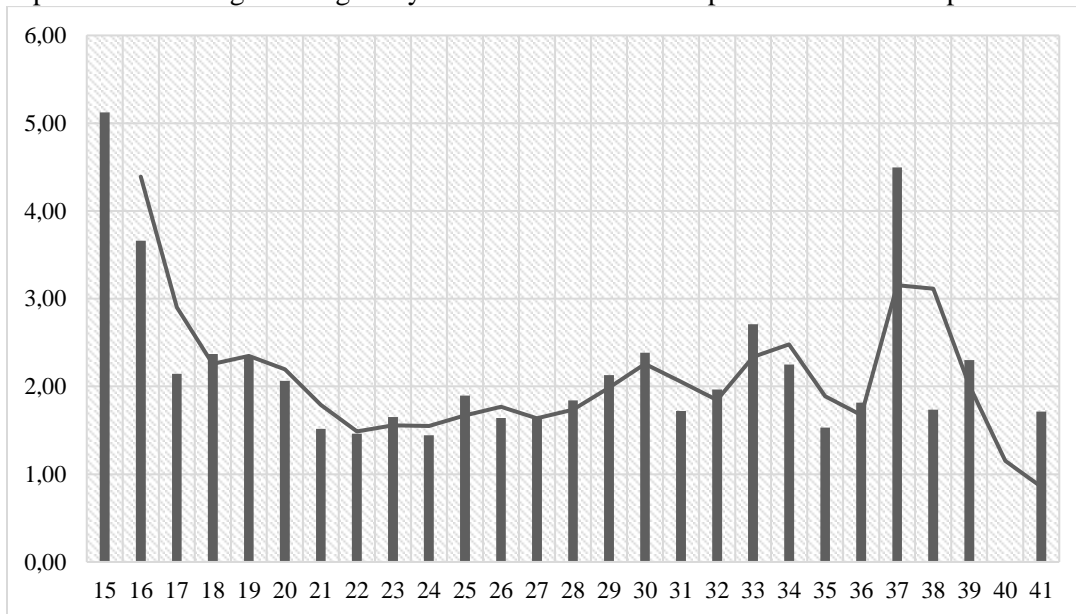
hard to find any tendency in movement of those indexes. After crossing 30 years of age the best sport performance, presented by minimum sport results as absolute value, is weakening.



**Figure 2.** Difference between best and weakest sport result registered by respondents.

The graphic presentation of variance coefficient reveals homogeneity of personal best sport result in age aspect. We find high homogeneity levels

between the results from 17 to 36 years of age. This indicates that high level sport performance can be expected between this period.



**Figure 3.** Variance coefficient of sport result in age aspect.

## CONCLUSION

Based on the research data, we can summarize that in order to achieve top performance in the discipline 100 m for men, certain age period stand out. On the other hand, this does not preclude the top-of-the-line sport performance outside of the so called “window for maximum sport realization”.

In our opinion this study must be widen with other sprint discipline to obtain more detailed information regarding performance in sprint discipline which are similar in many ways.

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