

SOME DIFFERENCES BETWEEN THE 12-YEAR OLD MALE SPRINTERS AND THE TOP SPRINTERS

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Abstract

Sprinting characteristics of 12-year-old boys, who were not engaged in athletic activities at that time, were determined on a 100-meter track. In parallel, the results achieved by a top sprinter were also obtained on the same track.

The purpose of this study was to determine the basic running stages, the time and distance limits, and the essential differences between the speed-distance curves for children and top sprinters.

As expected, the top sprinters exceeded the boys' performance at all points. Although there were similarities, significant sprinting differences between the two types were noted. The principal differences were in the number of distinctive running stages, the rate of initial acceleration, the position and duration of the maximum speed period, and the speed profile of the final 10 meters of the track. Finally, it was concluded that the 100-meter sprint may not be the most suitable length for this group of boys.

Key words: athletics, sprint, 12-year-old sprinters, top sprinters

Sažetak

NEKE RAZLIKE IZMEĐU DVANAESTOGODIŠNJIH DJEČAKA SPRINTERA I VRHUNSKIH SPRINTERA

Sprinterske karakteristike dvanaestogodišnjaka koji u to vrijeme nisu bili uključeni u atletske aktivnosti, determinirane su na stazi od 100 metara. Paralelno su na istoj stazi dobiveni i rezultati koje je postigao vrhunski sprinter.

Svrha ovoga rada bila je odrediti osnovne stupnjeve trčanja, vremenske i daljinske granice, te osnovne razlike između krivulja brzine i udaljenosti za djecu i za vrhunskog sprintera.

Kao što se i očekivalo, vrhunski je sprinter svojim rezultatima nadmašio rezultate dječaka u svim elementima. Iako su postojale sličnosti, uočene su i značajne razlike između dva tipa. Osnovne su razlike postojale u broju različitih stupnjeva trčanja, u početnom ubrzanju, položaju, te trajanju perioda maksimalne brzine i brzinskom profilu u zadnjih 10 metara staze. Na kraju je zaključeno da sprint na 100 metara ne mora biti najpogodnija duljina staze za ovu grupu dječaka.

Ključne riječi: atletika, sprint, 12 godišnji sprinteri, vrhunski sprinteri

Zusammenfassung

EINIGE UNTERSCHIEDE ZWISCHEN DEN 12JÄHRIGEN SPRINTERN UND SPITZENSPRINTERN

Die Charakteristiken des Sprints bei den zwölfjährigen Jungen, die in dieser Zeit nicht an den athletischen Aktivitäten teilgenommen haben, wurden auf der 100-m-Strecke determiniert. Parallel haben wir auf derselben Strecke die Resultate erworben, die ein Spitzensprinter erreicht hat.

Die Absicht dieser Forschung war die Bestimmung von Grundphasen des Laufens, von Zeit- und Streckengrenzen, und die Bestimmung von wesentlichen Unterschieden zwischen den Geschwindigkeits- und den Streckenkurven bei den Jungen und bei dem Spitzensprinter.

Wie erwartet hat der Spitzensprinter mit seinen Resultaten die Leistungen der Jungen in allen Elementen überschritten. Obwohl es gewisse Ähnlichkeiten gab, wurden wesentliche Unterschiede zwischen diesen zwei Typen festgestellt. Die Hauptunterschiede entstanden in der Anzahl von kennzeichnenden Phasen des Sprints, in der Anfangsbeschleunigung, in der Position und Dauer der Zeitspanne der maximalen Geschwindigkeit als auch in dem Geschwindigkeitsprofil in den letzten 10 Metern der Strecke. Schließlich kann daraus gefolgert werden, daß der 100-Meter-Sprint keine geeignete Länge für diese Gruppe der Jungen wäre.

Schlüsselwörter: Athletik, Sprint, 12 jährige Sprinter, Spitzensprinter

INTRODUCTION

The majority of authors studying the rates of change of a runner's speed in 100-meter sprints (Zaciorskij, 1979, Clarke, 1981, Filin, 1984, Milanović and others, 1986, Ionov, 1987, Šnajder and Milanović, 1991) concurred that these changes resulted from several interdependent factors in each running stage. These are: acceleration in the starting stage (0-30 m), period of maximum speed (30-60 m), speed on the track (60-80 m), and period of retaining the attained speed to the finish (80-100 m). The first stage reflects the quality of the start and the rate of acceleration, the second represents the period of maximum running speed, whereas the third and the fourth stage demonstrate the level of speed endurance. Performance in all the stages improves as the overall quality of the sprinter increases.

Although studies on sprinting abilities of children have been published (Šnajder, 1964, Clarke, 1981 and 1982, Volkov, 1981, Ropret, 1983), insufficient attention has been paid to graphical presentation of the running speed as a function of track distance. A curve resulting from the correlation of the running speed and track distance is an important means to determine the sprinting ability of children of different ages, as well as for the formulation of appropriate exercises to develop their sprinting characteristics.

An attempt was made in this investigation to establish the sprinting speed-distance curve for children running the 100-meter track. These data were obtained from the running tests of 42 12-year old children who were not engaged in athletic activities at that time. Measurements were performed at every 10 meters of the track. The time at each 10-meter interval was recorded by professional referees. Estimated error of measurement was +/- 0.1 second.

The experimental results confirmed the existence of basic running stages, determined their time and distance limitations, and established the essential differences between the speed-running curves for children and for a 100-meter sprinter. Furthermore, these results could be used to determine the suitability of the 100-meter sprint as an exercise and a running speed test for 12-year-old boys.

RESULTS AND DISCUSSION

The test data are given in Table 1 and are also shown graphically in Figure 1. Curves 1 and 2 show the speed of the top sprinter and the boys, respectively. Curve 2 represents the average speed for all the boys.

The data show that in boys the average total time for the 100-meter run was 17.3 seconds at an average speed of 5.3 m/s. The top sprinter needed 10.0 seconds to cover the same distance, running at an average speed of 10.0 m/s. Of all the segments, the boys used most of their time (2.1 seconds) for acceleration in the first 10 meters. Their speed increased up to the 60-meter mark when it gradually decreased till almost the end of the run. However, it is interesting to note that in the 20 to 30 meters segment, the rate of acceleration declined and then increased again to level off between 50-60 meters. Also, an unexpected increase in the speed occurred in the last 10 meters of the track, whereas in the case of the top sprinter the running speed in the last two segments continued to decline. The smallest speed difference (2.44 m/s) between the boys and the top sprinter was in the first segment. This difference gradually increased, reaching the maximum of 5.42 m/s in the 40-50 meters segment.

Table 1: Numerical values of the running speeds attained by 12-year old boys and a top sprinter on a 100-meter track

TRACK SECTIONS, m:	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Cumulative running time for boys, s	2.1	3.8	5.5	7.1	8.7	10.3	12.0	13.7	15.5	17.3
Boys running time in individual sections, s	2.1	1.7	1.7	1.6	1.6	1.6	1.7	1.7	1.8	1.8
Boys speed, m/s	4.7	6.0	5.9	6.2	6.2	6.3	5.9	6.0	5.5	5.7
Sprinter speed, m/s	7.14	10.00	10.26	11.36	11.62	11.11	11.11	11.36	10.86	10.63
Speed difference between boys and sprinter (m/s)	2.44	4.00	4.36	5.16	5.42	4.81	5.21	5.36	5.36	4.93
Relative speed diff.(sprinter/boys)	1.52	1.66	1.74	1.83	1.87	1.76	1.88	1.89	1.97	1.86
% maximum speed, sprinter	61.4	86.1	88.3	97.8	100.0	95.6	95.6	97.8	93.5	91.5
% maximum speed, boys	74.6	95.2	93.7	98.4	98.4	100.0	93.7	95.2	87.3	90.5



The two curves show certain similarities. For instance, there is a decline in the rate of acceleration in the 20-30 meters segment for both cases. Also, the two curves show a slight reduction in the running speed in the second part of the track, except that the boys showed an increase in the last 10 meters of the run. The following, however, are the principal differences between the two types of runners:

- (1) The level of the top sprinter's curve is higher at all stages.
- (2) Although the periods of acceleration are similar, the rate of acceleration for the top sprinter is appreciably higher.
- (3) The maximum speed segments are not equal. In the case of the sprinter it spanned over 40 meters, i.e. between the 40 and 80 meters marks. The boys were able to maintain the top speed for only 30 meters, between the 30 and 60 meters of the track.

It is also interesting to note that the boys reached 74.6% of their maximum speed in the first 10 meters, while the top sprinter achieved only 61.4 % of his top speed in the same section. It is only in the 30-40 meters segment that the boys and the top sprinter reached the same percentage of their maximum speeds. Also, while the sprinter reached his maximum speed in the 40-50 meters segment, the boys needed additional 10 meters to attain the maximum speed.

The tendency for the running speed to decrease after reaching the maximum is similar in both cases, but it is somewhat more abrupt for the boys. Furthermore, it has been shown that in the last 10 meters of the track the boys' speed actually increased. This fact demonstrates that the boys possessed an additional quantity of energy that was not fully utilized in the previous sections of the track, which allowed them to accelerate in the finish. Clearly, they could have obtained better results.

In contrast with the generally recognized four running stages for a top sprinter, in case of boys - as shown by curve 2 in Figure 1 - only three stages can be distinguished. These are as follows: accelerating period up to 30 meters, the period of running at the maximum speed in the 30-60 meters range, and the finishing stage from 60 meters to the end.

CONCLUDING REMARKS

The top sprinter obtained better results because of his higher acceleration initially and a much higher speed level during the maximum speed period, as well as the spatially longer section of the track that he maintained in the maximum speed period. The 100-meter sprint is not the most suitable track length for the 12-year old boys. They do not develop their potential capability fully at any section of the track. Additionally this confirms the facts that the overall speed was relatively low, that there was a rather small decrease in the speed after the 60-meter mark and most significantly, that the increase in speed occurred in the last 10 meters.

Judging from the shape of the curve depicting the running characteristics of the 12-year old boys who had no athletic experiences, the optimal track length should be 60 meters.

REFERENCES

1. Clarke, D.H., Irving, R.N. and Honeyman, B. (1981): Relations of maturity, structural and strength measures to the somatotypes of boys 9 through 15 years of age. *Research Quarterly*, 4.
2. Clarke, D.H. and Glines, D. (1982): Relationships of reaction moment and completion times to motor, strength, antropometric, and maturity measures o 13 years old boys. *Ibid*, 2,
3. Filin, V.P. (1984): Short distance running. *Fiskultura i sport*, (in Russian).
4. Ionov, D.P. and Cernjajev, G.I. (1987): Dynamic of the speed in 100 meters runs. *Legkaja Atletika*, 12, (in Russian).
5. Milanović, D., Hofman, E., Puhanić, V. and Šnajder, V. (1986): *Atletika - znanstvene osnove*. Fakultet za fizičku kulturu, Zagreb.
6. Ropert, J. (1983): Basic speed forms of 11-12 years old boys. *Fizička kultura*, 7-8.
7. Šnajder, V. (1964): Effect of some exercises for strength on the starting speed. *Diploma Thesis*, College for Physical Culture, Zagreb.
8. Šnajder, V. and Milanović, D. (1991): *Atletika hodanja i trčanja*. Fakultet za fizičku kulturu, Zagreb.
9. Volkov, N.I. and Lapin, V.I. (1981): analysis of the increase of the speed-curve in sprinting runs. *Theorija i praktika fiziceskoj kulturi*, 10, (in Russian).
10. Zaciorskij, V.M. and Primakov, J.N. (1979): Dynamics of the starting acceleration of running and it's influencing factors. *Ibid*, 7, (in Russian).