

# IMPROVED SPRINT ENDURANCE, A CONDITION FOR SUPERIOR PERFORMANCE IN SPEED RUNNING EVENTS

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**Abstract:** *Improving sprint endurance is a condition for achieving superior performance in junior female sprinters during speed running events. Better results can also be achieved by improving the time difference between the first portion of the race and the second portion of the race.*

*The research hypothesis is based on the premise that improving sprint endurance in speed events represents a condition for achieving superior performance. The object of this research is the training and competition model in junior girl sprint runners in Romania. The research aims at a continuous improvement and guidance of the training content by improving sprint endurance in speed events.*

*The practical value of this research is the development of a training and competition model that will allow a selection among several optimized methods and means for improving sprint endurance that can be applied to junior girl athletes who participate in speed events.*

**Key words:** *sprint endurance, superior performance, speed events.*

## 1. Introduction

The biochemical basis of motor quality, the velocity in the effector organ consists of muscle ATP content, the rate of ATP dissociation and the rate of ATP resynthesis.

Literature mentions the influence of several factors at psychological level such as the capacity of mental mobilization, the ability to focus the attention, the correct appreciation of the speed of movement,

the affective balance manifested through the ability to preserve the motor behaviour in the presence of some risk factors [4].

The speed of movement is also conditioned by the other motor qualities: muscle strength and neuromuscular endurance.

The speed of movement also depends on the other forms of velocity, repetition and execution in the sense that the superior speed of the displacement is

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conditioned by obtaining a latency of the motor reaction at start, the pushing force of the lower limbs immediately after start, the execution speed of the running steps, the frequency of the running steps and, last but not least, the ability to maintain the attained speed on the longest portion of the race [6].

Following means for developing the speed of acceleration can be used [4]:

- ankle flexion running with acceleration to the maximum, 20-30m,
- running with lifted knees, with acceleration to maximum pace, 20-30m,
- launch from standing start, with acceleration to maximum pace, 30-50m,
- launch from block start, with maximum pace, 10-30m.

Running speed can be improved by using the following:

- ankle flexion running at maximum pace, 20-30m,
- running with lifted knees, on the spot, maximum pace, 4-6 seconds.
- running with launched start, maximum pace, 20-50m.

Some recommendations on administered efforts [10]:

- preoccupation for improving reaction and execution speeds,
- correct acquisition of the technique and improvement of neuromuscular coordination,
- analytical development of force in speed mode,
- training muscle relaxation,
- improvement of speed during the training lesson must be done with a rested body,

- the speeds used should not alter the exercise techniques,
- low pace rates do not memorize competition techniques in contrast with maximum pace rates, which help memorize them,
- learning the launched speed step technique is achieved up to the level of controllable speed.
- strengthening and improving of the speed step technique is achieved using high and maximum speeds,
- using increased training volumes and intensities, without an adequate basis, leads to premature occurrence of the speed barrier.

Speed training at puberty age is in accordance with the growth and development processes of the human body as well as the level of force, with the installation of puberty [7]. As regards girls, progress is visible when entering the final stage of puberty when the level of muscle contraction is higher.

The movement execution time is improved at the upper leg, while the lower leg improves the force of the lower limbs, which will influence the execution of some motor actions and activities at higher speed rates, with the increase of coordination capacity.

In order to establish the training direction and to assess the level of psychomotor speed capabilities, a set of tests were conducted.

*Motor testing* is performed through tests of maximum speed capability, acceleration, sprint endurance, special strength and aerobic capacity [2].

*Maximum speed* is tested by covering 30m at maximum speed, after previously covering (acceleration zone) 30 m in launched mode. The time on the second

30m portion will be recorded, the result representing the maximum displacement speed expressed in m/s. Maintaining the maximum speed during most of the race is the main objective in training performance sprinters. The female sprinter's achieved time was 3.5s = 9m / s [9].

*Acceleration capability* was measured using a test running on a 60m portion with standing start. The acceleration capability is calculated by comparing the times achieved on the two 30m portions of the 60m track. The time achieved over the first 30m, during which the maximum speed is obtained, is compared with the time on the second portion of the track, while maintaining the maximum speed. The time difference between the first 30m and the final 30m represents the differential acceleration. Differential speed values above 1s indicate a good level of acceleration capability for established athletes, while at beginner level the values are less than 1.4s-1.6s. The sportswoman covered the first 30m of the track in 4.1s and the second portion of 30m in 3.6 s, which gives an acceleration capacity of 0.5s [9].

Sprint endurance is assessed by measuring the time recorded on 60m after previously completing an acceleration portion of 15-20m. The times on the 60m portion will be compared on the first 30m and the following 30m portions, the time difference between the first 30m portion, and the second portion being 3% in well-established athletes and 5-6% for those in formation. The female sprinter covered the first 30m in 3.6s and the second portion in 4.0s. By comparison, a higher value of 0.4 s is obtained on the first portion [9].

Sprint endurance assessment can also be achieved by covering a 150m section at

maximum speed. The average speed (m/s) is calculated, the difference between the maximum speed and the average speed can provide useful information on speed endurance as a basis in guiding and directing the training process.

Sprint endurance assessment can also be performed by covering a 120m section from standing start by recording 40m of each 120m section. There are three time intervals: the first intermediate time from departure to 40m, the second intermediate time from 40m to 80m launched speed mode, the third from 80 to 120m, speed in endurance mode. The small differences between the times recorded on the launched speed, 40-80m and the time on the 80-120th section in endurance mode show a good level of physical training. The female sprinter achieved 15,0s on 120m with intermediate times of 5.2s at 40m, 9.8s to 80m and 15.0s to 120m with the following differences: 5.2s, 4.6sec and 5.2s resulting in a sprint endurance of 0.6s.

## 2. Subjects and Methods

A training plan was designed for the female sprinter from CSM Braşov, a member of the national J3 group, for speed events, with a proposed performance goal of 12.7s /100m in the outdoors competitive season.

The training plan includes two macrocycles, the first macrocycle between October 1st and December 20th, to prepare for the outdoor competitive season and to achieve the proposed performance in the goal-oriented competition. The second macrocycle was designed for April-July (Table 1).

Regarding the periodic training, we determined that the training period

should be placed between October 1st and December 20th and the competition period between December 20th and March 18th, with the transition period of 3-4 weeks (Table 1).

Below is presented the structure of the weekly cycle of the training period:

#### **A1**

- warm-up running 2km,
- mobility and flexibility exercises 15-20min,
- special jogging and jumping exercises, 6x30m,
- launched running 4x40m,
- accelerated running 2 x 25m
  - repeated running 6x50m, 92-95%
  - repeated running 3x30m, 95-97%
- final running 4-600m.

#### **A2**

- warm-up running 2km,
- mobility and flexibility exercises 15-20min,
- special jogging and jumping exercises, 6x30m,
- launched running 4x40m
  - 4 series of special exercises with 6 elements x 30m each
  - launched running 4 x 50m
  - accelerated running 6x40m,
- final running 4x600m,
- GPP workouts, 25-30min.

#### **A3**

- warm-up running 2km,
- mobility and flexibility exercises 15-20min,
- special jogging and jumping exercises, 6x30m
- launched running 4x40m,
- accelerated running 2x25m
  - repeated running 4x80m, 92-95%,

- repeated running 3x30m, 95-97%

- final running 4-600m.

Structure of the weekly training cycle of the summer competitive period:

#### **A1**

- warm-up running 1,5km,
- mobility and flexibility exercises 15-20min,
- special jogging and jumping exercises, 6x30m,
- launched running 4x40m,
- accelerated running 2x25m
  - repeated running 6x60m, 95-97%
  - repeated running 3x30m, 95-97%
- final running 4-600m.

#### **A2**

- warm-up running 2km,
- mobility and flexibility exercises 15-20min,
- special jogging and jumping exercises, 6x30m,
- launched running 4x40m
  - 4 series of special exercises of 6 elements x30m each
  - launched running 4x50m
  - accelerated running 6x40m,
- final running 4-600m,
- GPP workouts, 25-30min.

#### **A3**

- warm-up running 2km,
- mobility and flexibility exercises 15-20min,
- special jogging and jumping exercises, 6x30m,
- launched running 4x40m,
- accelerated running 2x30m
  - repeated running 4x80m, 95-97%
  - repeated running 3x30m, 95-97%
- final running 4-600m.



### 3. Research Results

The analysis of the annual training plan revealed that the training was focused on the development of the speed of movement through repeated running exercises on 30-80m with a higher running volume during the autumn / winter training period and increased intensities up to 92-100% in the competitive seasons and the competitive summer season. Exercises of pushing, launching and throwing light objects and jumping on one leg and both legs, high knee and straight knee jumping steps strengthen the abdominal, back, lower and upper limb muscles. Special jogging and jumping exercises, small slope short distance uphill sprints, races, and specific checking norms were completed at the end of December for the indoor season and May- June for the outdoor season. Participating in competitions was designed for both indoor and outdoor competitions. Participation in the first stage of the j3 NC brought a performance of 8.63 seconds and in the final stage 8.38 seconds, and the qualification in the final of the event.

In outdoor competitions, the NC j3 first stage, she attained 13.06s so that, in the final stage, with 12.73s, she ranked third in the event standings.

### 4. Conclusions

1. Specialists in this field are interested in the development of modern methods and means of improving sprint endurance designed to obtain superior results in speed events.
2. The research revealed a correlation between sprint endurance and the achieved performance.
3. Sprint endurance assessment will be achieved over the 60m distance for the indoor season and the 120m distance for the outdoor season.

### References

1. Alexandrescu, D.C., Tatu, T., Ardelean, T.: *Athletics (Atletism)*. Bucureşti. Editura Didactică şi Pedagogică, 1983.
2. Alexandrescu, D.C., Tolvai, G.: *Latency of motor response in sprint and hurdles events (Timpul latent al reacţiei motrice în probele de sprint şi garduri)*. Editura Kapa, 2005.
3. Alexe, N.: *Modern sports training [Antrenamentul sportiv modern]*. Ed. Editis, 1993.
4. Ardelean, T.: *Specific features of athletics motor abilities development [Particularităţile dezvoltării calităţilor motrice în atletism]*. IEFIS, 1982.
5. Bompa, T.O.: *Theory and methodology of training, periodization (Teoria şi metodică antrenamentului, periodizarea)*. Bucureşti. Ed. CNFPA, 2002.
6. Demeter, A.: *Physiological and biochemical fundamentals of motor abilities (Bazele fiziologice şi biochimice ale calităţilor motrice)*. Ed. Sport-Turism, 1981.
7. Gârleanu, D.: *Didactical material for general physical preparation (Material didactic pentru pregătirea fizică generală)*. Bucureşti. Ed. Printech, 2012.
8. Platonov, V.N.: *Periodization in sports training [Periodizarea antrenamentului sportiv]*. Ed. Discobolul, 2015.
9. Raţă, G., Raţă, B.C.: *Capabilities in motor activities (Aptitudinile în activitatea motrică)*. Bacău. Ed. EduSoft, 2006.
10. Țifrea, C.: *Athletics, theory and methodology (Teoria şi metodică atletismului)*. Bucureşti. Ed. Dareco, 2002.
11. <http://www.scribub.com/timp-liber/sport/METODE-SI-PROCEDEE-PENTRU-DEZV1243131119.php>  
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