

OPTIMIZATION OF THE TRAINING AND COMPETITION MODEL IN MIDDLE-DISTANCE EVENTS FOR JUNIORS

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ABSTRACT

In this paper, we aimed to analyze the training and competition model of junior athletes from the Municipal Sports Club Bacău and to bring improvements based on this analysis. The hypothesis we started from was that it is possible to improve the training and competition model in middle-distance events for juniors by increasing the volume of the interval training method. The purpose of the paper was to optimize a training and competition model for middle-distance events for juniors. The research was conducted over a six-month period, from September 2023 to March 2024, in Bacău County and involved four athletes competing in middle-distance events.

KEYWORDS: training, competition, middle-distance events, juniors

JEL Clasifications: Z20, Z22, Z29

1.INTRODUCERE

Every coach has asked themselves at least once: "What more can I do to help the athlete surpass their performance?" Especially now, we can say that performance sports present specific conditions, with the main objective being to bring athletes to the podium at major competitions such as the European Youth Olympic Festival, the World Junior Championships, the European Championships, and the Balkan Championships. Progress in performance is continuous, and therefore the coach has the responsibility to create training plans and tests, more or less sophisticated, to evaluate the athlete's potential.

Analyzing the evolution of various world records in middle-distance events from 1912 to 2024 shows an improvement in the men's 800m event from 1'51"9 to 1'40"91, a gain of 11 seconds, or 9.83%; while the men's 1500m record has improved from 3'55"8 to 3'26"00, a gain of approximately 29 seconds or 12.64%. In the long-distance events, such as the 5000m and 10000m, there is a progress of 13.89% and 16.54%, respectively, from which it can be deduced that long-distance events have progressed the most, especially in recent decades.

Nowadays, it is clear to those involved in sports that the improvement of athletic performance and records in all disciplines has become possible due to the enhancement of training methods, training planning, and recovery means. To improve an athlete's performance, the coach must determine the specific qualities that need to be improved. The specificity of training is becoming increasingly important. Since increasing the frequency and intensity of training has its limits, qualitative preparation is necessary to continue improving the athlete's performance. Each training program allocates a significant volume to developing the qualities required by the practiced event. "Sporting performance is both an indicator of the quality of the work performed by the athlete and a measure of their success" (Matveev, 1981).

Speaking of pushing limits, we inevitably discuss fatigue and its correlations with performance in aerobic endurance sports, such as middle-distance events. It is believed that the ultimate limitation in middle-distance events is imposed by the nervous system and not by the athlete's capacity to transport and utilize oxygen during effort. This notion is based on the idea that the central nervous system integrates information from various sources, such as muscles, the heart, and the respiratory system during effort, and prevents the deterioration of skeletal muscles or damage to the heart and other vital organs.

The interval training method involves breaking down the effort into several sets and introducing breaks between them. A characteristic of this method is "the incomplete recovery of the body ($HR \approx 120-140$ beats/min), and we can highlight three working variants:

a) **Short interval method** – efforts lasting between 10 seconds and 1 minute, with incomplete recovery between sets;

b) **Medium interval method** – efforts lasting between 1 and 5 minutes, with incomplete recovery between sets;

c) **Long interval method** – efforts lasting more than 5 minutes, with incomplete recovery between sets" (Dragnea, 1996).

On the other hand, low-volume interval training can also be an efficient and practical method for physical improvement. The fundamental principle of interval training involves alternating periods of moderately intense exercise with periods of lower intensity or complete rest for recovery. Low-volume interval training refers to "workouts with a limited amount of activity" (Gibala MJ et al., 2014) and represents the minimum threshold of exercise intensity for developing aerobic capacity, usually at 40-45% of maximum oxygen uptake (VO_{2max}) (Mang ZA et al., 2021). Other studies show that excessive physical activity disrupts the body's balance and weakens immune function in blood variables, which can lead to a state of lethargy that ultimately decreases sports performance (Saidi, K., et al., 2019).

2. MATERIALS AND METHODS

The purpose of this study is to analyze the training plan based on a higher volume of the interval method and its effect on athletic performance.

The athletes who participated in this study numbered five and were divided into two groups: an experimental group ($n=2$) that followed a training program based on a higher volume of the interval method, and a control group ($n=3$) that followed a training program based on a lower volume of the interval method, with the intensity being the same for both groups.

Table 1 Athlete Variables

Variables	Experimental Group ($n=2$)	Control Group ($n=3$)
Age	16	17
Height	1.82	1.81
Weight	61.5	65
Body Mass Index	18.62	19.84

The endurance of the two groups was tested before and after six months of training using a widely recognized test, the Cooper Test. This test was used to evaluate the athletes' performances and their ability to cover the longest possible distance in 12 minutes. Before starting the test, the athletes warmed up for 20 minutes by running, stretching exercises, and running drills. They then ran for 12

minutes. During the test, they were informed about the remaining time until the end of the test. The distance covered was recorded for each athlete individually.

3.FINDINGS

The total volume of work using the interval method during the preparatory period for the control group was 60 km, and during the competition period, it was 75 km. For the experimental group, the training started with 60 km using this method and was reduced to 35 km by March.

Table 2 - Total Volume of Work in the Training Plan – Interval Method

Preparatory period		Competition period	
Control group	Experimental group	Control group	Experimental group
60km	60km	75km	35km

At the beginning of the 6-month program, insignificant differences were observed between the groups in the Cooper Test. However, at the end of the 6-month training program based on increasing the volume in the interval method, the difference was significant.

Table 3 Cooper Test Results

	Experimental group	Control group
Average Results of the Cooper Test - Initial	3.020m	3.050m
Average Results of the Cooper Test - Final	3.420m	3.170m

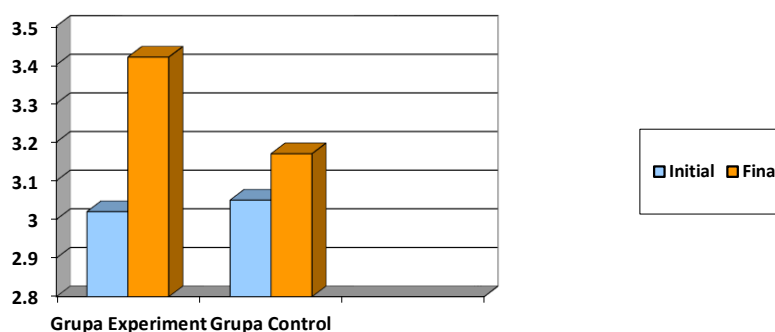


Chart no. 1 Average Results of the Cooper Test for the Two Groups

From Table no. 2, the following differences can be observed between the average results obtained in the initial testing and the average results obtained in the final testing between the two groups in the Cooper Test:

The experimental group recorded an initial average of 3,020m and a final average of 3,420m, with a difference of 400m, which represents progress compared to the initial test, with athletes covering a longer distance.

The control group recorded an initial average of 3,050m and a final average of 3,170m, with a difference of 120m, which also represents progress compared to the initial test, but less than the experimental group.

Table 4 VO2 Max Results Following the Cooper Test

	Experimental group	Control group
VO2 max - Initial	56.23	56.90
VO2 max - Final	65.17	59.58

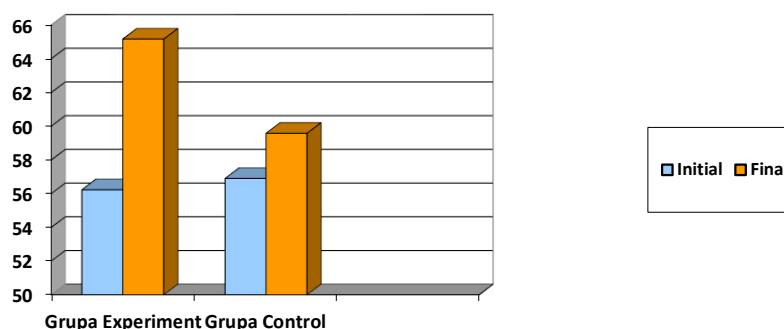


Chart no. 2 VO2 Max Values Following the Cooper Test Results for the Two Groups

From Table no. 4, the following differences can be observed between the average values obtained in the initial testing and the average values obtained in the final testing between the two groups for VO2 max following the Cooper Test:

The experimental group recorded an initial average value of 56.23 and a final average of 65.17, with a difference of 8.94, which represents progress compared to the initial test, with athletes showing improved values.

The control group recorded an initial average of 56.90 and a final average of 59.58, with a difference of 2.68, which also represents progress compared to the initial test, but much less than the experimental group.

4. CONCLUSIONS

At the beginning of the 6-month program, differences between the groups were observed. The experimental group showed a greater improvement in VO2 max values obtained from the Cooper Test compared to the control group. Following the analysis of the average results obtained by the experimental group in the Cooper Test at the end of the program, improvements in the distance covered during the test were observed, with 400 meters more than the initial test and 280 meters more than the control group, which followed the interval training method with lower volume and higher intensities.

In conclusion, this study shows that the interval training method with increased volume and moderate intensity (80-85%) seems to be a more effective method for improving aerobic capacity than the interval training method with reduced volume and higher intensity (90-95%). We can say that the interval training method with increased volume and moderate intensity (80-85%) offers advantages over training with reduced volume and higher intensity (90-95%), promoting the development of aerobic capacity and reducing the risk of overuse injuries.

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