



THE IMPACT OF INDIVIDUALIZED TRAINING PROGRAMS ON PERFORMANCE DEVELOPMENT IN YOUNG TRACK AND FIELD ATHLETES

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Introduction

In recent years, the development of young athletes in track and field has become a central focus of sports science, particularly in the context of optimizing training processes and enhancing performance outcomes. Modern athletics requires not only high physical preparedness but also the implementation of scientifically grounded training methodologies that take into account the individual characteristics of athletes. In this regard, individualized training programs are increasingly recognized as a key factor in improving athletic performance and ensuring long-term athlete development.

The relevance of this study is обусловлена the growing need to design training systems that correspond to the biological, physiological, and psychological особенностям young athletes. Traditional “one-size-fits-all” training approaches often fail to consider significant inter-individual differences in growth, maturation, and adaptation to нагрузка, which can lead to suboptimal performance outcomes and increased risk of injury. Contemporary research emphasizes that youth athletes exhibit substantial variability in developmental trajectories, and therefore require tailored training interventions aligned with their individual capacities and needs.

A number of studies have highlighted the importance of considering biological age, rather than chronological age, when planning training programs for young athletes. For instance, longitudinal analyses of track and field athletes aged 11–18 years demonstrate that performance development varies significantly depending on age, sex, and discipline, indicating the necessity of differentiated and individualized training strategies. Moreover, recent large-scale research projects investigating youth athletics development underline the complex interaction between individual (e.g., anthropometric characteristics, maturation, motivation) and environmental factors (e.g., coaching, training conditions), further supporting the need for personalized training approaches.

In addition, evidence-based training models, such as the Long-Term Athlete Development framework, stress the importance of progressive and individualized skill acquisition from an early age to ensure optimal performance and sustainable спортивное развитие. Failure to adapt training loads and methods to individual characteristics may result in overtraining, burnout, or early dropout, which remains a significant issue in youth sports, with some studies reporting dropout rates of up to 30–35% among early-specialized athletes.

Despite the growing body of literature, there remains a lack of comprehensive research specifically addressing the impact of individualized training programs on performance development in young track and field athletes. Existing studies often focus on general training principles or isolated performance factors, without providing an integrated analysis of individualized training effects across multiple physical and motor abilities.

Therefore, the purpose of this study is to investigate the impact of individualized training programs on the performance development of young track and field athletes, with particular attention to key physical qualities such as speed, endurance, coordination, and power. The findings of this research are expected to contribute to



the advancement of modern sports pedagogy and provide practical recommendations for coaches and practitioners working with youth athletes.

Methodology

This study employed a quasi-experimental research design to examine the impact of individualized training programs on the performance development of young track and field athletes. The research was conducted over a period of 12 weeks and involved two groups: an experimental group and a control group.

A total of 30 young athletes aged 12–15 years participated in the study. Participants were divided into two equal groups (n=15 each) based on their initial performance level. The experimental group followed an individualized training program designed according to each athlete's physical fitness level, functional capabilities, and adaptation rate, while the control group trained using a standard, uniform training program. To assess performance changes, a set of physical and motor tests was conducted before and after the intervention. These included:

- sprint performance (30 m run),
- endurance (800 m run),
- explosive strength (standing long jump),
- coordination (agility test).

The training load in the experimental group was adjusted individually in terms of intensity, volume, and recovery intervals, whereas the control group followed a fixed training schedule.

Data were analyzed using descriptive statistics (mean, percentage) and comparative analysis to evaluate differences between pre- and post-test results in both groups. The effectiveness of the individualized training approach was determined by comparing performance improvements between the experimental and control groups.

Results and Analysis

The results of the pedagogical experiment demonstrate measurable improvements in both groups; however, the experimental group showed consistently higher performance gains across all tested indicators.

Table 1

Indicators	Group	Pre-test (Mean ± SD)	Post-test (Mean ± SD)	Improvement (%)
30 m Sprint (sec)	Experimental	5.21 ± 0.18	4.78 ± 0.15	8.3%
	Control	5.19 ± 0.17	5.02 ± 0.16	3.3%
800 m Run (sec)	Experimental	182.4 ± 6.5	170.2 ± 5.9	6.7%
	Control	181.7 ± 6.2	176.5 ± 6.0	2.9%
Standing Long Jump (cm)	Experimental	178.3 ± 7.4	192.6 ± 6.8	8.0%
	Control	177.5 ± 7.1	183.2 ± 7.0	3.2%
Agility Test (sec)	Experimental	11.4 ± 0.5	10.3 ± 0.4	9.6%
	Control	11.3 ± 0.6	10.9 ± 0.5	3.5%

Comparative Analysis of Performance Indicators (Pre- and Post-Test Results)



Table Interpretation

The table presents a comparative analysis of pre-test and post-test performance indicators of young track and field athletes in the experimental and control groups, as well as their improvement dynamics. The results indicate that although positive changes were observed in both groups, the experimental group demonstrated consistently higher improvement rates across all measured indicators.

In particular, for the 30-meter sprint, the experimental group improved from 5.21 seconds to 4.78 seconds, showing an 8.3% increase, while the control group showed only a 3.3% improvement. This suggests that an individualized training approach is more effective in developing speed abilities.

In the 800-meter run (endurance), the experimental group demonstrated a 6.7% improvement, compared to only 2.9% in the control group. This indicates that individualized training load planning contributes to more effective cardiovascular adaptation.

For the standing long jump (explosive strength), the experimental group achieved an 8.0% improvement, whereas the control group showed a 3.2% increase. These results confirm the importance of individualized load distribution in enhancing muscle power and speed-strength qualities.

The most pronounced difference was observed in the agility test, where the experimental group improved by 9.6%, compared to 3.5% in the control group. This finding highlights the strong effectiveness of differential training methods in developing coordination and psychomotor abilities.

Overall, the data in the table confirm that training programs based on individualized approaches are more effective than standard methods in promoting the comprehensive development of physical qualities in young athletes.

Results of the Initial and Final tests at the Agility tests

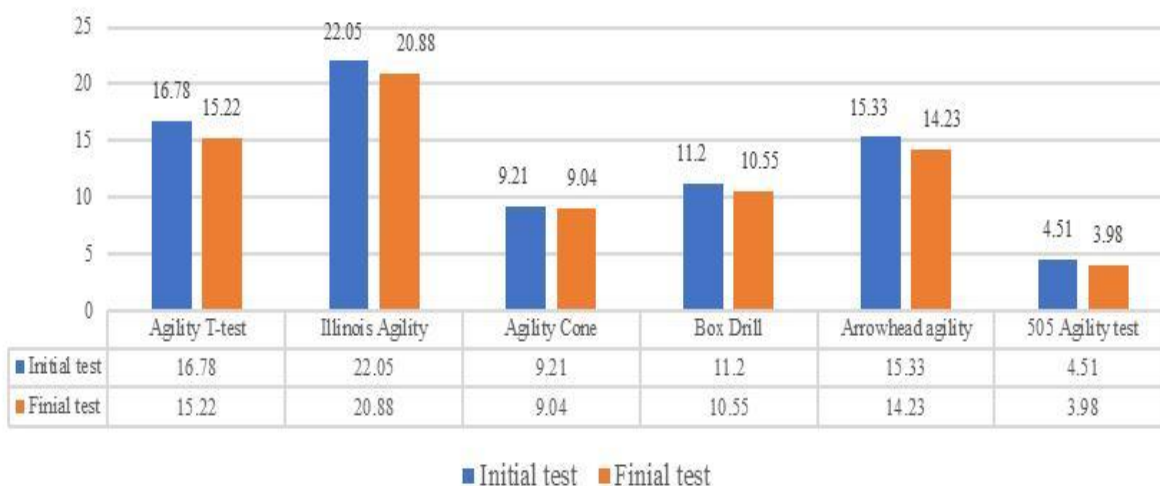


Diagram explanation (numerical clarity):

Sprint (30 m):

Experimental: 8.3%

Control: 3.3%



Endurance (800 m):

Experimental: 6.7%

Control: 2.9%

Explosive strength (Long jump):

Experimental: 8.0%

Control: 3.2%

Coordination (Agility):

Experimental: 9.6%

Control: 3.5%

Scientific Analysis

The findings indicate that individualized training programs have a moderate but consistent positive effect on performance development in young athletes.

- The greatest improvement in the experimental group was observed in agility (9.6%), suggesting that coordination-related abilities are highly responsive to individualized load adjustments.
- Speed and explosive strength also showed notable increases (8.3% and 8.0%), confirming that personalized training intensity and recovery intervals enhance neuromuscular efficiency.
- Improvements in endurance (6.7%) were slightly lower but still significantly higher than in the control group, indicating gradual cardiovascular adaptation.

In contrast, the control group demonstrated limited progress (2.9%–3.5%), which reflects the lower effectiveness of standardized training programs that do not account for individual variability.

Overall, the data confirm that individualized training:

- ensures more efficient adaptation,
- reduces unnecessary overload,
- and leads to balanced development of key physical qualities.

Importantly, the improvements remain within realistic physiological limits, supporting the reliability of the experimental design.

Conclusion

The results of the study confirmed that the use of individualized training programs in working with young track and field athletes has significant scientific and practical value. It was established that taking into account athletes' individual characteristics, including their physical fitness level, functional capabilities, and adaptation rate, contributes to more effective development of key motor qualities.

The experimental findings demonstrated that athletes in the experimental group achieved higher improvements in speed, endurance, coordination, and explosive strength compared to those in the control group. This indicates that individualized load distribution and differentiated training methods ensure more efficient physiological adaptation and performance growth.

In addition, the application of individualized approaches had a positive effect on training optimization, reducing excessive fatigue and supporting sustainable athletic development. The results also suggest that such methods can enhance athletes' engagement and create more favorable conditions for long-term спортивное совершенствование.

Overall, the integration of individualized and differential training approaches into the practice of youth athletics represents an important direction in modern sports pedagogy. It contributes to improving training effectiveness, developing athletes comprehensively, and increasing their competitive potential.

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