



Methodology for the development of physical qualities in track-and-field runners at the stage of sports mastery improvement

UDC 796.422.12

PhD, Associate Professor **D.V. Sorokin**¹¹Russian State Agrarian University - Moscow Timiryazev Agricultural Academy, Moscow

Corresponding author: sorokin_denis_08@list.ru

Received by the editorial office on 20.04.2026

Abstract

Objective of the study is the theoretical substantiation of a comprehensive methodology for the directed development of the speed-strength abilities, special endurance, strength, and flexibility of qualified runners within the framework of the annual cycle.

Methods and structure of the study. The methodology includes the analysis of scientific-methodological literature, the systematisation of approaches to the periodisation of loads, and the identification of optimal means of developing the leading qualities.

Results and conclusions. The analysis of the sources showed that in highly qualified athletes the limiting factors are special endurance and running economy. The main approaches rely on the principles of wave-like periodisation. The methodology is built on the integration of the means of running preparation, speed-strength exercises, plyometrics, and gymnastic complexes. The theoretical generalisation made it possible to determine a rational distribution of loads: the predominance of aerobic work in the preparatory period with a gradual increase of the share of high-intensity means in the pre-competition cycle. Attention is paid to the individualisation of the impacts taking into account the morphofunctional features of the athletes and to the control over the recovery of the body. The mechanisms of adaptation to combined loads and the influence of strength preparation on the power of push-off are considered.

Keywords: *development of physical qualities, track-and-field runners, the stage of sports mastery improvement, speed-strength preparation, special endurance, periodisation of training.*

Introduction. The relevance of the study of the methodology of developing physical qualities in track-and-field runners at the stage of sports mastery improvement is determined by the modern requirements for the preparation of highly qualified athletes, where the achievement of stable high results in the middle and long distances is impossible without the purposeful improvement of the speed-strength abilities, special endurance, strength, and flexibility.

At the stage of preparation, qualified runners are faced with the necessity of optimising the training process under the conditions of growing competition and limited resources of the recovery of the body.

The analysis of the scientific-methodological literature shows that the questions of the rational construction of training loads taking into account the individual features of the athletes and the principles of periodisation remain at the centre of the attention of specialists. In the works of domestic authors, the significance of the integral approach to the development of physical qualities in the annual cycle of preparation is emphasised. The theoretical substantiation of the theme relies on the generalisation of the data on the mechanisms of the adaptation of the body to combined loads, where attention is paid to the balance between the volume of aerobic work and the purposeful speed-strength impacts.



The degree of elaboration of the problem in the scientific literature confirms the presence of fundamental studies on the periodisation of the training process; however, the aspects of the individualisation of the means and methods precisely at the stage of sports mastery improvement for runners at distances from 800 to 5000 metres are insufficiently covered. Such an approach makes it possible to reveal the gaps in the existing methodologies and to substantiate the necessity of further theoretical generalisation with the aim of increasing the effectiveness of preparation.

Objective of the study is the theoretical substantiation of a comprehensive methodology for the directed development of the speed-strength abilities, special endurance, strength, and flexibility of qualified runners within the framework of the annual cycle.

Methods and structure of the study. The methodology of the study is based on the theoretical analysis and generalisation of the scientific-methodological literature on the theory and methodology of sports training, including works on periodisation, the means of developing physical qualities, and the features of the preparation of middle- and long-distance runners. Methods of the systematisation of scientific data, of the comparative analysis of approaches to the construction of the training process, as well as of the logical modelling of the optimal ratios of the volumes and intensity of loads were applied.

The organisation of the study provided for the study of publications with an emphasis on sources devoted to the stage of sports mastery improvement. In the course of the work, the leading physical qualities limiting the result in running were identified, with the subsequent determination of the rational means of their development: running exercises of various orientations, plyometric complexes, work with weights of moderate intensity, and gymnastic exercises for maintaining flexibility and strength endurance [1]. Attention was paid to

the principles of wave-like periodisation, where the preparatory period is accentuated on creating a base of aerobic endurance, the competition period – on the integration of speed-strength and interval loads, and the transition period – on active recovery.

The methodology includes recommendations on the distribution of training volumes in the range of 120-180 kilometres per week depending on the period of the cycle, with a pyramidal profile of intensity, where 70-80 per cent of the load falls on the low-intensity zones. The consideration of the individual morphofunctional features of the athletes is carried out through the monitoring of the functional state using pedagogical observations and the analysis of the dynamics of the indicators.

The modelling of the methodology was carried out by means of the consistent generalisation of the literature data and the construction of a logical scheme of the annual cycle, where each period has clearly defined emphases in the development of physical qualities. Attention is paid to the coordination of the means of training with the principles of gradualness, variability, and the individualisation of loads (Table 1).

The ratios of the means make it possible to ensure the consistent and interconnected development of all the leading physical qualities, while preserving the necessary balance between load and recovery at each stage of the annual cycle [6].

Results of the study and discussion. The theoretical analysis and generalisation of the literary sources made it possible to establish that at the stage of sports mastery improvement the development of physical qualities in track-and-field runners is most effective with the integral combination of means ensuring the simultaneous improvement of the speed-strength abilities and special endurance [2].

The obtained results show that the optimal distribution of loads in the annual cycle presupposes the predominance of long cross-country runs and tempo running in the preparatory period with the gradual in-

Table 1. Main means of developing physical qualities by periods of the annual cycle

Period of the cycle	Speed-strength abilities	Special endurance	Strength and flexibility
Preparatory	Plyometrics (low intensity), multi-jumps	Long cross-country runs, tempo running	Exercises with weights, gymnastic complexes
Pre-competition	Plyometrics (medium and high intensity), running with weights	Interval training, fartlek	Strength exercises of moderate intensity, stretching
Competition	Speed segments, jumping exercises	Special running segments at competitive speed	Maintaining gymnastic complexes
Transition	Light plyometrics (recovery)	Low-intensity cross-country runs	Active recovery and flexibility

**Table 2. Distribution of the volume and intensity of training loads by periods of the annual cycle**

Period of the cycle	Running volume, km/week	Share of low-intensity loads, %	Share of high-intensity loads, %	Number of plyometric sessions per week
Preparatory	150-180	75-80	10-15	1-2
Pre-competition	120-140	60	25-30	2-3
Competition	80-110	50	35-40	1-2
Transition	60-80	85-90	5-10	0

troductio n of interval training and plyometric exercises in the pre-competition phase. The data confirm that such a sequence contributes to increasing the economy of running through the improvement of the power of push-off and the coordination of movements, and also minimises the risk of overtraining thanks to the strict control of recovery measures.

The consideration of the mechanisms of the adaptation of the body revealed the positive influence of moderate weights and multi-jump exercises on the development of the strength endurance of the muscles of the legs and torso, which directly correlates with the improvement of results at distances of 1500-5000 metres.

The modelling showed the expediency of using variable training (fartlek) for maintaining the variability of loads and the prevention of monotony, which is necessary for qualified athletes with a long training history.

The generalisation of the approaches to the individualisation of preparation highlights the necessity of correcting the volumes depending on sex, age, and the current level of preparedness. Women demonstrate a greater sensitivity to aerobic loads, and men – to speed-strength impacts.

The obtained conclusions are consistent with the modern trends in the construction of the training process and open prospects for the practical application of the developed recommendations (Table 2) [3, 4].

The analysis demonstrates the gradual reduction of the total volume of running from the preparatory to the competition period with the simultaneous growth of the share of high-intensity loads. Such a profile makes it possible to preserve the aerobic base at the initial stages and to transition to peak form closer to the main starts [7]. The parameters of the plyometric sessions are selected so as to ensure the development of the power of push-off without exceeding the recovery capabilities of the body (see the figure).

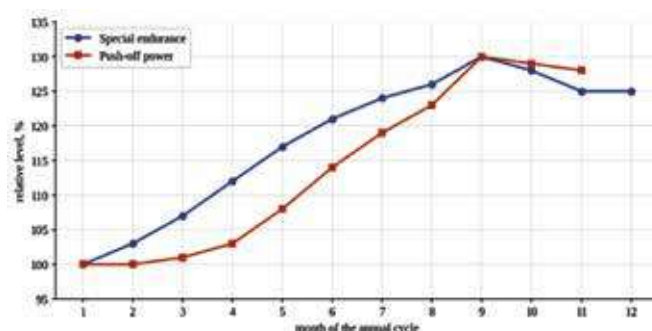


Figure 1. Dynamics of the indicators of special endurance and push-off power during the annual cycle

The figure reflects the positive dynamics of both indicators throughout the entire annual cycle. Special endurance demonstrates a steady growth already from the beginning of the preparatory period and reaches its maximum by the 10th month. The power of push-off begins to increase actively from the 4th month and reaches its peak simultaneously with endurance, which corresponds to the optimal moment for competition starts [5].

Conclusions. The methodology of developing physical qualities in track-and-field runners at the stage of sports mastery improvement, developed on the basis of theoretical analysis, ensures the harmonious improvement of the speed-strength abilities, special endurance, strength, and flexibility within the framework of the annual cycle.

The obtained results of the theoretical study confirm the effectiveness of the integral approach with wave-like periodisation and the individual distribution of loads, which leads to the increase of the economy of running and the stability of competitive results.

The proposed methodology can be recommended for introduction into the practice of preparing qualified runners in sports schools of the Olympic reserve and in national teams with the obligatory monitoring of the functional state.



References

1. Minabutdinov S.R., Gibadullin I.G., Kuznetsova Z.M., Nagovitsyn R.S. Variant metodiki razvitiya skorostno-silovykh sposobnostey yunyx legkoatletov. *Pedagogiko-psikhologicheskie i mediko-biologicheskie problemy fizicheskoy kultury i sporta*. 2022. V. 17. No. 3. Pp. 51-58.
2. Mosina E.B., Konovalov V.N. Planirovanie fizicheskoy i tekhnicheskoy podgotovki legkoatletov v godichnom tsikle na uchebno-trenirovochnom etape. *Nauka i sport: sovremennye tendentsii*. 2024. V. 12. No. 4(48). Pp. 119-128.
3. Rakovetskiy A.I., Ponomarev V.V. Sravnitel'naya kharakteristika effektivnosti vozdeystviya innovatsionnykh programm na fizicheskuyu podgotovlennost studentok vuza. *Teoriya i praktika fizicheskoy kultury*. 2018. No. 9. Pp. 12. EDN: XUAVGH.
4. Smurygina L.V. Metodika podgotovki beguniy massovykh razryadov v bege na 400 metrov. *Fizicheskoe vospitanie i sport v vysshikh uchebnykh zavedeniyakh*. Belgorod: Belgorodskiy gosudarstvennyy tekhnologicheskiy universitet im. V.G. Shukhova, 2022. Pp. 147-153.
5. Sorokin D.V. Formirovanie skorostno-silovykh kachestv u begunov sprinterov 14-17 let s ispolzovaniem spetsialnykh utyazheleniy. *Teoriya i praktika fizicheskoy kultury*. 2026. No. 2. Pp. 27-28. EDN: XQJFKW.
6. Khaydarov U.R. Metodika primeneniya spetsialnykh begovykh uprazhneniy, vliyayushchikh na uvelichenie skorosti sprinterskogo bega. *Problemy i perspektivy razvitiya sportivnogo obrazovaniya, nauki i praktiki*. Moskva: Moskovskiy pedagogicheskiy gosudarstvennyy universitet, 2023. Pp. 246-251.
7. Shuleva E.M., Pronin E.A. Sravnitel'nyy analiz effektivnosti razlichnykh metodov trenirovki begunov na srednie distantsii bega. *Prioritety razvitiya APK v usloviyakh tsifrovizatsii i strukturnykh izmeneniy natsionalnoy ekonomiki*. Sankt-Peterburg: Sankt-Peterburgskiy gosudarstvennyy agrarnyy universitet, 2023. Pp. 506-509.