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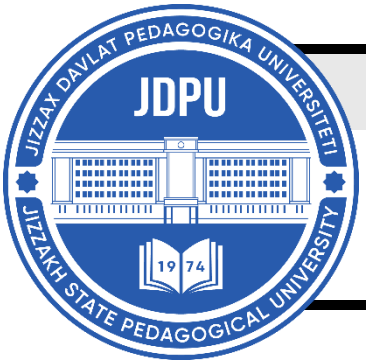


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# SCIENTIFIC AND PEDAGOGICAL FOUNDATIONS FOR IMPROVING THE LONG-TERM TRAINING SYSTEM OF SHOT PUT THROWERS

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## ABOUT ARTICLE

**Key words:** hammer throw, long-term training, athletic preparation, training load intensity, technical and tactical training, pedagogical monitoring, functional state, athlete development, individualized approach, competition preparation.

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**Abstract:** This article explores the scientific and pedagogical foundations for improving the multi-year training system of hammer throw athletes. the study analyzes the principles of progressive athlete development, optimization of training load volume and intensity, phased formation of technical and tactical skills, and modern methodologies aimed at preserving athletes' health. additionally, the article proposes effective approaches to pedagogical monitoring, functional state assessment criteria, and individualized preparation strategies for competitions. the content provides valuable theoretical and practical insights for coaches, researchers, and professionals in the field of sports science.

**Introduction.** Among the disciplines of athletics, throwing events—particularly shot put—represent a complex sport that requires an athlete to possess a high level of strength, balance, coordination, accuracy, and technical harmony. In recent years, the increasing participation of Uzbek athletes in international competitions and the growing competitiveness for achieving high results have further intensified the need for a scientifically grounded approach to the preparation process of shot put throwers.

Improving the long-term training system requires scientifically organizing the developmental stages of an athlete—from early childhood to elite performance. In this process, the integration of technical, physical, psychological, and tactical preparation, as well as the

proper planning of training load volume and intensity according to age-specific characteristics, plays a crucial role.

The lack of sufficiently developed scientific and pedagogical foundations for the training system of shot put athletes, the dominance of uniform approaches in practice, insufficient individualization of training loads, and inadequate application of modern monitoring and control methods all determine the relevance of this research topic.

Therefore, improving the long-term training system of shot put throwers, developing scientifically based methodologies and pedagogical approaches, and optimizing the preparation process for competitions serve as important factors in ensuring the stable improvement of athletes' performance.

Preparing athletes for competitions at a high level is a complex, multifactorial process that requires the integration of scientific research, pedagogical approaches, and practical methods for effective management. Throwing events, especially shot put, demand highly developed general and specific physical qualities, mastery of technical movements, and psychological stability.

The long-term training process is a systematic pedagogical framework that ensures the consistent physical, functional, technical, and psychological development of an athlete. Within this system, the content of all training stages—from basic preparation to achieving high sports mastery—must be clearly defined. Setting main goals and tasks for each stage, selecting age-appropriate training tools and methods, and planning load dynamics on an individual basis are among the most important factors determining an athlete's development pace.

Today, the use of modern monitoring tools in the training process of shot putters, evaluating the effectiveness of training loads, preventing injuries, and adjusting training based on individual technical analysis have become increasingly important. In addition, improving methodological guidelines for coaches, optimizing the developmental stages of young athletes, and creating an effective system for preparing competitive athletes are essential tasks.

This research aims to analyze the structure of the long-term training system of shot put throwers from a scientific and pedagogical perspective, identify existing problems, and develop effective recommendations to enhance the quality of athletes' preparation for competitions.

Ensuring optimal physical, technical, psychological, and health-related development at each age stage is essential. Through progressive stages, the athlete's readiness for competition is improved efficiently and safely. Each element—technique, strength, psychology, and health—complements the others and contributes to long-term athletic development.

**1st table**

Age-Specific Throwing Training Plan for Long-Term Athlete Development

| № | Age group | Technique | Strength - Endurance | Psychology | Health - Recovery |
|---|---|---|---|---|---|
| 1 | 10–12 | 🔵 Basic throwing movement, Coordination exercises | 🔵 Speed and agility, Game-based exercises | 🔵 Interest and motivation, mini-tournaments | 🟢 Muscle and joint flexibility, exercises with light load |
| 2 | 13–15 | 🟢 Introduction to technical elements, Analysis through video | 🟢 Increase strength and speed by 30–40%, using a light barbell | 🟢 Competition feeling, small victories and goals | 🟢 Injury risk is assessed, recovery takes 10–15% of time |
| 3 | 16–17 | 🟢 Specific trajectory, Sequential movement | 🟢 Speed-strength 50–70%, with heavy barbell elements | 🟢 Stress management, visualization techniques | 🟢 Muscle hypertrophy, rehabilitation, individual approach |
| 4 | 18–20 | 🔴 Individual technique, Control of force impulse | 🔴 Maximum strength 80–90%, explosive exercises | 🔴 Competition strategy, focus and concentration | 🔴 Recovery and injury monitoring, load-recovery balance |
| 5 | Over 20 | 🔴 Automated technique, Correction of micro-errors | 🔴 Maintain stable load, preserve strength | 🔴 Psychological resilience, intrinsic motivation | 🔴 Recovery slows down, injury risk increases |

Clearly define preparation for each age stage in terms of technique, strength-endurance, psychology, and health-recovery. Organize training loads and exercises according to the athlete's age and developmental level. Reduce injury risk while enhancing muscle and joint function and psychological stability. Gradually improve the athlete's strength, speed, endurance, and strategic preparedness. Serve as a planning and monitoring tool for both coaches and athletes. In short, this table is used to establish an optimal training strategy for athlete development at each age stage and to ensure safe and effective practice.

1. 10-12 age group

Technique: Basic throwing movements, coordination exercises. At this stage, the main focus is not on teaching complex techniques, but on developing fundamental motor skills. Children are introduced to a variety of throwing movements, which enhances hand-eye coordination. At this age, the emphasis is on understanding movements rather than mastering technical complexity.

Strength-Endurance: Speed and agility, game-based exercises. Developing speed and agility through playful activities enhances quick movement ability rather than merely increasing muscle strength. Children engage in physical activity in an enjoyable and motivating manner.

Psychology: Interest and motivation, mini-tournaments without competition. Foster interest in sports and increase motivation through non-competitive training sessions. Build intrinsic motivation before formal competition begins.

Health-Recovery: Muscle and joint flexibility, exercises with light load. Prepare the body without excessive strain. At this age, the young athlete's body is flexible, and the healthy development of muscles and joints is a primary focus.

2. 13-15 age group

Technique: Introduction to technical elements, video analysis. Break down movements into components to teach technique more thoroughly. Use video analysis to identify and correct errors.

Strength-Endurance: Increase strength and speed by 30–40% using a light barbell. Focus on developing muscles and enhancing speed. Loads are still light to avoid excessive stress on the young athlete's body.

Psychology: Competition feeling, small victories and goals. Initial competition experience; tasting victory helps increase motivation and self-confidence.

Health-Recovery: Injury risk assessment, recovery takes 10–15% of time. Apply loads carefully to muscles and joints. Emphasize the importance of recovery and rest.

3. 16-17 age group

Technique: Specific trajectory, sequential movement. Increase the complexity of movements by teaching sequential and specialized throwing trajectories. Goal: Prepare athletes for professional-level technique.

Strength-Endurance: Speed-strength 50–70%, incorporating heavy barbell elements. Develop muscles and prepare for increased strength and speed. Gradually progress from lighter to heavier loads.

Psychology: Stress management, visualization techniques. Adapt to competition pressure and mentally rehearse outcomes through visualization.

Health-Recovery: Muscle hypertrophy, rehabilitation, individual approach. Strengthen muscles while ensuring recovery and reducing injury risk through individualized rehabilitation programs.

4. 18–20 age group

Technique: Individual technique, control of force impulse. Each athlete develops their own individual technique. Focus on optimal control of force and movement impulse.

Strength-Endurance: Maximum strength 80–90%, explosive exercises. Perform complex and explosive exercises to achieve maximal strength and speed.

Psychology: Competition strategy, focus and concentration. Develop a competition plan, strategic thinking, and the ability to maintain focus.

Health-Recovery: Recovery and injury monitoring, load-recovery balance. Monitor recovery even under heavy loads to reduce injury risk.

5. 20+ age group

Technique: Automated technique, correction of micro-errors. Movements become automated, and the focus is on perfecting execution.

Strength-Endurance: Maintain stable load, preserve strength. Ensure muscle strength and stability are maintained over time.

Psychology: Psychological resilience, intrinsic motivation. Internal motivation and stress tolerance play a key role.

Health-Recovery: Recovery slows down, injury risk increases. As athletes age, recovery becomes slower, and precautions are needed to prevent injuries.

**Conclusion.** The article highlights the scientific and pedagogical foundations for improving the long-term training system of shot put throwers. The research demonstrates that an athlete's development from early childhood to elite level should be organized in a systematic, progressive, and individualized manner. Optimized training programs in technique, strength-endurance, psychology, and health-recovery for each age stage ensure the athlete's physical, technical, and psychological development.

The study emphasizes that the long-term training process should include:

Technical preparation: Age-appropriate, progressive movement systems, with mastery achieved through video analysis and individualized approaches.

Strength and endurance: Age-appropriate loads, progressive development of speed and strength, and protection of muscles and joints from injury.

Psychological preparation: Development of motivation, stress management, visualization techniques, and competition strategy.

Health and recovery: Injury prevention, controlled recovery periods, and individualized rehabilitation programs.

Additionally, the article provides coaches and researchers with methodological guidelines, monitoring systems, and functional assessment criteria, which are essential for enhancing athlete competitiveness and ensuring long-term development.

In summary, the article is focused on scientifically improving the training system of shot put throwers and optimizing age stages to ensure safe and effective athlete development.

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