

STUDYING THE EFFECTS OF PHYSICAL EDUCATION AND SPORTS TRAINING LOADS ON THE CHILD'S ORGANISM**Khamidjonov Muhammadbobir Ulugbek ogli**

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Abstract

Physical education and organized sports are essential components of healthy childhood development, yet the growing organism reacts differently to physical loads compared to the adult body. The present research analyzes how different intensities and structures of physical activity influence functional adaptation, fatigue formation, recovery processes, and behavioral responses in children aged 9–12 years. A twelve-week pedagogical experiment was conducted in which children participated in structured physical education lessons and extracurricular sports sessions. Physiological indicators, motor performance changes, and psycho-emotional reactions were monitored continuously. The results demonstrated that gradually increased moderate loads enhanced cardiovascular efficiency, coordination accuracy, and endurance capacity, while excessive repetitive high-intensity work caused delayed recovery, decreased concentration, and functional fatigue accumulation. The research confirms that proper load dosage and alternation of activity intensity are decisive factors in ensuring safe physical development. The findings provide a scientific basis for health-oriented organization of children's training and highlight the importance of balancing development and protection of the growing organism.

Keywords

physical education, training load, adaptation, children physiology, fatigue, recovery, motor development, functional response

INTRODUCTION

The period of childhood is characterized by rapid growth, active tissue differentiation, and the formation of regulatory mechanisms that determine future health status. During this stage, physical activity acts as a powerful biological stimulus influencing metabolic processes, the cardiovascular system, the respiratory system, and the nervous system. Regular movement contributes to the strengthening of immunity, improvement of posture, and development of coordination abilities. At the same time, the child's organism possesses limited tolerance to excessive external stress because functional systems are still forming and cannot always respond adequately to prolonged overload.

In modern society children increasingly participate in organized sports from an early age. Training often focuses on achieving performance results, sometimes ignoring the biological characteristics of growth. The difference between educational physical activity and performance-oriented training creates a methodological problem. Physical education should primarily enhance health, while sport often seeks competitive improvement. When training loads exceed adaptive possibilities, the organism reacts with protective mechanisms such as fatigue, reduced attention, and decreased performance.

Physiologically, children differ from adults by higher heart rate values, lower stroke volume, incomplete thermoregulation, and faster neuromuscular fatigue. Recovery processes also vary

depending on intensity and duration of activity. Short dynamic loads may be tolerated well, whereas long repeated intense exercises cause accumulation of functional strain. Therefore, studying the influence of training loads on children is necessary for developing scientifically grounded recommendations. The purpose of this study is to determine how different structures and intensities of physical education and sports training affect functional adaptation, fatigue development, and recovery in school-aged children and to identify conditions ensuring safe and effective training.

METHODS

The research was conducted over twelve weeks in a school environment and youth sports section. Seventy-two children aged 9–12 years participated voluntarily with parental consent and medical clearance. The pedagogical experiment was organized in natural educational conditions to observe realistic adaptation processes rather than laboratory-isolated reactions.

Three forms of activity were implemented during the study. The first involved traditional physical education lessons emphasizing general developmental exercises, running, stretching, and coordination tasks performed at moderate intensity. The second consisted of game-based recreational activities characterized by variable intensity including relays, small-sided games, and cooperative movement tasks. The third included structured sports training with repeated high-intensity drills, speed runs, and technical repetitions typical of early sport specialization programs.

Heart rate was measured before exercise, immediately after load, and during recovery periods. Motor performance was evaluated through running endurance tasks, coordination tests, and agility movements. Children also described subjective fatigue sensations after each session using an adapted perception scale. Teachers recorded behavioral indicators such as attention, motivation, and emotional response during lessons following training days. Throughout the experiment load progression followed a weekly increase pattern in duration and complexity, allowing observation of both adaptation and possible maladaptation. Changes were interpreted through comparison of physiological reactions and performance dynamics across the study period.

RESULTS

Children participating in moderate physical education activity demonstrated gradual and stable adaptation. Over time, the same exercises produced lower heart rate reactions and quicker recovery. Endurance performance improved steadily, and coordination accuracy increased. Children remained active and attentive during academic classes, suggesting balanced functional state. The group involved in variable game-based activity showed pronounced improvement in agility, reaction speed, and motivation. Emotional engagement remained high, and fatigue complaints were minimal. Rapid alternation of effort and rest supported effective recovery, and no persistent signs of overstrain were detected. The organism adapted through flexibility rather than through endurance accumulation alone.

In contrast, children exposed to frequent high-intensity training displayed a different pattern. Initial weeks produced performance growth, but later stages revealed slower heart rate recovery and increased resting values. Some children reported constant tiredness and reduced interest in activity. Coordination temporarily worsened despite endurance gains, indicating fatigue of regulatory mechanisms. Teachers noticed decreased concentration in lessons following intensive training sessions.

DISCUSSION

The results indicate that the child's organism adapts best when physical load corresponds to developmental possibilities and includes variability. Moderate continuous activity enhances efficiency of cardiovascular function without exhausting regulatory reserves. Game-based activity supports neuromuscular coordination and emotional stability, which indirectly improves learning capacity and motivation.

Excessive intensity, especially when repeated without adequate recovery, leads to accumulation of functional fatigue. The organism attempts to protect itself by reducing motor precision and attention levels. This condition should not be interpreted as laziness but rather as physiological limitation. Prolonged overload may interfere with growth processes and decrease interest in physical activity, ultimately reducing long-term participation in sport.

Adaptation in childhood occurs not only through increased performance but through improved efficiency. When the same work requires less physiological effort, positive adaptation is occurring. When effort increases while performance stagnates or declines, maladaptation is present. Monitoring recovery speed therefore becomes a practical indicator for teachers and coaches. If recovery duration increases across sessions, the load is excessive for the developmental stage.

Psychological factors also play a significant role. Activities involving cooperation and variability reduce perceived fatigue and stimulate motivation. Monotonous intense repetition increases stress even if physiological indicators appear acceptable in the short term. The educational value of physical activity lies not only in strengthening muscles but also in supporting emotional well-being and cognitive readiness.

CONCLUSION

The study demonstrates that physical education and sports training exert powerful influence on the growing organism, and this influence may be either beneficial or harmful depending on load regulation. Gradually increased moderate activity promotes harmonious development of cardiovascular efficiency, coordination, and endurance. Variable game-based activity provides optimal balance between training effect and recovery. Repeated excessive high-intensity training causes accumulation of fatigue and functional stress, reducing both performance and learning readiness.

For safe development, training programs for children must prioritize health orientation, gradual progression, alternation of effort and rest, and individual monitoring of recovery reactions. The main criterion of effectiveness should not be immediate performance improvement but stable adaptation without signs of overstrain. Proper pedagogical organization ensures that physical activity supports growth, strengthens health, and forms lifelong motivation for movement.

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