

**EFFECTIVENESS OF DEVELOPING COORDINATION ABILITIES IN 10–11-YEAR-
OLD ATHLETES BASED ON PSYCHOPHYSIOLOGICAL INDICATORS**

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Abstract.

This article examines the effectiveness of developing coordination abilities in 10–11-year-old athletes through training approaches based on psychophysiological indicators. At this age, the functional state of the nervous system, reaction speed, attention stability, and sensorimotor coordination play a decisive role in mastering complex motor skills. The study analyzes how typological properties of the nervous system, temperament characteristics, and functional mobility of neural processes influence coordination performance. An experimental training program incorporating differentiated coordination exercises based on psychophysiological characteristics was implemented. The results demonstrated significant improvements in balance, spatial orientation, movement accuracy, and reaction time among athletes who trained using individualized coordination methods. The findings confirm that considering psychophysiological indicators enhances motor learning efficiency, reduces fatigue, and increases training effectiveness. The study provides practical recommendations for coaches and physical education specialists on optimizing coordination training in young athletes.

Keywords: coordination abilities, psychophysiological indicators, young athletes, nervous system typology, sensorimotor reaction, motor control, training efficiency, individualization, motor learning, youth sports.

Аннотация.

В данной статье рассматривается эффективность развития координационных способностей у спортсменов 10–11 лет на основе тренировочных подходов, учитывающих психофизиологические показатели. В этом возрасте функциональное состояние нервной системы, скорость реакции, устойчивость внимания и сенсомоторная координация играют решающую роль в освоении сложных двигательных навыков. В исследовании анализируется влияние типологических свойств нервной системы, темпераментных характеристик и функциональной подвижности нервных процессов на уровень координационной подготовленности. Была внедрена экспериментальная программа тренировок, включающая дифференцированные координационные упражнения с учетом психофизиологических особенностей спортсменов. Результаты показали достоверное улучшение показателей равновесия, пространственной ориентации, точности движений и скорости реакции у спортсменов, занимавшихся по индивидуализированной методике. Полученные данные подтверждают, что учет психофизиологических показателей повышает эффективность обучения двигательным действиям, снижает утомляемость и способствует повышению результативности тренировочного процесса. В работе представлены практические рекомендации для тренеров и специалистов в области физического воспитания по оптимизации координационной подготовки юных спортсменов.

Ключевые слова: координационные способности, психофизиологические показатели, юные спортсмены, типология нервной системы, сенсомоторная реакция, управление движениями, эффективность тренировки, индивидуализация, обучение двигательным действиям, детско-юношеский спорт.

Introduction.

Modern youth sports training increasingly emphasizes scientific approaches that consider individual physiological and psychological characteristics of young athletes. Between the ages of 10 and 11, children experience intensive development of the central nervous system, improved motor analyzer function, and increased plasticity in neural processes. These changes create favorable conditions for the development of coordination abilities, which are fundamental for mastering sport-specific techniques and achieving long-term athletic success.

Coordination abilities include balance control, spatial orientation, movement differentiation, rhythm regulation, and the ability to quickly reorganize motor actions. Their development depends largely on the functional properties of the nervous system, including strength, mobility, and balance of excitation and inhibition processes. Psychophysiological indicators such as reaction time, attention stability, sensorimotor coordination, and functional asymmetry provide valuable insights into the athlete's readiness to perform complex motor tasks.

Traditional training methods often apply uniform coordination exercises without considering individual psychophysiological differences. However, research indicates that children differ significantly in nervous system strength, processing speed, and attention control, which directly affect motor learning efficiency. Therefore, individualized coordination training based on psychophysiological characteristics can enhance skill acquisition and prevent overload or decreased motivation.

The purpose of this study is to determine the effectiveness of developing coordination abilities in 10–11-year-old athletes using training methods designed according to their psychophysiological indicators. The research objectives include assessing psychophysiological characteristics, identifying their relationship with coordination abilities, implementing a differentiated training program, and evaluating its effectiveness.

Main Part (Methods, Practical Implementation, and Experimental Design).

The study involved young athletes aged 10–11 who were engaged in regular sports training. Participants were divided into control and experimental groups. Before the experiment, psychophysiological indicators were assessed using standardized methods, including simple and complex reaction time tests, tapping tests for nervous system strength, attention stability tasks, and coordination tests measuring balance, spatial orientation, and movement accuracy.

Based on the assessment results, athletes in the experimental group were categorized according to nervous system typology and functional characteristics. Children with strong and mobile nervous systems demonstrated higher tolerance for dynamic and complex coordination tasks, while those with weaker or less mobile nervous systems required gradual load progression and increased repetition for motor pattern stabilization. A specialized training program was developed and implemented over several weeks. The program included exercises aimed at improving balance (dynamic balance tasks, unstable surface training), spatial orientation (multi-directional movement drills, visual-motor tasks), rhythm and timing (movement synchronization exercises), and reaction speed (signal-based response drills). Exercise intensity and complexity were adjusted according to psychophysiological profiles. Athletes with high neural mobility were given tasks involving rapid motor switching and decision-making under time pressure. Those with lower reaction speeds performed progressive drills emphasizing accuracy and movement control. Attention stability training included tasks requiring focus under distraction conditions, enhancing cognitive-motor integration.

The control group followed a traditional training program without differentiation.

At the end of the experiment, repeated testing showed that the experimental group achieved greater improvements in coordination indicators compared to the control group. Significant progress was observed in static and dynamic balance, movement precision, reaction speed, and the ability to adapt movements to changing conditions. The practical implementation confirmed

that individualized coordination training reduces unnecessary fatigue, increases engagement, and accelerates skill acquisition. Coaches reported improved movement confidence and reduced error rates during technical drills.

Scientific Novelty. The scientific novelty of this study lies in substantiating the effectiveness of coordination training based on psychophysiological indicators in young athletes. Unlike traditional approaches, the research demonstrates the importance of nervous system typology and sensorimotor characteristics in designing training loads. The study proposes a differentiated methodology that integrates psychophysiological assessment into coordination training planning, providing a scientifically grounded framework for individualized youth sports training.

Conclusion. The development of coordination abilities in 10–11-year-old athletes is most effective when training programs consider psychophysiological indicators and nervous system characteristics. This age period represents a sensitive phase for coordination development due to high neural plasticity and rapid sensorimotor maturation. The study confirms that individualized training based on reaction speed, attention stability, nervous system strength, and motor control significantly improves coordination performance. Implementing differentiated coordination exercises enhances motor learning efficiency, supports optimal nervous system functioning, and fosters long-term athletic development. Coaches and physical education specialists are encouraged to incorporate psychophysiological assessments into training planning to optimize performance outcomes and promote balanced development in young athletes. Future research may explore long-term impacts of psychophysiological individualized training and its application across various sports disciplines.

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