Relationship between neurophysiological characteristics and efficiency of personal tactical manipulations of basketball players of different skill levels

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Abstract

Objective of the study is to establish the influence of psychophysiological abilities on the effectiveness of individual tactical actions of basketball players of various qualifications.

Methods and structure of the study. During 2024-2025, using pedagogical observations of competitive activities, quantitative and qualitative characteristics of individual tactical actions and psychophysiological abilities of young and qualified basketball players were studied, using the hardware and software complex "NS-Psychotest". Using correlation analysis, the matrix of relationships between the indicators under consideration was substantiated and their influence on each other was established.

Results and conclusions. A strong (at the level of r=0.800 and more) relationship between psychophysiological abilities and the effectiveness of individual tactical actions of young and qualified basketball players was established. An effective way to improve individual tactical skills is the use of training tools that ensure the development of cognitive abilities of young and qualified basketball players.

Keywords: *sports games, basketball, young and skilled athletes, individual tactical actions, psychophysiological abilities, methods of current and stage control, special training equipment.*

Introduction. Long-term training of sports reserves and qualified athletes in basketball is constantly associated with the search for the most effective approaches to ensure the successful development of sports skills. Individual tactical actions are the component that determines the effectiveness of the game of both young and qualified basketball players during competitions [1, 3]. According to a number of experts [4, 5], the effectiveness of individual tactical actions of athletes in basketball is influenced by many factors, including psychophysiological abilities that determine the cognitive sphere of activity, which are of decisive importance.

To determine the degree of influence of the level of development of psychophysiological abilities on the effectiveness of individual tactical actions of basketball players of various qualifications, it is necessary to conduct special studies with the involvement of modern instrumental methods, pedagogical observations and mathematical analysis [2]. Generalization of literary sources showed that to date, such studies have not been conducted by domestic specialists.

Objective of the study is to identify the relationship between psychophysiological indicators and the effectiveness of individual tactical actions in young and qualified basketball players.

Methods and structure of the study. The scientific work was carried out over the course of one year, from June 2024 to May 2025. Young basketball players of the MBU DO "Sports School No. 2" (Smolensk) aged 14-15 years took part in the study. Qualified players were represented by the student basketball team "Akademsport" (Smolensk) of the Federal State Budgetary Educational Institution of Higher Education "Smolensk State University of Sports (SSUS)". Registration of quantitative and qualitative indicators of in-

dividual tactical actions in attack and defense among young and qualified basketball players was carried out using pedagogical observation, which was carried out during the games of the championship of the central federal district of the School Basketball League "KES-BASKET" among young men's teams (Smolensk, March 10-14, 2025) and the regional cup of the ASB Championship (Saratov, April 25-27, 2025). Psychophysiological abilities were assessed in laboratory and training conditions of the above subjects using the hardware and software complex "NS-Psychotest", which allows determining the time of simple and complex visual-motor reactions, attention, perception, memory and thinking, determined by the cognitive capabilities of the players.

All the obtained indicators were subjected to paired correlation analysis using the Pearson method. This method made it possible to establish relationships and determine the degree of influence of variables from two different sample populations representing individual tactical actions and psychophysiological abilities of young and skilled basketball players. The established relationships determined the directions for choosing training tools that ensure an increase in the skills of basketball players.

Results of the study and their discussion. Correlation analysis revealed that psychophysiological abilities determine the achievement of high performance of individual tactical actions of young and skilled basketball players (see table). It was found that high speed of simple (SVMR) and complex (CVMR) visual-motor reaction ensures high efficiency of performing a feint with an accelerated jerk to the side in competitive activity when performing a throw-pass-throw combination with aggressive resistance of the opponent (FRKAS) – r=0.943 and 0.892, respectively.

A strong relationship between the SVMR and CVMR indicators was established with the efficiency of performing an accelerated average pass of the ball with one hand from the shoulder to the side during movement (UPD) – r=0.883 and -0.829, as well as an accelerated average pass forward in a static position (UPS) – r=0.717 and -0.786, respectively. It should be noted that high values of volume (OV) and distribution (DD) of attention have a positive effect on achieving high performance in the implementation of UPD – r=0.837 and 0.901, as well as UPS r=0.873 and 0.739, respectively, in the process of competitive activity of young and qualified basketball players.

High speed of attention switching (AS) determines the achievement of maximum performance in competitive conditions of accelerated dribbling to the right and left with the dribbling of an aggressive resisting opponent (UVOA) – r=0.782 and one-handed throw from the shoulder from the middle distance at an angle to the shield in a jump with the inert resistance of the opponent (BPIS) – r=0.774.

It should be noted that attention switching greatly affects the performance of accelerated average pass of the ball with one hand from the shoulder to the side while moving (UPD) – r=-0.809 and accelerated average pass forward in a static position (UPS) – r=-0.783. The speed of perception (SV) of young and skilled basketball players determines the achievement of high efficiency in executing an accelerated one-handed jump shot after moving from a close distance near the backboard with aggressive resistance from the opponent (UBPBA) – r=0.833, a feint with an accelerated jerk to the side when executing a throw-pass-throw combination with aggressive resistance from the opponent (FRKAS) – r=- 0.722 and an accelerated pick-up of the ball from a place with a push of two feet at an angle to the backboard of a ball that has bounced close and quickly off the backboard with direct aggressive resistance from the opponent (UPBA) – r=0.784.

The speed of perception greatly affects the efficiency of execution in competitions of young and skilled basketball players – accelerated dribbling to the right and left with dribbling an aggressive resisting opponent (UVOA) – r=- 0.917. A strong correlation was established between the indicators of short-term memory (STM) and the performance of uniform forward dribbling with dribbling and transferring the ball in front of oneself at a short distance (RVB) – r=0.727 by young and skilled basketball players during competitions.

Also, short-term memory and mental operations of analysis (MOA) determine the achievement of high performance in competitions of young and skilled basketball players of the FRKAS – r=0.882 and -0.793, respectively. It was revealed that short-term memory greatly affects the effectiveness of the UPBA indicators – r=-0.793, and mental operations of analysis on UBPBA – r=0.805 in the competitive activity of young and skilled basketball players.

Conclusions. The effectiveness of individual tactical actions in attack and defense in young and skilled basketball players is determined by achieving

a high speed of simple and complex visual-motor reactions, volume, distribution and switching of attention, speed of perception, short-term memory and mental operations of analysis. Thus, it is necessary to introduce a methodology of current and stage control into the training process of basketball players, as well as include special training tools that ensure the effective formation of individual tactical actions of athletes taking into account the psychophysiological component.

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