

## Original Article

### Study of the training system for young basketball players who are preparing for a competition

VICTOR KORYAHIN<sup>1</sup>, GENNADII IEDYNAK<sup>2</sup>, OKSANA BLAVT<sup>1</sup>, LESIA GALAMANDJUK<sup>2</sup>,  
ANATOLY ZAVERIKIN<sup>1</sup>, GALINA GREBINCA<sup>1</sup>, YAROSLAV ZUBRYTSKY<sup>1</sup>, YURIY BOROVIK<sup>1</sup>

<sup>1</sup>Lviv Polytechnic National University, UKRAINE

<sup>2</sup>Department of Theory, Methodology of Preschool and Elementary School Education, Kamianets-Podilskyi, National Ivan Ohiienko University, UKRAINE

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#### Abstract

Training of highly qualified reserve players depends on the organization of the training process, the competition system and the creative approach to issues by the coaching corps. One component in the effective management of a long-term training process is the identification of the major factors that influence the ability to achieve positive results. The aim of this study was to perform a factor analysis of the technical and physical preparedness of basketball players from 11 to 28 years old and use it as a basis for planning long-term technical and physical training of basketball players. In this study, we analysed the technical and physical conditions of young basketball players. The close correlation between the factors indicates that it is possible to achieve maximum physical, technical and speed strength training for basketball players until the age of 19 to 20.

**Keywords:** basketball, physical and technical training, young basketball players

#### Introduction.

An evaluation and analysis of the training and performance results for the strongest athletes in the world in many different sports show that sports records and outstanding success are achieved only via long-term training and when the required basics are provided in very childhood [1, 4]. The effectiveness of long-term preparation of basketball athletes is determined by a number of basic and relatively independent methodical factors:

- the age of the start of basketball practice;
- the structure and content of the training process;
- the growth pattern and the formation of various aspects of basketball sportsmanship;
- individualization of athletic training depending on the gender, age, physical development, player position, and personal qualities of the player; and
- the presence of non-traditional training methods, a high level of methodical and biological support and recovery [2, 6, 8, 10].

In this regard, it is apparent that the long-term sports training (from beginner to high-class athlete) is the process, which proceeds in accordance with the laws of physical abilities development, mastering the technique of the particular kind of sport, sports motor activity, intellectual and mental abilities and qualities. Scientific substantiation of these patterns will provide an opportunity for effective preparing of high-class basketball players in the process of long-term training. One of the components of effective management of training process in the system of long-term training is identification of major factors that affect the achievement of a high sports result most of all. It is very important in sports games, particularly in basketball, because here success depends on the complex of many factors and their place in the long-term preparation system [3, 9, 13].

During long-term training, a significant role is played by establishing a factor structure for the physical and technical readiness of basketball players of different ages beginning from the age of 11 [1, 4]. Knowledge of this structure enhances the training effectiveness and preparation of highly skilled basketball players during long-term training. Identification of significant factor trends as a function of basketball player age will allow scientific determination of to correctly determine the ratios of different types of training and to effectively use simulators to improve the playing technique [6, 9, 10].

To perform this study, we used several systemic-structural approach elements [10]. The specific elements of the systemic approach were as follows:

- the focus of the study was the technical and physical readiness of basketball players who were from 11 to 28 years old;

– we took into account the fact that the subjects (who were elements of the sports training system) in combination with theoretical, tactical, psychological, synthesised and integrated training comprise the entire system of sports training;

– to study the individual elements of training, we decomposed the subjects by studying the physical and technical training elements as independent parts. However, they were considered "independent" only in the cases when the dynamics of the individual preparation parameters were studied or means of integrated control were developed. To justify the individual types of training, they were considered to be integrated within a single scheme within the sports training system;

– In the study, primary attention was paid to the interconnection and interdependence of the technical and physical training elements and the connection between the subjects and certain influential factors (the influence of developmental age and preparation means on the process of physical training and technical improvement of the basketball players) [1-15].

**Purpose of the work.** The aim of this study was to perform a factor analysis of the technical and physical preparedness of basketball players from 11 to 28 years old and use it as a basis for planning long-term technical and physical training of basketball players..

### **Material & methods.**

In total, 941 basketball players from the ages of 11–12, 13–14, 15–16, 17–18, and 19–20, who are candidates for different groups of the Ukrainian national team, and members of the national Ukrainian team from 21 to 28 took part in the study. The tests used to study the physical and technical preparedness included tests that have been previously designed and implemented in basketball practice. All tests were justified and meet the requirements of the so-called test standardization theory.

All calculations were performed on a computer using standard programs for principal component factor analysis. The correlation matrix for the 5-factor analysis included 16 parameters.

These included the height, standing on growth socks with a hand raised up, the absolute and relative height of jumping, dynamometry of right and left hands, 20-meter run, standing long jump with take-off from both feet, running around the basketball court for 3 minutes and 40 seconds with a 1 minute rest period, moving in the defensive stance for 100 m, chest passing the ball into the wall with left, right and both hands, set shot, free throws, running set and comprehensive exercises while running, passing, dribbling and throwing a ball in the hoop. For the 6th factor, 23 indices in addition to those indicated above were used, including the weight, range of attention, attention distribution, attention focusing, systolic and diastolic blood pressure and heart rate.

### **Results and discussion.**

The correlation analysis showed a degree of interdependence between the indicators of physical and technical readiness for each age group, which plays an important role in the selection of the means and methods of training. Factor analysis performed for the age groups of 11–12, 13–14, 15–16, 17–18, 19–20, and 21–28 showed a trend in significance of factors depending on the age of the players. This was clearly evident from the compiled factor matrix of the significant coefficients for the different age groups (Table 1).

For the 11–12 age group, the height and speed are the most important factors and contribute to the total variance of 36 and 33%, respectively. For the 13–14 age group, technical training takes on special significance along with jumping (33 and 25%, respectively). For the 15–16 age group, technical training is the most important (27% of the total variance), and the height and speed remain significant (23 and 14% respectively). For the 17–18 age group, the leading factors include the height (32%), strength (16%), technical training (13%), jumping (11%), speed endurance (9%), which is 81% of the total overall variance.

The physical development (33%), technical training (17%), speed-strength training (13%), precision-locomotor (11%), and effectiveness (6%) were emphasized in the analysis of the level of readiness of skilled basketball players who were 19–20, which is 80% of the total overall variance. During the control analysis of readiness of the highly skilled basketball players who were 21–28 years old, physical development was also most important (41%), followed by technical training (16%). Next were speed-strength velocity (15%), precision-locomotor (11%) and endurance (7%).

Table 1 shows that the most important factor is notable for the specific dynamics, largely reflecting the heterochrony of the sports development of young basketball players. First is the height factor, showing the priority of height, which is typical for a junior player [11]. Then, although the height remains important, jumping ability also comes into play, i.e., the special speed-strength qualities begin to play a leading role.

Table 1.

**Factor matrix of the significant coefficients for the different age groups**

Age	Factors					Total %
	1	2	3	4	5	
11-12	Height 36	Speed 33	Speed- strength 10			79
13-14	Height and jumping 33	Technical Training 25	Precision Velocity 10	Speed- strength 10	Speed Endurance 7	84
15-16	Technical Training 27	Height 23	Speed 14	Jumping 8		72
17-18	Height 32	Strength 16	Technical Training 13	Precision- Locomotor 11	Speed endurance 9	81
19-20	Physical development 33	Technical Training 17	Speed- strength 13	Precision- Locomotor 11	Effectiveness	80
21-28	Physical development 41	Technical Training 16	Speed- strength 15		Speed endurance 7	90

For players who were 15–16 years of age, one of the "forbidden" zones regarding the means of strength and anaerobic-glycolytic preparation [1, 7] becomes favourable in terms of technical development.

Later, at the age of 16–17, the advantage that tall athletes have becomes important again. Only for the highly skilled basketball players who were at least 19 years of age, height, although very important, does not play as much of a dominant role because compensatory mechanisms of comprehensive physical development (factor I) and technological readiness (factor II) become influential.

If we consider that factor II demonstrates some kind of physical and technical preparedness, we can conclude that for younger ages, it is important to have good speed and speed-strength training in addition to height. By the age of 16, technical preparedness becomes increasingly important. Beginning at 17, the factor distribution is similar to the one shown for younger ages; however, it is certainly on a qualitatively new level. Here, we observe a singular illustration of the spiral development law in anthropology [9].

Upon comparing the preparedness of highly skilled basketball players who were 19–20 with those who were 21–28, considering additionally indicators, physical development, and technical and speed-strength training are the most important.

Considerable identity of the factors indicates that it is possible to achieve maximum physical development, and technical and speed strength training by basketball players until the age of 19-20, which is consistent with data from other authors [1, 3, 4, 7, 9, 12]. In this regard, the process of training young basketball players can be focused on achieving predicted model parameters that consider the developmental level of general and special qualities and technical skills until the age of 19-20.

**Conflicts of interest:** The authors state that there are no conflicts of interest.

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