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# STRATEGIES TO OPTIMISE U12 PLAYERS' BASKETBALL GAMES BASED ON AGE-SPECIFIC CHARACTERISTICS

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***Abstract.*** *The purpose of this research is to provide a theoretical and practical framework based on the specialized literature for research, identification and application of optimal training strategies in the game of basketball in the U12 category in accordance with the specific particularities of the age. In the Under 12 category, the specific training must be carried out according to the particularities of age, the characteristics of each athlete and the knowledge accumulated by them during the training period. In this category, the rules are adapted to the psychomotor skills specific to the children's ages and modified so that all children have maximum chances of being involved in the game. The manifestation of motor qualities is not crystallized, as a result, children who do not show aptitudes will not be removed from the training groups. This stage is intended to attract, detect and select talented children with basketball skills. The U12 training program should be tailored to the morpho-functional needs of young athletes, considering their physical, mental, and social development. The level of preparation will determine their competitive performance.*

***Keywords:*** *Under 12 category, age characteristics, practice, sports training, physical conditioning.*

## 1. Introduction

It is well-known, upon studying the literature that the physiological age periods do not correspond to the chronological as well as the schooling stages of athletes. It can be said that the age characteristics correspond to the biological periods with the schooling stages and chronological ages being specified, without these being valid for each athlete individually. [1], [2], [3]

In sports training, these issues are of particular importance because coaches divide children by age into training groups, regardless of their biological age, and thus different effort regimens have to be adopted.

In the game of basketball, the Under 12 category falls in the pre-pubescent age group (6-11 years old), beginners I and II level.

From a morphological (somatic) point of view, the U12 category comprises the a number of characteristics, among which we mention: the growth process presents a slow pace at the beginning of the period

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intensifying towards the end of the primary cycle of studies, body weight increases by about 10 kg, at the end of the period the approximate weight reaches 30 kg, height increases by about 20 cm, gender differences until the age of 10 years old are insignificant, growth of lower limbs in boys continues until about 15 years of age, resistance to pressure, pulling and twisting increases, due to increased bone strength, growth rate intensifies at the beginning of the period, general muscle mass increases, as well as fine muscle mass of the hands [6], [7].

At the same time, certain deformations of the skeletal system, particularly of the spine, can occur due to incorrect positioning or overloading [8], [13], [16].

In the U12 category, the age characteristics from a functional point of view can be outlined as follows:

- the cardiovascular system has an uneconomical response to exertion; coronary irrigation is bounteous, and light exertion is recommended up to the age of 7;
- in the respiratory system: the chest takes the shape of the adult chest, the dimensions of the transverse and anteroposterior diameters are larger than in adults, the ribs develop in a downward direction, the exertional capacity increases, without much efficiency, due to structural changes of the lungs, the lung volume is small due to insufficient development of the respiratory muscles, the exertional capacity increases without reaching the maximum values.
- developments appear in the central nervous system, reaching almost the weight of an adult, but functionally it is not fully developed, among the cortical processes, excitation predominates, and the newly received elements are hardly fixed at the cortical level, due to poorly developed differentiation inhibition [9], [10], [13].

Specific psychic peculiarities of this age are that the predominant forms of memory at this age are mechanical memory and involuntary memory, in the sensory level the auditory and visual senses predominate, perception reflects colour and shape more easily than volume, difficulties in the reception of the part-whole relationship can be observed, and the perception of space and time improves [4], [5], [11], [12].

From a motor point of view we can say that in the Under 12 category we can observe a slow development of muscle mass, muscle tone shows low values, favouring movements with range of motion, muscle strength is low, poor balance, increased motor learning ability based on a large number of repetitions, the fixation of new elements is reduced due to poorly developed differentiation inhibition, running is similar to optimal level, hand-eye coordination is satisfactory, which allows movement control and gestural refinement, and spatial and temporal orientation is present at a satisfactory level, which plays a role in movement coordination [12], [14], [15].

## 2. Objectives – The objective of this study

The objective of this research is to provide a theoretical and practical framework based on specialized literature for the research, identification and application of optimal training strategies in the game of basketball in the U12 category in accordance with the specific characteristics of the age group. In the Under 12 youth players, specific training

should be carried out according to the particularities of age, the characteristics of each athlete and the knowledge accumulated by them during the training practice. In this category, the rules are adapted to the children's age-specific psychomotor abilities and are modified so that all children have the maximum chance of being involved in the game.

## 3. Material and Methods

The rules for the U12 youth players are adapted to the age-specific psychomotor abilities and are modified so that all children have a maximum chance to be involved in the game, but at the same in this category is formed following the primary selection, respecting its criteria and requirements, health being the eliminating criterion.

In this category, the manifestation of motor qualities is not crystallized, therefore, athletes who do not show aptitude should not be excluded from the training groups. The purpose of this stage is to attract, identify and select talented children with an inclination to play basketball.

In the contemporary concept of training, superior performance is largely determined by the earliest possible preparation of players. Thorough preparation at this stage creates the preconditions for an increase in the volume, intensity and complexity of training, corresponding to the demands of major competitions.

This training is objectively required to be based on sound multilateral physical preparation, superior indices of physical development and a high level of technical-tactical knowledge, skills and abilities that meet international standards.

In modern basketball, the training process has a trainee-like character, each stage having instructional-educational objectives, content, methodology, in accordance with the age particularities, as well as the level of training necessary to achieve a permanent program.

The training methods specific to the U12 youth players' category are the following:

- methods based on the effort-rest relationship (repetition method; interval training method; long-duration effort method);
- methods based on part-whole relationship (modelling method, analogy method)

The training means specific to the U12 youth players' category are considered to be the following:

- training means: general training exercises, mixed, intermediate, specific drills.
- competitive means: school games, evaluation matches and competitive games.
- Means of recovery: specific and non-specific.

The preparation of U12 youth players in the game of basketball can be optimized by developing and experimenting with a training strategy designed according to the specific characteristics of their age and the level of knowledge acquired up to this level.

In any sports training program, both physical training, technical training and age-specific tactical training, individualized for each team member in the sports game is very important in achieving sports performance, which is why the specific characteristics of the position must be considered.

In this context, the specific training of the U12 youth players' category is carried

out at for the entire team, each athlete playing an important part to achieve the objectives and the goal of the respective basketball game, collective and individual performance.

Within the addressed didactic strategy, the methods, methodical procedures, materials and means of training should be highlighted, which should be integrated into operational structures or training programs that ensure the achievement of concrete operational objectives and ensure quality and efficiency in the training process.

In carrying out the research we will consider the following aspects:

- Studying specialized works on specific physical preparation in the game of basketball for U12 youth players.
- Systematization of the main means of physical, technical and tactical training in the game of basketball for U12 youth players, considering the age-specific peculiarities.
- The carry out of the specific training program for the U12 youth players, with the exposure of the main drills specific to this age.

The research needed to carry out this work was conducted between 2024 and 2025 using:

- bibliographic study method, by documenting the literature, represented by specialized books, magazines and websites, through whose content and way of presenting the concepts, we have acquired and developed our knowledge related to the discovery of optimal strategies for the preparation in the game of basketball for Under 12 youth players;
- the observation method during sports training.
- the pedagogical experiment method, based on the use of a longitudinal experiment aimed at developing a strategy focused on optimizing the preparation level in the game of basketball for Under 12 youth players.
- test method, in which we used the Purdue-Pegboard test and the Knox test.

**4. Results**

Following the research methods used as well as the means proposed to develop a strategy to optimise the training level in the game of basketball of Under 12 youth players we conducted a series of age-specific control tests: Purdue-Pegboard test and Knox test.

The Purdue-Pegboard test, through which we wanted to develop the dribbling frequency. The subjects dribble in the correct position with the right hand for 35 seconds, then dribble with the left hand for the same duration and finally dribble simultaneously with two balls.

Assessment scale:

- Very good:
  90-100 right-hand drills.
  90-100 left hand drills.
  80-90 drills, dribbling simultaneously with two balls.
- Okay:
  75-89 right hand drills.
  75-89 left-hand drills.
  70-79 simultaneous doubling drills with two balls.
- Satisfactory:
  55-69 right-hand drills.
  55-69 left-handed drills.
  50-69 drills, dribbling simultaneously with two balls.
- Unsatisfactory: - lower values.

The Knox test consists of four tests:

a. dribbling course (fast dribbling)

through 4 cones located 4 meters apart.

b. from 1,5 m - 2 m from the wall, execute 20 passes with both hands from chest level, in the shortest possible time (quick passes);
c. running a course between 3 cones, situated at 4 meters from each other, followed by a two-step throw in the shortest possible time.
d. travel the *'small marathon'* route at top speed.

Assessment scale:
- fast dribbling - 8.10 seconds.
- dribbling and shooting - 12.00 seconds.
- fast passes - 9.50 seconds.
- small marathon - 23.00 seconds.

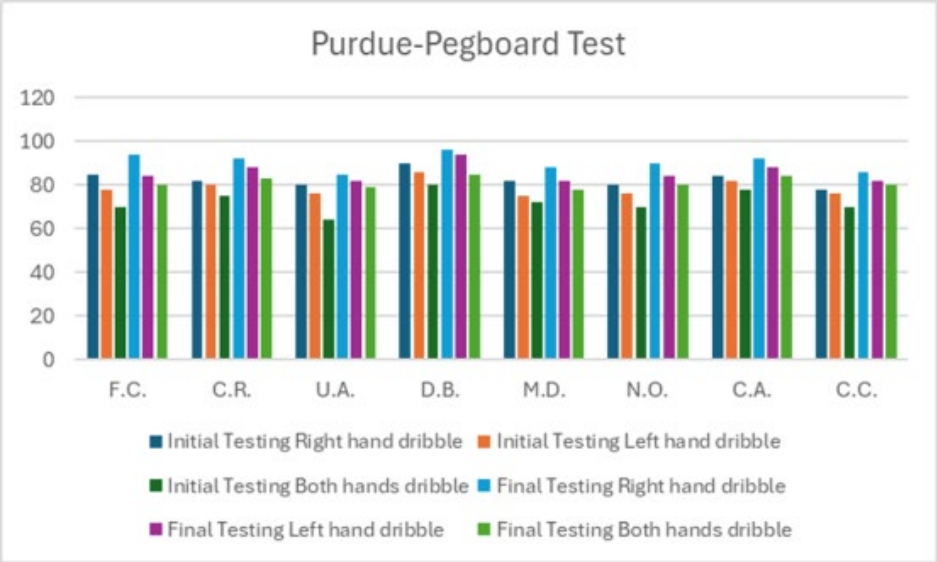


Fig.1. *Statistical indicators of Purdue-Pegboard*

Following the Purdue-Pegboard test shown in figure 1, performed for the eight subjects, dribbling variations were approached to determine their execution speed in the 35-second interval, dribbling executed with a single ball with both the left and right hand. The coordination ability of the subjects was also tested by dribbling with two balls. The evaluation of the results of this test was done by giving marks on the grid.

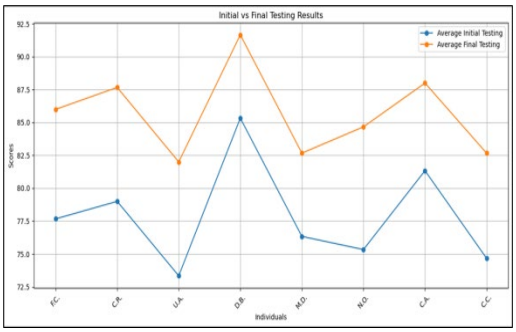


Fig. 2. *Individual Comparison between initial and final Purdue-Pegboard Test*

The graph presented in figure 2 shows an evolution through the development of the execution speed of dribbling

variations, as well as the coordination ability through the execution of dribbling with two balls.

According to the grading scale, it can be seen that a total of 5 athletes scored very good on the Purdue-Pegboard test, with the others also very close.

| Column1 | Average Initial Testing | Average Final Testing |
|---|---|---|
| Count | 8 | 8 |
| Mean | 77,875 | 85,66667 |
| Std | 3,939775 | 3,338092 |
| Min | 73,33333 | 82 |
| 25% | 75,16667 | 82,66667 |
| 50% | 77 | 85,33333 |
| 75% | 79,58333 | 87,75 |
| Max | 85,33333 | 91,66667 |
| rage | 12 | 9,666667 |

The statistical summary for the mean scores of the initial and final tests are as follows:

Average: Initial testing: 77.88, Final testing: 85.67.

Median: Initial testing: 77.00, Final testing: 85.33.

Standard deviation: Initial testing: 3.94, Final testing: 3.34.

Range: Initial testing: 12.00, Final testing: 9.67.

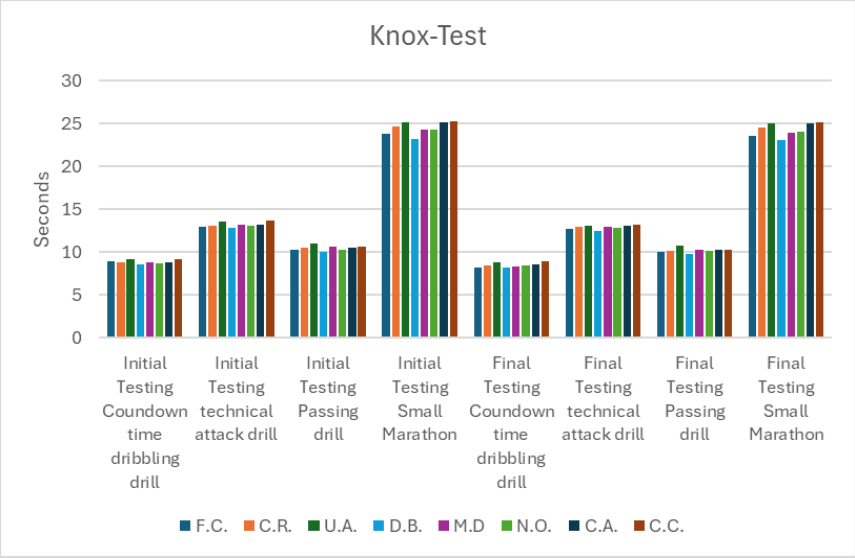


Fig.3. *Statistical indicators of Knox Testing*

Following the Knox test presented in figure 3, specific physical training exercise programs were designed to develop the parameters of reaction speed, execution speed, movement speed, speed endurance, control and skill, through the execution of fast dribbling, fast dribbling with two-step finishing, fast passing and attacking technique, and the small marathon test.

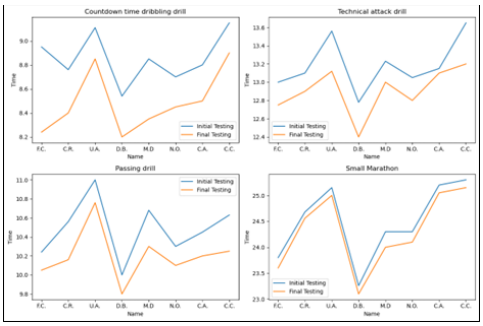


Fig. 4. *Individual Comparison between initial and final Knox test drills*

Line graphs were generated figure 4 for the initial and final test results for each sample. These graphs help observe trends over time and understand how performance changed from initial to final testing.

Following the test carried out for the 8 athletes, an improvement of the results by obtaining more efficient times in execution of the Knox Test can be noted.

| Column 1 | Difference Countdown time dribbling drill | Difference technical attack drill | Difference Passing drill | Difference Small Marathon |
|---|---|---|---|---|
| Count | 8 | 8 | 8 | 8 |
| Mean | -0,37125 | -0,28125 | -0,28 | -0,17875 |
| Std | 0,160039 | 0,135271 | 0,090869 | 0,055918 |
| Min | -0,71 | -0,45 | -0,4 | -0,3 |
| 25% | -0,395 | -0,395 | -0,38 | -0,2 |
| 50% | -0,32 | -0,25 | -0,245 | -0,155 |
| 75% | -0,2575 | -0,2225 | -0,2 | -0,15 |
| Max | -0,25 | -0,05 | -0,19 | -0,12 |

Standard statistics were generated for the differences in each sample belonging to the Knox test. The statistics include mean, median, standard deviation, minimum and maximum values for each drill.

## 5. Discussions

During this scientific approach, the conclusion was that the success in the implementation of an optimal strategy of preparation in the game of basketball in U12 youth players by developing and experimenting with a training program is influenced by the particularities of age, the characteristics of each athlete and the knowledge gained by them during the training period.

## 6. Conclusions

The continuous improvement of the quality and efficiency of the basketball player's training process is a major concern for all those who select, train and accompany the athletes in competitions, the desire being to achieve the best possible performance, not only at the collective, team level, but also on individual one.

Based on its character as an instructive-educational process, sports training is based on numerous principles and requirements, which must be respected throughout the entire training of athletes.

The concern for the thorough and forward-looking preparation of children and youth players in basketball, because of a series of scientific research and observations, as well as the experiences gained during the training period, led to the integration of basketball for children and youth players into the general sports system.

The optimization of the strategy regarding the preparation of Under 12 youth players in the game of basketball, implies the elaboration and observance of a sports training program within which specific physical exercises are well-defined for this category, classified according to the age-specific particularities, the motor qualities with which each player is endowed and which he/she can develop, reaching a performance level.

The results of the two tests used highlight a superior development of the level of motor skills, developed through the training program during the 2024/2025 season.

Depending on each sport branch, as well as on the dominant complex motor qualities, differentially involved in the practiced activity, the specific physical, technical and tactical preparation determines directly the performance of each athlete in the practiced performance sport activity.

Therefore, the specific preparation of the Under 12 players' category must consider the quantitative and qualitative transformations that define human development and evolution, from a physical, psychological and social points of view, the level of preparation being the one that determines the performance in competitions.

The development of an optimal strategy for the preparation of Under 12 youth players in the game of basketball encompasses a whole system of measures that ensure a high functional capacity of the body, through a high level of development of basic and specific motor skills, optimal values of morpho-functional indices, full mastery of the drills used and a perfect state of health.

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