Original Article

Psychological selection in game sports on the basketball example

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Abstract.
Purpose: to form an algorithm and to identify the criteria for psychological selection in basketball. **Material and Methods**: In the research 144 athletes (gender – men; age – 16 years old) took part. Among them18were selected as candidates for the Ukrainian cadet basketball teamusing methods for assessing individual technical and tactical mastery (modified formula by M. Malikov) and psychological characteristics (assessment of the level of psycho-physiological stress, self-esteem, leading sensory system, Eysenck Personality Questionnaire, Bem Sex-Role Inventory).**Results:** For the first time, an integrated approach based on the assessment of the technical and tactical skills of basketball players in combination with the psychological selection was used for selectionthe candidates for the Ukrainian cadet team. From the 144 athletes, who participated in the Ukrainian Championship, 36 players were selected based on the level of technical and tactical skills. According to the results of the psychological tests main characteristics of basketball players were defended and recommendations for coaches were given. As a result, 18 players, who were selected using psychological methods, had better technical and tactical mastery. They took part in the training process for preparation for the main competitions of the year (European Championship).**Conclusions**: According to the results of research, an algorithm of selection including technical and tactical assessment andpsychological criteriahas has been formed to increase the efficiency of the basketball players' selection. Such type of mixed selection allows not just chose perspectivecandidates for the national team, but also increase the effectiveness of training process through giving practical recommendations for coaches about better positions of a player and psychological approaches in the training process.
Keywords: psychological selection, basketball, technical, tactical, personality.

Introduction.

Among selection criteria in sports games are: morphological features, physical and functional qualities, personality traits. As technical and tactical skills and physical parameters are wide-used in sport, as well psychological factors are known, but rarely used for selection. Scientists all over the world are trying to find ways for optimization the training process in order to increase the level of individual skills of athletes in team sports (Mitova, Ivchenko, 2015; Vysochina, Bezmylov, 2015).

The searching prosses for ways to solve this complex task in the context of sport globalization turned to the alternative ways, which are not connected mostly with improvingtraining methods (Kon, 2006; Doroshenko, 2013; Sushko, 2017; Polianychko et al, 2018). At the present stage of development of elite sport, the psychological training of the athletes,as a system of psychological and pedagogical influences, is using to form and improve personality traits and mental qualities, which will influence on the effectiveness of athletes' training and competitive activity(Craig, Baucum, 2006).

Since the current level of physical activity in Olympic and professional sports reaches its limits sports psychologists point out the neediness of improving psychological preparedness with the help of emotional-volitional and internal mental reserves of an athlete (Giulianotti, 2015; Spesyvykh, 2017; Vysochina et al., 2018). The long-term researches experience in this field emphasizes the further possibility of improving the results by using scientifically-based methods of psychological influence (Platonov, 2013, 2015).

The complexity and multifactorial nature of psychological preparation to competitions in sports games necessitates the study of the athlete's individual personal characteristics, the dynamics of his mental processes at all stages of long-term preparation and the improving of psychological correction programs taking into account the current trends in training and competitive activity, as well as the specific of motor activity (Vysochina, 2017).

Thepurposeoftheworkto form an algorithm and identify the criteria for psychological selection in basketball.

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Material and methods.

*Participants.*In the research 144 athletes (gender – men; age – 16 years old) took part. Among them 18 were selected as candidates for the Ukrainian cadet basketball team U-16. Selection include two stages: assessment of the results of the competitive activity and the level of individual technical and tactical mastery; psychological selection.

Organization of research.

The study included three phases:

- the selection of 36 basketball players from 144 participants of the Ukrainian Championship on the basis of technical and tactical mastery assessment;

- the selection of 18 athletes from 36 previously selected, taking into account the assessment of the psychological characteristics of the players;

- formation of an algorithm for the selection of athletes for cadet national teams on the basis of an integrated approach.

To assess *the level of technical and tactical skills* a modified formula (Malikov et al., 2005) was used. This method of assessment has practical application (does not require the use of complex equipment and lengthy preparation). Its advantageous are: a high level of accuracy and objectivity for the assessment of players' skills in a particular game.

Method for assessing index of technical and tactical mastery (ITTM) include such stages:

- registration of the main indicators of technical and tactical actions;
- determining the time and effectiveness of players actions in comparison with total team indicators;
- mathematical calculation of the integral ITTM according to the formula:

$$ITTM = 33,33 \times (Og/Ok + Zg/Zk + t/T) + 1,4ST + 1,3RB + 1,2BS + AS + 0,5FS - F - 1,2TTS;$$

where: ITTM – index of technical and tactical mastery in basketball, cu; Og – points scored by the player, amount; Ok – points scored by the team per game, amount; Zg– player's successful shots, amount; Zk– the total amount of player'sshots, amount; t – player's time on the court, minutes; T –total playing time, minutes; AS – assists, amount; RB –rebounds ball, amount; ST –steals, amount; BS –blocked shot, amount; FS – opponent's fouls on player, amount; TTS –turnovers, amount; F–personal fouls, amount; 33,33; 1,4; 1,3; 1,2; 1; 0,5; -1; -1,2 – multiple regression equation coefficient.

Determination, evaluation and comparison of technical and tactical skills of players takes into account the player's position(point guard, shooting guard, small forward, forward, power forward, center) and are evaluated using a scale (table 1).

Table 1

Evaluation of ITTM depending on the playing position of basketball players

Level of technical and tactical mastery	ITTM value, cu	
	point guard, shootingguard, smallforward	forward, powerforward, center
Low	< 25,0	< 30,0
Below average	25,01 – 35,00	30,01 – 40,00
Average	35,01 – 45,00	40,01 – 50,00
Above average	45,01 – 55,00	50,01 – 60,00
High	> 55,00	> 60,00

Example of practical application: Forward "A" scored 18 points in the game (team – 71 points). He completed 12 shots, 6 of them were successful, played 29 minutes (total playing time – 40 minutes). In the asset – 4 assists, 4 rebounds, 2 steals, 0 block-shots, the opponents got 6 fouls, when counteracting the player. In passive –2 personal fouls and 4 turnovers.

Based on the presented indicators, the ITTM is calculated according to the formula:

$$ITTM = 33,33 \times (18/71 + 6/12 + 29/40) + 1,4 \times 2 + 1,3 \times 4 + 1,2 \times 0 + 4 + 0,5 \times 6 - 2 - 1,2 \times 4 = 57,53;$$

Taking into account the data from Table 1,level of technical and tactical mastery of player "A" – is above average.

Forassessing the athletes'psychological state the following methods were used:

1. Assessment of *the level of psycho-physiological stress* allows to determine the degree of external factors'influence on the psychological and physiological state of the athlete; to identify the features of his or her individual reaction. The results of assessment help to find further directions for the correction of stress.

2. *Eysenck Personality Questionnaire*for the type of temperament determining(using a 24-point scale) allows to identify the predominant type of temperament; assess the expression of individual mental qualities: extraversion-introversion and neuroticism (emotional instability).

3. Test for determination*the level of self-image* assessesthe availability of basic personal qualities of an athlete (achievement motivation, confidence, adaptability, self-defense)and based on the analysis of a complex of indicators.

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4. Determination of *the leading sensory system* (visual, audial, kinesthetic) allows to determine the severity and the ratio of the activity of the functioning of sensory systems in an athlete.

5. *TheBem Sex-Role Inventory*for the study of masculinity–femininity.

Statistical analysis. All indicators were calculated as absolute and relative (%) value.

Results.

The task of coaching staff of the Ukrainian cadet basketball team U-16 (head coach – I. Kharchenko, assistant coach 1 – A. Kharchynskyi, assistant coach 2 – D. Shalamov) was to select and prepare for the European Championship athletes, who have shown individual skills in the Ukrainian championship games. They decided to test the psychological state of the candidates. Previously, the selection took into account only technical and tactical indicators, physical fitness and the role of the player for the implementation of the planned tactical schemes.

Often, the psychological correction is carried out with the selected players for the national team. But, for the first time, with the support of the Ukrainian Basketball Federation they invited specialists, whose scientific qualifications in psychology allows to determine main psychological parameters in basketball for selection the candidates to the Ukrainian cadet basketball team. Their tasks were among the previously selected athletes choose players, who have psychological resistant to expected loads, possess the necessary mental qualities to work in the national team and are able to make situationally accurate decisions, to respond quickly to the coach's tasks. The conducted research has acquired particular importance in this direction.

Data abouttechnical and tactical indicatorswere collected during the competitive period.That made it possible to assess objectively the level of preparedness of the players (144 athletes), who took part in the Ukrainian Basketball Championship. The interpretation of the ITTM, taking into account the playing position (Sampaio et al., 2006), made it possible to preselect 36 basketball players for further psychological examinations (table 2). Mostly they had above average and some of them – high level of technical and tactical mastery. Two players had average level of the ITTM.

Table 2

Indicators of the ITTM level of preselectedcandidates for the Ukrainian national basketball team, taking into account the playing position (n=36)

Level of technical and tactical mastery	Playingposition			
	point guard, shootingguard, smallforward		forward, powerforward, center	
	number of players	%	number of players	%
Low	0	0	0	0
Below average	0	0	0	0
Average	0	0	2	5,56
Above average	15	41,67	12	33,33
High	6	16,67	1	2,78

To select the best from the preselected players (n=36) psychological methods were used. But firstly, the task was to choose the most informative parameters for basketball players.

Today scientists agree that the psychophysiological characteristics of the stress manifestation are directly connected with the athlete's emotional state influence on his well-being and the functioning of the body's functional systems. At the same time, long-term exposure to stress factors can lead to the chronic stress formation and, consequently, to decreasing physical and mental efficiency, which determines the performance of an athlete.

An assessment of the level of psychophysiological stress allowed us to determine the degree of external factors' influence on the psychological and physiological state of athletes and to identify the features of their individual reaction. As a result, it allows us to choose the further approaches for the correction of stress. According to the results of the study:2 players (5,56 %) hadlow levelof psychological and physiological stress (reflects the stability of the nervous system to external factors); 14 (38,89 %) – average level of psychological and physiological stress; 10 (27,78 %) – the average level of psychological and physiological stress with minor signs of anxiety (when the need to be noticedby and impatience lead to certain emotional problems, or increased self-insistence causes uncontrollable reactions of physiological stress – heart palpitations, tremors, excessive sweating, etc.); 4 (11,11 %)– average level of psychological and physiological stress with increased anxiety (a reaction to criticism and causeless anxiety, against the background of a high level of emotional reactions); 8 (22,22 %) – high level of psychological and average level of physiological stress (irritability is expressed, reaction to critical comments and unreasonable anxiety is aggravated).

Mostly basketball players had normal indicators of stress. This characteristic does not require correction, since a high level of psychological stress with an average level of physiological stress may be the result of the age-related psychological characteristics of athletes (typical for adolescence), and drastic changes in the hormonal level.

As forresults of the survey of the temperament type, among preselected basketball players were: sanguine persons (the nervous system is strong, mobile, balanced)– 13 people (36,11 %); melancholic (the nervous system is weak, which reflects the high sensitivity and susceptibility of the psyche to external factors; to work "in conjunction" with a representatives of a strong type of temperament is recommended)– 11 people (30,56 %); choleric persons (the nervous system is strong, mobile and unbalanced)– 7 people (19,44 %);phlegmatic (the nervous system is strong, inert and balanced) – 5 people (13,89 %).

The Hans Eysenck's test allowed us to determine the predominance of extraversion by 19 players (52,78 %); introversion – 14 (38,89 %); introversion and extraversion were equally expressed by 3 players (8,33 %). At the same time, the predominance of emotional stability was observed in 18 athletes (50,00 %), and emotional instability (neuroticism) was also observed in 18 athletes (50,00 %).

Extraversion is manifested in a friendly, talkative and energetic behavior, characterized by concentration on external objects, while introversion is manifested in a more closed and solitary, oriented to internal psychological activity.Extraversion and introversion are considered as a single measurement space, because high indicators of one characteristic imply low indicators of another.

Such a distribution of indicators of the temperament type gives grounds to assert that in team sports (particular, in basketball) an extraversion factor, which is associated with mental and, as a result, physical activity and mobility of athletes, occupies an important place, but emotional stability have not significant influence.

The Bem Sex-Role Inventory test "Masculinity-femininity" (BSRI, 1974) is used to diagnose psychological gender and determine the degree of androgyny, masculinity and femininity of the personality. Gender indicators of the examined athletes (a maximum score – 20 points) were divided into four categories:
  - the prevalence of pronounced masculinity (a significant predominance of male qualities) – 20 athletes (55,56 %) with an amplitude of 15-20 points;
  - the prevalence of pronounced femininity (female character traits) – 13 athletes (36,11 %)– 15-18 points;
  - there are signs of androgyny (male and female qualities are equally pronouncedwith a masculinity-femininity index ranging from -1 to 1) with high rates (14-20 points)of masculinity and femininity – 13 athletes (36,11 %);
  - there are signs of androgyny (male and female qualities are equally pronouncedwith an index of masculinity-femininity in the range from -1 to 1), when femininity and masculinity are poorly expressed (10-13 points)– 9 athletes (25,00 %).

Analysis of indicators of gender characteristics of basketball players shows that mostly athletes have a high level of masculinity. At the same time, out of 36 basketball players, 22 persons show signs of androgyny, which is an indirect indicator of extraversion (orientation to the outside world), since the emotional reactions of athletes with this type of mental organization are wellpronounced. This suggests that high indicators of gender characteristics, combined with androgyny, are the model characteristics of basketball representatives in this age group among young men.

The sensory system is responsible for the perception of signals of various modalities from the surrounding or internal environment. Determining the leading representative system (audial, visual, kinesthetic) made it possible to develop an optimal coaching position for presenting information for effective work with players. According to the prevailing sensory system, the athletes were divided into three groups:kinesthetic (reflects the dominance of perception of sensations)– 22 athletes (61,11 %); visual (the predominant perception of visual images)– 8 athletes (22,22 %); auditory (the predominant perception of speech and other sounds)– 6 athletes (16,67 %).

Predominent for the basketball players is kinesthetic perception, which is expressed in well-developed tactile sensitivity (feeling of the ball, feeling of partner or rival) and space-time orientation (perception of the size of the court, time limit for performing technical and tatistic actions with taking into account the features of the tempo rhythm, tactical location of the players on the court).

The overall results of the self-esteem of the basic personal qualities of candidates for the cadet national team (achievement motivation, confidence, adaptability, self-defense) are presented in table 3.

Table 3

Self-esteem of the personal qualities of basketball players (n = 36)

Basic personality traits	Personality assessment, %		
	missing	presented on the average level	presented
Achievement motivation	2,78	16,67	80,56
Confidence	16,67	36,11	47,22
Adaptability	11,11	0,00	88,89
Self-defense	2,78	0,00	97,22

The low level of self-esteem of confidence by athletes attracts attention. This is due to the fact that most of the basketball players, who participate in the study, haven't yet demonstrated high sports results. At the same

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time, increasing confidence is one of the key areas of psychological correction in sport (Vysochina, 2010), which must be taken into account in the program of psychological support for these athletes.

The generalization of the results of studies of the psychological state of athletes led to the following conclusions:

- stress indicators for most basketball players are within the normal range, which does not require correction. The presence of a high level of psychological stress on the background of the average physiological level is the result of the age-specific psychological characteristics of athletes associated with changes in the hormonal level during adolescence;

- according to the analisis of the type of temperament in basketball an extraversion factor plays an important role;at the same time, neuroticism (emotional stability) does not have a significant impact on the process of sports training;

- one of the model psychological characteristics of basketball players in this age category are high indicators of gender characteristics (masculinity and femininity), combined with androgyny;

- basketball players have the most pronounced priority influence of kinesthetic perception, which manifests itself in well-developed sensations of tactile sensitivity and space-time orientation;

- the main direction of psychological correction, taking into account the analysis, can be considered to increasing the level of confidence of athletes, which is carried out by influencing their self-image and reducing anxiety and the formation of psychological stability. It is also necessary to use means of psychological influence, contributing to the development of self-control and self-regulation.

A preliminary survey showed that players had no previous experience to work with psychologists and had not been involved into psycho correction process using special programs.

The results of the psychological tests and assessment of the level of technical and tactical skills significantly influenced on the opinion of the coaching staff to the selection of athletes to participate in training sessions. Based on the results of research 18 athletes were selected for training camps.For selected 18 players were developed an individual programs to improve technical and tactical actions, taking into accont their psychological features. The aim of the profram is increasing the effectiveness of athletes' implementation in the competitive process.

Re-registration of ITTM after 2-weeks camp is presented in the table 4.Basketball players selected by psychological indicators in the training process used recommendations not only about increasing the level of technical and tactical skills, but also were trained taking into account the recommendations of psychologists.They significantly improved the level of ITTM. So, the number of players of point guard, shooting guard, small forward playing position with a high level of ITTM was increased on 22,22%, and forward, power forward, center position–on 13,89%.

Table 4

Indicators of the ITTM level of selected players for the Ukrainian national basketball team, taking into account the playing position (n=18)

Level of technical and tactical mastery	Playingposition			
	point guard, shootingguard, smallforward		forward, powerforward, center	
	number of players	%	number of players	%
Low	0	0	0	0
Below average	0	0	0	0
Average	0	0	0	0
Above average	3	16,67	5	27,78
High	7	38,89	3	16,67

Among 18 selected athletes 10 players joined the Ukrainian cadet team, which played in the FIBA U16 European Championship Division B. The team played 8 games, scored 5 wins over teams from Belgium (76:71), Hungary (73:59), Denmark (64:96), Bulgaria (78:56), Cyprus (46:67), and lost three times to teams from Greece (78:63), Poland (59:57) and the Netherlands (48:55). It is indicative that the effectiveness of competitive activity in the attack significantly influences on the sports results of the Ukrainian national team, because all the games in which the team scored more than 65 points were won.

The results of the research are significant for the near future, since more than 70 % of the players of the national cadet team of Ukraine continue to perform in the following age categories of national teams (junior, youth) and about 45% have experience of recruiting to the national team of the country.

For clarity, for specialists we structured the algorithm of selection in basketball (fig. 1).
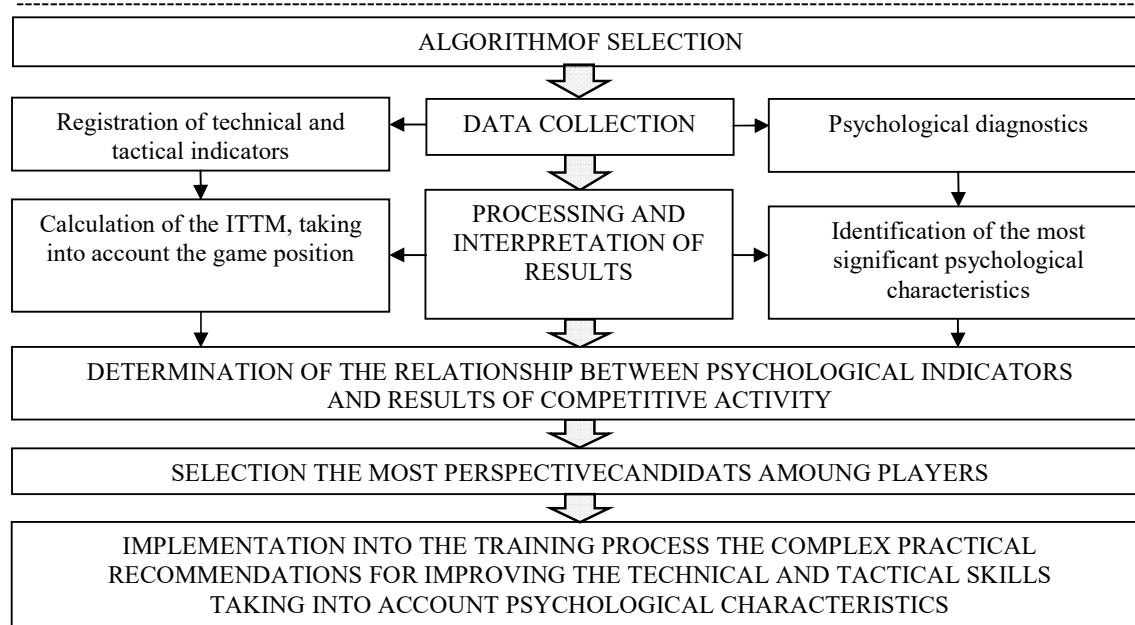

ALGORITHMOF SELECTION

DATA COLLECTION

Registration of technical and tactical indicators	DATA COLLECTION	Psychological diagnostics

Calculation of the ITTM, taking into account the game position	PROCESSING AND INTERPRETATION OF RESULTS	Identification of the most significant psychological characteristics

DETERMINATION OF THE RELATIONSHIP BETWEEN PSYCHOLOGICAL INDICATORS AND RESULTS OF COMPETITIVE ACTIVITY

SELECTION THE MOST PERSPECTIVECANDIDATS AMOUNG PLAYERS

IMPLEMENTATION INTO THE TRAINING PROCESS THE COMPLEX PRACTICAL RECOMMENDATIONS FOR IMPROVING THE TECHNICAL AND TACTICAL SKILLS TAKING INTO ACCOUNT PSYCHOLOGICAL CHARACTERISTICS

Figure 1 – The algorithm of psychological selection in sport games

Discussion.

The effectiveness of competitive activity of basketball players is determined by the indicators of technical and tactical skills, which influence on the result (Doroshenko et al., 2015).But current trends in scientific researches indicate the need for additional parameters for selection, such as psychological.Ability of athletes to adapt to psychological and physical stress significantly influence on team result (Kozina et al., 2015). According to the authors, who study the problems of psychological preparation in sports (Kostiukevich, 2012; Vysochina, Vorobiova, 2017; Mitova, Ivchenko, 2018), taking into account the results of assessment of the athlete's psychological state is important and necessary.At the same time personal psychological characteristics should not be considered as essential in making decision about selecting players for the national team. Taking into account psychological features allows to find understanding between players and coaches in national teams, who have limited training time, the difficulties of social adaptation of the leaders in the national team, and the intensity of the competitive struggle and responsibility for the outcome of the match (Kutovaia, 2007).

For the first time, the data about the psychological state of candidates for the Ukrainian cadet basketball team were obtained. The opinions of qualified specialists were confirmed on the significant impact of psychological readiness on the athletic performance, and the importance of conducting surveys of the psychological state of players of national teams for obtaining promising, current and operational information.

The generalization of the results of the research allowed us to form an algorithm of selection, taking into account the psychological characteristics of athletes for optimization of the training process.It can be used as a basis for scientific and methodological support to increase the efficiency of competitive activity of athletes in team sports.

Conclusions.

1. As a result of the study, criteria for psychological selection in basketball (and can be adopted to an other kinds of sport games) were formulated:
   - the predominance of the extraversion factor (orientation to the outside world);
   - high level of masculinity and femininity;
   - priority of kinesthetic perception.

These criteria should be taken into account as model psychological characteristics of representatives of team sports for developing programs.

2. As a result of the study, we have formed an algorithm for the selection ingame sports, which include technical, tactical and psychological evaluation.Algorithm made it possible to distribute rationally the process and time of specialists; more accurately and comprehensively accomplish the tasks of the training process; identify the relationship between psychological and technical-tactical preparation; compare the dynamics of mental functions of athletes and the results of competitive activities to increase its effectiveness; and as a result – find the most prospective candidates for the national team and reserve.

3. Analysis of the results of research confirmed the need for preliminary testing of psychological preparedness before starting training in national teams.The initial data (type of temperament, leading representative system, gender characteristics, self-image, level of psycho-physiological stress) affectonthe

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perception of the coach's tasks, the degree and the speed of psychomotor reactions, and, as a result, the effectiveness of competitive activity.

Prospects for further research: introduction of the developed selection algorithm into the system of psychological support of the training process in team sports.

Conflict of interest. Authors declare no conflicts of interests.

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