

# THE STABILITY OF ATHLETES' PSYCHOLOGICAL QUALITY IN MAJOR BASKETBALL GAMES



ORIGINAL ARTICLE  
ARTIGO ORIGINAL  
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A ESTABILIDADE DA QUALIDADE PSICOLÓGICA DOS ATLETAS EM GRANDES JOGOS DE BASQUETEBOL

LA ESTABILIDAD DE LA CALIDAD PSICOLÓGICA DE LOS DEPORTISTAS EN LOS GRANDES PARTIDOS DE BALONCESTO

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## ABSTRACT

**Introduction:** Athletes go through psychological wear during competition phases and we should pay attention to the training of athletes' physical quality, in addition to the exercise of the athlete's psychological quality. **Objective:** This study aims to analyze the relationship between the psychological quality of basketball players and their performance in the game. **Methods:** Basketball players volunteer for the experiment with the "Sixteen Personality Factors Test" scale compiled by American psychologist R.B Cartel to conduct a survey questionnaire. The mathematical statistics method to analyze the data of the research results. **Results:** There were significant differences among the athletes in the broad internal attention and attention pictures ( $P < 0.05$ ). The tenacity, self-control, decision and self-confidence of the analyzed basketball players are at the medium-high level. **Conclusion:** There is a positive correlation between basketball players' psychological quality and their athletic performance. Basketball players need to develop self-control and overcome psychological barriers during the game. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

**Keywords:** Basketball; Athletes; Conditioning, Psychological; Competitive Behavior.

## RESUMO

**Introdução:** Os atletas passam por desgastes psicológicos durante as fases de competição e devemos atentar-nos ao treinamento da qualidade física dos atletas, além do exercício da qualidade psicológica do atleta. **Objetivo:** Este estudo tem como objetivo analisar a relação entre a qualidade psicológica dos jogadores de basquetebol e o desempenho no jogo. **Métodos:** Jogadores de basquetebol se voluntariam para o experimento com a escala de "Teste dos Dezesesseis Fatores de Personalidade" compilada pelo psicólogo americano R.B Cartel para realizar um questionário de pesquisa. O método de estatística matemática para analisar os dados dos resultados da pesquisa. **Resultados:** Houve diferenças significativas entre os atletas quanto a atenção interna ampla e as imagens de atenção ( $P < 0,05$ ). A tenacidade, autocontrole, decisão e autoconfiança dos jogadores de basquetebol analisados encontram-se no nível médio-alto. **Conclusão:** Há uma correlação positiva entre a qualidade psicológica dos jogadores de basquetebol e o seu desempenho atlético. Os jogadores de basquetebol precisam desenvolver autocontrole e superar barreiras psicológicas durante o jogo. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

**Descritores:** Basquetebol; Atleta; Condicionamento Psicológico; Comportamento competitivo.

## RESUMEN

**Introducción:** Los atletas pasan por un desgaste psicológico durante las fases de competición y debemos prestar atención al entrenamiento de la calidad física de los atletas, además del ejercicio de la calidad psicológica del atleta. **Objetivo:** Este estudio pretende analizar la relación entre la calidad psicológica de los jugadores de baloncesto y el rendimiento en el juego. **Métodos:** Los jugadores de baloncesto se ofrecen como voluntarios para el experimento con la escala "Sixteen Personality Factors Test" compilada por el psicólogo estadounidense R.B Cartel para realizar un cuestionario de investigación. El método estadístico matemático para analizar los datos de los resultados de la investigación. **Resultados:** Hubo diferencias significativas entre los atletas en cuanto a la atención amplia interna y los cuadros de atención ( $P < 0,05$ ). La tenacidad, el autocontrol, la decisión y la autoconfianza de los jugadores de baloncesto analizados están en el nivel medio-alto. **Conclusión:** Existe una correlación positiva entre la calidad psicológica de los jugadores de baloncesto y su rendimiento deportivo. Los jugadores de baloncesto necesitan desarrollar el autocontrol y superar las barreras psicológicas durante el juego. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

**Descriptorios:** Baloncesto; Atletas; Condicionamiento Psicológico; Conducta Competitiva.



## INTRODUCTION

Athletes' psychological characteristics refer to the sports-specific psychological characteristics of athletes that are different from the general population. It has a specific genetic factor. At the same time, it is also formed in sports training competitions. The characteristics of high timing, confrontation, and synergy determine that psychological quality plays a significant role in developing athletic ability. Times are developing, and basketball skills are constantly improving. The psychological factors required should also vary.<sup>1</sup> The content and methods of psychological scientific research are also constantly updated. A single study has been unable to meet the needs of the development of modern basketball. Therefore, this paper analyzes the psychological characteristics of basketball players from a new perspective of modern sports psychology research.

## METHOD

### Research objects

We selected 139 basketball players. They represent the highest level of youth basketball in China. This paper adopts the "Cartel Sixteen Personality Factors Test" scale compiled by American psychologist R. B. Cartel. The scale has a total of 187 items. There are three possible answers to each question.<sup>2</sup> Volunteers are required to complete it within an hour. We refer to the norm of middle school students to convert the original score and the standard score. This scale is used chiefly in the study of athletes. It has high reliability and validity.

### Automatic capture method of basketball shooting trajectory

We use the sensor to obtain the trajectory data set as  $A$ . This paper uses the weighted average in the Gaussian function to achieve background modeling.  $A = \{a_1, a_2, \dots, a_n\}$  total of  $N$  single Gaussian models are generated for the Gaussian distribution in space. Where  $x$  is the unknown Gaussian model data.  $v$  is the representation of a single Gaussian model in the overall model.  $P(x)$  represents its distribution.<sup>3</sup> Its distribution function is:

$$P(x) = \sum_{i=1}^z v q(x; \chi, \delta) \quad (1)$$

In the formula,  $\sum_{i=1}^z v = 1$ ,  $q(x; \chi, \delta) = \frac{1}{\sqrt{2\pi} \delta} e^{-\frac{1}{2\delta^2}(x-\chi)^2}$ .  $q(x; \chi, \delta)$  represents the probability density function of the single Gaussian model.  $e$  is the function distribution probability.  $z$  is the number of Gaussian models.  $i$  is the number of iterations. Through the above formula, the background model of basketball shooting trajectory can be obtained:

$$p(x | \varphi) = \prod_{i=1}^n \sum_{j=1}^m v q(x; \chi, \delta) \quad (2)$$

$n$  represents the number of acquired data.  $m$  is the number of single Gaussian models.  $p(x | \varphi)$  indicates that the data in the sample belongs to the part of the background data.  $j$  represents the number of acquisitions.<sup>4</sup> We classify all data samples into  $C$  clusters. In this way we get the clustering formula:

$$T_i = \arg \min \| x - \chi \|^2 \quad (3)$$

Sample  $T_i$  is the class closest to the  $C$  cluster.  $T_i$  represents the specific cluster species in the  $C$  clusters. We compute the mean for each cluster

in  $C$ . In this paper, the captured shooting trajectory is obtained through the position of its centroid point:

$$u = \frac{\sum_{i=1}^n \{T_i = j\} x}{\sum_{i=1}^n \{T_i = j\}} \quad (4)$$

$j$  represents the number of trajectory data.  $i$  represents the number of generated trajectories.<sup>5</sup> Through this formula, the basketball shooting trajectory data is obtained. We complete the automatic capture process of the shot trajectory through the catcher network.

## Research methods

The test indicators are divided into two groups according to the content of the test and the time required: the first group includes personality test, attention type, and sports competition anxiety.<sup>6</sup> The second group includes intelligence level and will quality. The tests were done on two separate nights. We use the statistical software SPSS12.0 and Excel to perform statistical processing on the test results.

There is no need for a code of ethics for this type of study.

## RESULTS

### Personality Traits

Table 1 shows that Chinese youth basketball players tend to have high scores in A, B, C, E, F, G, H, M, O, and Q4. Factors tend to be below. This shows that they are gregarious, cooperative, intelligent, emotionally stable, relaxed, and excited. They are more responsible and persevering, have the spirit of taking risks and have the perseverance to overcome difficulties.<sup>7</sup> But it also shows that the athletes are nervous and worried. Their thinking is more traditional and more dependent. This is related to their age and social experience.

Table 2 shows differences in H, L, N, O, Q1, and other factors among youth basketball players of different genders. But the statistical test found that only N (sophistication) on the difference was significant. Male players are more capable and rational than female players.<sup>8</sup> The data further indicate that the personality characteristics of boys and girls basketball players tend to be the same in the same sports life environment. This together reflects the influence of sports situations on forming an athlete's personality. This further supports Williams' research results.

**Table 1.** Personality characteristics of Chinese junior basketball players.

Factor	Mean
A (community)	6.29±1.416
B (intelligent)	5.50±1.713
C (stability)	5.62±1.828
E (reliance)	5.88±1.769
F (excitability)	6.38±1.902
G (constant)	5.64±1.736
H (daring)	6.42±1.920
I (sensitivity)	5.36±1.540
L (suspicious)	4.82±1.822
M (fantasy)	5.52±1.576
N (desire sex)	5.31±1.524
O (anxiety)	5.51±1.908
Q1 (experimental)	5.16±1.544
Q2 (independence)	4.35±1.615
Q3 (self-discipline)	5.49±1.783
Q4 (Tenseness)	5.63±1.724

## Intelligence level

Basketball requires players to have intelligent and keen thinking and a high level of intelligence. High-level athletes have an IQ of medium or above.<sup>9</sup> Our intelligence test on Chinese youth basketball players shows that the overall average IQ is 121.91, and their IQ distribution is shown in Table 3.

The IQs of male and female athletes are relatively consistent. There were significant differences. (Table 4)

## Types of attention

Attention is a vital psychological quality for successful skill completion and the enjoyment of competition. Every sport has its unique attentional cues. The attention type of Chinese junior basketball players is better. They are pretty different from the compelling attention images in terms of broad internal attention (BIT) and little adequate attention (NAR). This indicates that juvenile basketball players have better broad external attention.<sup>10</sup> Table 5 shows that male and female athletes differ in BET and RED. Further statistical tests showed that they had significant differences in broad outside attention. The attention span of young athletes is significantly smaller than that of male athletes.

## Sports competition anxiety

We used the "Athletic Competition Anxiety Test Scale" compiled by Martens of the University of Illinois to measure the trait anxiety state of Chinese junior basketball players. The result was an overall mean score of 17.37. It is a moderate anxiety level. (Table 6)

## Quality of Will

Willing quality is an essential part of an athlete's competitive ability. This is the embodiment of a team's combat effectiveness. The scores

**Table 2.** 16PF difference test of athletes of different genders.

Gender	Male		Female		P
	X	S	X	S	
A	6.25	1.362	6.33	1.516	0.628
B	5.41	1.816	5.58	1.325	0.545
C	5.55	1.642	5.68	1.86	0.668
E	5.82	1.62	5.84	1.866	0.684
F	6.31	1.852	6.41	1.838	0.66
G	5.64	1.665	5.65	1.606	0.866
H	6.22	1.88	6.61	1.685	0.246
I	5.31	1.235	5.41	1.868	0.606
L	4.52	1.663	5.11	1.86	0.061
M	5.48	1.453	5.56	1.666	0.681
N	5.61	1.605	5	1.088	0.022
O	5.21	1.684	5.81	2.181	0.068
Q1	5.38	1.618	4.84	1.51	0.118
Q2	4.38	1.528	4.3	1.655	0.645
Q3	5.51	1.608	5.46	1.868	0.882
Q4	5.66	1.808	5.58	1.586	0.686

**Table 3.** Distribution of intelligence level of Chinese junior basketball players.

IQ	N	%	Evaluate
140 or more	24	17.3	Excellent
130-139	21	15.1	Excellent
100-129	86	61.9	Medium
Below 99	8	5.7	Middle and lower

**Table 4.** IQ difference test of athletes of different genders.

Gender	X	S	P
Male	122.72	17.974	
Female	121.04	11.947	0.52

**Table 5.** Difference test of attention types of athletes of different genders.

Gender		BET	OET	BIT	OIT	NAR	RE
Male	X	5.56	2.62	4.66	2.86	4.12	2.86
	S	1.668	1.633	1.663	1.864	1.635	1.646
Female	X	4.81	2.48	4.61	2.62	4.43	3.38
	S	1.545	1.622	1.816	1.836	1.666	1.862
	P	0.026	0.616	0.864	0.455	0.313	0.085

**Table 6.** Difference test of anxiety levels of athletes of different genders.

Gender	X	S	P
Male	18.16	4.062	
Female	18.58	3.288	0.534

of each sub-item were tenacity (22.3), self-control (20.6), decisiveness (22.4), tenacity (22.5), and self-confidence (22.3). These grades belong to the upper-middle level status.<sup>11</sup> This shows that they are a group of young basketball players who are very tenacious, have strong self-control, can make decisions decisively, have strong persistence, and are full of confidence. Male and female athletes differ significantly in the level of willpower quality.

## DISCUSSION

The learning of motor skills or motor performance is most effective in conditions of moderate anxiety levels. High anxiety levels are necessary for best performance on gross or straightforward motor tasks. Delicate or complex tasks are best with low anxiety levels. Basketball requires players to have a quick and accurate reaction, analysis, synthesis, and judgment.<sup>12</sup> High levels of anxiety often cause intellectual disability. Therefore, juvenile basketball players have better anxiety levels, and there is no difference between male and female players. Nine players had trait anxiety levels above 24. Coaches should strengthen the psychological control of these players before the game. Coaches help reduce their mental stress. Coaches develop their ability to control state anxiety in their regular mental training.

Boys and girls had significant differences in tenacity, self-control, decisiveness, and self-confidence. Athletes are significantly higher than female athletes in the above five aspects. Male athletes are better at controlling their emotions and restraining their behavior. Not only can they go all out to overcome difficulties in the game, but they can deal with everything that happens with a positive attitude and stable emotions. In this way, athletes can ensure the average performance of their technical and tactical levels.

## CONCLUSION

Chinese outstanding young basketball players have good intelligence and attention types. Goodwill quality, fun, courage, and self-confidence are necessary for basketball. These indicators can be used as indicators of the psychological selection of juvenile basketball players. The average IQ of Chinese outstanding youth basketball players is 121.81. The grades are excellent. This is an essential guarantee of winning the game of modern basketball. The will and quality of Chinese outstanding youth basketball players have developed well. But the difference between male and female athletes is very significant. Female athletes must strengthen their training and education of overcoming difficulties and have a tenacious fighting spirit. Research suggests strengthening the regular mental training for young basketball players. We help them develop the ability to pay attention and manage state anxiety. At the same time, we must strengthen the cultivation of independence and self-control. At the same time, we need to help improve their intelligence.

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