

FACTOR STRUCTURE AND BASIC FACTORS OF THE PHYSICAL DEVELOPMENT AND THE SPECIFIC WORKABILITY OF GROWING UP GIRL BASKETBALL PLAYERS (14 YEARS OLD)

Preliminary communication

Mariana Borukova

*National Sports Academy "Vasil Levski", Sofia
Department "Basketball, volleyball, handball", Sofia, Bulgaria*

Abstract

The purpose of the present study is to disclose the factor structure of the physical development and the specific workability of growing up girl basketball players. The present study was held during March – September 2015. The object of the study are the basic signs of the physical and technical-tactical preparedness in basketball of 14 years old girl basketball players. The contingent of the study are 66 girl basketball players born in 2001-2003 from the first five clubs having taken the first places in the State championship during the 2014/2015 season. Most important for the 14 years old girl basketball players is the so-called morphological factor, which discloses the high importance of: the length of the body; the height and weight indicators.

Keywords: *functional sport preparation, basketball tests, competitive effectiveness, basketball training, anthropometric indicators, motor tests, analysis of variance, factor analysis, physical preparedness factor, technical-tactical factor*

INTRODUCTION

The overall development of the specific functional preparation sets up the question about the assessment and control on the specific functional preparation of the competitors. For the purpose many researchers develop specific basketball tests and indicators (Borukova (Борукова), 2014a; Borukova (Борукова), 2014; Gigova (Гигова), 2002; Gosheva, Tszorov & Tszorova (Гъшева, Църов, & Църова), 1990; Dasheva (Дашева), 1991; Zhelyazkov (Желясков), 1978; 1993). It is indisputable that one of the main factors of the game effectiveness is the skill of the competitors to materialize their motor potential in rational technique and tactic actions. The studies in that field cover enormous factual material Aerbah (Ауербях), 1978; Borukova (Борукова), 2014a; Tszorov (Църов), 2001, 2008, 2012; Tszorova (Църова), 2013; Tszorova, & Borukova (Църова & Борукова), 2012; Coysi & Power, 1983; Karalejić & Jakovljević, (2001). The contribution of each of the indicators under study to the sports achievement of a given individual or a group, to a greatest degree depend on 3-4 basic factors. The disclosure of the factor structure of the physical development, the physical, technical and tactical preparedness, as well as the specific workability or competitive effectiveness is a multi-plan task of high informational value for the optimization of the education and training process [Tszorova (Църова), (2013).

Depending on the importance of the separate indicators for the sports achievement, their factor weights present greater or minor importance for the optimization of the training session in strategic aspect.

The purpose of the present study is to disclose the factor structure of the physical development and the specific workability of growing up girl basketball players.

METHODS

The present study was held during March – September 2015.

Subject of the study is the basketball play for growing up girl basketball players.

Object of the study is the basic signs of the physical and technical-tactical preparedness in basketball of 14 years old girl basketball players.

The contingent of the study are 66 girl basketball players born in 2001-2003 from the first five clubs having taken the first places in the State championship during the 2014/2015 season.

For the needs of the study a test has been held for all the competitors of the team according to 25 indicators bearing information about the basic signs of the physical development and the specific basketball workability. They have been distributed as follows:

- ✓ *physical development* (from 1st to 9th indicator);
- ✓ *physical preparedness* (from 10th to 17th indicator);
- ✓ *technical-tactical preparedness* (from 18th to 25th indicator).

The results from the test have been subjected to processing by *analysis of variance and factor analysis*. Five basic factors have been taken to the front characterizing the specific particularities of the totality under study.

RESULTS AND DISCUSSION

The results of the analysis of variance of the physical development and the physical and technical-tactical preparedness indicators (Table 1.) of our study show that the values are of normal distribution and the totality under study is homogeneous and relatively homogeneous in relation to the signs about which these indicators bear information.

The non-homogeneity is observed in relation to the skill of the girl basketball players to work with the ball at site, the ability to move along the playground by leading the ball at high speed and the dynamics of the abdomen muscles.

The factor structure of the 14 years old girl basketball players is established by 5 basic factors (Table 2.) which explain a very high percentage of the starting dispersion of the phenomenon of the study (84,24 %).

Table 1. Average values and verity of the indicators under study (N=66)

№	Indicators	Min.	Max.	X	S	As	Ex	V
1.	Height	145,00	179,00	164,87	7,75	-0,325	-0,512	4,70
2.	Weight	36,00	79,00	56,48	10,12	-0,062	-0,652	17,93
3.	BMI	13,78	29,12	20,65	3,01	0,222	-0,230	14,59
4.	Lower limb	88,00	113,00	100,07	6,13	0,159	-0,656	6,12
5.	Upper limb	65,00	82,00	74,05	4,41	-0,157	-1,145	5,96
6.	Span length	17,50	24,00	21,02	1,37	-0,460	0,241	6,50
7.	ГO-pause	66,00	95,00	81,35	7,84	0,007	-0,963	9,63
8.	ГO-difference	4,00	12,00	7,78	1,71	-0,189	0,193	22,04
9.	Stretch	140,00	180,00	164,91	9,15	-0,561	-0,127	5,55
10.	20M run	3,16	4,22	3,75	0,24	-0,307	0,313	6,40
11.	Run b/n stands	20,02	26,40	22,49	1,39	0,693	0,154	6,19
12.	112M shuttle	23,13	34,21	28,65	2,10	0,033	1,120	7,34
13.	Vertical jump	22,00	53,00	33,94	5,83	0,574	0,787	17,19
14.	Long jump	130,00	220,00	177,12	20,46	-0,156	-0,419	11,55
15.	Throwing compact ball from sitting and looking forward	2,90	5,30	4,15	0,58	0,059	-0,629	13,88
16.	Moving in defense	8,44	12,36	10,72	0,79	-0,306	0,000	7,40
17.	Abdominal press	12,00	52,00	24,15	8,41	1,375	1,630	34,83
18.	Leading the ball b/n stands	20,82	30,10	24,03	1,96	1,234	1,930	8,18
19.	Leading index	-1,72	7,29	1,54	1,20	1,885	8,290	77,73
20.	Loops by dribble	8,00	88,00	44,61	14,99	-0,213	0,828	33,60
21.	Shot on the run – time	32,54	45,77	36,42	2,16	1,338	4,376	5,94
22.	Shot on the run – number	4,00	6,00	5,27	0,69	-0,421	-0,833	13,12
23.	Shot on the run – coefficient	5,42	11,44	7,04	1,21	1,286	2,024	17,14
24.	Shot from position	7,00	25,00	16,91	3,41	-0,625	1,220	20,16
25.	Free throws	8,00	19,00	12,94	2,58	-0,153	-0,703	19,92

Table 2. Factor structure of the physical development and the physical ability of 14 years old girl basketball players

№	Indicators	I	II	III	IV	V	h ²	1-h ²
1.	Height	,906	,109	,081	,123	-,046	,856	,144
9.	Stretch	,902	,085	,147	,145	-,106	,874	,126
15.	Throwing compact ball while sitting	,901	-,158	,07	,037	,035	,845	,155
4.	Upper limb length	,877	,095	,296	,101	-,019	,779	,221
5.	Lower limb length	,803	,269	,135	,176	,113	,876	,124
2.	Weight	,788	,453	,085	-,285	-,065	,918	,082
7.	Chest measurement – pause	,762	,367	-,059	-,168	,111	,759	,241
6.	Span length	,601	-,024	,032	,325	,017	,469	,531
3.	BMI	,524	,472	-,024	-,476	-,066	,729	,271
21.	Shot on the move – time	-,123	,715	,249	,082	-,253	,658	,342
13.	Vertical jump	,247	-,713	,155	,285	-,093	,683	,317
10.	20 m. run	-,291	,685	-,128	,007	,029	,571	,429
23.	Shot on the move – coeff.	-,118	,632	-,318	,395	-,445	,868	,132
16.	Moving in defense	-,307	,628	-,05	,297	,174	,617	,383
15.	Loops by dribble	,088	-,603	-,172	-,303	-,061	,845	,155
8.	Chest measurement - difference	,050	-,581	,340	,028	-,143	,477	,523
11.	Run b/n stands	-,334	,578	,560	-,054	,185	,797	,203
22.	Shot on the move – baskets	,095	-,477	,470	-,424	,406	,802	,198
18.	Leading the ball b/n stands	-,312	,395	,740	,127	,236	,87	,134
17.	Abdominal press	,219	-,063	-,638	,236	,232	,566	,434
19.	Leading index	-,124	-,025	,562	,264	,172	,429	,571
24.	Shot from position	,157	,16	-,451	-,125	,334	,381	,619
14.	Long jump	,18	-,456	,023	,594	-,156	,617	,383
12.	112 m. shuttle run	,087	,057	-,081	-,476	-,625	,628	,372
25.	Free throws	,247	,143	-,474	,026	,558	,619	,381
$\sum a^2 = 84,24 \%$		25,53 %	18,60 %	10,95%	7,43 %	6,20 %		

Additionally to the factor weights the table presents as well data about the explained (h^2) and non-explained ($1-h^2$) initial dispersion of each sign under the study.

Table 2. analysis shows that the first factor taken to the front explains 25,53% of the initial dispersion of the phenomenon under the study. The two ones following have lower contribution to the general physical development and the specific workability of the girl basketball players (respectively 18,60 % and 10,95 %) while the last are additionally establishing the completion and the dispersion explained by them is rather under 10 % - (7,43 % and 6,20 %).

The *first factor* in the factor structure of the physical development and the specific workability of the 14 years old girl basketball players is defined by nine basic indicators and, as it has been already mentioned, explains the highest percentage of the initial dispersion of the phenomenon under study (25,53 %). That factor can be defined as *morphological* because it discloses the place in the factor structure of the indicators related to the lengths in the body and the height-weight indicators. They, on their side, are a prerequisite for higher achievements while throwing the compact ball (Table 2.).

The *second factor* in the factor structure of the physical development and the specific workability of the 14 years old girl basketball players is defined by nine basic indicators which explain a high percentage of the initial dispersion of the phenomenon under the study (18,60 %). The indicators defining that factor are related to the factor of physical preparedness of the competitors. For the age group of the girls under the study the greater functional capacity of the chest is a prerequisite for higher achievements when moving along the playground with and without a ball, the quick move in defense, the skill to work with the ball at site as well as the ability to effect a basket for the shortest time (Table 2.).

The *third factor* in the factor structure of the physical development and the specific workability of the 14 years old girl basketball players is defined by four basic indicators, which explain 10,95 % of the initial dispersion of the phenomenon under the study. These indicators are related to the basketball skills of the players and can respectively be identified as *technical-tactical factor*. It discloses the high importance of the skills to lead the ball at high speed, the effectiveness of the shot, the dynamics of the abdomen muscles for the general preparedness of the young girl basketball players from the totality under the study.

The *forth factor* is defined by the indicator related to the explosive strength of the lower limbs upon horizontal efforts (7,43 %).

The last *fifth factor* (6,97 %) discloses the place of the speed endurance and the skill of effecting free throws in the factor structure of the physical development and the specific workability. That shows that the speed endurance and the skill of effecting the free throws lose their importance as one of the most important signs of the physical development and the specific workability for the 14 years old girl basketball players. According to us the reason about that might be the fact that they are young competitors yet who are not subjected to great loads in the educational and training process.

CONCLUSIONS

The analysis of the results and the general look on the factor structure of the physical development and the specific workability of the 14 years old girl basketball players gives us the reason to formulate the following *conclusions*:

1. Most important for the 14 years old girl basketball players is the so-called *morphological* factor, which discloses the high importance of:

- the length of the body;
- the height and weight indicators.

2. Less contribution to the general physical and technical-tactical preparedness of the 14 years old girl basketball players have got:

- the physical preparedness;
- the technical-tactical preparedness.

REFERENCES

- Ауербах, А. (1978). *Basketball* [Basketball. In Bulgarian.] София: Медицина и физкултура.
- Борукова, М. (2014). *Усъвършенстване на системата за прием и контрол на баскетболни таланти в системата на спортните училища в България* [Improving the system for reception and control of basketball talent in the system of sports schools in Bulgaria. In Bulgarian] (Unpublished doctoral dissertation, National Sports Academy, Sofia) София: Национална спортна академия.
- Гигова, В. (2002). *Статистическа обработка и анализ на данни* [Statistical processing and data analysis. In Bulgarian]. София: НСА – ИПБ.
- Гъшева, К., Цървов, К., & Цървова, Р. (1990). *Система за контрол, оценка и оптимизиране на спортната подготовка на момичета и момчета 13-15 години* [System for monitoring, evaluation and optimization of sports training of girls and boys - 13-15 years. In Bulgarian.] София: ЕЦНПКФКС – ИПБ..
- Дашева, Д. (1991). *Стрес и стресови въздействия в подготовката на баскетболисти* [Stress and stress effects in the preparation of basketball players. In Bulgarian.] (Unpublished doctoral dissertation, VIF, Sofia) София: ВИФ. София..
- Желязков, Ц. (1978). *Методологични основи на управлението и оптимизирането на спортната подготовка при висококвалифицирани баскетболисти* [Methodological foundations of management and optimization of sports training with highly skilled basketball players. In Bulgarian.] (Unpublished doctoral dissertation, VIF, Sofia) София: ВИФ.
- Желязков, Ц., & Кьоле, В. (1993). Изследване на специфичното функционално натоварване при високо квалифицирани баскетболисти [Investigation of specific functional load skilled basketball players. In Bulgarian. *Спорт & наука*, 37(7), 5-9.
- Коузи, Б., & Пауер, Ф., (1975). *Баскетбол-концепции и анализи* [Basketball, concepts and techniques. In Russian.], Москва: Физкультура и спорт.
- Цървов, К. (2008). *Подборът в баскетбола* [Selection in basketball. In Bulgarian.] София: НСА Прес.
- Цървов, Кр. (2012). *Състезателната ефективност в баскетбола* [Competitive efficiency in basketball. In Bulgarian.] София: Болид инс.
- Цървов, Кр. (2001). *Фактори на състезателната ефективност на елитни отбори по баскетбол* [Race performance factors of elite basketball teams. In Bulgarian.] Автореф. на дис. труд. София: Национална спортна академия.
- Цървова, Р. (2013). *Проблеми на контрола в баскетбола* [Problems of control in basketb. In Bulgarian.] София: Болид инс.
- Цървова, Р., & Борукова, М. (2011). Изследване върху нивото на подготвеност на учениците, кандидатстващи в спортните училища с профил баскетбол [Study on the level of preparedness of students applying to schools with sports basketball profile. In Bulgarian.] *Спорт & наука*, 55(2), 89-97.
- Уилкс, Г. (1968). *Пълно ръководство за треньора по баскетбол* [Basketball for coaches. In Bulgarian.] София: Медицина и физкултура.
- Вотра, О. Т. (2000). *Total Training for Young Champions*. Champaign, IL: Human Kinetics.
- Coysi, B., & Power, F. (1983). *Basketball-concepts and techniques*. Boston: Allyn and Bacon.

- Karalejić, & M., Jakovljević, S. (2001). *Osnove košarke [Fundamentals of Basketball]*. In Serbian.] Beograd: Viša škola za sportske trenere.
- Karalejić, & M., Jakovljević, S. (2007). Faktorska struktura košarkaških vestina [Factor structure of basketball skills. In Serbian.] *Zbornik radova sa međunarodnog skupa „Analitika I dijagnostika fizičke aktivnosti“* (pp. 117-125). Beograd, Fakultet sporta i fizičkog vaspitanja.
- Miller, S. & Bartlett, R. (1996). *The relationship between basketball shooting kinematics, distance and playing position. Journal of Sports Sciences, 14*(3), 243 -253.

Correspondence:

Mariana Borukova

National Sports Academy "Vasil Levski",

Department "Basketball, volleyball, handball"

Studentski grad, 1700 Sofia, Bulgaria

E-mail: marianaborukova@gmail.bg