

ORIGINAL SCIENTIFIC PAPER

Decreasing the Effectiveness for Shooting the Basket: A Basic Problem for the U16, U18, and U20 European Women's Basketball

Mariana Aleksieva Borukova¹

¹National Sports Academy "Vassil Levski", Faculty of Pedagogy, Department of Basketball, Volleyball, Handball, Sofia, Bulgaria

Abstract

The view of experts regarding women basketball in Europe is that in recent years the effectiveness of shooting baskets is slowly diminishing, which impacts the game negatively. The purpose of our research is to effect studies related to the effectiveness of shooting the basket in women basketball for various age groups: U16, U18, and U20. For the research, we have studied specialized literature and analysed game effectiveness statistic data from the Genius Sport official system for registering the game indicators of the European Basketball Federation (FIBA). The initial data are processed mathematically-statistically by variation analysis, relative share for establishing the effectiveness of shooting baskets from various distances, and comparative analysis. We have researched shooting effectiveness data from the last European championships for the three age groups. The results show a decrease in the competitors' skills for effecting baskets by the growth of age. We can conclude that women's basketball is a dynamic sport with many elements, but the effectiveness of shooting baskets is at its core, which is something that is often forgotten. Coaches working at each level should use at least 30% of the training and training process for specific shooting exercises for the basket; this is the minimum that can stop this process so that the game of basketball does not go into an existential crisis.

Keywords: *European championships, women's basketball, shooting*

Introduction

The development of women's basketball has been in regression at the global level in recent years. The technical and tactical skills of good players are so well perfected that aggression and speed when playing is simply routine for them. To a greater degree, that is due to the changes in the rules of playing, stimulating the spectacular and active game, both in offence and defence. That fact requires the optimization of the basketball school and training process for the upcoming generation but in relation to increasing the efficiency (Borukova, 2018). Following a deep analysis of the European and World championships for the period of 2017–2019 (11 total), we have established that four teams only pass over the average limit of 70 points per match and only one of the teams is from Europe;

these are the teams of the USA, China, Hungary, and Japan. We think that part of the reasons for that state is the insufficient effective school and training work with the upcoming women basketball players in relation to scoring baskets.

Modern women's basketball requires from the players a game of dynamic, varied, and simply better play than the opponent has. At the same time, the players should have high levels of precision when shooting baskets, which influences the presentation in basketball considerably but, during a competition, are performed in more difficult conditions. In order to shoot baskets correctly, the player should have good motor abilities, which are different for men and women.

One of the most obvious and important differences in sexes for the presentation in many kinds of sports is the correla-



Correspondence:

M.A. Borukova
National Sports Academy "Vassil Levski", Faculty of Pedagogy, Department of Basketball, Volleyball, Handball, 1700 Sofia, Bulgaria
E-mail: marianaborukova@gmail.com

tion between strength and body mass, which is in favour of men during puberty (DeVries, 1986). At the age of 15-16 years of the young women basketball players, it is assumed that the majority of them are at the end of the puberty second phase, i.e., of the maturing of the body (Borukova, 2018); for the girls, this is characterized by the development of the muscles and width of the body proportions (skeleton). During that period, the proportions are formed to the state of an adult body (Slanchev, 1991), which is of great importance for basketball, particularly for shooting baskets.

Until 2004, all basketball competitions for both sexes used a size 7 ball. To make women's basketball more attractive and interesting, as well as improving the effectiveness and precision of shooting baskets, on June 12, 2004, the FIBA Central Council changed the Official Basketball Rules 2004, and for the 2004/2005 FIBA season introduced a smaller and lighter ball: size 6 for women, which is to be used in all FIBA competitions. The same ball was introduced in the United States' Women's Professional Basketball League (WBL) in 1978. The difference between size 6 and size 7 is 34 mm measurement, 10.8 mm diameter and 70 g mass, all in the middle of the scope interval.

Consequently, by introducing the 6 size ball, the correlation between the diameter of the ball and the basket (hoop) is changed as well as the correlation between the clear zone of the basket (ring), the surface of the ball (projection to the plane) and the minimal angle of entering (falling angle) under which the ball passes through the basket. Therefore, it can be concluded, at least theoretically, that it is easier to score a basket with size 6 ball (Podmenik, Leskošek, & Erčulj, 2012). Following a range of studies (Podmenik et al., 2012) it is established that the introduction of a size 6 basketball ball does not lead to improving the exactness of shooting (the reverse was established for free throws only), although the amount of three-point shooting has increased.

Many authors confirm the positive effect of strength on the exactness of shooting (Sherwood, Schmidt, & Walter, 1988; Tang & Shung, 2005; Justin, Strojnik, & Šarabon, 2006). The precision of shooting the basket depends on the performance technique and the position from which the player plays. Women's basketball is more interesting for the spectators as women basketball players are apt to shoot more often and from greater distances than men are and, as a whole, have more precise control of the ball while shooting. Resulting from

planning the school and training process for many years and the accumulated experience, by increasing the age from 16 to 18 years and respectfully to 20 years of age, the young players are expected to improve their skills and be ready to move to a women's basketball league.

The purpose of our study is to verify that with the increase of age, a change of the shooting basket effectiveness is observed for the women basketball players in Europe. The study is the first to engage with this theme. To date, we have not found similar studies in Europe or elsewhere.

Methods

The present study covers all U16, U18, and U20 teams having participated in Division A women's European championships during the years 2017, 2018 and 2019. We have studied 144 teams (48 teams per age) participating in Division A European championships, having played 224 matches. For greater representativeness of the results, we have studied 32 more teams, which participated in the last two World championships for women but have different age limits of U17 and U19 (112 matches total).

Specific literature data is studied, and an analysis of the statistical data regarding game effectiveness is annexed. Data are taken from FIBA official website of official basketball statistics for all above-mentioned European and World championships; they are processed by the official system for game indicators (FIBA Genius Sport). In order to perform the analysis, we have studied four indicators: points per game (PPG), shooting percentage (FG%), 3PShooting percentage (3P%), and free throws (FT%). The initial mathematic-statistic data are processed according to descriptive statistics, relative share for establishing shooting effectiveness from various distances, comparative analysis for independent extracts by t-criterion of students, and ANOVA, with the help of SPSS21 and Microsoft Excel.

Results

Following the application of descriptive statistics on the initial data of the teams participating in the Division A U16, U18, and U20 European championships during 2017, 2018 and 2019, we have established that the values are distributed normally and close to normal. For the needs of the study, we have applied comparative analysis of the average values of the three U16 European championships in 2017, 2018, and 2019, presented in Table 1.

Table 1. Comparative analysis of the average values for three U16, U18, U20 European championships in 2017, 2018, and 2019

Age	Years	PPG	FG%	3P%	FT%
16 years	2017	59.19	33.64	25.34	65.11
	2018	57.94	33.4	24.28	62.84
	2019	57.13	33.04	23.99	63.19
18 years	2017	62.64	36.27	27.61	66.80
	2018	59.16	34.69	26.14	63.06
	2019	66.18	36.08	27.4	64.56
20 years	2017	67.81	38.48	29.29	69.92
	2018	63.64	37.46	29.34	72.06
	2019	57.69	33.94	25.08	65.49

Legend: PPG-points per game; FG%-shooting percentage; 3P%-3PShooting percentage; FT%-free throws

The data cover 168 matches total (56 matches per championship and 7 matches per team). Analysing Table 1, it is seen

that during the period of 2017-2019, the U16 teams realized an average between 57.13-59.19 points per match, the total

shooting percentage is within the frames of 33%, three-point shooting is between 23.99-25.34%, and the free throws are between 62.11-65.11%. It is noteworthy that the results are decreasing each year, and the lowest are in 2019.

In order to establish the importance of the results of the average for all indicators, ANOVA is applied; it shows no statistically important differences.

When analysing Table 1, it is seen that U18 realized an average between 59.16 and 66.18 points per match, the total shooting percentage is within the frames of 34-36%, three-point shooting is between 26.14 and 27.40%, and free throws are between 63.06 and 66.80%. A decrease of the results is not observed here, except for 2018 when they are the lowest; in 2019, the general efficiency is the highest, but the successful percentages are not the highest, this is in favour of the greater number of shots performed per match: 67 trials for 2019, 62 in 2018, and 63 in 2017.

For establishing the importance of the differences of the average values of the symptoms, ANOVA was applied, which shows statistically important differences for the "PPG" indicator between the teams that participated in the 2018 and 2019 European championships, respectively 59.16 and 66.18 points scored, supported by reliability ($p=0.02$) and value of F Ratio=4,925. There are no statistically significant differences

for the other indicators.

When analysing Table 1, it is seen that for the U20 European championships there is no increase of the performed points; they are between 67.81 and 57.69, the total shooting percentage is within the frames of 33.94-38.48%, and three-point shooting is between 25.08 and 29.34%. It is interesting to note that during the 2018 championship, for the first time, a pass over the limit of 70% is observed for the free throws. It is seen from Table 3 that a drop off in the results is observed during each coming championship. For establishing the importance of the differences in the average values, ANOVA is applied; it again shows statistically important differences for the "PPG" indicator only for the teams that participated in the 2017 and 2019 European championships, respectively 67.81 and 57.69 points scored, supported by $p=0$ reliability; for the rest of the indicators, there are no statistically important differences, and they are due to occasional reasons.

Low results are also observed for the last U17 and U19 World championships. Table 2 presents a comparative analysis of the average values, in which it again becomes clear that the average realized points of the teams are around 62. Table 2 presents a descriptive statistics of the data of the two championships, which shows that again the average realized points of the teams are about 62.

Table 2. Descriptive Statistics of the average values for World Cup U17, 2018 World Cup U19, 2019

Group	N	Min	Max	Mean±SD	Skewness	Kurtosis
Total	32	45.3	89.3	62.13±9.09	.778	1.615
U17	16	45.3	89.3	62.39±10.25	.958	2.261
U19	16	48.1	80.6	61.86±8.10	.428	.601

It is a matter of some concern that only four teams succeeded in surpassing the average limit of 70 points per match: the USA, China, Hungary and Japan. Some teams can score only between 40 and 55 points. The percentage correlation is again low: around 35% general shooting and 25% for 3-point shooting, while the lowest percentage for the performance of free

throws is observed for U19, at 52.78%. The comparative analysis by t-criterion of student, which is annexed, does not show statistically significant differences for the symptoms under study.

Table 3 presents Descriptive Statistics for "PPG" indicator only for the teams of all ages that participated in the last European and World Championships.

Table 3. Descriptive Statistics of the "PPG" indicator for the teams of all ages that participated in the last European and World Championships

Groups	N	Min	Max	Mean±SD	Skewness	Kurtosis
U16	16	40.60	75.70	59.13±9.63	-.184	-.237
U18	16	56.40	79.00	66.18±7.33	.464	-.929
U20	16	47.10	72.70	57.69±6.67	.262	.390
U17	16	45.30	89.30	62.39±10.25	.958	2.261
U19	16	48.10	80.60	61.86±8.10	.428	.601
Total	80	40.60	89.30	61.45±8.79	.350	.639

It can be generalized that these age categories score per match 57.69 (U20) the least, and the highest result is 66.18 (U18). For the last two European women's basketball championships, the average efficiency of the teams is 66.39 p. for 2017 and 66.66 p. for 2019; however, for these teams, Range does not significantly differ from the teams under study.

ANOVA is applied to establish the importance of the differences in the average. During the 2019 European championships, ANOVA registrants for the "PPG" indicator has a statistically considerable higher realization of points for U18 only at 66.18, as compared to U20 who had a considerably

lower number of points at 57.69 (Hkey HSD post-hoc test of Tukey, $p=0.04$). ANOVA does not register statistical differences for the rest of the teams and indicators under study.

Discussion

The results of the study do not show essential differences in relation to the increase or decrease of the effectiveness of shooting baskets for the teams under study (i.e., U16, U18, and U20). The fact that they are in different age groups and have different years of playing experience does not privilege any of them in any way. They are approximately at the same

level as to scoring average points per championship. These observations are based on ANOVA results, which show that the younger U18 score more baskets than the older U20. Scoring baskets is the most important skill for basketball, but the players should have many others. The precision of shooting is determined by many factors, which we have not treated in our study; however, it is important to specify that modern basketball is very dynamic, varied, of and exceptionally aggressive defence, which hampers the precision of shooting and makes the players do it in difficult situations from various positions. That leads to changes in the tactical plan. More teams play by short attacks relying on the individual drive to the basket and extra pass. The purpose is to take the player to an open shoot, to be able to score undisturbed.

Nevertheless, the efficiency for the various ages is not increased, and the percentage of shooting, in general, is very close 33%, and for 3 points is 23%. Most interesting is the fact that for the free throw performance, the values surpass 70% only for U20 at the 2018 European championship. The performance of free throws is the only situation in the game in which shooting is made from the same position, without any counteraction, which provides the possibility for the player to rest for five seconds. Nevertheless, no considerable increase of the precision for the older groups is observed, which is confirmed by ANOVA.

It can be concluded that the precision of shooting of the

upcoming players is a complicated matter, which depends on many factors, some of which will be an object of future study.

The results of the study cannot be generalized as clear availability of a decrease of the shooting effectiveness of the young players; neither can it be defined as positive as no increase of the realized points is observed during the period. The introduction of high technology means in the activities of the coaches in the modern world help their work but can also hamper it. More of the coaches count on specific apparatuses for establishing the functional state level; a greater part of the training sessions time is spent on fitness; the other part is used for deep tactical preparation and the most important element of the game – shooting baskets – is neglected. Everybody working in that area, but most of all coaches, should use at least 30% of the training time for specific shooting exercises, which could stop the process that could degrade women's basketball. The players should know how important it is to be able to score baskets from various difficult situations during a match. Only when the player knows for what she is exercising can she be convinced of the usefulness of certain exercises in favour of achieving success (Aleksieva, 2012). The results of the study suggest that if we want women's basketball to be interesting and attractive for the audience, we have to know that the heart of the game is the effectiveness of shooting the basket – something that many people forget.

Acknowledgements

There are no acknowledgements.

Conflict of Interest

The authors declare that there are no conflicts of interest

Received: 02 March 2020 | **Accepted:** 26 April 2020 | **Published:** 01 October 2020

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