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Pairing, game order and number of games in the playoffs of a basketball top competition: Do free throws have an influence on the score efficiency?

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The researches reveal the importance of free throw efficiency to qualify for the victory in a basketball game. Hereafter, this investigation presents an analysis of free throws made in 74 Spanish ACB Basketball League games. The results show that pairings, order of games and number of games in the playoffs are not related to the accuracy percentage achieved in free throws. The shooting efficiency from the free throw line has significantly explained the points per game made by each team. However, at the end of the game, it results that type of pairing, order of games and number of games in the playoffs free throw have not been factors for the number of points scored. Both home and visiting teams reach their maximum accurate percentage in semifinals and five-game playoffs.

Key words: Free throw efficiency, contextual situations, stress, playoffs, basketball.

INTRODUCTION

Nowadays, scientific research is becoming more and more important in sports because it brings the possibility of extracting relevant information which is a base for a search of qualitative improvements to be built on. Specifically in basketball, there is an increase of studies related to the different game situations, either training or contextual, that can improve the efficiency at a broader level. In this sense, study and analysis of statistics is becoming more and more important. The Spanish top competition, the ACB (*Association of Basketball Clubs*) league set a ranking system based on individual statistics. The teams carry out deep exploration studies focused on teams' strengths and weaknesses. These studies prove to be beneficial for what they reveal in the game.

Within the research field, different authors have worked on the discriminant analysis of game statistics of positions: guards, forwards, centers (Gómez and Lorenzo, 2007) teams during the season (Ittenbach and Esters, 1995; Ibanez and Ortega, 2008; Ibanez et al., 2008; Lorenzo et al., 2010), competitions (Fierro, 2002) or short championships (Dias, 2007; Ibanez et al., 2009) and the most significant statistical indicators in the final game result (Sampaio, 1998). What is still lacking is a larger number of specific studies aimed at analyzing individual fragments of the game (as free throw), and how it can be affected by competitive situations. However, multiple and interesting conclusions are drawn from different studies

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for a better understanding of general conditions that take place in game situations, those who create them, what is more or less effective, and so on.

One of the most repeated considerations in both long drive championships and in major competitions is that as a general conclusion, a percent of two points attempts, a number of assists, and also a number of times one was fouled and free throws scored turn to be some of the most important and predictor indicators of victory (Dias, 2007), especially in tied games where free throws gain special importance (Ibánezet et al., 2008). It should be taken into consideration when it comes to compete with rivals of a similar level.

Other researches indicate that 20-25% of all the points scored in a game are the points scored from the free throw line (Hays and Krause, 1987). This percentage is higher in the last minutes of the game, since it reaches up to 35% in the last five minutes and significantly more, 69% in the last minute of the game or in tied finals (Kozar et al., 1994; Ibanez et al., 2009, Navarro et al., 2009). It is also noticeable that in those games that are decided by nine points or less, a winning team can reach 48% of their total points from the free throw line in the last five minutes, and up to 69% in the last minute (Kozar et al., 1994; Navarro et al., 2009). It means that more than a half of the points made at the end of a game are scored from the free throw line. However, other researches do not mention the percentage of accuracy, what would be interesting to know too. This information could be used to check in what way, by improving the free throw training, the teams could make bigger advantage of their performance. In short, different studies (Walker, 1985; Hays and Krause, 1987) found that free throws determine the final result of more than a half of the games in a season.

The consequences of succes in the basketball free throw are very important in the game. For this reason, it has been studied from different points of view. It has been studied from the statistical analysis point of view, as it had already been referred, from positions related to the training at a biomechanical and motor control level (Okubo and Hubband, 2006; Keetch et al., 2008; Tran and Silverberg, 2008). Other Research, about free thow, also focused on the implications that should be considered in the realization of the activities included in the training (Cárdenas, 1998; Getz and Rainey, 2001; Ortega et al., 2005; Foster and Weigand, 2006; Lonsdale and Tam, 2008), or taking into account the psychological factors: attention, concentration, visual control, anxiety or stress levels (Rivares, 1996; Whitehead et al.,1996; Dandy et al., 2001; Harle and Vickers, 2001; Larue, 2001; Oliveira et al., 2008; Mesagno et al., 2009; Gooding and Gardner, 2009; Otten, 2009; Wilson et al., 2009).

Our study sought to describe the effectiveness of the basketball free throw in certain contextual situations and the relationship with psychological aspects associated with these, in relation with other studies that have analysed game statistics between different positions and competitions with the view of finding statistical determining indicators of the final results (Gómez and Lorenzo, 2007; Ittenbach and Esters,1995; Ibánez et al. 2008, 2009; Lorenzo et al. 2010; Fierro, 2002; Días, 2007; Sampaio,1998; Zuzik, 2011; López-Gutiérrez and Jiménez-Torres, 2013).

All of these studies related to the psychological aspects make an attempt either to put the free throw situation during the training into the conditional situations that can occur in competition, such as anxiety or stress, or to detect which elements should be considered from the point of view of attention and concentration that could lead to improve the performance in the free throw attempt. However, it is also important to know how the different situations that we could consider stressful affect, if so, the free throw efficiency.

Recently, Ibánez et al. (2009) report that certain contextual situations may change statistical aspects that distinguish the winners from the losers. Type of competition, players` quality, psychological aspects are associated with competition. It is also known that the condition of being either home or visiting team and the importance of the game can have an influence on what is called a situation of *choking* that can be produced on players, and can have an influence on their capacity to process information which can affect the final result (Baumeister and Steinhilber, 1984; Tauer et al., 2009). But the association of emotions to the possibility of failure must be well taken into account, since we can say that failure itself is not enough to arouse emotional responses, as it is a meaning we attribute to the possible consequences of that failure as a cause of the associated emotions (Conroy, 2008).

In that sense, our research investigates how the moment of the game, its importance, and so on can influence the free throw effectiveness through the different seasons in the top level competitions such as the Spanish ACB league, and within that league, two relevant competitions: *Copa del Rey de Baloncesto* and the playoffs.

Probably this type of attempts may seem the easiest of all; however, in competing situations they result to be more complicated because of such factors as stress and fatigue (Sampaio and de Janeira, 2003) which have many implications from the psychological point of view because of their importance in the final result.

In regard to the fatigue, several studies conclude that there are no significant effects in the free throw (Montgomery et al., 2008; Ibañez et al., 2009; Uygur et al., 2010), at least over the mechanical aspects. Another thing would be to consider attention, concentration, in one word psychological issues that indeed can be affected.

A classic study discusses the levels of stimulation that

arouse in a free throw shooter when there is a difference on the scoreboard between eight and five points (Ahart, 1973). If the differences are over eight points the accuracy percentage drops, whereas if the differences are below five points the accuracy percentage rises. However (Labrador et al.,1995; Lafuente, 2005), some of the investigators disagree claiming that such variables as motivation or the game importance should be considered, as well as the combination of different contextual variables. On that context, the type of competition mentioned above is chosen in the present research, considering that the motivation towards it is bigger than in regular season games, since *Copa del Rey de Baloncesto* is a decisive moment in which the teams fight for titles. The importance of free throw in games where teams play on similar level leads us to consider the importance of observing, from the statistics, like the effectiveness of response in different contextual situations of the game. Working from the ideas above, this research aims to test the influence type of paring (quarterfinal, semifinal or final), order of games in playoffs (1^{st} game of 3 or 1^{st} -2^{nd} game of 5; 2^{nd} game of 3 or 3^{rd} -4^{th} game of 5, 3^{rd} game of 3, 5^{th} game of 5 or the playoffs in the *Copa del Rey de Baloncesto)* and number of games during the playoffs (one, three or five games) have on the free throw efficiency.

We have specifically proposed the following objectives:

1. To analyze the number of free throws made by home team and visiting team and the accuracy percentage for each period of five minutes, each quarter, each half and for the minutes of overtime.
2. To check if there are any differences in the accuracy percentages of free throw in consideration of the pairing type: quarterfinal, semifinal or final.
3. To study possible differences in the accuracy percentages of free throws in consideration of the number of games in playoffs: one, three or five games.
4. To analyze if there are any differences in the accuracy percentages of free throws in consideration of the game order in the playoffs.
5. To determine whether the type of pairing, the order of games in the playoffs, the number of games and the efficiency rating from the free throw line are predictor factors for the number of points achieved in a game by both home and visiting teams.

METHODS

Design

This is a retrospective ex post facto research, as rated in Montero and Leon (2002) classification.

Sample

The subjects were a sample taken from 74 basketball games in the ACB league of the *Copa del Rey de Baloncesto* and Playoffs from the years 2008, 2009 and 2010 (Appendix 1). Depending on the type of competition, 24.3% of the sampled games correspond to the *Copa del Rey* and 75.7% to playoffs. Depending on the season, 28.1% of the games correspond to the 2007/2008 season; 36.7% to the 2008/2009 season and 35.2% to the 2009/2010 season. In regard to the pairing, 52.4% of the games correspond to the quarterfinals; 29.8% to the semifinals and 17.8% to the final. As for the order of games, 40.5% of the sample correspond to the 1^{st} game of 3 or 1^{st} -2^{nd} game of 5; 27.1% to the 2^{nd} game of 3 or 3^{rd} -4^{th} game of 5, and 32.4% to 3^{rd} game of 3, 5^{th} game of 5 or the playoffs in the *Copa del Rey*. In consideration of the number of games in the playoffs, 24.3% of the sample corresponds to *Copa del Rey*, 39% to three-game playoffs and 36.7% to five-game playoffs.

Instruments

For the present research the database from the official game statistics of the *Asociación de Clubes de Baloncesto* (Basketball Club Association) was used, as an ad hoc record sheet with all the free throws made in every minute of the game.

Procedure

In each game, there was a record sheet in which the following variables was taken into account: Competition and season, playoffs, teams involved, order of games, minute of play, number of free throw attempts, score and partial score between the teams during the free throw attempts, number of free throw attempts, percentage, and final result. In the record sheet there are included all the statistical data that later on turned to be a database for SPSS program.

RESULTS

Data analysis

The statistical treatment of data was performed with SPSS 15.0 for Windows. Previously preliminary and exploratory analysis was carried out to determine the data characteristics. When all normality criteria were achieved (Kolmogorov-Smirnov test $p > 0.05$), we decided to use parametric tests in statistical analysis. The level of significance for all tests was set at $p < 0.05$.

Descriptive analysis, comparative analysis through Pearson's chi-square test and single-factor ANOVA, and regression analysis in successive steps have been carried out.

Free throws and accuracy percentage in consideration of the moment of the game

Table 1 shows the free throws for different intervals of time analyzed for both home and visiting team, and the accuracy percentage of free throws for both teams at the same interval of time. In regard to the number of attempts, five-minutes intervals show a pattern of broken

Table 1. Free throws and accuracy percentage in consideration of the moment of the game.

EVERY FIVE MINUTS	Free throws number			Average accuracy percentage		
	Home team	Visiting team	Total	Home team	Visiting team	Total
Minute 1-5	92	75	167	79,50	78,30	78,90
Minute 6-10	185	114	299	77,25	72,63	74,94
Minute 11-15	125	119	244	73,19	78,51	75,85
Minute 16-20	201	220	421	74,73	80,75	77,74
Minute 21-25	122	113	235	83,06	73,52	78,29
Minute 26-30	241	211	452	78,59	78,98	78,78
Minute 31-35	163	132	295	67,02	71,20	69,11
Minute 36-40	375	318	693	79,20	78,67	78,93
Minute 41-45	19	35	54	77,12	84,61	80,86
QUARTER	**Free throws number**			**Average accuracy percentage**		
First Quarter	277	221	498	78,05	74,72	76,38
Second Quarter	326	339	665	74,07	79,88	76,97
Third Quarter	363	324	687	80,23	77,01	78,62
ForthQuarter	538	450	988	74,81	76,19	75,50
Overtime	19	35	54	76,70	87,78	82,24
HALF	**Free throws number**			**Average accuracy percentage**		
First half	603	560	1163	75,91	77,73	76,79
Second half	901	774	1675	77,10	76,55	76,84
Overtime	19	35	54	76,70	87,78	82,24

line in the way that in the first half of the quarters there are less free throws than in the second half of the quarters. This goes together with the fact that as the game progresses, the number of free throw attempts increases. So while during the first half home teams make a total of 603 free throw attempts and visiting teams make 560 free throw attempts; in the second half these numbers increase to 901 and 774 respectively.

On the other hand, in regard to the average accuracy percentage of free throws, there are no significant differences between the first and the second half of the game, neither for home nor visiting team. The total average percentage is 76.79 and 76.84 for the first and the second halves respectively. However, home and visiting teams follow the opposite tendency: home team usually slightly increases an accuracy percentage in the second half in comparison to the first one (77.10 versus 75.91), while an accuracy percentage of visiting team usually drops slightly (76, 55 versus 77.73).

Another striking fact is that during the overtime home teams tend to lower the accuracy percentage in comparison to the second half (76.70 versus 77.10), whereas visiting teams tend to improve their successful shoots in this period in comparison to their records in the second half (87.78 versus 76.55).

Free throws and accuracy percentage in consideration of the pairing

No significant differences were found in the accuracy percentage for home and visiting teams in consideration of the pairing (quarterfinals, semifinals and a final). However, the results indicated in Table 2 show some tendency. Home team made a total of 708 free throw attempts. They scored 411 times out of 708 which makes a 58 accuracy percentage; 27.5% of the times they managed to make 50% of the free throws (195 out of708) and 7.6% of the times (54 out of 708) they do not manage to make any of the free throws . Visiting teams made a total of 642 free throws attempts. 59.6% of the times they scored all of them (383 out of 642); 26.9% of the times they scored 50% of them (173 out of 642) and 7% of the time (45 out of 642) they do not manage to score any of the free throws attempted.

The highest percentage of times home teams scored 100% of free throw attempts was at the semifinals pairings (123 out of 204), whereas the lowest percentage of times the maximum effectiveness was achieved was in the quarterfinals pairings (219 out of 386). The highest percentage of times home teams missed all their free throws (0% successful shoots) was in the finals (11 out of

Table 2. Free throws and accuracy percentage in consideration of the pairing.

		Pairing			Total	Chi-Square (Pearson)	Sig. Bilateral P
		Quarterfinals	Semifinals	Final			
Home accuracy percentage	0	28	15	11	54	18,26	,69
	25	0	1	0	1		
	33	1	1	0	2		
	50	112	53	30	195		
	55	0	0	1	1		
	66	1	0	0	1		
	67	3	5	3	11		
	75	19	5	4	28		
	80	1	0	0	1		
	83	1	1	0	2		
	87	1	0	0	1		
	100	219	123	69	411		
Total		386	204	118	708		
Visiting accuracy percentage	0	29	10	6	45	20,34	,31
	25	1	1	1	3		
	33	2	2	1	5		
	50	96	50	27	173		
	60	1	0	0	1		
	66	1	0	2	3		
	67	4	2	2	8		
	75	13	4	1	18		
	83	3	0	0	3		
	100	184	133	66	383		
Total		334	202	106	642		

p > ,05. (no significant differences)

118), whereas the lowest percentage of times they missed all of their free throws was in the quarterfinals pairings (28 out of 386).

The highest percentage of times visiting teams scored 100% of free throw attempts was at the semifinal pairings (133 out of 202), whereas the lowest percentage of times the maximum effectiveness was achieved was in the quarterfinal pairings (184 out of 334). The highest percentage of times visiting teams missed all their free throws (0% successful shoots) was in the quarterfinal pairings (29 out of 334), whereas the lowest percentage of times they missed all of their free throws was in the semifinal pairings (10 out of 202).

The highest free throws effectiveness (100%) was made unevenly in different pairings. In quarterfinals, home teams made 56.7% of all the free throw attempts, whereas visiting teams shot 55.1%. In semifinals, home teams achieved 100% effectiveness (60.3% of the times), whereas visiting teams made 65.8%. In finals, home teams achieved the highest effectiveness of 58.5% of the times, whereas visiting teams achieved 62.3% of the times.

The highest free throws inefficiency (0%) shows different data in different pairings. In quarterfinals, home teams missed all of the free throws attempted 7.2% of the times, whereas visiting teams missed all of them 8.7% of the times. In semifinals, home teams missed all of the free throws attempted 7.3% of the times, whereas visiting teams missed all of them 4.9% of the times. In the finals, home teams missed all of the free throws attempted 9.3% of the times, whereas visiting teams missed all of them 5.7% of the times.

Free throws and accuracy percentage in consideration of the number of games in the playoffs

No significant differences were found in the accuracy percentage for home and visiting teams in consideration of the number of games in the playoffs. However, the

Table 3. Free throws and accuracy percentage in consideration of the number of games in the playoffs.

		Game number				Chi-Square	Sig.
		Copa del Rey	Three-game	Five-game	Total	(Pearson)	Bilateral p
Home accuracy percentage	0	14	19	21	54		
	25	0	0	1	1		
	33	0	1	1	2		
	50	56	83	56	195		
	55	0	0	1	1	19,67	,60
	66	0	1	0	1		
	67	2	2	7	11		
	75	9	11	8	28		
	80	0	1	0	1		
	83	0	1	1	2		
	87	0	1	0	1		
	100	94	168	149	411		
Total		175	288	245	708		
Visiting accuracy percentage	0	11	22	12	45		
	25	2	0	1	3		
	33	0	2	3	5		
	50	38	71	64	173		
	60	0	1	0	1	24,82	,13
	66	1	1	1	3		
	67	0	4	4	8		
	75	2	13	3	18		
	83	0	3	0	3		
	100	92	145	146	383		
Total		146	262	234	642		

p > ,05. (No significant differences)

results indicated in Table 3 show some tendency stated below.

The highest percentage of times home teams achieved 100% of all of the free throws attempted was made in five-game playoff (149 out of 245), whereas the lowest percentage of times they achieved this maximum effectiveness was made in one-game playoffs (94 out of 175). The highest percentage of times home teams missed all of the free throws attempted (0% successful shoots) was in five-game playoffs (21 out of 245), whereas the lowest percentage of the times they missed all of the free throws attempted was in three-game playoffs (19 out of 288).

The highest percentage of times visiting teams achieved 100% of all of the free throws attempted was made in one-game playoff (92 out of 146), whereas the lowest percentage of times they achieved this maximum effectiveness was made in three-game playoffs (145 out of 262). The highest percentage of times visiting teams missed all of the free throws attempted (0% successful shoots) was in three-game playoffs (22 out of 262), whereas the lowest percentage of the times they missed all of the free throws attempted was in five-game playoffs (12 out of 234).

The highest free throws effectiveness (100%) was made unevenly in different playoffs. In one-game playoffs, home teams scored 53.7% of times all the free throws, whereas visiting teams achieved it 63% of times. In three-game playoffs, home teams achieved 100% effectiveness 58.3% of the times, whereas visiting teams 55.3% of the times. In five-game playoffs, home teams achieved the highest effectiveness 60.8% of the times, whereas visiting teams achieved it 62.4% of the times.

The highest free throws inefficiency (0% successful free throws) shows different data in different playoffs. In one-game playoffs, home teams missed all of the free throws attempted 8% of the times, whereas visiting teams missed all of them 7.5% of the times. In three-game playoffs, home teams missed all of the free throws attempted 6.6% of the times, whereas visiting teams

Table 4. Free throws and accuracy percentage in consideration of the order of games in the playoffs.

		Relevance			Total	Chi-Square (Pearson)	Sig. Bilateral p
		1of 3 or 1-2 of 5 game	2 of 3 or 3-4 of 5 game	3 of 3or 5 of 5 or Copa del Rey			
Home accuracy percentage	0	22	15	17	54		
	25	0	0	1	1		
	33	1	1	0	2		
	50	81	46	68	195		
	55	1	0	0	1	19,98	,58
	66	0	1	0	1		
	67	7	2	2	11		
	75	13	4	11	28		
	80	0	1	0	1		
	83	1	1	0	2		
	87	0	1	0	1		
	100	167	114	130	411		
Total		293	186	229	708		
Visiting accuracy percentage	0	19	11	15	45		
	25	0	1	2	3		
	33	3	2	0	5		
	50	63	54	56	173		
	60	1	0	0	1	19,72	,35
	66	2	0	1	3		
	67	3	4	1	8		
	75	11	5	2	18		
	83	1	2	0	3		
	100	166	97	120	383		
Total		269	176	197	642		

p > ,05. (No significant differences)

missed all of them 8.6% of the times. In five-game playoffs, home teams missed all of the free throws attempted 8.6% of the times, whereas visiting teams missed all of them 5.1% of the times.

Free throws and accuracy percentage in consideration of the game order in the playoffs

The following order was adopted: 1st, 2nd and 3rd. 1st (1st game of 3 or 1st -2nd game of 5), 2nd (2nd game of 3 or 3rd -4th game of 5) and 3rd (3rd game of 3 or 5th game of 5 or the playoffs in the Copa del Rey). No significant differences were found in the accuracy percentage for home and visiting teams in consideration of the game order in the playoffs. However, the results indicated in Table 4 show some tendency stated below.

The highest percentage of times home teams achieved 100% of all of the free throws attempted was made in games of second order (114 out of 186), whereas the lowest percentage of times they achieved this maximum effectiveness was made in games of third order (94 out of 175). The highest percentage of times home teams missed all of the free throws attempted (0% successful shoots) was in games of second order (15 out of 186), whereas the lowest percentage of the times they missed all of the free throws attempted was in games of third order (17 out of 229).

The highest percentage of times visiting teams achieved 100% of all of the free throws attempted was made in games of first order (166 out of 269), whereas the lowest percentage of times they achieved this maximum effectiveness was made in games of second order (97 out of 176). The highest percentage of times visiting teams missed all of the free throws attempted (0% successful shoots) was in games of third order (15 out of 186), whereas the lowest percentage of the times they missed all of the free throws attempted was in games of second order (11 out of 176).

The highest free throws effectiveness (100%) was

made unevenly in different games. In games of first order, home teams scored 57% of times all the free throws, whereas visiting teams achieved it 61.7% of times. In games of second order, home teams achieved 100% effectiveness 61.3% of the times, whereas visiting teams 55.1% of the times. In games of third order, home teams achieved the highest effectiveness 56.8% of the times, whereas visiting teams achieved it 60.9% of the times.

The highest free throws inefficiency (0% successful free throws) shows different data in different games. In games of first order, home teams missed all of the free throws attempted 7.5% of the times, whereas visiting teams missed all of them 7.1% of the times. In games of second order, home teams missed all of the free throws attempted 8.1% of the times, whereas visiting teams missed all of them 6.2% of the times. In games of third order, home teams missed all of the free throws attempted 7.4% of the times, whereas visiting teams missed all of them 7.6% of the times.

Comparison of averages of free throws made in consideration of pairings, games order in the playoffs and the games number in the playoffs

Results of the different comparative analysis are expounded in Table 5. The comparisons were performed for different pairings, order and number of games in the playoffs, separately for home and visiting teams. As can be seen in this table, none of the comparisons thus made were significant (all of the p-value are >0.05). Hence, we cannot confirm that the accuracy percentage will be higher or lower in consideration of pairings, order and number of games in the playoffs, neither for home teams nor visiting teams.

In spite of the above, we can observe how home teams reach their maximum accuracy percentage in semifinals (77.46), in the 2^{nd} of 3 and 3^{rd}-4^{th} of 5 games (77.87) and in 5-game playoffs (77.41). Similarly, visiting teams reach their maximum accuracy percentage in semifinals (80.82), in the 1^{st} of 3 and 1^{st}-2^{nd} of 5 games (78.62) and in 5-game playoffs (78.99).

Predictor factors of the points made at the end of a game by home and visiting teams

The regression analysis shows that points made at the end of a game by home and visiting team can be explained on a base of respective efficiency rating in free throws. However, type of pairing, order of games in playoffs and number of games in playoffs have not affected the points made at the end of the game either by home or visiting team. To be more specific, 20% of the variation in home team final points and 24% of the variation in visiting team are explained by free throw efficiency (Table 6).

DISCUSSION

There are five aims of the present research. The first one is to analyze the number of free throws made by home and visiting team, and the accuracy percentage in each five-minute period, each period and in the overtime period.

Regarding the number of free throw attempts, the five-minute intervals show a pattern of broken line in the way that in the first half of quarters there usually are less free throws attempted than in the second half of the quarters. It goes together with the fact that as the game progresses, the number of free throw attempted also increases. On the other hand, regarding the average accuracy percentage, there are no significant differences between the first and the second quarters, neither for home, nor for visiting team. However, a contrary tendency is observed in home and visiting teams: in comparison to the first half, home teams usually increase slightly the accuracy percentage in the second half, whereas visiting teams tend to lower it slightly. In the overtime, the accuracy percentage of home teams is usually lower than in the second half, whereas visiting teams usually improve their efficiency rating during this period in comparison to the percentage they make in the second half of the game. Accordingly, we can observe that as more time passes, more free throws are made, as we could observe in the data analysis of the second half when, altogether, 1675 throws were made versus 1163 throws made in the first half (which represents an increase of 30.56%). It is also related with a slower response produced by an increment of fatigue that leads to a greater number of fouls. However, the accuracy percentage does not seem to be altered significantly in consideration of the moment of a game, and this does not match up with different researches (Kozar et al., 1994; Ibánez et al., 2009) that analyze the free throw development in the games. It does not seem either that the fatigue has an influence on the efficiency rating, as it stands in the research of Uygur et al. (2010). No significant differences in efficiency rating were found in any of the observed time series (five-minute periods, quarters and halves), but an interesting fact is that the last period is the one with the worst average percentage, and it remains three points below the fourth one (78.62 versus 75.50%).

The most relevant factor regarding the temporal relation was found in the last two minutes of the game. In this period of time, the average rates can vary from 85.17 (81.64 home teams and 88.71 visiting teams) to 73.13% (74.80 home teams and 71.47 visiting teams); therefore, there is a decrease of free throw efficiency in increasing

Table 5. Averages of free throws made in consideration of the pairing, the order of games and the number of games in the playoffs.

	PAIRING	N	Media	Standar deviation	F	Sig. p
Accuracy. (Home team)	Quartefinals	386	76,36	30,83	0,12	,89
	Semifinal	204	77,46	31,21		
	Final	118	75,90	32,59		
	Total	708	76,60	31,20		
Accuracy. (Visiting team)	Quarterfinals	334	74,58	32,18	2,72	,07
	Semifinal	202	80,82	29,08		
	Final	106	78,76	30,07		
	Total	642	77,23	30,97		
	ORDER	**N**	**Media**	**Standar devi.**	**F**	**Sig. p**
Accuracy. (Home team)	1 of 3 or 1-2 of 5 game	293	76,33	31,02	0,22	,80
	2 of 3 or 3-4 of 5 game	186	77,87	31,63		
	3 of 3 or 5 of 5 or cup	229	75,91	31,19		
Accuracy (Visiting team)	1 of 3 or 1-2 of 5 game	269	78,62	30,69	0,54	,58
	2 of 3 or 3-4 of 5 game	176	75,57	30,48		
	3 of 3 or 5 of 5 or cup	197	76,82	31,85		
	NUMBER	**N**	**Media**	**Standar devi.**	**F**	**Sig. p**
Accuracy (Home Team)	Copa del Rey	175	74,34	31,49	0,61	,54
	3 games	288	77,28	30,35		
	5 games	245	77,41	32,01		
Accuracy (Visiting Team)	Copa del Rey	146	77,85	31,84	0,90	,41
	3 games	262	75,32	31,74		
	5 games	234	78,99	29,53		

p > ,05. (No significant differences)

Table 6. Predictor factors of the scored points at the end of the game.

Predictor factor	R2	β Stand.	F	p	t	p
Home team free throws accuracy (It is a predictor of the scored points by the home team)	,20	,45	17,84	,000	4,22	,000
Visiting team free throws accuracy (It is a predictor of the scored points by the visiting team)	,24	,49	22,25	,000	4,72	,000

Excluded variables: pairing, game order and the number of games in the playoffs.

pressure situations (Whitehead et al., 1996), just as it is mentioned in the research of Lafuente (2005). The author of this research claims that upon considering a combination of the moment of a game, differences in the score

and a sign of difference, it has been observed that the accuracy percentage drops in the last minutes of a game. Generally speaking, in the last minute the greatest number of fouls is committed and this type of situations are considered to be a source of stress for the players (Anshel and Wells, 2000). Furthermore, an individual stress situation shows a dynamic relation between a man and his environment (Mellalieu et al., 2009).

In these situations of extreme stress, it may be produced a phenomenon that in psychology is known as *chocking*. The cause is an interaction among many behaviour changes at both psychological and physiological level that leads to decrease sport performance and can cause a situation of negative thinking as a consequence of the throw (Murayama et al., 2010). It is because of the high situational self-awareness produced by the close skills –in this case by a free throw. As a training implication, it is observed that the individuals with higher efficiency expectations are less affected by the *chocking* situations (Bakhshayesh et al., 2010). This observation can provide the appropriate strategies to work with the players on, such as the improvement of self-awareness or an appropriate information about the improvement options like how to shape emotions associated with a failure (Conroy, 2008; Otten, 2009).

The second, third and forth aims focused on checking if there are any differences in the accuracy percentage of free throws in consideration of pairings, order of games and number of games in the playoffs. The result is that for both home and visiting teams, it cannot be stated if the accuracy percentage is higher or lower than the other in consideration of pairing, order and number of games in playoffs. This information corresponds with what Cárdenas and Rojas (1997) claimed–that the fact of playing either as home or as visiting team does not determine the accuracy percentage of free throws. Notwithstanding the above, it has been observed in this investigation that both home and visiting teams reach their best free throw accuracy in semifinals and five-game playoffs. It corresponds to the fact that the teams with better records during the season which are also the teams that play more games in the playoffs would demonstrate better performance in longer sets of games (Tauer et al., 2009).

Specifically, regarding the second aim which was made to verify if there are any differences in the accuracy percentage in consideration of a type of pairing (quarterfinals, semifinals or final), the results achieved show that the highest percentage when home and visiting teams scored 100% of free throws was made in semifinal pairings, whereas the lowest one was made in quarterfinal pairings.

Home and visiting teams missed all of the free throws in an uneven way. The highest percentage of times home teams missed all of the free throws (0% successful shoots) was in finals, because of the increasing pressure produced in a situation when they were on the peak (Baumeister and Steinhilber, 1984; Whitehead et al., 1996; Tauer et al., 2009), whereas the same situation in visiting team was observed in the quarterfinal pairings.
The lowest percentage of times home teams missed all the free throws was in the quarterfinal pairings, whereas the same situation happend to visiting teams assiduously in the semifinal pairings.

The third aim tries to analyze if there are any differences in an accuracy percentage of free throws in consideration of a number of games in playoffs: one game, three games or five games. The results indicate that there are no significant differences in the accuracy percentage of free throws in consideration of number of planned games in playoffs. However, there are some tendencies that should be mentioned.

The highest percentage of times home teams made 100% of free throws was in five-game playoffs, whereas the lowest percentage of times they made 100% was in one-game playoffs. It corresponds with Tauer et al. (2009) who said about a team with better performance has better records in longer sets of games. On the other hand, the highest percentage of times visiting teams made 100% of free throws was in one-game playoffs, whereas the lowest percentage of times they made 100% was in three-game playoffs. Perhaps it was because under these circumstances, the possibility to surprise the teams with more points was bigger because of them being pressured by winning or losing all the work done during the season in the situation with smaller opportunities to redirect possible errors (Baumeister and Steinhilber, 1984; Tauer et al., 2009). Certainly and in the way that it is explained by Dias et al. (2009) in his research about athletes, the relevance or the difficulty level of the competition can generate stress on 81.8% of the sportsmen. This certainly affects them in coping with stressful situations that are presented and in their response capacity.

The highest percentage of times home teams missed all of the free throws attempted (0% successful shoots) was in five-game playoffs, whereas the lowest percentage of the times they missed all of the free throws attempted was in three-game playoffs. It indicates higher level of concentration and state of readiness that do not exceed the excitation levels which can cause differences in a response (Sagar et al., 2009). However, the highest percentage of times visiting teams missed all of the free throws attempted (0% successful shoots) was in three-game playoffs, whereas the lowest percentage of the times they missed all of the free throws attempted was in five-game playoffs.

The forth aim was made to study if there are any differences in an accuracy percentage of free throws in consideration of order of games in the playoffs. No significant differences were found in the accuracy percentage for home and visiting teams in consideration

of the game order in the playoffs. Well, now it seems that middle games of the playoffs lead home teams to achieve the highest percentage of times with 100% successful shots, but also to the highest percentage of missed free throws attempted (0% successful shoots). However, visiting teams achieve the highest percentage of time with 100% successful shots in the first games of playoffs, and the highest percentage of times these teams missed all of the free throws was in the last games of playoffs.

Finally, the fifth aim was stated to check if type of pairing, order of games in playoffs, number of games in playoffs and successful free throws are the predictor factors of the point number made at the end of a game both by home and visiting team. With regard to this aim it was observed that the successful free shoot is a predictor factor of the points made at the end of a game by both home and visiting teams. However, the type of pairing, the order of games and the number of games in the playoffs are not the predictor factors of the final score, neither for home nor visiting teams.

No reasons were found to think that the factors related to fatigue could have an influence, but there are some studies that prove fatigue could impact game situations, and in some different types of shooting, when games are sufficiently close in time; as in the short competitions or the playoffs, in reference to free throw there are not significant influences (Montgomery et al., 2008; Ibánez et al., 2009).

In that context, it seems during the playoffs, that in a search of aim consequence, the motivation grade and grade of others contextual elements that may be involved in free throws attempts are still high (Labrador et al., 1995). Therefore, we consider that the coping styles of the stressful situations are more important when it comes to explaining the possible failures/errors in the crucial situations (Anshel and Wells, 2000; Anshel and Anderson, 2002; Dias et al., 2009; Mellalieu et al., 2009; Sagar et al., 2009).

Conclusion

In an average accuracy percentage, no significant differences were found between the first and the second half of a game, neither for home nor for visiting team. However, home and visiting teams follow the opposite tendency: home team usually slightly increases an accuracy percentage in the second half in comparison to the first one, while an accuracy percentage of visiting team usually drops slightly.

During the overtime, home teams tend to lower the accuracy percentage in comparison to the second half, whereas visiting teams tend to improve their successful shoots in this period in comparison to their records in the second half.

Home teams reach their maximum accuracy percentage in the second half of a game, in the third quarters, and concretely between 21 and 25 min of a game. Meanwhile, visiting teams reach their maximum accuracy percentage in the first half of a game, in the second quarters, and concretely between 16 and 20 min of a game.

Both home and visiting teams reach their maximum accuracy percentage in semifinals and five-game playoffs. However, the order of games affects home and visiting teams in an uneven way: middle games of the playoffs lead home teams to achieve the highest percentage of times with 100% successful shots; however, visiting teams achieve the highest percentage of time with 100% successful shots in the first games of playoffs.

In spite of the above, it is pointed out that we cannot confirm that the accuracy percentage will be higher or lower in consideration of pairings, order and number of games in the playoffs, neither for home nor for visiting teams.

A successful free throw is a predictor factor of the points made at the end of a game by home and visiting teams. However, type of pairings, order and number of games in the playoffs are not predictor factors of the final score reached by home and visiting teams.

We can observe a need to adapt and make free throw training more personal, trying to work on the aspects of visual and attention control, and trying to work on controlling and manipulating cognitive anxiety.

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REFERENCES

Ahart FC (1973). The effect of score differential on basketball free throw shooting efficiency. None published doctoral Thesis. Ithaca: Ithaca College.

Anshel MH, Wells B (2000). Sources of acute stress and coping styles in competitive sport. Anxiety Stress Coping 13:1-26.

Anshel MH, Anderson DI (2002). Coping with acute stress in sport: linking athletes coping style, coping strategies, affect and motor performance. Anxiety Stress Coping 15(2):193-209.

Bakhshayesh SH, Nia PS, Neisi A (2010). Impact of self-consciousness on choking under pressure in basketball players. Stud. Phys. Culture Tourism 17(2):139-143.

Baumeister RF, Steinhilber A (1984). Paradoxical effects of supportive audiences on performance under pressure: The home field disadvantage in sports championships. J. Pers. Soc. Psychol. 47:85-93.

Cárdenas D, Rojas J (1997). Determinación de la incidencia del tiro libre en el resultado final a través del análisis estadístico. Revista Motricidad, 3:177-186.

Cardenas D (1998). El entrenamiento del tiro libre. Revista RED 11(4):29-35.

Conroy DE (2008). Fear of failure in the context of competitive sport. Int.

J. Sport Sci. Coaching 3(2):179-183.
Dandy J, Brewer N, Tottman R (2001). Self-consciousness and performance decrements within a sporting context. J. Soc. Psychol. 141(1):150-152.
Dias C, Cruz JF, Fonseca AM (2009). Emoçoes, stress, ansiedade e coping: estudo qualitativo com atletas de elite. Revista Portuguesa Ciencias do Desporto 9(1):9-23.
Dias JM (2007). The stats value for winning in the world basketball championship for men 2006. Fitness Perfomance 6(1):57-61.
Fierro C (2002). Variables relacionadas con el éxito deportivo en las ligas NBA y ACB de baloncesto. Revista de Psicología del Deporte 11(2):247-255.
Foster DJ, Weigand DA (2006). The effect of removing superstitious behaviour and introducing a pre-performance outline on basketball free throw performance. J. Appl. Sport Psychol. 18:167-171.
Getz GE, Rainey DW (2001). Flexible short-term goals and basketball shooting performance. J. Sport Behav. 24(1):31-41.
Gómez MA, Lorenzo A (2007). Análisis discriminante de las estadísticas de juego entre bases, aleros y pívots en baloncesto masculino. Apunts 87:86-92.
Gooding A, Gardner FL (2009). An investigation of the relationship between mind fullness pre shot routine and basketball free throw percentage. J. Clin. Sport Psychol. 4:303-319.
Hanton S, Fletcher D, Coughlan G (2005). Stress in elite sport performers: a comparative study of competitive and organizational stressors. J. Sport Sci. 23(10):1129-1141.
Harle SK, Vickers JN (2001). Training quiet eye improves accuracy in the basketball free throw. Sport Psychol. 15:289-305.
Hays D, Krause JV (1987). Score on the throw. The Basketball Bulletin, winter pp.4-9.
Ibánez SJ, Sampaio J, Feu S, Lorenzo A, Gómez MA, Ortega E (2008). Basketball game related statistics that discriminate between team´s season-long success. Euro. J. Sport Sci. 8(6):369-372.
Ibánez SJ, García J, Feu S, Lorenzo A, Sampaio J (2009). Effect of consecutive basketball games on the game-related statistics that discriminate winners and losing teams. J. Sport Sci. Med. 8:458-462.
Ibánez SJ, García J, Feu S, Parejo I, Cañadas M (2009). La eficacia del tiro a canasta en la NBA: análisis multifactorial. Revista Cultura Ciencia y Deporte 4:39-47.
Ittenbach F, Esters IG (1995). Utility of team indices for predicting end of season ranking in two national polls. J. Sport Behav. 18(3):216-224.
Keetch KM, Lee TD, Schmidt RA (2008). Especial Skills: specify embedded within generality. J. Sport Exerc. Psychol. 30:723-736.
Kozar B, Vaughn RE, Whitfield KE, Lord RH, Dye B (1994). Importance of free-throws at various stages of basketball games. Percept. Motor Skills 78(1):243-248.
Labrador FJ, Crespo M, Buceta JM, González S (1995). Factores contextuales implicados en el lanzamiento de tiros libres en baloncesto. Revista de Psicología del Deporte 7-8, 87-99.
Lafuente V (2005). Factores contextuales y personales en el rendimiento en los tiros libres en baloncesto. Tesis doctoral no publicada. UNED. Madrid.
Lonsdale C, Tam JT (2008). On the temporal and behavioural consistency of pre-performance routines: an intra-individual analysis of elite basketball players´ free throw shooting accuracy. J. Sport Sci. 26(3):259-266.
López-Gutiérrez CJ, Jiménez-Torres MG (2013). The free shot in basketball: successes in every minute of game. Int. J. Med. Sci. Phys. Activity Sport. 13(50):307-327
Lorenzo A, Gómez MA, Ortega E, Ibánez S, Sampaio J (2010). Game related statistics which discriminate between winning and losing under-16 male basketball games. J. Sport Sci. Med. 9:664-668.
Mellalieu SD, Neil R, Hanton S, Fletcher D (2009). Competition stress in sport performers: stressors experienced in the competition environment. J. Sports Sci. 27(7):729-744.
Mesagno C, Marchant D, Morris T (2009). Alleviating choking: the sounds of distraction. J. Appl. Sport Psychol. 21:131-147.
Montgomery P, Pyne D, Hopkins W, Dorman J, Cook K, Minahan C (2008). The effect of recovery strategies on physical performance and accumulative fatigue in competitive basketball. J. Sport Sci. 26(11):1135-1145.
Montero I, León OG (2002). Clasificación y descripción de las metodologías de investigación en psicología. Int. J. Clin. Health Psychol. 2:503-508.
Murayama T, Sekiya H, Tanaka Y (2010). Factor analysis of the mechanisms under lying “choking under pressure” in sports. Asian J. Exerc. Sport Sci. 7(1):55-60.
Oliveira RF, Oudejans RD, Beek PJ (2008). Gaze behaviour in basketball shooting: further evidence for online visual control. Res. Quarter Exerc. Sport 79(3):399-406
Ortega E, Cárdenas D, Puigcerver C, Méndez JJ (2005). Propuestas prácticas para el entrenamiento del tiro libre en etapas de formación elaboradas a partir del análisis de la competición. Cuadernos de Psicología Del Deporte 5(1-2):197-217.
Otten M (2009). Choking vs. clutch performance: a study of sport performance under pressure. J. Sport Exerc. Psychol. 31:583-601.
Okubo H, Hubband M (2006). Dynamics of the basketball shot with application to the free throw. J. Sport Sci. 24(12):1303-1314.
Rivares L (1996). La concentración en el tiro libre. Revista de Psicología del Deporte 9-10:77-90.
Sagar SS, Lavalle D, Spray CM (2009). Coping with the effects of fear of failure: a preliminary investigation of young elite athletes. J. Clin. Sport Pychol. 3:73-98.
Sampaio J (1998). Los indicadores estadísticos más determinantes en el resultado final en los partidos de basquetbol. Lecturas Educación Física y Deportes 3(11), recuperado de http://www.efdeportes.com/efd11/sampe.htm.
Sampaio J, Janeira M (2003). Importance of free throw performance in game outcome during the final series of basketball playoffs. Int. J. Appl. Sport Sci. 15(2):9-16.
Tauer JM, Guenther CL, Rozek C (2009). Is there a home choke in decisive playoff basketball games? J. Appl. Sport Psychol. 21:148-162.
Tran CM, Silverberg LM (2008). Optimal release conditions for the free throw in men´s basketball. J. Sports Sci. 26(11):1147-1155.
Uygur M, Gottepe A, Ak E, Karabörk H, Korkusuz F.(2010). The effect of fatigue on the kinematics of free throw shooting in basketball. J. Hum. Kinetics 24:51-56.
Walker F (1985). Take P.R.I.D.E. in your free-throwing: It will win for you. Scholastic Coach 55(3):18-20.
Whitehead R, Butz JW, Kozar B, Vaughn RE (1996). Stress and performance: an application of Gray´s three-factor arousal theory to basketball free throw shooting. J. Sport Sci. 14:393-401.
Wilson MR, Vine SJ, Wood G (2009). The influence of anxiety o visual attentional control in basketball free throw. J. Sport Exerc. Psychol. 31:152-168.

Appendix: Relationship between the discussed games

Sample games of Play-Offs

SEASON		
2007-2008	**2008-2009**	**2009-2010**
Joventut-Girona (Quarterfinals)	Barcelona-Pamesa (Quarterfinals)	Caja laboral-Estudiantes (Quarterfinals)
Girona-Joventut (Quarterfinals)	Pamesa-Barcelona (Quarterfinals)	Estuiantes-Cajalaboral (Quarterfinals)
Joventut-Girona (Quarterfinals)	Tau-Bilbao (Quarterfinals)	R. Madrid-Cajasol (Quarterfinals)
Barcelona-Bilbao (Quarterfinals)	Bilbao-Tau (Quarterfinals)	Cajasol-R. Madrid (Quarterfinals)
Bilbao-Barcelona (Quarterfinals)	Unicaja-Gran Canaria (Quarterfinals)	R. Madrid-Cajasol (Quarterfinals)
Tau-Pamesa (Quarterfinals)	Gran Canaria-Unicaja (Quarterfinals)	Barcelona-Gran Canaria (Quarterfinals)
Pamesa-Tau (Quarterfinals)	Unicaja-Gran Canaria(Quarterfinals)	Gran Canaria-Barcelona (Quarterfinals)
Tau-Pamesa (Quarterfinals)	R. Madrid-Joventut (Quarterfinals)	Valencia-Unicaja (Quarterfinals)
R. Madrid-Unicaja (Quarterfinals)	Joventut-R. Madrid (Quarterfinals)	Unicaja-Valencia (Quarterfinals)
Unicaja-R. Madrid (Quarterfinals)	R. Madrid-Joventut (Quarterfinals)	Barcelona-Unicaja (Semifinal)
DkvJoventut-Barcelona (Semifinal)	Barcelona-Unicaja (Semifinal)	Barcelona-Unicaja (Semifinal)
Barcelona-DkvJoventut (Semifinal)	Unicaja-Barcelona (Semifinal)	Caja laboral-R. Madrid (Semifinal)
Tau Cerámica-Unicaja (Semifinal)	Barcelona-Unicaja (Semifinal)	Caja laboral-R. Madrid (Semifinal)
Unicaja-Tau Cerámica (Semifinal)	Tau-R. Madrid (Semifinal)	R. Madrid-Caja laboral (Semifinal)
Barcelona-Tau (Final)	R. Madrid-Tau (Semifinal)	R. Madrid-Caja laboral (Semifinal)
Barcelona-Tau (Final)	Tau-R. Madrid (Semifinal)	Caja laboral-R. Madrid (Semifinal)
Tau-Barcelona (Final)	Tau-Barcelona (Final)	Barcelona-Caja laboral (Final)
	Tau-Barcelona (Final)	Barcelona-Caja laboral (Final)
	Barcelona-Tau (Final)	Caja laboral-Barcelona (Final)
	Barcelona-Tau (Final)	

Sample games of Copa del Rey

SEASON		
2007-2008	**2008-2009**	**2009-2010**
Bilbao-Barcelona (Cuartos)	Estudiantes-Dkv (Cuartos)	P. Valencia-Estudiantes (Cuartos)
Tau-Unicaja (Cuartos)	Tau-Pamesa (Cuartos)	Barcelona-Cajasol (Cuartos)
Tau-Bilbao (Semifinal)	R.Madrid-Barcelona (Cuartos)	Bilbao-Caja Laboral (Cuartos)
Tau-Juventud (Final)	Unicaja-Gran Canaria (Cuartos)	R. Madrid-DkvJoventut (Cuartos)
	Estudiantes-Unicaja (Semifinal)	Caja Laboral-R. Madrid (Semifinal)
	Barcelona-Tau (Semifinal)	P. Valencia-Barcelona (Semifinal)
	Unicaja-Tau (Final)	Barcelona-R. Madrid (Final)