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ORIGINAL ARTICLE

Brief exploration of short and mid-term timeout effects on basketball scoring according to situational variables

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Abstract

The aim of this study was to identify the effects of timeouts on Basketball teams' performance differences, as measured by points scored by the team that calls a timeout and points scored by the opponent team according to game location, the quality of the opponent and the game quarter. Sixty games were analysed using the play-by-play game-related statistics from the Asociación de Clubes de Baloncesto (ACB) League in Spain (2009–2010 season). For each timeout, the points scored in the previous and post 3, 5 and 10 ball possessions were registered for the teams that called the timeout and for the opponents ($n = 436$ and $n = 427$, $n = 322$ and $n = 319$, $n = 112$ and $n = 110$ for 3, 5 and 10 ball possessions, respectively). For the teams that called the timeout, the results reflected positive effects on points scored, with increases of 1.59, 2.10 and 2.29 points during the period within the third, fifth and tenth timeout ball possessions. For the teams that have not called the timeout, the results identified timeout negative effects in points scored, during the period within the third and fifth ball possessions (decreases in points scored of 1.59 and 1.77, respectively). Unexpectedly, the situational variables had little or no effects on points scored, which opens up this important topic for further studies and discussion.

Keywords: *Performance analysis, team sports, multiple regression*

Introduction

Research on performance analysis in team sports has grown intensively in recent years and is revealing new insights to understand this complex phenomenon (Mace, Lalli, Shea, & Nevin, 1992; Roane, Kelley, Trosclair, & Hauer, 2004; Lago, Casais, Dominguez, & Sampaio, 2010; Sampaio, Lago, Casais, & Leite, 2010). Recently, game performance has been modelled according to several frameworks that intend to clarify the effects and interactions of situational variables such as game location, quality of opponent or score-line (Carling, Williams, & Reilly, 2005; Jones, James, & Mellalieu, 2004; Lago, 2009; Lago & Martin, 2007; Sampaio, Lago, Casais, & Leite, 2010; Taylor, Mellalieu, James, & Shearer, 2008).

Team sports such as basketball present multiple and different dynamics during the game as a result of variability in offensive and defensive performances (Bourbousson, Sève, & McGarry, 2010a, 2010b). In these different positive and negative phases, the coaches have to manage the team and decide how to control the different game dynamics and players' behaviours (Hastie, 1999). Research has described the importance of coaches' cognitive abilities during competitive situations (Debanne & Fontayne, 2009; Zetou, Kourtesis, Giazitzi, & Michalopoulou, 2008), and on the other hand, some studies pointed out the importance of coaches' decisions related to the instructions given to the players in critical situations for starters and reserve players or in the last minutes of a game (Allison & Ayllon, 1980; Bar-Eli & Tractinsky, 2000).

Within all these topics, the coaches are given the opportunity to act and react to the game dynamics by stopping the time for 60 s using the timeouts. This strategic decision enables the players to recover, (re)gain focus, and listen to the coach's instructions. It has been suggested that calling a timeout is an effective intervention for reducing the opponents'

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rate of reinforces and their behavioural momentum (Smisson, Burke, Joyner, Munkasy, & Blom, 2007). According to Duke and Corlett (1992) the coaches' decision making process when calling a timeout is related to players' behaviours, due to the impact that a positive or negative action has on the teams' offensive and defensive performances. In sport psychology literature, the momentum concept is defined as an extra psychological power that may change the interpersonal perceptions and later influence game dynamics and players' performances (Burke, Aoyagi, Joyner, & Burke, 2003; Burke, Burke, & Joyner, 1999; Iso-Ahola & Mobily, 1980; Mace et al., 1992; Roane et al., 2004; Smisson et al., 2007). Particularly in basketball, this topic has been described distinguishing between positive and negative momentum, according to the positive or negative effects of players' actions on performance (Burke et al., 2003).

One other example within this research is the 'hot hand' or 'streakiness', terms that address the belief that performance during a particular moment is significantly better than could be expected on the basis of the overall record (Gilovich, Vallone, & Tversky, 1985). Despite the popular belief, most of the empirical research in professional basketball seems to supports the non-existence of a relationship between future success and past performance (for a comprehensive review see Bar-Eli, Avugos, & Raab (2006)).

Empirical studies on the effects of timeouts in basketball performance are very scarce. Mace et al. (1992) found that the effectiveness of a team's performance was sharply reduced following a timeout called by the opponent team. More recently, Roane et al. (2004) showed that a timeout called by the target team was effective in reducing the opponents' local rate of reinforcement. Smisson et al. (2007) found that the most common game actions that mainly ended the momentum sequences were the timeouts called by the opponent team.

Given that basketball is dominated by strategic factors, it might be reasonable to suspect that situational variables may somehow influence the coaches' decisions. Empirical evidence suggests that game location, quality of the opponent and game period may be important influences on teams' performances (Sampaio, Drinkwater, & Leite, 2010). Concerning game location, the crowd noise and fans' support have an important effect on psychological momentum. Basketball teams playing at home win more than 50% of their games in a balanced schedule (Gómez & Pollard, 2011; Pollard & Pollard, 2005). Research has suggested that social facilitation theory may explain home advantage (Silva & Andrew, 1987) because spectators affect players' performances and consequently the fans' support may selectively reinforce certain home team's behaviours (i.e., a steal or a block shot) allowing to start or maintain a positive momentum (Burke et al., 1999, 2003; Smisson et al., 2007). It has been suggested that the quality of the opposition may affect a team's performance before and after a timeout. Duke and Corlett (1992) found that the best teams focused the players' attention during timeouts more on offensive than on defensive strategies. Finally, because basketball is a time dependent sport, the game period should also be taken into account when analysing timeouts effects (Kozar, Whitfield, Lord, & Mechikoff, 1993). Research has found differences in performance indicators between the first and the second half of USA basketball games during Beijing's Olympic Games (Sampaio, Lago, & Drinkwater, 2010). According to these authors the influence of timeouts on a team's performance may be affected by the game quarter, with more variations during the first and the fourth quarter.

The quantitative examination of timeouts and situational variables in basketball is still very limited and inconclusive; therefore, the aim of this study was to identify the effects of timeouts on teams' performance differences, as measured by points scored by the team that calls a timeout and points scored by the opponent team according to game location, the quality of the opponent and the game quarter.

Methods

Sample

Sixty games were analysed using the play-by-play game-related statistics from the Asociación de Clubes de Baloncesto (ACB) Spain from the 2009–2010 season. The games were randomly selected; however, all 19 teams that participated in the league were present in this sample. All data were gathered on-court by the league professional technicians and this process is assumed to be highly reliable as previously studied (Sampaio, Lago, & Drinkwater, 2010).

Procedures

Basketball rules (International Basketball Federation, FIBA basketball rules, 2008, art. 18) allow coaches to call five timeouts during a game (two during the first half and three during the second half). Also, one TV-timeout is allowed in each period of a game in addition to the regular timeouts (art. E.2.), which should be called with five minutes remaining in each period. Only timeouts called by coaches were analysed. For each timeout, the points scored in the previous and post three, five and ten ball possessions were registered for the teams that

called the timeout and for the opponents ($n = 436$ and $n = 427$, $n = 322$ and $n = 319$, $n = 112$ and $n = 110$ for three, five and ten ball possessions, respectively). The game location (home or away), quality of opposition (difference between end-of-season rankings of the confronting teams), game attendance and game period were also registered. Game attendance averaged 6264 ± 1754 spectators (minimum of 3600 and maximum of 10000).

Statistical analysis

Linear regression models were used to identify the effects of the independent variables on the teams' point differences (points scored minus points received) for teams that called the timeout and for the opponents. When estimating the models, no heteroscedasticity in residuals or multicollinearity among regressors was observed. Moreover, the RESET test of Ramsey (1969) did not reveal specification problems. When interpreting the statistical results, positive or negative coefficients indicate a greater or lower propensity to increase/decrease the teams' point differences. Five independent variables were included in the model: Time Out, Game Location, Quality of Opponent, Game Attendance, and Game Quarter. The model is as follows:

$$SC = \beta 0 + \beta 1 \,.\, TO + \beta 2 \,.\, GL + \beta 3 \,.\, QO + \beta 4 \,.\, GA + \beta 5 \,.\, GQ + \varepsilon i \quad (1)$$

where SC = the teams' point differences (points scored minus points allowed), TO = time out, a dummy variable indicating whether the points were scored before (value 0) or after (value 1) the time out, GL = game location, QO = quality of opponent, GA = game attendance, GQ = game quarter.

Statistical analyses were performed using SPSS software release 17.0 (SPSS Inc., Chicago, IL, USA) and STATA for Windows version 10.0 (Stata Corp., LP, Texas, USA). Statistical significance was set at $P < 0.05$.

Results

Effects of the five independent variables on teams' point differences for teams that called the timeout and for the opponents are displayed in TablesI and II, respectively. For the teams that called the timeout (Table I), the results reflected positive effects on points scored ($P \leq 0.01$), with increases of 1.59, 2.10 and 2.29 points during the period within the third, fifth and tenth timeout ball possessions. The average point scored per possession in all games was 0.95 ± 0.18. All other independent variables were not statistically significant; with the exception of a negative effect of game location during the period within the 10th timeout ball possessions. In this case, playing away was associated with a decrease in the points scored by these teams. The intercept was statistically significant in all the regression models.

For the opponents, i.e., for the teams that have not called the timeout, (Table II), the results identified timeout negative effects in points scored ($P \leq 0.01$), during the period within the third and fifth ball possessions. These teams decreased points scored by 1.59 and 1.77 after the timeout. All other independent variables were not statistically significant, with the exception of a negative effect from the quality of opponent during the period within 10 ball possessions. In these cases, the better the opponent, the lesser the points scored by the team. The intercept was statistically significant in all the regression models. Figure 1 describes the variation in points scored for the teams that called the timeout and their opponents during the period within the third, fifth and tenth ball possessions.

Discussion

The aim of this study was to identify the effects of timeouts on teams' performance differences, as measured by points scored by the team that calls a timeout and points scored by the opponent team. Also we reasoned that situational variables like game location, game attendance, quality of the opponent and game quarter would have effects on these differences.

Table I. Effects of the independent variables on points scored by teams that called the timeout.

	Ball possessions		
Variables	−3/3	−5/5	−10/10
Timeouts	**1.59****	**2.10****	**2.29****
	(0.17)	(0.28)	(0.70)
Game Location	−0.07	−0.14	**−1.23***
	(0.18)	(0.28)	(0.67)
Quality of Opponent	−0.02	0.01	−0.05
	(0.01)	(0.02)	(0.04)
Game Attendance	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)
Game Quarter			
Second Quarter	−0.08	−0.07	−0.71
	(0.26)	(0.41)	(0.92)
Third Quarter	−0.17	0.08	−1.24
	(0.27)	(0.42)	(1.01)
Fourth Quarter	−0.14	−0.63	−1.62
	(0.26)	(0.41)	(1.12)
Intercept	**1.23****	**1.89****	**8.65****
	(0.38)	(0.59)	(1.45)
Number of observations	436	322	112
R^2	0.38	0.32	0.25

Standard errors are in parentheses.
**$P \leq 0.01$; *$P \leq 0.05$.

Table II. Effects of the independent variables on points scored by the opponent teams.

	Ball possessions		
Variables	−3/3	−5/5	−10/10
Timeouts	−1.59**	−1.77**	−0.10
	(0.2)	(0.30)	(0.89)
Game Location	0.18	0.29	0.29*
	(0.21)	(0.31)	(0.87)
Quality of Opponent	−0.01	−0.03	−0.11*
	(0.01)	(0.02)	(0.06)
Game Attendance	−0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)
Game Quarter			
Second Quarter	0.15	−0.04	−0.34
	(0.31)	(0.45)	(1.10)
Third Quarter	0.37	0.52	−0.70
	(0.34)	(0.48)	(1.20)
Fourth Quarter	−0.27	−0.29	−0.37
	(0.32)	(0.48)	(1.59)
Intercept	**4.72****	**7.77****	**11.65****
	(0.48)	(0.61)	(1.45)
Number of observations	427	319	110
R^2	0.23	0.14	0.1

Standard errors are in parentheses.
**$P \leq 0.01$; *$P \leq 0.05$.

Available research on this topic is very scarce, thus, no studies can be used for comparison purposes. Although the conclusion that teams who call a timeout were able to increase points scored seems too trivial and expected (Smisson et al., 2007), these results should be emphasised because, first, they quantify the increases in points scored and, second, they follow-through these increases having the ball possessions as a natural measure of basketball game dynamics (Kubatko, Oliver, Pelton, & Rosenbaum, 2007). Therefore, results have shown that teams who called a timeout were able to increase points scored immediately after and that this effect increased at least for ten ball possessions, whereas, in these same situations, their opponents decrease their scoring, with the same magnitude at the third ball possession, but this effect ceased somewhere after the fifth ball possession. The causes that might explain these timeout effects are very difficult to isolate and quantify. It is most likely that they will be operating together, each interacting with the other in several ways. In fact, after this 60 second break the players may perform better due to physiological recovery; however, their opponents also had the same recovery opportunity and performed worst. Nevertheless, physiological recovery may be determinant when interacting with technical (Lyons, Al-Nakeeb, & Nevill, 2006) and tactical performances (Davey, Thorpe & Williams, 2002; Royal et al., 2006). In essence, the most likely reasons to explain these timeout effects may be related to stopping the opponents' from scoring, to promoting strategic changes in team play or, promoting changes in game pace.Regarding the results, it is also important to enhance the fact that timeout effects helped the teams to increase points scored across the tenth ball possessions but only refrained the opponents from scoring, as they were doing, for the next five ball possessions. It may be suggested that these results put emphasis on the emergent nature of decision making processes, as dependant on the interaction of each player within the specific constraints of each game context (Araújo, Davids, & Hristovski, 2006). In this particular case, results seem to describe game dynamics where one team is having success playing eminently with anticipatory intentions, whereas the other team calls for timeout trying to stop momentum and merely reacting to the adversity. This

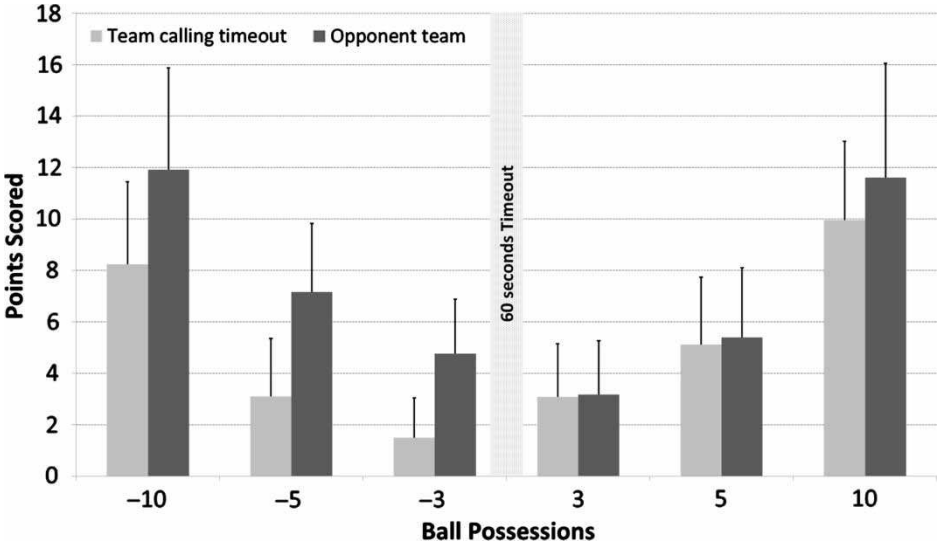

Figure 1. Effects of the independent variables on points scored by teams that call a team out and their opponents.

strategy seems to have a time-restricted efficacy, also because the opponents will probably keep playing anticipating by using perceptions of key information sources from game actions and the external environment (Araújo et al., 2006; Araújo & Kirlik, 2008; Philips, Davids, Renshaw, & Portus, 2010).

The results of the present study showed that pre and post timeout points scored were not affected by the studied situational variables. It would be reasonable to expect to find stronger effects from game location (Gómez & Pollard, 2011; Pollard & Pollard, 2005; Silva & Andrew, 1987), for example, that following the timeout the home teams would further increase their scoring or, that higher game attendances would also help to increase scoring post timeout. However, the results have not supported this hypothesis and the timeout effects were identical for home and away teams.

We have also hypothesised that playing against a lower quality opponent could have resulted in scoring more points after the timeouts, reasoning that the best teams have better coaches who can use more and better players. Additionally, and because basketball is a time-dependent team sport (Sampaio, Lago, & Drinkwater, 2010), the location of the timeout could be having different effects on points scored, for example, the last game quarter could be having less points scored due to a lower game pace (Malarranha & Sampaio, 2007). However, the present results do not confirm all these presumable effects and probably open up this important topic for further studies and discussion.

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