Original article (short paper)

Effects of match situational variables on possession: The case of England Premier League season 2015/16

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Abstract - Aims: To identify the effects of match location, quality of opponents and match status on possession during the 2015/16 Season of England Premier League. **Methods:** Three hundred and eighty matches played by 20 teams were analysed. For each match, two values were recorded, resulting in 760 observations. **Results:** Teams who played at home (51.77 ± 10.22%) presented higher possession values (EF=moderate) than those who played away (48.21 ± 10.30%). Quality of opponents also had a significant difference, as possession was higher (EF=large) when teams played against weak (52.30 ± 9.77%) than strong opponents (46.48 ± 10.38%). The multivariate analysis revealed no interaction between situational variables and possession (p = 0.76). Despite the teams classified as "best-ranking" (1st to 8th position: 50.60 ± 10.35%) presented greater possession (EF=moderate) than "worst-ranking" (9st to 20th position: 47.59 ± 9.74%), no significant differences were found in the comparisons of match status (winner [50.34 ± 10.48%] x drawer [49.95 ± 10.25%] x loser [49.68 ± 10.48%]). **Conclusion:** General interpretations should be viewed with caution, since the possession can represent an indicator of success for a team but not for others.

Keywords: football association, performance indicator, situational variables, match analysis, elite soccer.

Introduction

Match analysis in soccer has aroused much attention in the past few decades, with possession being one of the most studied performance indicators[1-4]. This emergent behaviour was stated because possession maintenance usually leads a team to victory[5,6], but different possession strategies may be adopted during the same match depending on situational variables of the game[7,8].

According to previous studies[3,6], by adopting a more defensive pattern of play (*i.e.*, control the match) it is possible to increase possession time and find a way to goal by passing the ball or by long distance shots to offensive field, both being predictors of success. Yet, the same authors describe that teams with counterattack strategies (absorbing opponents' attacks) often reach the goal by retaking possession and rapidly moving the ball to scoring range. However, several factors are suggested to influence possession (e.g., physical, technical-tactical aspects, phase of the competition). Match location (playing home or away), quality and strength of opponents (e.g. "weak" or "strong" and their position on league rankings), and match status (if winning, losing or drawing) were identified as the most important situational variables that dictates possession patterns[9-13].

Concerning match location, playing home presented stronger interaction with team possession than playing away[6,8,14], which might be explained by a more familiar environment and a more consistent style of play[15,16]. The quality of opposition is also a determinant variable when investigating possession in soccer[12,16]. According to Taylor, Mellalieu[10], when facing strong opponents, teams perform more passes and fewer dribbles. Moreover, there's association between playing with strong opponents and the reduction in possession time[3,8]. In addition, recent researches have found interaction between match location and quality of opponents, in manner that when a team faces a strong opponent in home, for example, the possession time is likely to increase when comparing the away situation[4,8]. Authors have shown evidences that stronger teams presented more consistent patterns of play and did not benefit the same home advantage outcomes as weaker opponents[6,8,17].

Match status has been pointed as the most important variable to explain possession along the match[6]. The evolving score is a factor that determines the strategies adopted by teams. For example, losing-match status presented positive interaction with ball possession, *i.e.*, when losing, teams usually tried to retake and maintain possession, controlling the match (indirect play), raising their overall possession time; while in the winning-match status, teams lowered their possession, which may indicate a preference for counter-attacking or direct play[3,6,8]. Also, it is interesting the influence of match status on the field zone possession, as Lago[6] found that, when losing, possession time were greater in offensive field zone than when winning or drawing. Nevertheless, many of the reviewed literature brings inconclusive data for reasons such as small sample size, unstandardized analysis procedures, or by not considering the complexity of soccer, as an unpredictable and dynamic sport.

The England Premier League is considered one of the most disputed and valuable leagues in the world. A non-typical 2015/16 Season of this championship has increased the attention of soccer coaches and practitioners in delimiting success indicators in soccer. In a background of the scientific literature, the latest published study on the effects of match situational variables on possession dates from three years ago during the England Premier League[4]. Barnes, Archer[18] identified that physical (i.e., high-intensity running/sprinting distances) and technical (i.e., number of passes) performances have increased by 30-50% across seven seasons of the England Premier League (2006-07 to 2012-13). These evolutions can interfere on the possession behaviour during current matches, i.e. higher number of successful passes can result in higher values of possession[3]. Thus, the discriminatory power may vary between home/away, matches played against "strong" and "weak" opponents and successful/unsuccessful teams along the seasons. In addition, the use of a large sample and the provision of the context of the competition (i.e., situational variables) are recommended for studies with match analysis[12]. Therefore, the main objective of this study was to investigate the effects of match location, quality of opponents and match status on possession withing a large matches sample of the 2015/16 Season of England Premier League.

Methods

Matches Sample

Three hundred and eighty matches played by the 20 teams of the England Premier League 2015/16 were considered for analysis. The championship was composed of 38 rounds. In each round were performed 10 clashes (matches). For each match, two values were recorded, resulting in 760 observations. For example, in the match Leicester City vs Arsenal the match location, quality of opponents, match status and possession were computed for both teams. Therefore, of the 760 values, 380 were home and 380 were away, 301 were played against strong and 459 against weak opponents, which resulted in 273 wins, 214 draws and 273 losses, with 1027 goals scored and 1027 goals conceded.

Procedures

This study was divided in two stages, each with a particular analysis method. The first stage aimed to verify possible influences of match location and quality of opponents on possession in all matches of England Premier League season 2015-2016, for which independent and interactive effects of match location and quality of opponents on possession were assessed. The second stage aimed to identify if possession is a real indicator of success, with the teams being distributed between two groups: successful ("best-ranking") and unsuccessful ("worst-ranking"), verifying if the possession of the ball would discriminate winner, drawer and loser teams. A successful discrimination can support the validity of this parameter.

Measures

Dependent variable: Possession was defined as the percentage of total time the team was in offensive phase. The start of offensive phase was characterized by recovery of possession (e.g., interceptions and crosses followed by pass), while the end was determined by loss of possession (e.g., unsuccessful passing and dribbling). This variable was recorded in the three hundred and eighty matches during the 2015-2016 England Premier League. The data was obtained from website (http://www.sportstats.com/) and was organized in Microsoft Excel sheets. An experienced researcher and coach (soccer coaching experience with professional players: 10 yrs; academic degree: graduated in sports science) analysed the possession in 15 randomly-chosen matches and compared the achieved data with those from website (http://www.sportstats.com/) to calculate the data reliability. The resulting Cohen's kappa (k) values were between 0.84 and 0.91.

Independent variables: Matches were divided into episodes related to match situational variables. These episodes were defined as match location (*i.e.* played at home or played away), quality of opponents (*i.e.* played against strong or weak opponents) and match status (*i.e.* winners, drawers or losers). The quality of opponents was determined according to k-means cluster analysis[14] on final team ranking at the end of the competition (sum of points obtained). The results identified two clusters: "best-ranking", featuring strong opponents (1st to 8th position); "worst-ranking" representing the weak opponents (9th to 20th position). In addition, these two clusters were used to define successful group (strong teams, $n = 8$) and unsuccessful group (weak teams, $n = 12$).

Statistical analysis

Data were analysed as mean and standard deviation (SD). Normality (Kolmogorov-Smirnov) and homogeneity of variances (Levene) were checked, and no violations were noticed. To compare the average of the dependent variable (possession) between the match location (home $_x$ away), quality of opponents (strong $_x$ weak) and teams ranking (best $_x$ worst), we used the T-test for independent samples. One-way ANOVA was performed to compare the average of the dependent variable between the match status (winners $_x$ drawers $_x$ losers). A multivariate general linear model was used to verify the effect of interactions between match situational variables (location, quality of opponents and status) on possession. Bonferroni "post-hoc" test was applied when necessary. Fixed effect model was used in ANOVA and multivariate linear model. In order to examine the possible differences between successful teams (winners $_x$ drawers $_x$ losers) and those which were not, a discriminant analysis was calculated. The magnitude of effect was calculated using Cohen's "*d*"[19]. The *d* values lower than 0.1, from 0.1 to 0.20, from 0.20 to 0.50, from 0.50 to 0.80 and higher than 0.80 were considered as trivial, small, moderate, large and very large, respectively. Significance level was preserved at 5% ($p < 0.05$). Analyses were performed in IBM SPSS Statistics software for Windows, version 22.0 (IBM Corporation©).

Results

Table 1 presents the descriptive statistics. In general, teams classified as "best-ranking" (1st to 8th position) presented greater possession than the "worst-ranking" teams (9th to 20th position). However, it's possible to observe that the winner team (*i.e.* Leicester City) showed low possession along the competition.

Possession presented difference ($t = 4.77$; $p < 0.001$; $d = 0.34$ [moderate]) between matches played at home (51.77 ± 10.22 %) when compared with those played away (48.21 ± 10.30 %) (Figure 1A). Furthermore, the quality of opponents showed a significant difference ($t = 7.83$; $p < 0.001$; $d = 0.57$ [large]), in which was found higher possession values when teams played against weak opponents (52.30 ± 9.77 %) in comparison to strong opponents (46.48 ± 10.38 %) (Figure 1B).

For univariate analysis, no difference was found in the comparison of match status (winner [50.34 ± 10.48 %] $_x$ drawer [49.95 ± 10.25 %] $_x$ loser [49.68 ± 10.48%]) for possession ($F_{(2,757)} = 0.276$; $p = 0.76$) (Figure 2A). Nonetheless, regarding teams ranking, a significant difference was found ($t = 8.12$; $p < 0.001$; $d = 0.30$ [moderate]) on possession values (Best: 50.60 ± 10.35 %; Worst: 47.59 ± 9.74 %) (Figure 2B).

Table 1. Descriptive statistics (mean, standard deviation [DP], coefficient of variation [CV], 95% confidence intervals [CI], minimum [Min], maximum [Max]) of the possession during the England Premier League season 2015/16.

Ranking	Teams	Possession (%)					
		Mean	DP	CV	CI	Min	Max
1º	Leicester City	43.13	8.19	18.99	40.44 to 45.82	28	65
2º	Arsenal	58.07	11.22	19.32	54.38 to 61.76	36	74
3º	Tottenham	57.21	6.58	11.50	55.05 to 59.37	45	71
4º	Manchester City	57.02	7.56	13.25	54.54 to 59.50	41	72
5º	Manchester United	58.23	8.03	13.79	55.59 to 60.87	39	70
6º	Southampton	48.55	9.77	20.14	45.34 to 51.76	29	66
7º	West Ham	48.55	10.45	21.53	45.12 to 51.98	27	68
8º	Liverpool	57.44	8.48	14.76	54.65 to 60.23	34	72
9º	Stoke City	49.78	7.72	15.51	47.24 to 52.32	34	68
10º	Chelsea	56.26	7.98	14.19	53.64 to 58.88	33	69
11º	Everton	51.68	9.41	18.22	48.59 to 54.77	33	76
12º	Swansea City	52.57	8.54	16.25	49.76 to 55.38	35	73
13º	Watford	44.84	8.67	19.34	41.99 to 47.69	31	65
14º	West Bromwich	39.76	8.09	20.35	37.10 to 42.42	24	57
15º	Crystal Palace	45.81	8.72	19.03	42.94 to 48.68	28	67
16º	Bournemouth	51.13	8.38	16.39	48.38 to 53.88	33	69
17º	Sunderland	40.94	7.93	19.37	38.33 to 43.55	27	58
18º	Newcastle	46.63	9.51	20.39	43.50 to 49.76	26	69
19º	Norwich City	45.42	9.74	21.46	42.22 to 48.62	28	66
20º	Aston Villa	46.26	9.06	19.59	43.28 to 49.24	29	66
	All teams	**49.99**	**10.41**	**20.82**	**46.57 to 53.41**	**24**	**76**

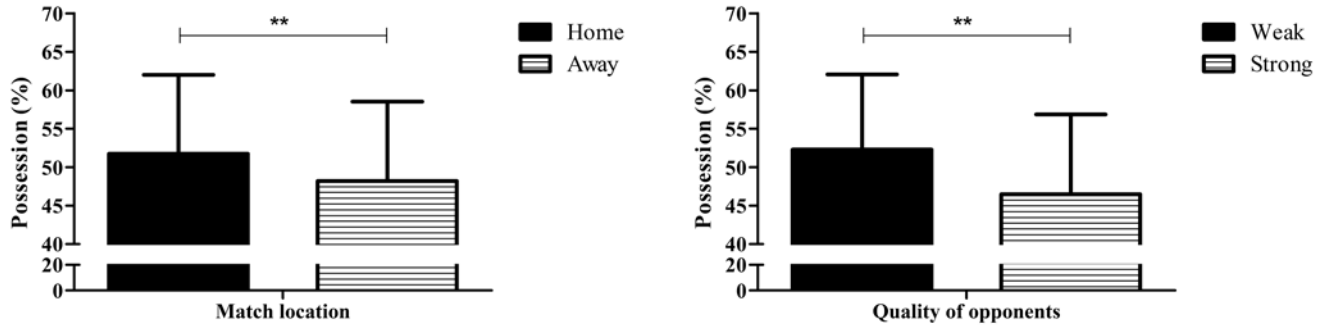

Figure 1. Influence of match location (A) and quality of opponents (B) on possession during the England Premier League season 2015/16. ** $p < 0.001$.

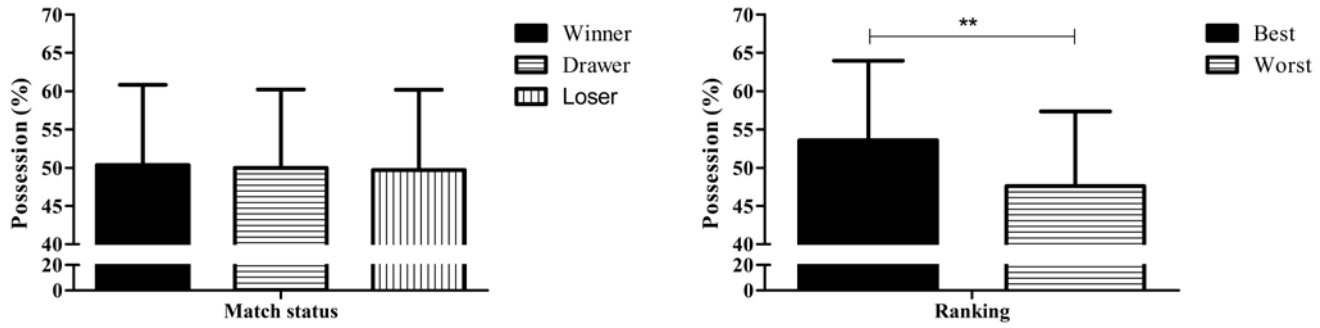

Figure 2. Influence of match status (A) and team ranking (B) on possession during the England Premier League season 2015/16. ** $p < 0.001$.

Multivariate general linear model showed no interaction effects between match situational variables on possession, *i.e.* match location*quality of opponents ($Z = 0.536$; $p = 0.46$; $\eta^2 = 0.11$), match location*match status ($Z = 1.038$; $p = 0.35$; $\eta^2 = 0.23$), quality of opponents*match status ($Z = 1.568$; $p = 0.20$; $\eta^2 = 0.33$) and match location*quality of opponents*match status ($Z = 0.414$; $p = 0.66$; $\eta^2 = 0.11$). Finally, the results of the discriminant analysis revealed that only 36.3% of cases were classified correctly (see Table 2).

Table 2. Teams' classification by match status and according to discriminant function analysis values.

Original group	Predicted group membership		
	Winner	Drawer	Loser
Winner	49.9%	4.4%	46.6%
Drawer	48.1%	3.7%	48.1%
Loser	46.7%	4.4%	48.9%

Note: 36.3% of cases were classified correctly.

Discussion

The main contribution of the present study is the proposition of scientific evidences that possession analysed independently and in perspective of individual teams, does not appear to be crucial to success in elite soccer disputed during the England Premier League. Specifically, the results showed independent effects of match location and quality of opponents on possession, *i.e.* home matches or matches against weak opponents resulted in greater possession compared to away or against strong opponents matches, respectively. Despite the teams classified as "best-ranking" had higher possession compared to teams classified as "worst-ranking," according to the results of match status, there were no significant differences in the comparisons winners $_x$ drawers $_x$ losers. This is confirmed by the results found in the discriminant function analysis, where only 36.3% of cases were classified correctly. The unsuccessful discrimination cannot support the validity of the possession to discriminate teams that win, draw and lose. Therefore, the use of this parameter as success indicator should be viewed with caution by the coaches and practitioners in the England Premier League.

The match location variable influenced independently the possession during the England Premier League 2015/16, *i.e.,* home matches had more possession than away matches (~ 7%). Researches on home advantage in soccer have received more attention in the last years (*e.g.*, [3, 8, 14, 20]). Different international tournaments have presented home advantage on performance indicators. For example, Thomas, Reeves[21] found that home advantage happeneed in 60.7 % of the 4426 matches from English Football

Premiership. Lago and Martín[3] showed that home teams have more possession than away teams using data from 170 matches of the 2003-04 Spanish Soccer League. The same behaviour was found by a myriad of studies[5,8,10,22]. Previous researches in sport psychology have demonstrated factors that can explain this behaviour, such as crowd effects[23], crowd density[24], local familiarity[25], and travel[26]. In addition, the tactic strategy adopted by the team in home (*i.e.*, control the match with "possession play") can explain this advantage[3]. On the other hand, we can speculate that nowadays top-teams do not change game model playing home or away matches. The changes can occur according to opponent quality, game model (strategy), and match status.

Quality of opponents is another match situational variable that influenced the possession during the England Premier League 2015/16. Matches against weak opponents presented a higher possession percentage than matches against strong opponents. In short, Almeida, Ferreira[14] explain this result pointing that stronger teams dominate possession against their weaker opponents[5,6], showing more stable game patterns, independently of the evolving score-line[6,8]. In addition, these strong teams did not experience the same home advantage as inferior opponents[17].

According to the match status, our study didn't find any differences for possession when comparing winners $_{x}$ drawers $_{x}$ losers. In contrast, other previous studies[1,3,8] showed greater possession when losing than winning and explained their results by changes in tactics and the playing style adopted according to the within-match status, *i.e.*, when winning suggesting they preferred to play counterattacking or direct play and when losing suggesting they preferred to "control" the match by dictating play or indirect play. Methodological issues can explain these different findings. The aforementioned studies splitted the variable match status by time (minutes) the team was winning, drawing or losing. In our study, the possession of the ball was obtained at the end of each match. This choice is especially justified because our purposes in each game were to verify the final result and not the offensive strategies of each team according to the evolving score (*i.e.*, score-line).

On the other hand, "best-ranking" teams (1st to 8th position), analysed in our study, demonstrated greater possession than the "worst-ranking" (9th to 20th position). However, from an individual team perspective, the champion team (Leicester City) presented low average possession (43.13 ± 8.19 %). In addition, "best-ranking" teams showed little differences in coefficients of variation compared to "worst-ranking", *e.g.*, Leiceister City (1st position: CV = 18.99 %) and Aston Villa (20th position: CV = 19.59 %). This suggests that, besides the analysis of performance indicators of all teams together, attention must be paid to soccer performance analysis from the perspective of teams individually[27]. For example, in the case of England Premier League season 2015/16, it is possible to interpret that Leicester City (champion) preferred to play counterattacking or direct play (low average possession), *i.e.*, this is a success indicator for this team. But for the Arsenal (2th position), the possession of the ball can be a success indicator (high average possession [58.07 ± 11.22 %]), *i.e.*, suggesting they preferred to "control" the match by indirect play. Another example refers to a UEFA Champions League 2015/16, the most prestigious club competition in Europe[14]. The finalist teams (Atletico Madrid and Real Madrid) had different possession behaviour throughout the competition. While Atletico Madrid presented low average possession (~ 46%), the Real Madrid demonstrated an indirect style of play (high average possession: ~ 54%) (data from official UEFA website: http://pt.uefa.org/). The final between the two clubs in Madrid was widely seen as a confrontation between a team with a match philosophy based in terms of possession (Real Madrid) and a more direct playing style team (Atletico Madrid). Therefore, by soccer performance analysis from the perspective of individual teams, rather than analysing only possession behaviour of all teams together, it is possible to plan more specific training sessions. This can promote a better definition of what are the real indicators of success of a team and do not make general interpretations. Coaches can use this information to prepare their teams according to individual characteristics of the players.

This study is not without limitations. Two should be recognized, being first: possession analyses were registered in the end of the matches. To measure the match status, the time length each team was winning (minutes winning), drawing (minutes drawing) and losing (minutes losing) can promote other interpretations. However, one of the purposes of our study is to question the actual use of possession as indicator of success, and so the record of this variable in minutes will become unnecessary; and second, in this study we did not analyse the possession of the ball in different field zones (*e.g.*, defensive, defensive midfield, offensive midfield, offensive) and in different leagues. We assume this limitation and recommend for future researches three main data approaches: i) relation between ball possession and the field zones it tends to occur; ii) relationship between possession per attack and the final result of the respective attacking; and iii) understand how possession is performed, i.e., how players' behaviours such as passes (short/long), dribbling, shots, allow the teams to maintain ball possession and if it differs between clubs and players. On the other hand, our study supports the critical review of Mackenzie and Cushion (2013) which suggests a checklist for future researches on soccer performance analysis: i) strong power of generalization of findings based on the sample size (n = 380 matches) and ii) provide the context of the competition (location, quality of opponents and status). These strong points can increase the validity of results presented.

In summary, our findings demonstrated independent effects of match location and quality of opponents in possession during England Premier League season 2015-06, with greater values when teams played at home or against weak opponents. In addition, it was not verified influence of match status on possession behaviour, despite "best-ranking" teams showed more possession than "worst-ranking". General interpretations should be viewed with caution, since the possession can represent an indicator of success for a team but not for others.

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