How does match status affects the passing sequences of top-level European soccer teams?

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Abstract

The purpose of this study was to identify the effect of match status (winning, losing or drawing) on the length of passing sequences of top-level soccer teams. A total of 20 matches of the knockout phase of the 2008-2009 UEFA Champions League were analysed. The sample consisted of 222 passing sequences leading to shooting opportunities performed by the four semi-finalists teams (FC Barcelona, Manchester United FC, Chelsea FC and Arsenal FC). These passing sequences were selected to reflect how each team tended to break the balance with the opposing teams to reach the goal (symmetry-breaking process). The passing sequences were measured by the number of passes performed until the shot and their respective durations, according to the match status. Results revealed that teams used preferentially long passing sequences when they were losing or drawing, and short passing sequences when they were winning. Besides, these top-level European teams tended to differently adapt the length of their passing sequences according to the evolving score-line, which suggests the existence of a team's signature of play.

Keywords: notational analysis, situational variables, team performance, UEFA Champions League, soccer.

1. Introduction

Performance analysis has been used in recent decades to objectively record and examine behavioural events that occur during team sports' competitions (Carling *et al.*, 2005; Lago, 2009). For instance, many researchers have sought to identify the existence of patterns of play in behaviours and actions performed by different soccer teams and its players (Lago and Anguera, 2003; Duarte *et al.*, 2012b; Lapresa *et al.*, 2013). In this regard, empirical evidence have highlighted the importance of sequential analysis of game actions and the analysis of individual teams in a series of competitions for a better understanding of performance (Castellano and Hernández-Mendo, 2000; McGarry *et al.*, 2002). Since soccer is a team sport dominated by strategic aspects, it is reasonable

to suspect that contextual factors have a major influence on teams' and players' decisions and consequent behaviours (Gómez *et al.*, 2012).

Perceiving how contextual variables, such as match location, quality of opposition and match status, typically influence the competitive performance in soccer is currently a very trendy topic (Carling *et al.*, 2014). Previous studies have already assessed the effects of these situational variables on physical, technical and tactical performance (Taylor *et al.*, 2008; Lago, 2009; Almeida *et al.*, 2014). Nevertheless, teams have distinct playing styles and, thus, probably different ways to act according to a given match context. Based on this proposition, the research literature has suggested the need for an individual team analysis (Hughes *et al.*, 2001; Taylor *et al.*, 2008; Lago-Ballesteros *et al.*, 2012).

Indeed, elite soccer teams exhibit very wide traits, which make it difficult to predict the outcome of future matches with any accuracy (Hook and Hughes, 2001). Tucker *et al.* (2005) inclusively claimed that tactics and strategies are unique to individual teams and what is successful for one team may not be for another. So, it is vital to use performance indicators that reflect in the best possible way the identity of the team, its peculiar performance and its ability to generate success (Hughes and Bartlett, 2002; Hughes and Franks, 2005; Lago and Martín, 2007). Furthermore, a good performance indicator may be employed as a means to predict future behaviours in sports performance (Carling *et al.*, 2005; Lago-Peñas *et al.*, 2010). For example, ball possession is frequently used to describe team performance (Mackenzie and Cushion, 2013). Usually, the successful teams have longer ball possessions than the unsuccessful, regardless of the evolving match status, i.e. whether the team is winning, losing or drawing (Jones *et al.*, 2004; Bloomfield *et al.*, 2005; Lago-Peñas and Dellal, 2010).

Following this viewpoint, Tenga *et al.* (2010) and Lago-Ballesteros *et al.* (2012) suggested that it is essential to evaluate how teams use possession associated with aspects of offensive effectiveness. Hughes and Franks (2005) found, for instance, that successful teams produced significantly more shots using long sequences of passes, but the ratio of goals from shots through "direct play" was better than using a "possession play" style. Later, Tenga *et al.* (2010) also demonstrated that elaborated attacks were less effective than counterattacks when playing against an imbalanced defense. However, when data were normalized to the total number of passing sequences, longer passing sequences were considered also to be more effective than the shorter sequences. According to Lago-Peñas *et al.* (2010), by knowing what characterizes successful and unsuccessful teams, coaches can set well-targeted goals to be achieved in a specific competitive match; on the other hand, they have the opportunity to present to their players certain patterns of play to be avoided either in the offensive or defensive phases of the game.

The available research identified the strategies influenced by the momentary score-line and the changes in playing style during the matches (Lago, 2009; Lago-Peñas and Dellal, 2010; Almeida *et al.*, 2014). Winning teams are mainly differentiated by the ability to be offensively organized through long passing sequences until penetrating into the opponents' penalty area (Ruiz-Ruiz *et al.*, 2013). This offensive playing style occurs in an attempt to break the balance (i.e., a symmetry-breaking process) with the opponent

team and increase the number of shooting opportunities (McGarry *et al.*, 2002). In addition, the probability of reaching the score-box possessions increases with the duration of the "unity of possession". As match status reflects a more advantageous score, there is a decreased likelihood of reaching the score-box (Lago-Ballesteros *et al.*, 2012), probably due to a momentary change in whole team intentionality (Duarte *et al.*, 2012a).

In this sense, the evolving match status is one of the most relevant situational variables influencing performance in soccer (Lago, 2009; Lago-Peñas and Dellal, 2010; Taylor *et al.*, 2010). However, there are still some inconsistencies remaining. Hughes and Reed (2005) reported a decreased incidence of shots associated to a losing-match status. On the contrary, several studies found that teams have greater ball possession when they are losing, compared to when they are winning or drawing (Lago and Martín, 2007; Lago, 2009; Lago-Peñas and Dellal, 2010). In line with this tendency, teams tend to produce more entries into the opponent's penalty area when losing (Ruiz-Ruiz *et al.*, 2013).

Therefore, Lago-Peñas *et al.* (2011) and Lago-Ballesteros *et al.* (2012) have acknowledged the need to evaluate the suitability of new measurements of offensive and defensive effectiveness in soccer, particularly considering contextual factors that may affect high-level team performances. Some studies have recommended as well the assessment of each team individually, since their different identities may moderate the impact of situational variables (Hughes and Reed, 2005; Collet, 2013). Given that, the present study aimed to examine the effect of match status on passing sequences leading to a shot at goal performed by the four top-level European soccer teams of the season 2008-2009.

2. Methods

2.1. Match Sample

A total of 20 matches of the knockout phase of the 2008-2009 UEFA Champions League from 4 different teams were analysed (FC Barcelona, Manchester United FC, Chelsea FC, and Arsenal FC). These teams were selected as the most successful since they reached the semi-finals of the competition. To ensure a similar representation of data, 6 matches were observed for each sampled team (i.e., 2 in round of 16, 2 in quarter-finals, and 2 in semi-finals). An overall of 222 passing sequences prior to a shot at goal were selected for further analysis. This inclusion criterion was used in order to capture the offensive patterns of play when each team created goal-scoring opportunities. Approval for the study procedures was granted by the Ethics committee of the University of Évora.

2.2. Data Collection and Analysis

Matches were observed in digital video format, publically obtained in the official site of UEFA (http://video.uefa.com/video). The passing sequences – the units of analysis of this study – were identified and collected in clips with the software Camtasia Studio 7 (TechSmith, Michigan, USA). For each team, the lengths of passing sequences were notated post-event based on two previously used dependent variables: the number of passes prior to a shot at goal and its corresponding duration (s) (Hughes and Franks,

2005; Lago-Ballesteros *et al.*, 2012; Collet, 2013). Selected episodes were classified as winning, losing or drawing according to the score-line of the match for sampled teams at the time of data entry (Lago, 2009).

For analysis purposes, we performed an automatic cluster classification analysis with the overall data, which allowed identifying three groups of passing sequences divided by their substantial differences, reflecting the three possible match status. Secondly, we applied another automatic cluster classification to identify differences within each match status and to compare the differences between groups of long and short passing sequences. Since parametric assumptions (normality and homogeneity of variance) were not verified, Mann-Whitney test was used for comparing mean ranks of number of passes and duration between groups of passing sequences. The level of statistical significance was set at $p \leq 0.05$. All statistical procedures were conducted using the software IBM SPSS, version 19 (SPSS Inc., Chicago, USA).

2.3. Reliability Testing

Data reliability was assessed through intra- and inter-observer testing procedures. In both tests, the first 45 minutes of a randomly selected match were coded (Seabra and Dantas, 2006). In the intra-observer test, a new observation took place after 6 weeks to avoid any possible adverse effects of memory (Lago, 2009). For the inter-observer testing, two experienced and independent soccer performance analysts (one of them being the first author) conducted a training protocol to familiarize themselves with the process; after one week the test was performed (Hughes *et al.*, 2004). The Intraclass Correlation Coefficient (ICC) was used to calculate the reliability of dependent variables. Table 1 shows the existence of a strong association between observations in number of passes and duration of passing sequences, which proves the intra- and inter-observer reliability in using these performance indicators.

Table 1. Intra- and inter-reliability (ICC) values for number of passes and duration of passing sequences.

Passing Sequences	**Intra-observer** (O_1 vs. O_1)	**Inter-observer** (O_1 vs. O_2)
Number of passes	1	0.978
Duration	1	0.997

Note: O_1 – First observer; O_2 – Second observer.

3. Results

In the preliminary results it was possible to compare the two groups of passing sequences (i.e., long and short) on winning and drawing match status. The losing-match status presented only long passing sequences, so it was not possible to compare groups of passing sequences on this status. The number of passes involved in each sequence ranged from 1 to 22 passes and the duration of passing sequences varied between 1 and 70 seconds.

Taking into account the mean values of number of passes and duration of passing sequences (Figures 1 and 2), both variables were relatively proportional between the two groups of passing sequences.

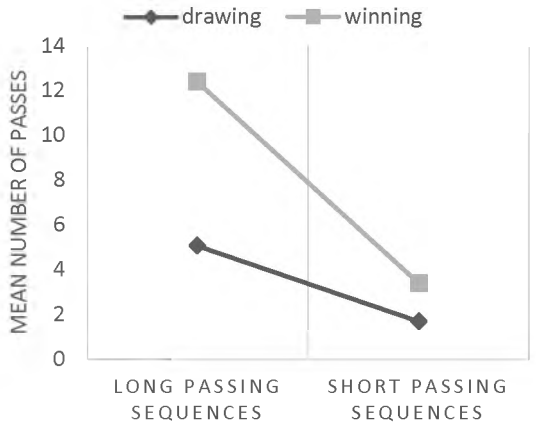

Figure 1. Comparing the mean number of passes between the two groups of passing sequences as a function of match status.

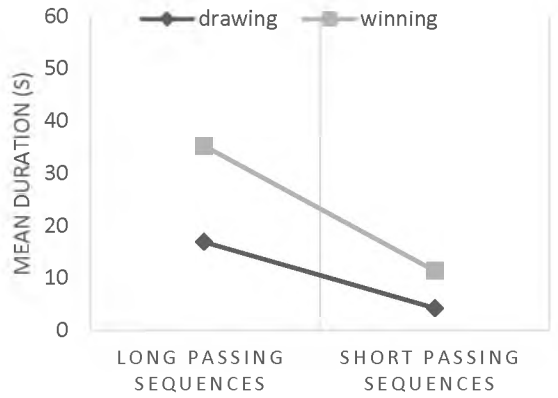

Figure 2. Comparing the mean duration between the two groups of passing sequences as a function of match status.

However, when teams were winning, we found that the duration of long passing sequences did not increase proportionally with a higher number of passes. The two groups of passing sequences had a greater number of passes when teams were winning than when they were drawing. Besides, Mann-Whitney test confirmed the mean number of passes were significantly different between long and short groups of passing sequences, whether teams were drawing ($U = 232.5$; $W = 583.5$; $p < 0.001$) or winning the matches ($U = 39.5$; $W = 2595.5$; $p < 0.001$). Additionally, the mean duration of passing sequences was also higher for both groups of passing sequences in winning situations. As expected, long passing sequences presented a higher mean value of duration (35s). These mean durations were significantly different between groups of passing sequences in drawing ($U = 132.0$; $W = 483.0$; $p < 0.001$) and winning status ($U = 43.5$; $W = 2599.5$; $p < 0.001$).

Our results revealed as well that Barcelona was the team with a large number of passing sequences leading to a shot at goal, while Chelsea showed the lowest total number of successful passing sequences (see Figure 3). When these top-level European teams were losing there was a tendency for a complete absence of short passing sequences. On the contrary, when facing a winning match status, teams increased the relative number of short passing sequences. Furthermore, it was observed an overall tendency for all sampled teams to build-up more goal-scoring opportunities through elaborate attacks when drawing than when winning.

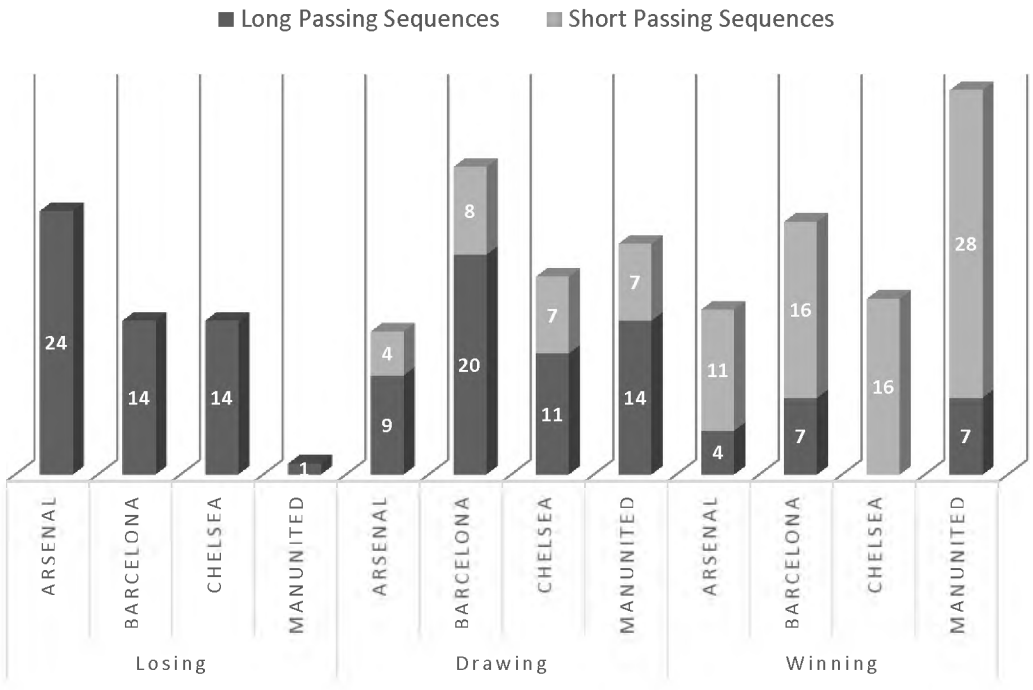

Figure 3. Absolute frequencies of long and short passing sequences by each sampled team as a function of match status.

To analyse the potential existence of different 'signatures of play' between teams, we decided to normalize the data according to the time spent by each team in the different match status (see Figure 4).

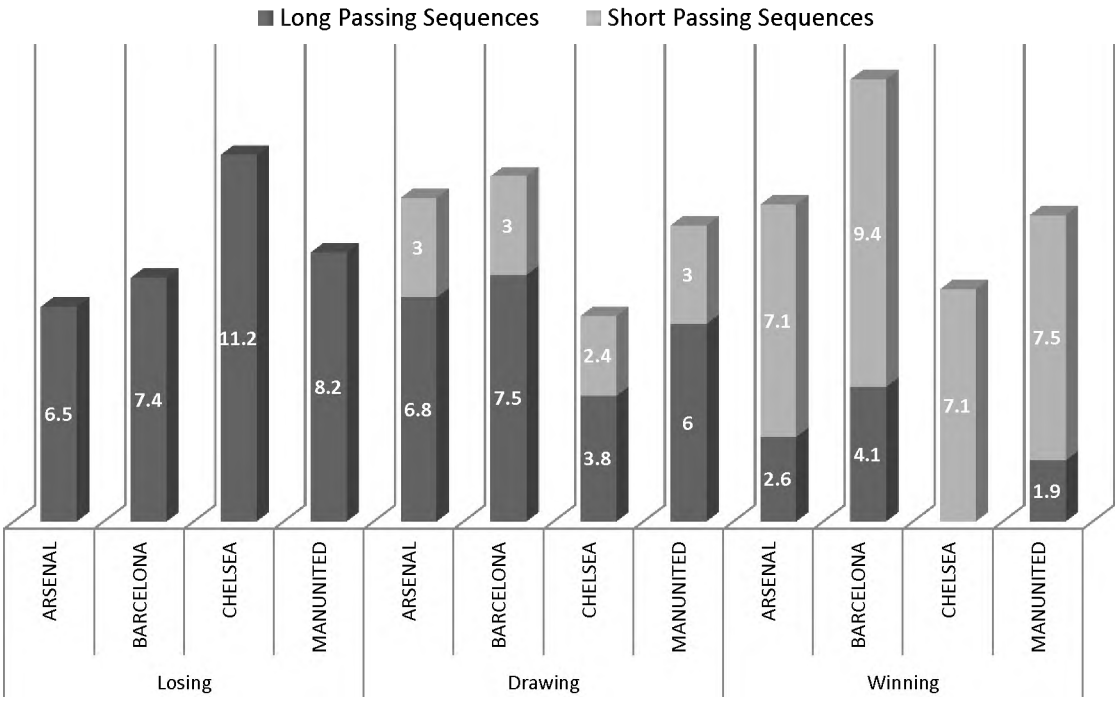

Figure 4. Relative frequencies of long and short passing sequences (normalized per each 90-min of match-play) by each sampled team as a function of match status.

Using the normalized data we can compare the idiosyncratic tendencies of each team as a function of variations in match status. For example, we verified that Chelsea was the most contrasting case across all match status, being the single team presenting solely short passing sequences in the winning status. Conversely, the other three teams were more balanced in the patterns of passing sequences across the different status. In contrast to the data presented in Figure 3, this later normalized values allow us to clarify some extreme values such as the similar relative frequencies of long passing sequences of Arsenal and Manchester United in all the match status that were not seen in Figure 3.

4. Discussion

Previous research highlighted the need to analyse elite teams individually, since their different identities and patterns of play may moderate the impact of situational variables such as the evolving match status (Hughes and Reed, 2005; Collet, 2013). This study aimed to examine the effect of match status on passing sequences leading to a shot at goal performed by the four semi-finalists teams in the 2008-2009 UEFA Champions League. Previous investigations suggested that evaluations of how teams use possession must be associated with aspects of offensive effectiveness (Tenga *et al.*, 2010; Lago-Ballesteros *et al.*, 2012). Thus, the units of analysis of the current work – passing sequences – were selected to reflect the way each team tended to break the balance with the opposing teams to reach the goal (symmetry-breaking process).

Generally, the number of passing sequences leading to a shot at goal tended to increase as the match status became more favourable. This data somehow contradicts Lago-Ballesteros *et al.* (2012), who found a decreasing likelihood of reaching the score-box when the team was drawing or winning compared to the losing situation. The four teams investigated in this study used preferentially long passing sequences when they were losing or drawing, and short passing sequences when they were winning, which corroborates the findings of Lago and Martín (2007), Lago (2009), and Ruiz-Ruiz *et al.* (2013). These authors found greater team possession when teams were losing than when they were winning or drawing. Such fact was attributed to changes in the strategy and the style of play adopted by teams according to the status within the match (evolving score). When winning, teams decreased their possession, suggesting they preferred to play counterattacking or direct play; when losing, teams increased their possession, suggesting they seek permanently to achieve the opponent goal with more elaborated play due to the more defensive opponent style of play (Lago-Peñas and Dellal, 2010).

Nevertheless, considering the mean values of number of passes and duration of long and short passing sequences, we observed that these top-level teams significantly increased the number of passing actions and the duration of ball possession leading to scoring opportunities, when they were winning compared to drawing episodes. Although teams have performed fewer long passing sequences in winning situations, they sought to build-up more patiently their attacks irrespective of the group of passing sequence (long or short). In fact, Bloomfield *et al.* (2005) reported that the top three teams in the 2003-2004 FA Premier League (Chelsea, Arsenal, and Manchester United) dominated possession against their opponents whether winning, drawing or losing. Our results are also in line with Lago-Peñas and Dellal (2010), who suggested that the best classified teams in the 2008-2009 Spanish *La Liga* maintained a higher percentage of ball possession and that their pattern of play was more stable despite the alteration in contextual variables over the match (e.g., evolving score) and between matches.

According to Pratas *et al.* (2012), the evolving match status is essential for an understanding of a team's tactical options in terms of ball possession. Overall, when winning, teams substantially increased the number of goal-scoring opportunities through short passing sequences. This may be a consequence of top-level teams' ability to quickly explore the spaces that opposing teams concede in their own defensive zones, when struggling for a more favourable score (Tenga *et al.*, 2010; Almeida *et al.*, 2014). Carling *et al.* (2005), for instance, highlighted the importance of fast counter-attacking play, given that most goals are scored after periods of possession lasting less than 15 seconds and involving fewer than four passes. Our findings seems to corroborate the results of Hughes and Franks (2005), which reported that successful teams produced significantly more shots by long sequences of passes, even though the strike ratio of goals from shots was better for 'direct play'.

Due to the relative small sample size (n = 222 passing sequences, divided by 4 teams per 3 match status each) we opted for having not examine differences between teams as a function of match status using inferential statistics. The sample came from a relatively high number of matches (20 matches), but the number of passing sequences collected per team in each possible match status was low. So, in order to identify more accurately different patterns of play between high-level teams, we recommend that future studies

should examine larger samples. Nevertheless, mean data seemed to indicate that Chelsea sought to take over the ball and try to score when losing, using preferentially long passing sequences in those circumstances. When the score was tied or favourable, this trend clearly decreased. Thus, following the perspective of Lago-Ballesteros *et al.* (2012), we can extrapolate that the probability of Chelsea to reach scoring zones increased with the duration of the "unity of possession".

Our results also support the idea that Barcelona did not clearly abdicate of the possession play style to shoot at goal in any of the match status. Such evidence sustains the research of Gómez *et al.* (2012), who claimed that winning teams are differentiated by an offensive supremacy. However, in losing and drawing match-status this tendency was even more evident, which perhaps suggests negative and balanced score-lines to be a stimulating factor for this specific team. The productivity of Barcelona as the winning team corresponds to the results shown by Lago-Peñas *et al.* (2011), in which the winning teams had significantly higher mean values in match performance indicators such as ball possession.

The normalized data allowed us to deeply inspect Manchester United patterns of play. While the non-normalized data suggested a progressive higher number of passing sequences leading to a shot at goal, from losing to winning match status, the normalized data revealed a similar relative number of sequences in all the match status. Indeed, Manchester United was much more time winning than drawing and losing in the analysed competition, but there was a similar tendency of achieving the opponent goal of 8-9 times per match, independently of the match status.

As stated before, the team of Chelsea adapted notoriously its passing sequences depending on the current match status. The behaviour of this team grounded the idea of Lago (2009) and Lago-Peñas and Dellal (2010) that strategies in soccer are influenced by the momentary score and teams modify their playing style during the match accordingly. Our normalized data demonstrated the existence of some diverging trends in the offensive patterns of play between top-level teams as a function of match status. These findings mean that different teams tend to distinctively adapt their playing styles to changes in relevant performance constraints, such as the evolving score-line, which sustains what Hughes and Reed (2005) called as team's 'signatures of play'.

The distinct 'signatures of play' characterizing how each team breaks the stability with the opponents and creates scoring opportunities also supports the idea of Castellano *et al.* (2012) that teams can be differentiated from each other based on how they use the ball to enhance attacking effectiveness. Here, we examined the main effect of match status on the length of passing sequences in top-level teams. However, the examination of situation variables independently appears to provide limited insight into the complex nature of soccer performance (Taylor *et al.*, 2008). This said, effective assessment of successful teams' performance needs to account for potential interaction effects between situational variables (e.g., match status, match location, quality of opposition, competition stage). As such, we acknowledge potential limitations in the generalization of our findings and recommend that future research must focus on the interactive effects of relevant contextual variables.

5. Conclusions

The findings of this study showed that top-level European soccer teams used preferentially long passing sequences to achieve the opponent goal when they were losing or drawing, and short passing sequences when they were winning. In addition, at a team level, we verified that teams tended to show some differences in the way they adapt the length of their passing sequences as a function of the evolving match status. These different patterns of play support the notion of Hughes and Reed (2005) for a team's 'signature of play'. As future research, it would be interesting to analyse an individual successful team during several competitive matches and/or consecutive season periods. In order to examine more deeply their team profile and the factors that generate success, we suggest the use of performance indicators such as passing sequences leading to a shot at goal, but also taking into account the main and interactive effects of different situational variables.

6. Practical application

The present study developed contributes to enable the analysis process of opposing teams to be more effective, providing coaches with useful information to increase tactical knowledge and to improve the design and organization of practice sessions, by simulating possible competitive scenarios. As stated by Lago-Peñas *et al.* (2010), it is necessary the scouting of opposing teams considers the identification of the playing styles but also their changes due to situational factors inherent to the observed matches. Thus, this investigation provides evidence that the evolving match status might be taken into account when coaches and analysts try to identify how each team attempts to approach the goal and create scoring opportunities.

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