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Comparative analysis of the top six and bottom six teams' corner kick strategies in the 2015/2016 English Premier League

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This study compared the corner kick strategies employed by the top six and bottom six teams across 120 matches of the 2015/2016 English Premier League Season. In total, 2,303 corner kicks were examined by univariate analyses (individual χ^2) and bivariate analyses with contingency tables (χ^2 and association measures). Top six teams favoured an outswinging delivery, whilst the bottom six teams favoured inswinging deliveries ($p < 0.001$). Top six teams operated a dynamic attacking organisation during ball deliveries, ($p < 0.001$), whereas the bottom six operated static and dynamic attacking strategies in equal measure. Top six teams took corner kicks frequently when winning or drawing, whereas bottom six teams took most corner kicks when losing or drawing (match status, $p < 0.001$). Bivariate analyses identified that goals were scored from corner kicks when attacking organisation was dynamic, two defenders were on the posts and the score line was level ($p < 0.05$). Results supplement the design of practice tasks that afford successful corner kicks in training and game play scenarios.

Key Words: Soccer, Observational methodology, Performance analysis, Set pieces.

Introduction

Performance analysis research in soccer has undergone rapid expansion over recent years, with studies investigating performance indicators related to possession, tactical behaviour, positional demands and the match location (Lago & Martin, 2007; Lago-Peñas, Lago-Ballesteros, Dellal, & Gómez, 2010; Yue, Broich, & Mester, 2014). During soccer matches, when the ball runs out of the playing area or play is stopped due to fouls, the game is restarted through set plays (e.g., penalty kicks, free kicks, corner kicks, and throw-ins). Set plays account for 30% to 40% of goals scored in elite soccer, highlighting these game events as critical components of successful offensive performance (Armatas, Yiannakos, & Sileloglou, 2007; Yinnakos & Armatas, 2006).

Despite being relatively low in frequency (an average of 10 corner kicks are taken per match, Pulling, 2015), corner kicks can be a determining factor in match outcome between teams of similar levels (Castelo, 2009). Casal et al. (2015) examined corner kicks across the FIFA 2010 World Cup, UEFA Champions League 2010-2011 and UEFA Euro 2012, with results showing 26% of corner kicks resulted in an attempt at goal, 9.8% of which were directed on target, and 2.2% culminating in a goal being scored. Despite this relatively low frequency with which corner kicks resulted in goals being scored, in 76% of those matches where a goal was scored from a corner, it resulted in that team drawing or winning the match. Beyond simply collecting notational data on the characteristics of corner kicks, researchers have investigated the outcome of corner kicks relative to attempts at goal and goals scored (Pulling, Robins & Rixon, 2013) with regards to delivery type (Casal, Maneiro, Ardá, Losada, & Rial, 2015), delivery area (Pulling, 2015), and match status (De Baranda & Lopez-Riquelme, 2012).

Exploring the effect of delivery zone on corner kick outcome, Taylor, James and Mellalieu (2005) demonstrated that 41% of first attacking contacts and attempts at goal occurred 6-12 yards from the goal line, in line with the width of the goal area (20 yards). These findings are supported by Schmicker (2013), who divided the penalty area into 66 distinct 3-yard by 4-yard boxes and found that corner kick deliveries played into the area 6 to 9 yards from the goal line and positioned centrally in front of the goal had a higher goal scoring rate compared to the other zones. In addition to demonstrating the importance of the zone of delivery, the organisation of attackers has also been identified as an important factor of corner success, with Casal et al. (2015) reporting corners are more successful when the attack organisation is dynamic (i.e., players moving) rather than static.

Researchers investigating the effectiveness of corner kicks have typically focused on examining matches at International level or European club level (e.g., Champions League) (for exceptions see Pulling, 2015; Pulling & Newton, 2017). Furthermore, disparity also exists between teams in the same league, for example during the 2016/17 season West Bromwich Albion scored 16 out of their 43 goals from set-pieces (> 35.0% of their goals), whilst others obtained less than 7.0% of their goals from set-pieces (e.g., Sunderland scored 2 out of their 29 goals from set-pieces). However, this game selection criterion fails to consider if corner kick strategies are affected by changes in playing level across the top and bottom teams. Therefore, identifying the corner kick strategies used by more successful and less successful teams would have practical importance for football coaches across all levels of the game. Moreover, researchers investigating corner kicks to date have typically analysed data from a small sample of games ($\mu = 65$) (Casal et al., 2015; De Baranda & Lopez-Riquelme, 2012; Pulling & Newton, 2017; Pulling, 2015; Pulling, Robins, & Rixon,

2013) and other than Pulling (2015) and Pulling and Newton (2017), previous researchers examining corner kicks have used games from 2012 or earlier and, with the ever-changing tactical strategies of soccer, analyses of more recent soccer seasons are required.

Power et al. (2018) have previously compared set pieces as a function of top and bottom 6 teams to investigate the notion of “set piece specialists”. On this basis, and with studies investigating expertise commonly employing within task criterion to differentiate upper and lower quartiles for the purpose of subsequent analyses, this analysis examined if corner kick strategies would differentiate ‘more successful’ versus ‘less successful’ teams. Given that an average set-piece taker will win a team 0.9 points while an elite set-piece taker will win 1.9 points (worth ~8% of a team's points for a bottom 6 team vs ~3.5% for a top 6 team) (Power et al., 2018), identifying the corner kick strategies used by more successful and less successful teams would have practical importance for football coaches. It is anticipated that this season long comparative analysis, exploring the corner kick strategies associated with the top six and bottom six teams in the 2015/2016 English Premier League (EPL) may identify those variables that are considered the most important for creating goal scoring opportunities from corner kicks. Therefore, the aims of this research were to first, describe how corner kicks were taken by the top six and bottom six teams placed in the 2015/2016 EPL table, and second, determine the effectiveness of these different types of corner kick and identify key variables associated with attempts on target and goal scoring.

Methods

Match Sample

The English Premier League soccer season consists of 380 games, whereby 20 teams play against each other; once at a team's home stadium and once away at the opponent's stadium. Corner kicks were sampled from all 120 games of teams placed within the top six or bottom six positions of the final 2015/2016 English Premier League table (Table 1). All teams were playing in the Premier League and so could reasonably be defined as elite, however the final league ranking was used as the within group criterion to distinguish between more and less successful teams, and so compared corner kick strategies between the top 6 (more successful) and bottom 6 (less successful) teams (Power et al., 2018). The top six and bottom six teams were analysed during all of their 2015/2016 league games (i.e., 1 home and 1 away game against the other 19 teams). Footage of the corners taken in sampled games was transferred from the Wyscout software database (Wyscout, Wyscout Spar, Italy). Initially, 2,418 corner kicks were recorded, with 2,303 of these being sampled as they satisfied the criterion of having the ball delivered directly into the goal zones by the corner kick taker, or delivered into the box indirectly within a maximum of four passes (Casal et al., 2015; Pulling, 2015). The Local University ethics committee granted approval for the study.

Table 1 near here

Measures and Procedures

The data were recorded using an observation instrument created in Microsoft Office Excel (Version 14.7.1, Microsoft Cooperation, United States). To ensure the stability of notational data, the observational instrument was created using key performance indicators and operational definitions related to corner kicks adapted from

both empirical research (e.g., Casal et al., 2015; Lames & McGarry, 2007; Pulling, 2015; Pulling et al., 2013) and the expert declarative knowledge of the head performance analyst at an English Football League Championship club. Definitions of observation metrics are displayed in Table 2. Respecting the future directions identified in previous corner kick research (e.g., Pulling et al., 2013; Pulling, 2015), the goal area was divided into three different sections (goal area 1 = GA1, goal area 2 = GA2 and goal area 3 = GA3). The central space of the critical area (the width of the goal posts) was further divided into six separate areas (critical area 1 = CA1, critical area 2 = CA2, critical area 3 = CA3, critical area 4 = CA4, critical area 5 = CA5, and critical area 6 = CA6) (see Figure 1 for an illustration of these zones and areas of interest). For each corner, the area where a player first made contact with the ball, along with the corner outcome was then recorded along with the type of ball delivery as either: inswinging, outswinging, clipped or driven delivery. The lead observer worked for a professional football club as a performance analyst, having seven years' experience coding soccer matches during applied field research. The second observer had five years' experience coding soccer matches during applied field research. The video footage was scrutinised thoroughly using individual freeze frame functions to combat missed events as this allowed the cross-comparison of all the tactical actions against the operational definitions adapted from previous research (James, Taylor, & Stanley, 2007).

Figure 1 near here

Table 2 near here

Reliability Testing

Prior to the analyses, the two analysts participated in four training sessions on how to conduct the analysis. Information was also provided on the operational definitions of the corner kick outcomes, as well as on the areas of the goal area and

critical area (Pulling, 2015). Intra-observer analysis was verified through the reassessment of the same 151 tactical actions on two separate occasions, six-weeks apart by the primary researcher (Altman, 1990). A second analyst separately assessed the same 151 tactical actions for comparison to the primary researcher's first observation for inter-observer reliability. Intra- and inter-observer reliability of the notional analysis data was quantified through the calculation of Cohen's Kappa (Cohen, 1960). Intra- and inter-observer reliability of each key performance indicator are presented in Table 3, with a mean kappa statistic of $k = 0.92$ and $k = 0.90$, corresponding to 'excellent' intra- and inter-observer agreement respectively (Fleiss, Levin, & Paik, 2003).

Table 3 near here

Data Analysis

Descriptive analyses were employed in Microsoft Excel to calculate relative frequencies for each variable. The data were analysed further in SPSS (Version 24.00 SPSS Inc., USA). A series of univariate descriptive analyses using individual chi-squares were employed to describe the tactical behaviours used by the top and bottom six teams during corner kick execution (frequency of kicks and tactics used) (Pulling, 2015). Further, bivariate analyses with contingency tables (χ^2 and association measures) were employed to analyse the level of collective success of corner kicks taken by the twelve teams included in the analysis. For univariate analyses, relative frequencies were first calculated relative to the total number of corner kicks sampled, attempts on target, and goal. For bivariate analyses, relative frequencies for attempts on target, and goals were calculated using outcomes directly related to offensive play as the analyses focused on strategies that created an attempt on target, or a goal rather than the

defensive variables that prevent attempts at goal from occurring (Pulling et al., 2013; Serrano, Shahidian, Sampaio, & Leite, 2013). For bivariate analysis, effect sizes are presented as a measure for collective success using the contingency coefficient.

Results

Descriptive Analysis

A mean 10.6 (± 3.6) corner kicks were taken per match (4-7 per team), 9.9% of offensive actions resulted in an attempt, 6.9% resulted in an attempt on target, and just 3.1% resulted in a goal being scored. These goals contributed to a draw or a victory in 69.0% of cases (in 48 out of 70 corners where a goal was scored it was delivered directly into the playing area towards an attacking player). The top six teams had a 2.9% success rate of scoring a goal from a corner in comparison to 3.3% for the bottom six teams ($t(10) = 0.70, p > 0.05$). The top six teams scored $9.3\% \pm 3.8\%$ of their total goals from corners, whereas goals from corners accounted for $14.1\% \pm 4.0\%$ of the total goals scored by bottom six teams ($t(10) = 2.13, p = 0.059$).

Table 4 displays the relative frequencies for each of the variables related to the execution of corner kicks analysed for the top six and bottom six teams. Based on these findings, the corner kick strategies used by the top and bottom six teams have the following characteristics. Top six teams were more varied in the foot used to deliver the ball (laterality of corner, $\chi^2 = 77.85; p < 0.001$), selecting both the left side-right foot and left side-left foot combination the most, whereas bottom six teams used the right foot to deliver the ball regardless of corner position. Top six teams used more outswinging deliveries whereas the bottom six teams used more inswinging deliveries, but both frequently delivered the ball into the 18-yard box directly through the air (delivery type $\chi^2 = 145.37; p < 0.001$). Top and bottom six teams both delivered more

corners to the GA1 and CA2 (delivery zone, $\chi^2 = 48.00$; $p < 0.001$) compared to other areas.

Top six teams operated frequently with a dynamic attacking organisation during ball deliveries, ($\chi^2 = 73.58$; $p < 0.001$), whereas the bottom six teams operated both static and dynamic attacking strategies in equal measure. Top six teams and bottom six teams commonly employed one intervening attacker (intervening attackers, $\chi^2 = 18.39$; $p < 0.001$) relative to six or more defenders during ball deliveries (number of defenders, $\chi^2 = 11.20$; $p = 0.01$). Top six teams and bottom six teams used mostly combined marking, although the top six teams also used man-to-man marking more frequently (type of marking, $\chi^2 = 68.98$; $p < 0.001$). Top six teams took corner kicks frequently when winning or drawing, whereas bottom six teams took most corner kicks when losing or drawing (match status, $\chi^2 = 188.52$; $p < 0.001$), however both had higher frequencies of corner kicks when drawing. There were no notable trends for time elapsed in the match ($\chi^2 = 14.74$; $p = 0.01$).

****Table 4 near here****

Bivariate Analysis

Bivariate analyses with contingency tables were employed to analyse the influence of variables on corner kick success, classified as ATTEMPT ON TARGET (EXCLUDING GOALS), or GOAL. The application of χ^2 and calculation of contingency coefficient revealed several variables associated with successful corner kicks.

Table 5 displays the results for ATTEMPTS ON TARGET (EXCLUDING GOALS). The following variables were associated with attempts on target (excluding goals): Position of corner ($\chi^2 = 4.25$; $p = 0.04$), delivery zone ($\chi^2 = 48.18$; $p < 0.001$),

attacking organisation ($\chi^2 = 7.92$; $p = 0.05$), number of defenders on the post ($\chi^2 = 43.36$; $p < 0.001$) and interaction context ($\chi^2 = 209.06$; $p < 0.001$). Based on the contingency coefficient, number of defenders on the post and interaction context were strongly associated with attempts on target ($C = 0.315$ and $C = 0.588$ respectively) but were not affected by league position (see Table 6).

Corner kicks resulting in an attempt on target occurred more frequently when the ball was delivered into CA1 (47.1%) and CA2 (56.0%) compared to the other zones. From the attempts on target the bottom six teams (CA1 21.4%; CA2 21.4%) had more attempts from these central areas compared to the top six teams (CA1 13.7%; CA2 15.7%). In comparison the top six teams created considerably more attempts on target from the front zone (17.6%) compared to the bottom six teams (0%). Further, corner kicks resulting in an attempt on target occurred more frequently when the attacking organisation was dynamic (32.5%) and operating on a numerical inferiority (65.3%) with two defenders situated on the post (85.0%). The attempts which were on target occurred more frequency from top six team using a dynamic attacking organisation (63.5%) compared to the bottom six teams (40.4%).

Table 5 near here

Table 6 near here

Table 7 displays the results for GOAL. The following variables were associated with goals scored: Attacking organisation ($\chi^2 = 5.22$; $p = 0.02$), number of defenders on the post ($\chi^2 = 18.79$; $p < 0.001$), interaction context ($\chi^2 = 138.96$; $p < 0.001$) and match status ($\chi^2 = 34.26$; $p < 0.001$). Based on the contingency coefficient interaction, context and match status were strongly associated with goals scored from corner kicks ($C =$

0.51 and $C = 0.28$). Corner kicks resulting in a goal occurred more frequently when the attacking organisation was dynamic (21.3%), operating a numerical inferiority (46.7%), whilst negating two defenders situated on the post (50.0%). Data also suggests that goals scored from corner kicks are more common when teams are drawing (33.3%).

****Table 7 near here****

Team position did not affect the strategy through which goals were scored from corner kicks, however, dynamics attack organisation (72.9%) with zero defenders on the posts (61.8%) were the most common when goals were scored (see Table 8).

****Table 8 near here****

Discussion

Our aim in this study was to compare attacking corner kick strategies employed by the top and bottom six teams of the 2015/2016 English Premier League season to determine the effectiveness of these corner kicks and identify variables associated with attempts on target and goals scored. Collectively, an average of 10.6 corner kicks were taken per match (4-7 per team), which is in line with previous reports that highlight corner kicks as being relatively infrequent in elite soccer (Casal et al., 2015; De Baranda & Lopez-Riquelme, 2012; Taylor et al., 2005). The outcome of the corners resulted in an attempt at goal 9.9% of the time, in which 6.7% were on target and 3.1% resulted in a goal. The importance of corners was further evidenced with goals scored from corner kicks contributing to team success, with the scoring team claiming a draw or victory in 67.0% of cases, supporting previous findings that although corners are relatively infrequent, they often have a decisive impact on the outcome of matches (e.g.,

Casal et al., 2015, Casal, Andujar, Losada, Ardá, & Maneiro, 2016; Pulling, 2015). Results demonstrate that corner kicks may be more important for lower level teams to create goals as 14.1% of their overall goals scored came from corner kicks, in comparison to 9.3% for the top level teams, although this difference was not statistically significant ($p = .059$).

Despite the success rates between the top and bottom six teams not being statistically different, significant differences were observed in their delivery behaviours. The top six teams were more varied in the player's foot used to deliver the ball (i.e., laterality of corner), whilst top teams also produced significantly more outswinging than inswinging deliveries in comparison to the bottom teams regardless of corner position (see Table 4). These findings supplement previous research, which has established that higher placed teams take corners frequently with the same foot as the side of the pitch (Casal et al., 2015; Taylor et al., 2005).

Similar to Pulling (2015), all teams delivered a higher frequency of corners into the zones directly in line with the front of the goal or goal post (GA1, GA2 and CA2), suggesting these are the most targeted areas for corner delivery. When examining the most effective zone to create overall attempts on target, zones GA1 (43.8%), CA1 (47.1%), CA2 (56.0%) and inside middle (43.5%) were the most effective areas (see Figure 1 and Table 5), supporting previously published findings (e.g., Schmicker, 2013; Taylor et al., 2005). However, when considering delivery zones and attempts on target as a function of team level, significant differences emerged between the top and bottom six teams. For the bottom six teams 57.1% of their attempts on target (in comparison to 33.3% for the top six teams) came from corners delivered in to zones CA1 (bottom six 21.4% vs top six 13.7%), CA2 (bottom six 21.4% vs top six 15.7%), and CA3 (bottom six 14.3% vs top six 3.9%) in comparison to other zones. When combining deliveries in

to these zones with delivery style (i.e. bottom 6 teams favoured inswinging deliveries with the ball curling towards the goal), it is proposed the bottom teams were looking to swing the ball inwards towards the central goal area. In contrast, the top six teams demonstrated more variation in the zone of delivery with a reduced proportion of attempts at goal resulting from corners delivered in to these zones favoured by bottom six teams. Instead, a significantly greater proportion of attempts at goal for top six teams relative to bottom six teams came from corners delivered in to zones CA5 (top six 13.7% vs bottom six 7.1%) and the front zone (top six 17.6% vs bottom six 0.0%). With top six teams also using significantly more outswinging deliveries (i.e. the ball curling away from the goal) than bottom 6 teams, this will have resulted in the ball swinging away from the goalkeeper, or towards outer sections of the box (CA5) to develop more complex passages of play to create goal scoring chances. Although delivery zone was important for creating an attempt at goal, this did not stand true for goal scoring. Hence, delivery zone is shown to be important for creating goal-scoring opportunities, but it may then be down to the skill of the attacking players to convert that chance into a goal, although future research would be required to confirm this suggestion.

Collectively, the use of dynamic attacking organisation resulted in significantly more attempts on target compared to a static organisation. However, the top six teams employed a dynamic attacking organisation (all players moving) significantly more frequently during delivery than the bottom six teams. This significant difference in attacking organisation between top and bottom six teams may also be linked to the delivery zone strategies employed. With there being significantly more attempts on target from the front zone by the top six teams in comparison to the bottom six, this front zone strategy could be linked with the dynamic attacking organisation. The top six teams may employ dynamic attacking organisation to attack the front zones to either

head the ball directly at goal or create space in deeper areas to ‘flick’ the ball in to for other attackers to run on to. In contrast, the bottom six teams may be looking for consistent inswinging deliveries to the central areas of the penalty area, and hence position themselves in more static positions where the corner kick taker can target delivery towards specific players or zones. Importantly, when examining the goals scored from total attempts (see Table 7), a dynamic attacking organisation resulted in significantly more goals being scored in comparison to static organisation. However, there were no significant differences between the top and bottom 6 teams, with both scoring more goals through dynamic attacking organisation. Hence, it is suggested that teams adopt a dynamic attacking organisation strategy regardless of other tactics being employed.

From an applied perspective, the dynamic attacking organisation may force the defensive unit/system to become disturbed and disorganised, which increases uncertainty in the defending players and allows attacking players to exploit free space (Silva et al., 2014). For example, during near post runs (GA1 and CA1) where attacking players are able to arrive on the ‘blind side’ of the zonal marker (usually situated in GA1) and challenge for the ball. These findings demonstrate how movements in space by one element (dynamic attacking organisation) of a coordinative system (i.e., attackers and defenders), increase the chances of goal scoring (Vilar, Araújo, Davids, & Button, 2012). Applying theoretical principles of system organisation and pattern formation to learning design in soccer, this characteristic may be seen as a process of soft assembly in which emergent decisions and movements in one versus one situations (player movements within the box) are tailored to the immediate performance context to satisfy some general goal (produce a goal from the corner kick) (Ric et al., 2016).

In soccer, there is a common perception that defending teams should position a player on each of the goalposts during the corner kick. The data analysed and reported here reveals that this strategy was not typically employed with 46.8% of corners having zero defenders on the posts, 40.1% having one defender, and only 13.0% employing two defenders on the posts. Despite being used less frequently, when two defenders were employed on the posts this resulted in an attempt on target 85% of the time, which subsequently led to a goal being scored 50% of the time. However, there were no significant differences between the top and bottom six teams. Hence, our data supports the suggestion by Power, Hobbs, Ruiz, Wei, and Lucy (2018) that teams are actually more likely to concede goals when they have two players on the posts compared to when they do not.

It is important to acknowledge how match status influenced the corner kick strategy used by teams, with the bottom six teams having an increased proportion of their corners when losing the match (41.4% vs 19.2% respectively) and during the final 15 minutes (21.4% vs 16.0% respectively). Hence, corners seem a common method for lower level teams to attempt to score in the final stages of the game while trying to overturn a losing position. However, overall, teams were significantly more likely to score from a corner while drawing (33.3%) or winning (20.7%) in comparison to being in a losing position (7.2%) (see Table 7).

Concerning the limitations of the current study, it is important to acknowledge that it represents an initial investigation to compare corner kick strategies as a function of team league placing and so findings should be treated with some caution. It is advisable that researchers seek to further this investigation by conducting similar comparisons across the different English leagues and also across different countries (e.g., La Liga, Ligue 1, Serie A, Bundesliga) as this would provide a broader

perspective of corner strategies. It would also potentially provide interesting insights in to how corner kick strategies are affected by not only level of success, but also how constraints such as level of competition and country of competition shape the strategies that are employed. Furthermore, these analyses focused solely on offensive corner kick strategies and future research should address the defensive corner kick strategies used by teams of similar and different levels to supplement the design of practice tasks and ensure they are representative of constraints specific to the defensive aspects of corner kick skill.

Aligned with the principles of representative learning design (see Pinder, Davids, Renshaw, & Araújo, 2011), soccer coaches should use the results of these analyses to inform practice tasks that promote a varied corner kick delivery, dynamic attacking organisation and adaptive variability, and advance decision-making capabilities in attacking players (Araújo, Davids, & Hristovski, 2006; Silva et al., 2016). Implementing these conditioned practice tasks would uphold a representative learning design in the practice environment and afford performers with opportunities to detect the affordances (opportunities for action) innate to the corner kick skill identified in these analyses (Pinder et al., 2011).

Conclusions

The conclusions from this study are 1) in the EPL corner kicks are uncommon and largely ineffective, but are influential in the final result of the match; 2) top teams are more dynamic and adaptive in execution and delivery of corner kicks than lower ranked teams; 3) more elaborate corner kicks, delivered directly, with a dynamic attacking organisation are more effective for goal scoring. However, future research is required to provide impetus on how balanced and unbalanced matches impact the

strategies exhibited by teams in professional football.

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521 Table 1. Top six and bottom six teams from the 2015/2016 EPL season (Retrieved from:
 522 <https://www.premierleague.com/tables>).
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Position Finished	Team	Total Points	Total Corners	Corners Meeting Inclusion Criteria
1	Leicester City	81	197	165
2	Arsenal	71	224	218
3	Tottenham Hotspur	70	254	232
4	Manchester City	66	257	245
5	Manchester United	66	228	183
6	Southampton	63	220	213
15	Crystal Palace	42	216	208
16	Bournemouth	42	221	193
17	Sunderland	39	150	147
18	Newcastle United	37	159	154
19	Norwich	34	189	182
20	Aston Villa	17	167	162

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528 Table 2. Key performance indicators and operational definitions for the corner kick
 529 outcomes. Adapted from Pulling Robins, and Rixon (2013), Casal et al. (2015) and
 530 Pulling (2015).

Variable	Definition
Time	Time on game video: 0-15 minutes, 16-30 minutes, 31-45+ minutes, 46-60 minutes, 61-75 minutes, 76-90+ minutes.
Position of corner	Right or Left.
Laterality of corner	Natural: Right-foot kick from right wing or left-foot kick from the left wing. Switched: Right-foot kick from the left wing or left foot-kick from the right wing.
Delivery type	Direct: The ball is sent to the shot zone with just one touch. Inswing: Ball is spinning/curling towards the goal. Outswing: Ball is spinning/curling away from the goal. Driven: Ball is kicked at high speed, with no spin, with a flat trajectory. Clipped: Ball is kicked at low speed, with no spin, with a looping trajectory. Indirect: The ball is sent to the shot zone after several touches (If delivery into the box is made within a maximum of four passes, if corner exceeds this then it will be excluded as it becomes a possession in open play).
Delivery Zone	Delivery zone was defined as the location where a player first made contact with the ball, after the corner kick was taken. The location of each delivery zone is displayed in Figure 1.
Number of attackers	Players on the team being observed are attacking and in a position to receive the ball (2-3), (4-5) (6 or more).

Attacking organisation	<p>Static: The players on the team being observed stay in their set positions during the corner kick.</p> <p>Dynamic: The players on the team being observed vary from their set positions during the corner kick .</p>
Number of defenders	Four or five players on the team not being observed are defending and in a position to recover the ball (4-5) (6 or more). (I.e. In the box).
Type of marking	<p>Zonal marking set-up was recorded when the majority of the defending players within the penalty box was positioned at a particular spatial sector prior to the corner kick being taken.</p> <p>Man-to-Man marking set-up was recorded when the majority of the defending players within the penalty box was positioned against a specific member of the opposition prior to the corner kick being taken.</p> <p>Combined: some next to defenders some next to the post.</p>
Number of defenders on the post	Positioning of defensive players at the goalposts (only a player on the near post; only a player on the far post; players positioned on both the near and far posts; or no defensive players on the goalposts) was recorded.
Interaction context	<p>Numerical inferiority: The attacking team has fewer players than the defending team in the shot zone.</p> <p>Numerical equality: The attacking team has the same number of players as the defending team in the shot finish zone.</p> <p>Numerical superiority: The attacking team has more players than the defending team in the shot finish zone.</p>

Corner kick outcome: offensive	<p>Goal: The ball went over the goal line and into the net. The referee awarded a goal.</p> <p>Attempt on target, excluding goals: The ball would have entered the net, but for being prevented by a goalkeeper or defender save.</p> <p>Attempt off target: Any attempt by the attacking team that was not directed within the dimensions of the goal. An attempt that made contact with the crossbar or either of the posts was classified as an attempt off target.</p> <p>Attempt miss hit: Any attempt by the attacking team that was not directed within the dimensions of the goal.</p> <p>Ball exited the ball no contact: Any player did not touch the ball and the ball exited the 18-yard box.</p> <p>Attacking free kick/pen: The referee awarded a free kick/penalty to the attacking team.</p> <p>Flick on or pass: An attacking player touch the ball onto another attacking player.</p> <p>Defensive Clearance: The goalkeeper or defensive player from the opposition either regained possession or cleared the ball from the 18 yard box</p>
Number of intervening attackers	Number of players on the team being observed moving towards the direction of the ball or situated in position where they could visibly touch the ball on delivery (0, 1, 2, 3-4).
Match status	<p>Winning: Goal tally higher for the observed team.</p> <p>Drawing: Goal tally for observed team equal with opponent.</p> <p>Losing: Golly tally lower for the observed team.</p>

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Table 3. Intra-observer and Inter-observer reliability values for the notional analysis data quantified through the calculation of Cohen's Kappa.

Categories	Intra-rater	Inter-rater
	Observer ₁ - Observer ₁	Observer ₁ - Observer ₂
Time	1.00	1.00
Position of corner	1.00	1.00
Laterality of corner	1.00	1.00
Delivery type	0.96	0.92
Delivery Zone	0.75	0.70
Number of attackers	0.95	0.94
Attack organisation	0.82	0.78
Number of defenders	0.94	0.94
Type of marking	0.81	0.75
Number of defenders on the post	0.94	0.94
Interaction context	0.83	0.80
Corner kick outcome: offensive	0.83	0.88
Number of intervening attackers	0.98	0.95
Match status	1.00	1.00
K_{total}	0.92	0.90

*When: $k = (p_o - p_c) / (1 - p_c)$

549 Table 4. Relative frequencies for variables related to the execution of corners for the
550 top six and bottom six teams (N = 2303).

Variables		Position in the league			χ^2	Sig.
		Overall	Top six	Bottom six		
Time	0-15	15.5%	16.4%	14.4%	14.74	0.01
	16-30	13.6%	14.6%	12.2%		
	31-45+	16.6%	17.5%	15.6%		
	46-60	18.2%	17.8%	18.8%		
	61-75	17.6%	17.7%	17.5%		
	76-90+	18.5%	16.0%	21.4%		
Laterality of corner	Right Side-Right Foot	24.8%	24.2%	25.5%	77.85	<0.001
	Right Side-Left Foot	25.1%	24.9%	25.3%		
	Left Side-Right Foot	28.3%	22.9%	34.8%		
	Left Side-Left Foot	21.8%	28.0%	14.3%		
Delivery type	Direct: Inswing	43.0%	38.5%	48.5%	145.40	<0.001
	Direct: Outswing	38.0%	45.9%	28.5%		
	Direct: Driven	3.0%	2.3%	3.8%		
	D-Clipped	5.2%	1.4%	9.9%		
	Indirect	10.7%	11.9%	9.3%		
Delivery zone	GA1	15.9%	16.2%	15.5%	48.00	<0.001
	GA2	13.1%	13.4%	12.8%		
	GA3	4.4%	3.9%	5.1%		
	CA1	10.2%	11.2%	9.0%		
	CA2	18.2%	16.5%	20.3%		
	CA3	5.6%	5.4%	5.9%		
	CA4	2.3%	2.4%	2.2%		
	CA5	5.2%	6.0%	4.3%		
	CA6	2.1%	1.6%	2.6%		
	Front Zone	10.4%	12.9%	7.3%		
	Inside Middle	7.1%	7.0%	7.2%		

	Back Zone	4.4%	2.9%	6.2%		
	Outside Middle	1.0%	0.6%	1.4%		
Attacking organisation	Static	40.4%	32.3%	50.0%	73.58	<0.001
	Dynamic	59.6%	67.7%	50.0%		
Number of defenders	4-5	5.3%	6.7%	3.6%	11.20	0.01
	6+	94.7%	93.3%	96.4%		
Type of marking	Man-to-man	37.5%	44.8%	28.7%	69.00	<0.001
	Zonal	5.8%	6.3%	5.3%		
	Combined	56.7%	48.9%	66.0%		
Number of defenders on the post	0	46.8%	44.1%	50.1%	7.12	0.03
	1	40.1%	42.2%	37.7%		
	2	13.0%	13.7%	12.2%		
Match status	Winning	20.0%	28.1%	10.3%	188.52	<0.001
	Drawing	50.7%	52.7%	48.3%		
	Losing	29.3%	19.2%	41.4%		
Corner kick outcome	Goal	3.1%	3.3%	2.9%	5.148	0.642
	Attempt on target	4.4%	4.5%	4.2%		
	Attempt off target	9.1%	9.0%	9.2%		
	Attempt miss hit	0.6%	0.6%	0.5%		
	Attempt free kick or penalty	0.3%	0.2%	0.4%		
	Ball exited the box with no contact	5.0%	5.2%	4.8%		
	Fick on or pass	0.3%	0.5%	0.1%		
	Defensive clearance	77.3%	76.7%	77.9%		

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555 Table 5. Corner kick success analysed by attempt on target (excluding goals) (N =
556 99/395)

		Criterion 2: ATTEMPT ON TARGET (EXCLUDING GOALS)				
Variables		Yes	No	χ^2	Sig.	Contingency Coefficient
Position of corner	Right	29.5%	70.5%	4.25	0.04	0.103
	Left	20.5%	79.5%			
Delivery zone	GA1	43.8%	56.2%	48.18	<0.001	0.33
	GA2	14.3%	85.7%			
	GA3	4.1%	95.9%			
	CA1	47.1%	52.9%			
	CA2	56.0%	44.0%			
	CA3	26.7%	73.3%			
	CA4	16.7%	83.3%			
	CA5	30.7%	69.2%			
	CA6	14.0%	86.0%			
	Front Zone	20.8%	79.3%			
	Inside Middle	43.5%	56.5%			
	Back Zone	16.7%	83.3%			
Attacking organisation	Static	20.0%	80.0%	7.92	0.05	0.14

Dynamic		32.5%	67.5%			
Number of defenders on the post	0	18.7%	81.3%			
	1	26.7%	73.3%	43.36	<0.001	0.315
	2	85.0%	15.0%			
	Numerical inferiority		65.3%	34.7%		
Interaction context	Numerical equality		0.0%	100.0%	209.06	<0.001
	Numerical superiority		5.0%	95.0%	0.588	

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570 Table 6. Relative frequencies of the top six and bottom six teams related to execution of
571 corners resulting for an attempt on target (excluding goals) (N = 99).

Variables		League Position			χ^2	Sig.
		Overall	Top six	Bottom six		
Position	Left	40.2%	36.5%	44.7%	0.68	0.41
	Right	59.3%	63.5%	55.3%		
Delivery zone	GA1	5.4%	7.8%	2.4%	21.37	0.045
	GA2	5.4%	7.8%	2.4%		
	GA3	2.2%	0.0%	4.8%		
	CA1	17.2%	13.7%	21.4%		
	CA2	18.3%	15.7%	21.4%		
	CA3	8.6%	3.9%	14.3%		
	CA4	1.1%	0.0%	2.4%		
	CA5	10.8%	13.7%	7.1%		
	CA6	5.4%	5.9%	4.8%		
	Front Zone	9.7%	17.6%	0.0%		
	Inside Middle	10.8%	9.8%	11.9%		
	Back Zone	3.2%	3.9%	2.4%		
	Outside Middle	2.2%	0.0%	4.8%		
Attacking organisation	Dynamic	52.5%	63.5%	40.4%	5.25	0.022
	Static	47.5%	36.5%	59.6%		
Number of defenders on the post					0.37	0.83
	0	42.4%	42.3%	42.6%		
	1	40.4%	38.5%	42.6%		
	2	17.2%	19.2%	14.9%		
Interaction context	Numerical inferiority	99.0%	100.0%	97.9%	1.118	0.29
	Numerical equality	0.0%	0.0%	0.0%		
	Numerical superiority	1.0%	0.0%	2.1%		

Table 7. Corner kicks success analysed by goal (N=70/395)

Variables		Criterion 3: GOALS				
		Yes	No	χ^2	Sig.	Contingency Coefficient
Attacking organisation	Static	12.3%	87.7%	5.22	0.02	0.114
	Dynamic	21.3%	78.8%			
Number of defenders on the post	0	19.1%	80.9%	18.79	<0.001	0.213
	1	11.3%	88.7%			
	2	50.0%	50.0%			
Interaction context	Numerical inferiority	46.7%	53.3%	138.96	<0.001	0.510
	Numerical equality	0.0%	100.0%			
	Numerical superiority	0.0%	100.0%			
Match status	Winning	20.7%	79.3%	34.26	<0.001	0.283
	Drawing	33.3%	66.7%			
	Losing	7.2%	92.8%			

Table 8. Relative frequencies of the top six and bottom six teams related to execution of corners resulting in a goal (N = 70).

Variables		League Position			χ^2	Sig.
		Overall	Top six	Bottom six		
Attack Organisation	Static	27.1	27.78	26.47	0.015	0.902
	Dynamic	72.9	72.22	73.53		
Defenders on Post	0	61.8	50	73.5	4.368	0.113
	1	24.0	33.33	14.7		
	2	14.2	16.67	11.7		
Match Status	Win	25.8	33.33	18.18	2.372	0.305
	Draw	55.4	47.22	63.6		
	Lost	18.8	19.44	18.18		