

Analysis of attacking corner kick strategies in the FA women's super league 2017/2018

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1 **Analysis of Attacking Corner Kick Strategies in the FA Women's**
2 **Super League 2017/2018**

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19 The datasets generated during and/or analysed during the current study are not
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21 request.

22

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29 **Analysis of Attacking Corner Kick Strategies in the FA Women's**
30 **Super League 2017/2018**

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32 This study describes how corner kicks were taken across the 2017/2018 FA
33 Women's Super League season and assesses the effectiveness of these attacking
34 corner kick strategies. A total of 824 corner kicks were analysed examining
35 delivery type, delivery area and attack organisation on corner kick outcomes. A
36 total of 38 goals were scored (4.6% of corners taken resulted in a goal) from the
37 corner kicks, accounting for 13.5% of the total 282 goals scored during the
38 2017/2018 season. Corner delivery type did not affect the outcome of the corner (p
39 > 0.05). However, delivery zone effected both the likelihood of an attempt on
40 target ($p = 0.018$) and goal being scored ($p < 0.001$). Attempts on target were
41 increased when the ball was delivered into the central area of the 18-yard box (zone
42 CA2) with 14.7% of corners delivered to CA2 resulting in an attempt on target.
43 Goals were most likely to be scored when the ball was delivered into the central
44 zone but closer to the goal line (zone GA2) with 13.0% of corner kicks delivered to
45 this zone resulting in a goal. These results can aid coaches to enhance the attacking
46 effectiveness of corner kicks within Women's soccer.

47 Key words: Performance analysis; Set pieces; Football; Soccer

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55 **Introduction**

56 Performance analysis is now an integral part of the coaching process in soccer
57 (Carling, Williams, & Reilly, 2005; Groom, Cushion, & Nelson, 2011; Hodges &
58 Franks, 2002). There has been a continued growth of performance analysis research
59 focusing of set plays within men’s soccer (e.g., Kubayi & Larkin, 2019; Strafford,
60 Smith, North, & Stone, In Press). Performance analysis research within women’s soccer
61 has also increased in recent years, for example, examining attacking strategies leading
62 to goal scoring opportunities (Bergier, Soroka, & Buraczewski, 2009; Mara, Wheeler, &
63 Lyons, 2012), comparing women’s soccer performances in international and domestic
64 league games (Andersson, Randers, Heiner-Møller, Krustup, & Mohr, 2010; Krustup
65 et al., 2009) and the effects of scoring first on match outcome (Ibáñez, Pérez-Goye,
66 Courel-Ibáñez, & García-Rubio, 2018). Despite this increase there is still significantly
67 less research, specially examining set plays within women’s soccer compared to the
68 men’s game.

69 During soccer matches, when the ball runs out of the playing area or play is
70 stopped due to fouls, the game is restarted through set plays (e.g., penalty kicks, free
71 kicks, corner kicks, and throw-ins). Set plays account for 30% to 40% of goals scored in
72 elite men’s soccer (Armatas, Yiannakos, & Sileloglou, 2007; Yinnakos & Armatas,
73 2006) and provide a 1.8% chance of scoring a goal compared to a 1.1% chance in open
74 play (Power, Hobbs, Ruiz, Wei, & Lucey, 2018). Hence, set plays are critical game
75 events for successful offensive performance (Janković, Leontijević, & Mićović, 2011).
76 Corner kicks are one form of set play and are awarded when the whole of the ball passes
77 over the goal line, on the ground or in the air, having last touched a player of the
78 defending team, and a goal is not scored (Law 17, International Football Association
79 Board, 2019). With an average of 10 corners per game in men’s soccer (Casal, Maneiro,
80 Ardá, Losada, & Rial, 2015; Siegle & Lames, 2012; Taylor, James, & Mellalieu, 2005),

81 corner kicks are considered an important form of set play as they provide more goal
82 scoring opportunities than free kicks (Mara et al., 2012; Page & Robins, 2012; Taylor et
83 al., 2005) with a 2.1% chance of scoring from a corner compared to 1.1% chance from a
84 free kick (Power et al., 2018).

85 Research examining attacking corner kicks in men's soccer have mainly
86 focussed on delivery type (Casal et al., 2015), delivery area (Pulling, 2015) and overall
87 effectiveness in the men's game (Strafford et al., In Press). Although corner kicks
88 produce frequent opportunities to score, they are not very effective at producing goals
89 with 2.1% to 2.9% of corners taken resulting in a goal being scored in men's soccer
90 (Casal et al., 2015; De Baranda & Lopez-Riquelme, 2010; Power et al., 2018; Pulling &
91 Newton, 2017; Taylor et al., 2005). Despite this, the goals scored from corner kicks are
92 decisive on game outcome, in the 2015/2016 English Premier League, 67% of goals
93 scored from corners contributed towards the team winning or drawing the game
94 (Strafford et al., In Press). Taylor et al. (2005) analysed corner kick delivery area in
95 men's soccer and highlighted the importance of a 'critical area' for deliveries to be
96 made in to, defined as the area 6-12 yards from the goal line, within the width of the
97 goal area. Pulling (2015) found a significant association between attempts at goal and
98 delivery area, yet no significant association between delivery type and attempts at goal;
99 suggesting that delivery area is more important than delivery type in regard to creating
100 attempts at goal. This important finding needs further assessment within a professional
101 women's league.

102 Set plays, specifically corners, seem to be important match events within men's
103 soccer. However, the importance of corner kicks in the professional women's game has
104 yet to be investigated. Therefore, a season long analysis exploring the attacking corner
105 kick strategies in the 2017/2018 FA Women's Super League may identify those

106 variables that are considered the most important for creating goal scoring opportunities
107 from corner kicks in the women's game. Therefore, the aims of this research were to
108 first, describe how corner kicks were taken across the 2017/2018 season, and second,
109 determine the effectiveness of these different types of corner kicks and identify key
110 variables associated with attempts on target and goal scoring.

111

112 **Methods**

113 ***Match Sample***

114 A total of 824 corner kicks were analysed from 89 games in the 2017/2018 FA
115 Women's Super League with all teams in the league being included in the study. Corner
116 kicks could not be sampled from one game (Manchester City Women v Everton Ladies
117 FC - 20/05/18) due to footage being unavailable. Each corner was cropped from full
118 game footage sourced from Wyscout (Wyscout 2017, Chiavari, Italy), being defined
119 when the whole of the ball passed over the goal line, on the ground or in the air, having
120 last touched a player of the defending team, and a goal was not scored (International
121 Football Association Board, 2019). Corner kicks were considered complete when the
122 ball exited the 18-yard box and did not immediately re-enter (Pulling, Robins, & Rixon,
123 2013). The Local University ethics committee granted approval for the study.

124

125 ***Procedures and Measures***

126 Corner kicks were analysed using a custom notational instrument using
127 SportsCode performance analysis software (Agile Sports Technologies 2018, Lincoln,
128 NE). The coding system was developed using the operational definitions selected from
129 empirical research on corner kicks in the men's games (Casal et al., 2015; Pulling et al.,
130 2013; Pulling, 2015; Pulling & Netwon, 2017) and are outlined in table 1 and figure 1.

131

157 statistic of $k = 0.90$ and $k = 0.88$, corresponding to 'excellent' intra- and inter-observer
158 agreement respectively (Fleiss, Levin, & Paik, 2003).

159

160 **Table 2 near here**

161

162 ***Data Analysis***

163 Data was exported from SportsCode and descriptive analyses were completed in
164 Microsoft Excel (Version 14.7.1, Microsoft Cooperation, United States) to calculate
165 relative frequencies for each variable. The data were analysed further in SPSS (Version
166 24.00 SPSS Inc., USA). An important assumption of the chi-squared test is that the
167 expected values should not be less than 5 (Field, 2009). To prevent this assumption
168 being violated, the delivery area was collapsed by combining CA1 and GA1 to create an
169 area at the front of the 6-yard box, (GA&CA1), combining GA3 and CA3 to create an
170 area at the back of the 6-yard box, (GA&CA3), and combing the frontzone, backzone
171 and edge to create a combined outer zone.

172 Bivariate analyses (χ^2) were employed to analyse *attempts on target* and *goals*
173 scored. The following associations were tested via chi squared: (1) attempts on target in
174 relation to delivery area, (2) goals scored in relation to delivery area, (3) attempts on
175 target in relation to the delivery type, (4) goals scored in relation to the delivery type,
176 (5) attempts on target in relation attack organisation, and (6) goals scored in relation to
177 attack organisation. The alpha level was set at .05. Cramer's V (V) effect sizes were
178 calculated and described as small ($V = 0.10$), medium ($V = 0.30$) or large ($V \geq 0.50$)
179 (Gravetter & Wallnau, 2007).

180 **Results**

181 ***Descriptive Analysis***

182 A total of 824 attacking teams' corner kicks were analysed within the study, an
183 average of 9.3 corners per game (see table 3). There was a total of 276 (33.5% of
184 corners taken) attempts at goal from the corners analysed, of which, 122 (14.8%) were
185 attempts off target, 77 (9.3%) attempts on target excluding goals and 38 resulting in a
186 goal (4.6% of total corners). Goals from these corners accounted for 13.5% of the total
187 282 goals scored within the 2017/2018 FA Women's Super League season. The most
188 frequent corner outcome was loss of possession (434) which accounted for 52.7% of all
189 corners analysed.

190 **Table 3 near here**

191 *Corner Delivery Type*

192 The most frequent delivery type was an inswing delivery (36.7% of total corners) with
193 the least frequently delivery type being short (5.0% of total corners). However, corner
194 kick delivery type was not associated with the creation of attempts on target ($\chi^2_4 =$
195 4.057, $p = 0.398$, $V = 0.070$) or if a goal was scored ($\chi^2_4 = 0.893$, $p = 0.926$, $V = 0.033$)
196 (see table 4).

197 **Table 4 near here**

198

199 *Delivery Area*

200 Corner kicks were most frequently delivered into CA2 (156 corners; 18.9% of
201 total corners) whereas the least number of corners were delivered to the back zone (23
202 corners; 2.8% of total corners). There was a significant association for the likelihood of
203 an attempt on target, $\chi^2_4 = 11.918$, $p = 0.018$, $V = 0.121$ with 14.7% of corners delivered
204 to zone CA2 resulting in an attempt on target. Corners delivered to the combined outer
205 zones (backzone, frontzone and edge) resulted in an attempt on target 11.5% of the time
206 in comparison to zones CA1&GA1 which had the lowest percentage of corners

207 resulting in an attempt on target (4.8%). For the likelihood of goals scored there was
208 also a significant association, $\chi^2_4 = 28.300$, $p < 0.001$, $V = 0.186$ with 13.0% of corners
209 delivered into GA2 resulting in a goal (19 out of 38 goals scored) (see figures 2 and 3).
210 No goals were scored from either the back zone or front zone.

211 **Figure 2 near here**

212 **Figure 3 near here**

213 *Attack Organisation*

214 There was no significant association for the type of attack organisation on attempts on
215 target ($\chi^2_1 = 2.098$, $p = 0.147$, $V = 0.05$) or goals scored ($\chi^2_1 = 0.523$, $p = 0.470$, $V =$
216 0.25). However, teams most commonly used a static attack organisation (80% of
217 corners) during corner kicks.

218

219 **Discussion**

220 The aim of this study was first to describe how corner kicks were taken across
221 the 2017/2018 FA Women's Super League season, and secondly assess the
222 effectiveness of these attacking corner kick strategies. In total, 824 corner kicks were
223 analysed within the study, which equated on average to 9.3 corners per game. This is in
224 line with previous research in men's soccer where an average of 10 corner kicks per
225 game occurred (Siegle & Lames, 2012; Taylor et al., 2005). Of the corners analysed,
226 4.6% resulted in a goal scored and accounted for 13.5% of the total 282 goals scored in
227 the 2017/2018 FA Women's Super League. Importantly, although corners appear
228 relatively inefficient (4.6%) at producing goals in the women's game, this is
229 approximately double that of efficiency values reported in the men's game (ranging
230 from 2.1% to 2.9%) (Casal et al., 2015; De Baranda & Lopez-Riquelme, 2010; Power et
231 al., 2018; Pulling & Newton, 2017; Taylor et al., 2005). Hence, suggesting that corner

232 kicks are more effective at producing goals in women's soccer compared to men's
233 soccer and should be an important area for teams to focus on during tactical and
234 technical preparation for matches.

235 The most frequent delivery type was the inswinger (36.7% of corners)
236 supporting previous research in the men's game that this is the most common type of
237 delivery (De Baranda & Lopez-Riquelme, 2010; Power et al., 2018; Pulling, 2015;
238 Strafford et al., In Press; Taylor et al., 2005). However, corner delivery type was not
239 associated with the creation of attempts on target or if a goal was scored. The inswing
240 delivery resulted in the lowest percentage (7.6%) of corners resulting in an attempt on
241 target. While the percentage of goals scored were similar across driven, inswinger,
242 outswinger and worked corners (4.0%-5.6%), with the lowest delivery type being short
243 (2.4%). This finding supports Pulling (2015) that delivery type might not be important
244 to achieve attempts on target or goals scored.

245 Examining corner kick delivery areas, there were significantly more attempts on
246 target achieved when the ball was delivered into the CA2, and outer areas. This support
247 research from men's soccer (e.g. Pulling, 2015; Strafford et al., In Press) with corner
248 kicks being most frequently delivered into CA2 and also resulting in the most attempts
249 on target. However, the likelihood of scoring from zones CA2 (3.2%) and outer zones
250 (3.3%) were low, meaning balls delivered centrally, but further away from the goal,
251 enabled attempts on target to be created, however, these were not effectively converted
252 into goals. In comparison, corner kicks were also frequently delivered into GA2 (17.4%
253 of total corners) and importantly, significantly increased the likelihood of scoring a goal
254 from this delivery area (13.0%) with 50.0% of all goals being scored from GA2. This is
255 in contrasts to literature within men's soccer where the majority of goals scored are
256 from corners delivered within the critical area, notably CA1 and CA2 (Casal et al.,

257 2015; Pulling, 2015). This is an important difference between attacking corner kicks
258 within men's and women's soccer and from the findings of this study could explain the
259 increase in efficiency, in terms of goals scored, in women's soccer compared to men's.

260 When descriptively examining the 38 goals scored (see figure 3), there was a
261 large proportion of goals resulting from inswing and driven deliveries, within the zone
262 (GA2) closest to the goal. It is proposed, unlike the men's game when often the
263 goalkeeper or defenders may regain possession or clear the ball in this central zone
264 closet to the goal; in the women's game it seems the attacking team can use this zone as
265 an effective method of scoring. Based on these results coaches in the women's game
266 may focus specifically on attacking corner kicks delivered in to GA2, as these were the
267 most effective at producing goals. Similarly, a recommendation for coaching practice
268 for the defensive teams is to work on technical and tactical methods to reduce the
269 effectiveness of this specific corner tactic. One possible way could be using principles
270 of Non-Linear Pedagogy (Chow, Renshaw, Button, Davids, & Tan, 2013), and
271 specifically focussing on representative learning design (Pinder, Davids, Renshaw, &
272 Araújo, 2011), to create training scenarios which recreate these specific corner kick
273 strategies identified here.

274 With this being one of the first examinations of women's corner kicks, future
275 research should continue to assess attacking corner kick strategies within the FA
276 Women's Super League to assess strategies over recent seasons. Alongside this,
277 research should explore attacking corner kick strategies across other top professional
278 women's leagues around the world and in international competitions; this will allow
279 comparisons and analysis to be made across a wider range of leagues. This will help to
280 develop the understanding of women's soccer and will aid coaching processes in
281 developing women's soccer on both a practical and research level, therefore enhancing

282 the game to the level of understanding currently available for professional men's soccer.
283 Furthermore, this study has focused on attacking variables, future work should explore
284 more defensive variable's, with a possible focus on the most effective strategies to
285 reduce goals being scored from zone GA2, to give further understanding into both
286 effective offensive and defensive tactical behaviours.

287

288 **Conclusion**

289 In conclusion this present study assessed the attacking corner kick strategies within
290 professional women's soccer. Findings demonstrate corner kicks occur frequently
291 within the women's game and are more efficient at producing goals in comparison to
292 the men's game. Corner kicks were frequently delivered in to CA2 which resulted in
293 attempts on target, however, goals are most frequently scored from corner kicks
294 delivered in to GA2. Future research should continue to assess attacking corner kick
295 strategies across multiple leagues and at international level of women's soccer to aid the
296 development of the professional women's game at a practical and research level, whilst
297 also allowing for results to be correlated and compared directly between studies.

298

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412 Table 1. Operational definitions for the corner kick outcomes, delivery type, and attack
 413 organisation. Adapted from (Casal et al., 2015; Pulling et al., 2013; Pulling, 2015;
 414 Pulling & Netwon 2017).

Variable	Definition
Corner Outcome	<p>Goal: The ball went over the goal line inside the dimensions of the goalposts. The referee awarded a goal.</p> <p>Attempt on target excluding goals: Any goal attempt that was heading towards the goal which was saved by the goalkeeper or blocked by a defensive player.</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>Lost possession: The attacking team lost possession of the ball as a result of the corner kick. This was defined when the ball exited the 18 yard box and was not re-delivered by the attacking team.</p> <p>Penalty: The defending team commits a foul during the corner kick phase and the referee awards a penalty kick.</p> <p>Free Kick: The referee awarded a free kick to the defensive team.</p> <p>Defensive block: Any goal attempt that was heading towards the goal and is immediately blocked by a defensive player.</p> <p>Goalkeeper catch: The goalkeeper gained possession of the ball by catching the ball.</p> <p>Goalkeeper punch: The goalkeeper made contact with the ball by using a punching action.</p>
Delivery Type	<p>Inswinger: The ball was kicked and moved through the air in a curve towards the goal.</p> <p>Outswinger: The ball was kicked and moved through the air in a curve away from goal.</p> <p>Driven: The ball was kicked with no curve and the ball entered the 18-yard box aerially with pace.</p> <p>Short Corner: The ball is kicked to an attacking player who is in short proximity to the initial corner kick taker; the initial ball does not immediately or directly enter the 18-yard box.</p> <p>Worked Corner: The corner kick is played where there is a clear corner kick routine in place by the attacking team.</p>
Attack 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>

415

416 Table 2. Intra-observer and Inter-observer reliability values for the notional analysis
 417 data quantified through the calculation of Cohen's Kappa.
 418

Categories	Intra-rater	Inter-rater
	Observer ₁ -Observer ₁	Observer ₁ - Observer ₂
Delivery type	0.88	0.88
Delivery area	0.95	0.90
Attack organisation	0.84	0.80
Corner outcome	0.91	0.92
K _{total}	0.90	0.88

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455 Table 3. Descriptive analysis of corner kicks (n =824) during the 2017-18 season

456

Variable	Absolute	Percentage
Delivery Type		
Driven	247	30.0%
Inswinger	303	36.8%
Outswinger	126	15.3%
Short	41	5.0%
Worked	107	13.0%
Delivery Area		
CA1	67	8.1%
CA2	156	18.9%
CA3	57	6.9%
GA1	122	14.8%
GA2	143	17.4%
GA3	89	10.8%
Back zone	23	2.8%
Front zone	52	6.3%
Edge	107	13.0%
N/A	8	1.0%
Attack Organisation		
Static	158	19.2%
Dynamic	666	80.8%
Corner Outcome		
Goal	38	4.6%
Attempt on target	77	9.3%
Attempt off target	122	14.8%
Shot blocked	39	4.7%
Foul: Free kick	26	3.2%
Foul: Penalty	3	0.4%
Loss of possession	434	52.7%
Goalkeeper punch	40	4.9%
Goalkeeper catch	42	5.1%
N/A	3	0.4%

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467 Table 4. Corner kick success analysed by attempts on target (excluding goals) and
 468 goals. Data is presented as absolute frequencies and percentages occurrence (stated in
 469 brackets).
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	Goal: Yes	Goal: No	Attempt on target: Yes	Attempt on target: No
Delivery Type				
Driven	11 (4.5%)	236 (95.5%)	21 (8.5%)	226 (91.5%)
Inswinger	15 (5.0%)	288 (95.0%)	23 (7.6%)	280 (92.4%)
Outswinger	5 (4.0%)	121 (96.0%)	15 (11.9%)	111 (88.1%)
Short	1 (2.4%)	40 (97.6%)	4 (9.8%)	37 (90.2%)
Worked	6 (5.6%)	101 (94.4%)	14 (13.1%)	93 (86.9%)
Delivery Area				
GA&CA1	5 (2.7%)	183 (97.3%)	9 (4.8%)	180 (95.2%)
CA2	5 (3.2%)	151 (96.8%)	23 (14.7%)	133 (85.3%)
GA&CA3	3 (2.1%)	141 (97.9%)	14 (9.6%)	132 (90.4%)
GA2	19 (13.0%)	127 (87.0%)	10 (7.0%)	133 (93.0%)
Outer Area	6 (3.3%)	176 (96.7%)	21 (11.5%)	161 (88.5%)
Organisation				
Dynamic	9 (5.7%)	149 (94.3%)	10 (6.3%)	148 (93.7%)
Static	29 (5.0%)	637 (95.6%)	67 (10.1%)	599 (89.9%)

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