Investigating lineout performance between the top and bottom four English Premiership rugby union teams in the 2016/17 season

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1 **Investigating lineout performance between the top and bottom four**

2 **English Premiership rugby union teams in the 2016/17 season**

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22 **Investigating lineout performance between the top and bottom four**

23 **Premiership rugby union teams in the 2016/17 season**

24   This study investigated lineout performance between the top and bottom four

25   English Premiership rugby union teams during the 2016/17 season. A season long

26   review was conducted analysing all of the top four ($n = 1152$) and bottom four

27   teams' ($n = 1124$) lineouts. Findings showed the number of tries scored

28   originating from a lineout play for the top four teams' (1.57 tries per match) was

29   higher in comparison to the bottom four teams' (1.10 tries per match) ($p < 0.05$).

30   Lineout success did not change between the top (87%) and bottom (85%) four

31   teams ($p > 0.05$). However, the top four teams were more effective in stealing

32   opposition possession at a lineout (17%) compared to the bottom four teams (9%,

33       $p < 0.05$). Additionally, top four teams showed a more forwards orientated style

34   of play using binding actions (top = 62%, bottom = 56%, $p < 0.05$) and maul

35   formation (top = 55%, bottom = 47%, $p < 0.05$). These results suggest coaches

36   should focus on analysis of opposition tactics in lineout play in an aim to develop

37   effective strategies to steal opposition possession at a lineout.

38   Keywords: contesting strategies; key performance indicators; lineouts; rugby

39   union; performance analysis

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1. Introduction

Rugby union is a team invasion sport which has seen a growth in popularity becoming a more commercialised, business orientated game with a larger emphasis placed on maximising performance through the use of analytical and scientific support (Austin, Gabbett, & Jenkins, 2011; Owen & Weatherson, 2004; Vaz, Mouchet, Carreras & Morente, 2011). Analytical support is traditionally used by a method of notational analysis which provides an objective way of quantifying performance in a reliable manner (Hughes & Franks, 2015). An essential component of analysis in rugby union match play is the 'lineout', which is a way of restarting the game once the ball has passed the plane of touch and allows for a quick, safe and fair competition for the ball (World Rugby, 2017). Two lines of players from opposing sides form within the 5 and 15-meter lines on the field of play with at least a meter gap separating them. The attacking side dictates the number of players committed to the lineout and the opposition can have an equal number or fewer players to contest for possession. An attacking player stood beyond the plane of touch (generally referred to as the 'hooker') throws the ball in an overhead manner down the centre of the two lines of players to allow the teams to contest for possession (World Rugby, 2017).

Sayers (2011) suggested lineouts are an important aspect of a team's attacking game because they are an excellent try scoring modality, with lineout success shown to be a factor that attributes to winning a match (Hughes & White, 1991; Jones, Mellalieu & James, 2004; Vaz et al., 2011). Winning teams typically have a greater percentage of success in winning the oppositions ball during the lineout in domestic European rugby as well as the Six Nations Championship (SNC) (Jones et al., 2004; Ortega Villarejo, & Palao, 2009). While losing teams have a greater number of lineouts lost (Ortega et al., 2009). However, conflicting research suggests that lineout performance may not always

74   act as a key discriminator in determining match outcome (Bishop & Barnes, 2013;

75   Ortega et al., 2009; Vaz, Rooyen & Sampaio, 2010). For example, no differences were

76   found in lineout success between winning and losing teams in the 2011 Rugby World

77   Cup (RWC) knockout stages (Bishop & Barnes, 2013). Bishop and Barnes (2013)

78   suggested the reason for not finding differences in lineout statistics was due to the

79   importance of lineout success being highlighted as an area of success in the modern

80   game and therefore an increased emphasis was placed on having a successful lineout.

81   Since 2000 onwards there was an increase in defending teams contesting the

82   throwing in teams' lineout and using it as a method of regaining possession (Quarrie &

83   Hopkins, 2007). Contesting a lineout can be defined by a player from the defending

84   team being lifted by a player from his own team in the lineout in an attempt to win

85   possession on the oppositions throw in (Eaves & Hughes, 2003; Quarrie & Hopkins,

86   2007). Vaz et al. (2010) suggested winning teams when defending had a greater success

87   rate in 'stealing' the attacking teams' lineout ball. However, with no differences found

88   in number of lineouts stolen per game to make this conclusion further research would

89   have to be conducted into contesting strategies used by opposition teams to support this

90   statement (Vaz et al., 2010). In addition, Vaz et al. (2010) suggested that contesting

91   strategies may be more effective in winning teams as stolen lineouts can be convert into

92   possession which may result in point scoring opportunities. However, a KPI of 'lineouts

93   lost' was recorded (Vaz et al., 2010; Vaz et al., 2011), this could indicate that the

94   lineout was lost due to attacking error or the opposition stealing possession. Hence,

95   further detailed KPI's are required to understand if it is poor attacking play, or good

96   defensive play leading to success in the lineout. This would enable the effectiveness of

97   contesting strategies used by defending teams at a lineout to be examined.

98   Although lineouts in rugby have been suggested as being a key component in

99   rugby union, limited research has performed a detailed analysis specially focused on the

100   lineouts. One exception is Franken, van Vuuren, Kraak and Vaz (2017) who

101   investigated lineout statistics between the SNC and The Rugby Championship (TRC)

102   including lineout formations, pitch locations of the lineouts, throwing targets, actions

103   during the lineout and actions post lineout. Franken et al. (2017) concluded that most

104   lineouts occurred in an attacking area between the 22 m line and the halfway line with

105   binding formation followed by pass being the most utilised formats. Although research

106   has highlighted the importance of lineout performance there is a lack of research

107   explaining what the reasons are for these differences in performance. Furthermore,

108   research has traditionally focussed on international matches indicating a gap in literature

109   for investigating performance in domestic level rugby (Bishop & Barnes, 2013; Franken

110   et al., 2017; Orterga et al., 2011).

111   Therefore, this study aims to analyse lineout statistics and contesting strategies

112   between successful (top four) and unsuccessful (bottom four) teams within the English

113   rugby Premiership. This aim will help to clarify whether scoring or conceding tries from

114   a lineout attributes to a team being more successful across a season and the importance

115   of contesting strategies.

116   **2. Methods**

117   *2.1 Design and sample*

118   Following institutional ethical approval eight teams were selected for analysis

119   based on their final league position during the 2016/17 Premiership season (the 4

120   highest and 4 lowest ranked teams, see table 1). The sample included all matches played

121   by the eight teams within the regular season (n = 120 matches) in which every lineout

122   taken (n = 2276; top four n = *1152;* bottom four n =*1124*) was analysed. The 'play off'

123   matches (for teams finishing in the top four) were excluded from the study to avoid an

124   imbalance in number of games played between the two sets of teams.

125

126   [INSERT TABLE 1 HERE]

127   *2.2 Performance indicators*

128   Guided by previous literature (e.g. Franken et al., 2017; Hughes & Bartlett,

129   2002) a series of KPI's were derived. These were; successful lineouts, unsuccessful

130   lineouts, formation, zonal location, intended target, actions during lineout, actions after

131   lineout, scores originating in lineouts and contesting strategies used to compete for

132   opposition ball. Operational definitions of these KPI's can be found in table 2 and the

133   zonal locations are described in figure 1.

134

135   [INSERT TABLE 2 HERE]

136

137   [INSERT FIGURE 1 HERE]

138   *2.3 Procedure*

139   Each rugby match was downloaded from Elitehub[©] (Version 2017.12.1137) and

140   analysed using SportsCode Elite (Version 9.0, Sportstech, Warriewood, Australia). The

141   matches were coded by an experienced professional analyst, with in-depth knowledge

142   of rugby union. The analysis took place by coding each lineout using the KPI's defined

143   in table two. The data was then exported from SportsCode into Microsoft Excel 2013

144   (Microsoft Corporation, Washington, USA) for data processing.

145 *2.4 Reliability*

146   Intra-rater reliability was examined by randomly selecting two games (65

147 lineouts) which were reanalysed 2 weeks post initial analysis by the primary analyst (in

148 line with Hughes, Barnes, Churchill, & Stone, 2017). For each KPI's, Cohen's Kappa

149 Coefficient was used as an assessment of reliability. Using classification of Kappa

150 values (Altman, 1990) the system showed a very good level of agreement (ranging from

151 0.88 to 1.00) across the range of KPI's coded (see Table 3)

152   [INSERT TABLE 3 HERE]

153 *2.5 Data analysis*

154   Data analysis was conducted using Microsoft Excel 2013 (Microsoft

155 Corporation, Washington, USA) and SPSS 24.0 (IBM Corporation, New York, USA).

156 A Kolmogorov-Smirnov test for normality revealed the data to be non-normally

157 distributed across all KPI's. Therefore, non-parametric tests were used for statistical

158 analysis of the data. A series of Mann-Whitney U tests were conducted to identify

159 statistical differences between the top four and bottom four teams. Statistical

160 significance was accepted at a 95% level. To allow for comparison of data descriptive

161 statistics were presented in absolute and percentage values (means and standard

162 deviations). Cohen's *d* effect size (ES) testing was conducted across all variables with

163 Cohen's (1992) criteria for effect size tests used for interpreting findings; $ES \geq 0.1 < 0.3$

164 indicating a small effect, $ES \geq 0.3 < 0.5$ indicating a medium effect and $ES \geq 0.5$

165 indicating a large effect.

166 **3. Results**

167   Table two presents descriptive statistics as well as *Cohen's Effect Sizes* between

168 the top and bottom four teams (see table 4). The top four team's number of lineouts per

169 game did not differ significantly from the bottom four teams number of lineouts per

170 game, $U = 3918$, $z = .138$, $p = .890$, $d = 0.006$.

171
172   [INSERT TABLE 4 HERE]

173 **3.1 Tries from lineouts**

174   The number of tries scored originating from a lineout play for top four teams'

175 was significantly higher than the number of tries scored originating in lineout play for

176 bottom four teams', $U = 3121$, $z = -2.312$, $p = .021$, $d = 0.39$. In addition, the number of

177 tries conceded from a lineout play for top four teams' was significantly lower than

178 number of tries conceded from a lineout play for bottom four teams', $U = 5183$, $z =$

179 4.036, $p < .001$, $d = 0.66$.

180 **3.2 Lineout Success**

181   Top four teams' lineout success percentage did not differ significantly from

182 bottom four teams' lineout success percentage, $U = 3654$, $z = -0.65$, $p = .519$, $d = 0.05$.

183 The percentage of unsuccessful lineouts due to attacking error for the top four teams'

184 did not differ significantly from the bottom four teams', $U = 3612$, $z = -.786$, $p = .432$, d

185 $= 0.09$. Top four teams' percentage of unsuccessful lineouts due to opposition stealing

186 possession did not differ significantly from bottom four teams' $U = 4405$, $z = 1.68$, $p =$

187 $.094$, $d = 0.02$.

188 **3.3 Zones**

189   Percentage of lineouts that occurred in Zone A for the top four teams did not

190 differ significantly from the bottom four teams, $U = 3482$, $z = -1.16$, $p = .248$, $d = 0.21$.

191 Percentage of lineouts that occurred in Zone B for the top four teams did not differ

192 significantly from the bottom four teams, $U = 4453$, $z = 1.72$, $p = .085$, $d = 0.18$.

193 Percentage of lineouts that occurred in Zone C for top four teams did not differ

194   significantly from bottom four teams, $U = 3909$, $z = .113$, $p = .910$, $d = 0.04$. Percentage

195   of lineouts that occurred in Zone D for the top four teams did not differ significantly

196   from bottom four teams, $U = 3735$, $z = -.411$, $p = .681$, $d = 0.05$.

197   *3.4 Formation*

198   The percentage of 7-man lineout formations for the top four teams did not differ

199   significantly from the bottom four teams, $U = 3857$, $z = -.043$, $p = .966$, $d = 0.02$.

200   Across the remaining lineout formations which include; 3, 4, 5 and 6 man lineouts there

201   were also no significant differences found between the top and bottom four teams (all *p*

202      $> .05$).

203   *3.5 Intended Target*

204   The percentage of lineouts with a front intended target for top four teams (*Mdn*

205   did not differ significantly from bottom four teams, $U = 3735$, $z = -.411$, $p = .681$, $d =$

206   0.06. Percentage of lineouts with a middle intended target for top four teams did not

207   differ significantly from the bottom four teams, $U = 3784$, $z = -.259$, $p = .796$, $d = 0.00$.

208   Percentage of lineouts with a back intended for top four teams did not differ

209   significantly from bottom four teams, $U = 3704$, $z = -.495$, $p = .621$, $d = 0.11$.

210   *3.6 Action during*

211   Bottom four teams had a significantly higher percentage of off the top actions

212   during the lineout than top four teams, $U = 4536$, $z = 1.968$, $p = .049$, $d = 0.38$.

213   Whereas, top four teams had a significantly higher percentage of binding actions during

214   the lineout than bottom four teams, $U = 2982$, $z = -2.634$, $p = .008$, $d = 0.29$. All other

215   actions during the lineout; overthrow, slap and direct transfer showed no significant

216   differences (all *p* $> .05$).

217 ***3.7 Actions post***

218   Top four teams had a significantly higher percentage of maul actions post

219 lineout than bottom four teams, $U = 2979$, $z = -2.644$, $p = .008$, $d = 0.36$. All other

220 actions post lineout; pass, kick, ruck and carry showed no significant differences (all $p >$

221 $.05$) (see table 5).

222   [INSERT TABLE 5 HERE]

223 ***3.8 Contest***

224   The top four teams' percentage of lineouts contested on opposition ball did not

225 differ significantly from the bottom four teams, $U = 3615$, $z = -.761$, $p = .447$, $d = 0.02$.

226 However, top four teams' percentage of successful contests on opposition was

227 significantly higher than bottom four teams' percentage of successful contests, $U =$

228 2560, $z = -3.984$, $p = .000$, $d = 0.54$. Bottom four teams' percentage of lineouts

229 contested on 7-man formation was significantly higher than top four teams' percentage

230 of lineouts contested on 7-man formation, $U = 4870$, $z = 3.132$, $p = .002$, $d = 0.41$.

231 Across all other formations; 3, 4, 5, and 6-man the percentage of contested lineouts did

232 not differ significantly between top and bottom four teams (all $p > .05$). In addition,

233 percentage of lineouts contested in Zones; A, B, C and D did not differ significantly

234 between top and bottom four teams (all $p > .05$).

235 **4. Discussion**

236   The aim of this study was to analyse lineout statistics and contesting strategies

237 between the top and bottom four rugby teams in the English Premiership. Analysis

238 indicated that the top four teams (1.57 tries per game) were more effective at using

239 lineouts as a platform to score tries than the bottom four teams (1.10 tries per game). In

240 addition, results demonstrate the top four teams conceded less tries from lineouts (0.89

241   tries per game) than bottom four teams (1.63 tries per game) proposing the top 4 had a

242   more effective defence following a lineout.

243   Importantly, despite more tries being scored from lineouts by successful teams,

244   lineout success was not significantly different between the top (87%) and bottom four

245   teams (85%) supporting previous findings that lineout success is not a discriminatory

246   factor in winning matches (Bishop & Barnes, 2013; Vaz et al., 2010). Rather, our data

247   suggests the ability to win possession on opposition ball could be a more important

248   factor in influencing match outcome and league positions. Although the top four teams

249   did not contest a greater number of lineouts (57%) than the bottom four teams (55%),

250   the top four teams had a significantly higher success rate (17%) than bottom four teams

251   (9%) when contesting the ball. This finding suggests that top four teams are more

252   effective in 'stealing' opposition possession at a lineout and could be an important

253   factor for successful performance (Vaz et al., 2010). Vaz et al. (2011) suggested that

254   winning teams enjoyed a greater success rate on stealing opposition ball having found

255   that losing teams lose more lineouts than winning teams. The present study adds clarity

256   to previous research that used a KPI of 'lineouts lost' (Vaz et al., 2010; Vaz et al.,

257   2011), this could indicate that the lineout was lost due to attacking error or the

258   opposition stealing possession. With the present study using 'successful contesting

259   strategies' as a KPI this clearly identifies that the top four teams were more successful

260   in stealing opposition possession at a lineout and this was not due to an attacking error.

261   A further important finding was that bottom four teams contested 7-man lineouts

262   more times (29%) than top four teams (20%). With 7-man formations generally being

263   used to have more players involved in setting up an effective maul post lineout (Franken

264   et al., 2017), top four teams may choose to not contest 7-man lineouts but stay on the

265   ground to defend the maul post lineout. In addition, research has suggested that

266   successful teams enjoy greater forward dominance in matches (Hughes & White, 1997)

267   which might indicate why bottom four teams choose to contest to win possession at the

268   lineout rather than attempt to defend the subsequent driving maul. When lifting a player

269   in the air to contest possession at the lineout this can leave the defensive team with less

270   players on the ground to then defend a driving maul and subsequently could be the

271   reason as to why more tries are scored, particularly if the lineout is close to the try line.

272   Future research is required to further investigate whether tries come from mauls or from

273   phases after the lineout and in which zone they originated.

274   Analysis of actions during the lineout showed that top four teams used binding

275   actions more times (62%) than bottom four teams (56%). This tactic has been

276   considered by previous research as a safer option in terms of being able to retain

277   possession (Franken et al., 2017). Additionally, actions post lineout often depend upon

278   actions during the lineout and as previously mentioned top four teams opt for binding

279   actions during the lineout which is how mauls are formed. This can offer explanation as

280   to why the top four teams went into maul actions following a lineout significantly more

281   times (55%) than bottom four teams (47%). A maul is also considered as a safer option

282   in securing possession rather than distributing possession to the backs immediately post

283   lineout (Franken et al., 2017). With the top four teams enjoying this greater forward

284   dominance this may be why bottom four teams choose to use off the top actions

285   significantly more (28%) than top four teams (23%) in an attempt to distribute the ball

286   to the backs away from opposition forwards.

287   Investigating frequency of contests in different zone locations found no

288   significant differences indicating that zone location was not a factor in determining

289   whether teams contested possession at a lineout. An aspect of zone location that may

290   see differences is in which zone teams enjoyed greater success in stealing opposition

291   possession which is an area of further research. In addition, an area that could identify

292   differences is what the intended target at the lineout was when the ball is stolen. For

293 example, whether this occurs more often when the ball this thrown to the back of the

294 lineout which can be perceived as a more difficult skill (Kraak, Venter, & Coetzee,

295 2016).

296 *5. Conclusion*

297   In conclusion, this study demonstrates successful teams score more tries from

298 lineouts than less successful teams. Although lineout success was not found to be

299 different between the top and bottom four teams, top four teams did enjoy a greater

300 success rate while contesting the ball. This indicates although lineout success is an

301 important factor, success rate on the opposition ball is also a critical factor that can

302 influence team succus. Here, the data supports the practical recommendations to players

303 and coaches that an area of training and analysis should be focussed on attempting to

304 steal opposition possession at a lineout. Finally, this study presents findings which

305 suggest that top four teams use a more forward originated approach to lineouts in that

306 they choose to use maul actions more frequently post lineout as well as securing

307 possession through binding actions during a lineout.

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309 Word Count: 3222

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362 Table 1. The finishing positions of the top and bottom four teams' in the
363 Premiership 2016/17 season once all matches had been played including total
364 points.

Position	Team	Points
1st	Wasps	84
2nd	Exeter Chiefs	84
3rd	Saracens	77
4th	Leicester Tigers	66
9th	Gloucester	46
10th	Sale Sharks	40
11th	Worcester Warriors	33
12th	Bristol	20

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385   Table 2. KPI's with operational definitions (adapted from Franken et al., 2017).

KPI	Definition
Successful Lineout	Lineout won by attacking team
Unsuccessful Lineout (Attacking Error)	Lineout lost by attacking team due to: Not straight throw, free-kick/penalty conceded, handling error, overthrow.
Unsuccessful Lineout (Opposition Steal)	Lineout won by defending team
Zonal Location (See figure 1)	Zone A: Attacking area between try line and 22m line Zone B: Attacking area between 22m line and halfway line Zone C: Defending area between halfway line and 22m line Zone D: Defending area between 22m line and try line
Formation	3-man: Three attacking players in lineout 4-man: Four attacking players in lineout 5-man: Five attacking players in lineout 6-man: Six attacking players in lineout 7-man: Seven attacking players in lineout
Intended Target	Front: First third of the 15m area Middle: Second third of the 15m area Back: Final third of the 15m area
Action During Lineout: (What the player who catches the ball does with it)	Off the top: When the player who caught the ball in the lineout throws the ball to the scrum-half whilst still in the air Tap-back: When the ball is knocked back in a controlled or uncontrolled fashion by the player being lifted Over throw: When the thrower throws the ball over the intended target Binding formation: When teammates of the player who caught the ball bind onto him Direct transfer: When the ball is passed to another player standing in the lineout.
Action After Lineout: (Play directly after lineout)	Pass: When the ball carrier passes the ball to a teammate Kick: When the ball carrier kicks away possession. To deck: When only the ball carrier goes directly to ground To maul: When the ball carrier is held up by an opponent and at least one of his team mates is binding onto him Carry: When the ball carrier immediately breaks away from the lineout
Try scored originating from lineout	Whether a try was scored as a result of a lineout (from phase play after the lineout or maul)
Try conceded originating from lineout	Whether a try was conceded as a result of a lineout (from phase play after the lineout or maul)
Contesting Strategies	Contest: When a player on the defending team jumps or is lifted by teammates to compete for opposition ball. No Contest: Defending teams stay down and do not contest for the ball. Zonal locations: Which zone of the field of play do defending teams contest, A, B, C, D.

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387   Table 3. Intra-observer reliability values for the notional analysis data quantified

388   through the calculation of Cohen's Kappa Co-efficient.

KPI	KAPPA
Lineout Success	1.00
Formation	0.89
Zonal Location	1.00
Intended Target	0.88
Actions During	1.00
Actions After	1.00
Tries Originating	1.00
Contest	1.00
Contest Success	1.00
Contest Formation	0.91
Contest Zonal Location	1.00

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411 Table 4. Comparison of KPI's including effect sizes for the 2016/17 Aviva Premiership
412 season between the top four and bottom four teams.

KPIs	Top 4				Bottom 4				d-value
	F	Mean	SD	%	F	Mean	SD	%	
Lineouts	1152	12.94	3.63	-	1124	12.92	3.62	-	.006
Try scored	140	1.57*	1.36	-	96	1.10*	1.05	-	0.39
Try conceded	79	0.89*	0.96	-	145	1.67*	1.38	-	0.66
Zone A	324	3.64	2.28	28	278	3.20	1.97	25	0.21
Zone B	449	5.04	2.65	39	478	5.49	2.33	43	0.18
Zone C	267	3.00	1.83	23	267	3.07	1.69	24	0.04
Zone D	112	1.26	1.19	10	101	1.16	1.15	8	0.09
Successful	998	11.21	3.37	87	961	11.05	3.39	85	0.05
Unsuccessful: Attacking Error	88	0.99	0.91	7	79	0.91	0.92	7	0.09
Unsuccessful: Opposition Steal	64	0.72	0.95	6	84	0.95	1.11	8	0.22
Quick Throw in	28	0.31	0.56	2	30	0.34	0.61	3	0.05
3 man	12	0.13	0.46	1	9	0.10	0.31	1	0.08
4-man	24	0.27	0.52	2	28	0.32	0.62	2	0.09
5-man	332	3.73	2.03	29	341	3.92	1.89	30	0.10
6-man	449	5.04	2.37	39	422	4.85	2.79	38	0.07
7-man	335	3.76	2.21	29	324	3.72	2.48	29	0.02
Front	540	6.07	2.60	47	543	6.23	2.70	48	0.06
Middle	377	4.24	1.85	33	369	4.24	2.28	33	0
Back	234	2.63	1.76	20	212	2.44	1.71	19	0.11
Off the top	245	2.75*	1.63	23	291	3.34*	1.95	28	0.38
Tap-back	90	1.01	1.19	8	100	1.15	1.03	10	0.13
Overthrow	54	0.61	0.81	6	51	0.59	0.79	5	0.02
Bind	663	7.45*	2.76	62	574	6.60*	3.03	56	0.29
Direct transfer	14	0.16	0.40	1	11	0.13	0.37	1	0.08
Pass	347	3.90	1.94	35	380	4.37	2.33	39	0.22
Kick	11	0.12	0.39	1	16	0.18	0.47	2	0.14
To deck	27	0.30	0.63	2	41	0.47	0.87	4	0.22
To maul	548	6.16*	2.56	55	452	5.20*	2.73	47	0.36
Carry	70	0.79	0.90	7	79	0.91	0.95	8	0.13

413 Notes. KPIs – Key performance indicators, F - Frequency, SD - Standard deviation, d – Cohen's
414 effect size, * indicates $p < 0.05$.
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418   Table 5. Comparison of contesting strategies KPI's including effect sizes for the

419   2016/17 Aviva Premiership season between the top four and bottom four teams.

KPIs	Top 4				Bottom 4				d-value
	F	Mean	SD	%	F	Mean	SD	%	
Contest	642	7.21	2.90	57	615	7.07	2.85	55	0.02
Successful Contest	110	1.24*	1.23	17	56	0.64*	0.99	9	0.54
Contest Zone A	67	0.75	0.86	11	67	0.77	0.98	11	0.02
Contest Zone B	176	1.98	1.34	27	162	1.86	1.47	26	0.09
Contest Zone C	292	3.27	1.97	45	271	3.11	1.74	44	0.09
Contest Zone D	107	1.19	1.14	17	115	1.32	1.23	19	0.11
Contest 3 man	6	0.07	0.25	1	6	0.07	0.25	1	0
Contest 4-man	37	0.42	0.77	6	26	0.30	0.70	5	0.16
Contest 5-man	224	2.51	1.62	35	185	2.13	1.59	30	0.24
Contest 6-man	244	2.73	1.70	38	218	2.51	1.63	35	0.13
Contest 7-man	131	1.47*	1.38	20	180	2.07*	1.51	29	0.41

420   Notes. KPIs – Key performance indicators, F - Frequency, SD - Standard deviation, d – Cohen's
421   effect size, * indicates $p < 0.05$.
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423   Figure 1. Illustration of the pitch being divided into various zonal locations (adapted
424   from Van Rooyen, Diedrick, & Noakes, 2010).
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Direction of Play →

Zone D
Defending
Zone
Try line to
22m

Zone C
Defending
Zone
22m to
half-way

Zone B
Attacking
Zone
22m to
half-way

Zone A
Attacking
Zone
Try line to
22m

428