

1 **Factors Influencing Physical and Technical Variability in**
2 **the English Premier League**

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15

16 **Abstract**

17 **Purpose:** To investigate match-to-match variability of physical
18 and technical performances in English Premier League (EPL)
19 players and to quantify the influence of positional and
20 contextual factors. **Methods:** Match data ($n=451$) were
21 collected using a multi-camera computerised tracking system
22 across multiple seasons (2005-06 to 2012-13). The coefficient
23 of variation (CV) was calculated from match-to-match for
24 physical and technical performances in selected positions
25 across different match contexts (location, standard and result).
26 **Results:** Wide midfielders demonstrated the greatest CVs for
27 total distance ($4.9\pm 5.9\%$) whilst central midfielders the smallest
28 ($3.6\pm 2.0\%$), nevertheless all positions exhibited CVs $<5\%$
29 ($p>0.05$, ES: 0.1-0.3). Central defenders demonstrated the
30 greatest CVs and wide midfielders the lowest for both high-
31 intensity running ($20.2\pm 8.8\%$ and $13.7\pm 7.7\%$, $p<0.05$, ES: 0.4-
32 0.8) and sprint distance ($32.3\pm 13.8\%$ and $22.6\pm 11.2\%$, $p<0.05$,
33 ES: 0.5-0.8). Technical indicators such as tackles
34 ($83.7\pm 42.3\%$), possession won ($47.2\pm 27.9\%$) and interceptions
35 ($59.1\pm 37.3\%$) illustrated substantial variability for attackers
36 compared to all other positions ($p<0.05$, ES: 0.4-1.1). Central
37 defenders demonstrated large variability for the number of
38 times tackled per match ($144.9\pm 58.3\%$), passes attempted and
39 received compared to other positions ($39.2\pm 17.5\%$ and
40 $46.9\pm 20.2\%$, $p<0.001$, ES: 0.6-1.8). Contextual factors had
41 limited impact on the variability of physical and technical
42 parameters. **Conclusions:** The data demonstrate that technical
43 parameters varied more from match-to-match than physical
44 parameters. Defensive players (full backs and central
45 defenders) displayed higher CVs for offensive technical
46 variables, whilst attacking players (attackers and wide
47 midfielders) exhibited higher CVs for defensive technical
48 variables. Physical and technical performances are variable *per*
49 *se* regardless of context.

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59 **Introduction**

60 In the last two decades there has been substantial investment in
61 computerised tracking systems in elite soccer in an attempt to
62 evaluate and optimise team performance. Although some
63 progress has been made in this research area, some caveats
64 exist. For instance, researchers typically adopt a one-
65 dimensional approach analysing individual aspects of soccer
66 performance (physical, technical or tactical) with the main
67 intention of predicting future performance or identifying trends
68 that lead to successful performances.¹⁻³ Thus, more research is
69 needed that integrates multiple parameters that allow a more
70 holistic understanding of the important facets of performance.

71 Assessing performance is essential in order to develop
72 intervention programmes and to improve performance.
73 Nevertheless without measuring the variability between
74 performances it is impossible to evaluate the effectiveness and
75 success of an intervention programme.¹ One method proposed
76 is to use the coefficient of variation (CV) to calculate the
77 inconsistency on a match-to-match basis. Mohr et al.⁴
78 demonstrated that players analysed in two consecutive elite
79 matches played within a 3-wk period produced a CV of 3% and
80 9% for the distance covered in total and at high-intensity
81 respectively. Interestingly, the variability in high-intensity
82 running across different stages of the season was much higher
83 (CV=25%) than across shorter periods of time. However, this
84 study only quantified variability of <20 elite players across 1-3
85 observations, thus restricting the application of the findings.⁴
86 Gregson and colleagues⁵ used a large sample of elite players and
87 demonstrated that high-intensity activities can vary by ≈15-
88 30% from match-to-match and that variability is higher for
89 central defenders and midfielders than for wide midfielders and
90 attackers.

91 Rampinini et al.⁶ found that physical parameters were
92 reduced when playing against lower standard opponents,
93 nevertheless this difference equated to approximately 100 m in
94 total distance covered and 50 m at high-intensity. Despite
95 analysing variation in performance Rampinini et al.⁶ examined
96 performance across the season rather than a match-to-match
97 basis. Previous research has not investigated the effects of
98 context on variability; however there have been investigations
99 into the effects of contexts on match performance. Teams
100 finishing higher in competitive leagues were found to perform
101 more passing and shooting variables compared to teams
102 finishing lower in the leagues.⁷ Home teams have been
103 identified to perform greater technical performance compared
104 to away teams for passing and shooting variables as well as
105 goals scored whilst losing possession less.⁷ In addition teams
106 spend less time in the attacking third and more time in the

107 defensive third when playing away from their home ground.⁸
108 However, no studies have been published to date that have used
109 a combined approach (analysed both physical and technical
110 variability), and taken into account the influence of context on
111 match-to-match variability (e.g. team standard, match location
112 and result).¹ This is surprising as numerous studies have found
113 that context influences both physical and technical performance
114 of teams^{9,7,8} and thus the variability in performance could be
115 partly explained by some of these factors.

116 Thus, this study aimed to investigate match-to-match
117 variability of physical and technical performances in English
118 Premier League (EPL) players and quantify the influence of
119 positional and contextual factors.

120

121 **Method**

122 *Players and Design*

123 Match performance data were collected from multiple EPL
124 seasons (2005-06 to 2012-13) and consisted of 451 individual
125 players across 3016 observations (mean = 7, range = 2-93
126 observations per player). Data were analysed in five playing
127 positions: central defenders ($n=110$), full backs ($n=99$), central
128 midfielders ($n=108$), wide midfielders ($n=59$) and attackers
129 ($n=75$). Original data files were de-sensitized and included 20
130 teams in each season. Individual match data were only included
131 for players that completed entire matches. Ethical approval was
132 granted from the appropriate institutional ethics committee.

133 *Methodology*

134 Data were obtained from a computerised multiple-camera
135 tracking system (Prozone 3, Prozone Sports Ltd[®], Leeds, UK).
136 Players' movements were captured during matches by cameras
137 positioned at roof level and analysed using proprietary software
138 to produce a dataset on each players' physical and technical
139 performance. The validity and reliability of this tracking system
140 has been quantified to verify the capture process and data
141 accuracy.^{10,11} Inter-operator reliability of technical performance
142 parameters has been measured at 99.3% with 95% of variables
143 coded within one tenth of a second by both observers.¹⁰ The
144 computerised-tracking system was tested in comparison to
145 timing gates with almost perfect correlations measured for a
146 variety of tests including straight sprints, angled runs and
147 dribbles with the ball ($r>0.9$).¹¹

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149

150 *Match Performance Parameters*

151 Activities were coded into: standing (0-0.6 km·h⁻¹), walking
152 (0.7-7.1 km·h⁻¹), jogging (7.2-14.3 km·h⁻¹), running (14.4-19.7
153 km·h⁻¹), high-speed running (19.8-25.1 km·h⁻¹) and sprinting
154 (>25.1 km·h⁻¹).^{3,6,12,13} Total distance represented the summation
155 of distances covered in all categories. High-intensity running
156 consisted of the combined distance in high-speed and sprinting
157 (>19.8 km·h⁻¹) and was separated into three subsets based on
158 teams possession status: with (WP) or without ball possession
159 (WOP) and when the ball was out of play (BOP). Technical
160 events included the number of passes attempted, passing
161 success, number of passes received, interceptions, the number
162 of tackles completed per player and the number of times the
163 player was tackled, the number of possessions won/lost and the
164 average number of touches per possession were selected for
165 analysis.

166 *Data Analysis*

167 All analyses were conducted using statistical software (SPSS
168 v21, SPSS Inc., Chicago, USA). CVs were used to quantify
169 match-to-match variability of EPL players¹⁴ and subsequently
170 calculated for each playing position and context such as match
171 location (home and away), standard of opposition
172 (stronger/equal standard/weaker) and result (won/lost/drawn).
173 One- and two-way analysis of variance tests were used to
174 analyse CV differences between playing positions and contexts.
175 Statistical significance was set at $p < 0.05$. The effect size (ES)
176 was calculated to determine the magnitude of the effect and
177 was classified as; trivial (<0.2), small (>0.2-0.6), moderate
178 (>0.6-1.2), large (>1.2-2.0) and very large (>2.0-4.0).¹⁵
179 Relationships between selected physical and technical
180 indicators were evaluated using Pearson's product moment test.
181 The magnitudes of the correlations were considered as trivial
182 (<0.1), small (>0.1-0.3), moderate (>0.3-0.5), large (>0.5-0.7),
183 very large (>0.7-0.9), nearly perfect (>0.9) and perfect (1.0).¹⁶
184 Values are presented as means±SD unless otherwise stated.

185 **Results**

186 *Physical Match-to-Match Variability*

187 Wide midfielders illustrated the largest CVs for total distance
188 covered, while central midfielders illustrated the smallest CVs,
189 nevertheless no meaningful differences were found for total
190 distance covered between positions, with all demonstrating
191 CVs <5% ($p > 0.05$; ES: 0.1-0.3). Central defenders produced
192 the most variation from match-to-match for high-intensity
193 running distance compared to all other positions (Fig. 1; $p < 0.05$

194 and ES: 0.4-0.8), particularly high-intensity running distance
195 WP ($p < 0.001$; ES: 0.6-1.1). Sprint distance CVs were greater
196 for central defenders ($32.3 \pm 13.8\%$) compared to attackers
197 ($25.5 \pm 13.5\%$), full backs ($26.0 \pm 12.0\%$, $p < 0.05$; ES: 0.5) and
198 wide midfielders ($22.6 \pm 11.2\%$, $p < 0.01$; ES: 0.8). The CVs for
199 high-intensity running distance WOP were greatest for
200 attackers ($27.6 \pm 16.6\%$) compared to central positions (CD:
201 $21.8 \pm 10.1\%$; CM: $21.9 \pm 11.3\%$, $p < 0.05$; ES: 0.4) and full backs
202 ($18.6 \pm 9.1\%$, $p < 0.001$, ES: 0.6).

203 *Technical Match-to-Match Variability*

204 Central defenders produced the highest CVs for passes
205 ($39.2 \pm 17.5\%$), passes received ($12.9 \pm 7.8\%$) and the number of
206 times they were tackled per match ($144.9 \pm 58.3\%$) compared to
207 other positions (Fig. 2; $p < 0.01$; ES: 0.6-0.7, 1.4-2.4 and 0.7-1.2
208 respectively). In contrast, attackers demonstrated the largest
209 CVs for the number of tackles per match ($83.7 \pm 42.3\%$),
210 possession won ($47.2 \pm 28\%$, $p < 0.01$; ES: 0.3-0.8, 0.4-1.0) and
211 interceptions ($59.1 \pm 37.3\%$, $p < 0.05$; ES: 0.5-1.1) compared to
212 other positions. Full backs illustrated higher CVs for the
213 number of times tackled per match ($76 \pm 36.4\%$) compared to
214 central midfielders ($56.5 \pm 29.4\%$), attackers ($41.5 \pm 22.7\%$) and
215 wide midfielders ($37.7 \pm 21.4\%$, $p < 0.05$, ES: 0.6-1.3). Wide
216 midfielders demonstrated higher CVs for the number of
217 interceptions ($45 \pm 24.1\%$) and possession won ($36.9 \pm 19\%$) than
218 central defenders ($29 \pm 14.3\%$ and $26 \pm 12.1\%$), central
219 midfielders ($31.6 \pm 19.1\%$ and $26 \pm 14.4\%$) and full backs
220 ($30.2 \pm 19.7\%$ and $26.9 \pm 17.6\%$, $p < 0.05$; ES: 0.6-0.8 and 0.5-0.7
221 respectively).

222 *Contextual Match-to-Match Variability*

223 No meaningful differences were observed across physical and
224 technical parameters for match location ($p > 0.05$, ES: < 0.4).
225 Central defenders produced lower CVs for high-intensity
226 running distance WP when playing against stronger opposition
227 compared to playing similar standards and weaker opposition
228 ($p > 0.05$, ES: 0.2-0.5), although high-intensity running was less
229 variable against weaker opposition ($p > 0.05$, ES: 1.1-1.2). In
230 contrast wide midfielders produced lower variation when
231 playing against weaker opposition for all physical parameters
232 ($p > 0.05$, ES: 0.2-1.2). Central defenders, attackers and wide
233 midfielders displayed larger CVs for the number of passes
234 received when playing weaker opposition ($p > 0.05$, ES: 0.4-
235 1.2). In addition, full backs, attackers and wide midfielders
236 demonstrated larger CVs for the number of passes made when
237 playing weaker opposition ($p > 0.05$, ES: 0.4-1.2). For match
238 result, the number of high-intensity efforts and recovery time
239 between these showed significantly lower CVs for wide
240 midfielders when matches were won compared to matches that

241 were lost or drawn ($p < 0.05$; ES: 0.5-0.9). Full backs were
242 found to have greater CVs for the number of tackles made in
243 matches that were won compared to matches that were lost or
244 drawn ($p > 0.05$, ES: 0.9).

245 *Correlations between Physical and Technical CVs*

246 Correlation analysis between the CVs for physical and
247 technical variables mainly produced small magnitude
248 correlations (Fig 3; $r < 0.20$). The variability in the number of
249 times tackled displayed the highest correlations with sprint
250 distance ($r = 0.25$, $p < 0.01$), high-intensity running ($r = 0.25$,
251 $p < 0.01$) and high-intensity distance WP ($r = 0.37$, $p < 0.01$).
252 Nevertheless none of the CV correlations between physical and
253 technical variables illustrated associations greater than a
254 moderate magnitude. Analysis of physical parameters identified
255 very large magnitude correlations between the variability of
256 high-intensity running and sprint distance ($r = 0.75$, $p < 0.01$) and
257 moderate correlations with high-intensity running distance WP
258 and WOP ($r = 0.42$, $p < 0.01$). The CVs for the number of high-
259 intensity activities displayed near perfect correlations with
260 recovery time between high-intensity activities ($r = 0.96$,
261 $p < 0.01$) and large magnitude correlations with high-intensity
262 running distance ($r = 0.66$, $p < 0.01$). Moderate-large magnitude
263 correlations were observed for CVs between sprint distance and
264 high-intensity distance WP ($r = 0.37$, $p < 0.01$), recovery time
265 ($r = 0.41$, $p < 0.01$) and high-intensity running distance ($r = 0.66$,
266 $p < 0.01$). Analysis of technical parameters identified very large
267 magnitude correlations for CVs between possessions won and
268 the number of interceptions ($r = 0.85$, $p < 0.01$) and moderate
269 magnitude correlations with the average number of touches per
270 possession ($r = 0.34$, $p < 0.01$). Moderate magnitude correlations
271 were observed for CVs between the number of passes
272 attempted with pass success, and the number of passes received
273 ($r = 0.30-0.50$, $p < 0.01$).

274 **Discussion**

275 The present study was the first to quantify the match-to-match
276 variability of physical and technical parameters across both
277 position and context. The data demonstrate that technical
278 parameters varied more from match-to-match than physical
279 parameters. Defensive players displayed higher CVs for
280 offensive technical variables, whilst offensive players exhibited
281 higher CVs for defensive technical variables. Physical and
282 technical performances are variable regardless of context.

283 Currently no exact measure of physical performance in
284 elite soccer matches exists, the total distance covered and that
285 performed at high-intensity provide useful indicators of
286 physical performance.^{3,4} Both measures correlate with physical

287 capacity but high-intensity running to a higher degree than total
288 distance covered.¹⁷ This supports the existing contention that
289 high-intensity running is a better indicator of match
290 performance than total distance covered.^{4,18} In the current study
291 total distance covered did not vary from match-to-match
292 (CV<5%) which is in line with previous studies quantifying the
293 match-to-match variability elite soccer.⁴⁻⁶ The present study
294 found CVs for high-intensity running distance ranged from
295 14% for wide midfielders to 20% for central defenders and thus
296 compares well with values reported for the same positions (13-
297 19%)⁵ and the average variability for all positions (14%).⁶ The
298 greater variability for central positions is probably indicative of
299 the higher player density in central regions of the pitch in the
300 modern game.^{19,20} Previous research demonstrated that CVs for
301 sprint distance were greater than high-intensity running
302 distance⁵, whereas these two parameters produced similar CVs
303 in the present study. This is unsurprising due to the large
304 magnitude of correlations between the CVs for the two
305 variables. The high variability of these parameters has a direct
306 impact on the assessment and evaluation of intervention
307 strategies on match running performance, this is especially
308 important as high-intensity running and sprint bouts usually
309 occur during significant moments in the game.²¹

310 This study was the first to quantify match-to-match
311 variability of technical performance parameters. We identified
312 indicators such as possession won, possession lost and average
313 touches were higher, although non-significantly, for attackers
314 compared to all other positions. Attackers generally receive the
315 ball in the offensive third of the pitch, often within sight of
316 goal. Thus, attackers are required to take many touches to hold
317 the ball up to retain possession in densely populated areas of
318 the pitch.^{22,23} Nevertheless an attacker's ability to hold-up play
319 will be affected by the number and quality of possession won
320 along with the aptitude and tactics of the opposition defenders,
321 thus affecting the variability in performance. The low match-to-
322 match variability observed for the number of possessions won
323 and lost indicate teams in the EPL now adopt more possession
324 based strategies, maintaining possession in order to develop
325 goal-scoring opportunities. Recent research has found that the
326 number of short and medium passes performed during matches
327 has increased since 2006-07.¹⁹ Although this current study did
328 not measure the variability of passing distance, the previous
329 findings combined with the current data demonstrating low
330 match-to-match variability for possession won and lost
331 supports the notion that teams now adopt possession based
332 playing styles rather than the direct playing styles previously
333 embraced.²³

334 The number of passes and percentage pass success for
335 each position showed variability to be <40%. Passes made and

336 pass success occur when the team is in possession. Although,
337 previously we have suggested there is low variability in the
338 change of possession (possession won/lost), the variability in
339 passing variables occur due to the amount of possession a team
340 holds. High levels of ball possession provide greater
341 opportunity to perform passes, in contrast matches with low-
342 ball possession will reduce the time available to perform
343 passes. Over the course of a season teams will encounter or
344 adopt varying playing styles and tactics, which could
345 potentially explain the variability in passing measures. In
346 contrast the number of tackles made and the number of times
347 they were tackled demonstrated the highest CVs out of the
348 technical parameters (>50%). Attackers and wide midfielders
349 had lower variability for the number of times they were tackled.
350 Players in these positions gain the ball in attacking areas, and
351 are thus more likely to be tackled to reduce the attacking threat.
352 In contrast, defenders (wide and central) experienced a more
353 variable number of times they were tackled as they are less
354 likely to pose a threat to the opposition goal; as a consequence
355 opposition strategy is more of an influence on these technical
356 indicators. For example, some teams try to regain possession
357 high up the pitch applying pressure on players in defensive
358 positions; whilst other teams will allow defenders to keep
359 possession. As a result, depending on a team's strategy on
360 regaining possession the number of tackles completed between
361 attackers and defenders will be affected and may explain the
362 high CVs observed.

363 The relatively high CVs discovered for the number of
364 tackles and times tackled may be due to the low frequency of
365 occurrences in matches. As a result small changes in the
366 frequency of occurrences can have large impacts on the CVs
367 observed.^{2,9,7,8} In contrast the numbers of passes attempted and
368 successful passes made are more frequent and hence stable
369 technical parameters. A 70% pass success statistic is deemed a
370 minimum requirement for elite soccer²⁴ and thus the potential
371 range of this measure is low, resulting in relatively low
372 variability. The high variability observed in the majority of
373 technical parameters highlights the difficulties in assessing the
374 effectiveness of interventions or coaching adaptations on
375 technical performance. Large subject numbers would be
376 required to determine whether improvements in performance
377 would be due to interventions or the inherent variability in
378 performance. In addition, although researchers have previously
379 analysed the parameters that are important for success^{2,8,9,25}, the
380 high CVs observed for technical parameters in this study would
381 suggest that success cannot be defined by a small list of
382 elements, but is a combination of factors. Success in one game
383 could be as a result, of a high turnover in possession (high
384 number of tackles, possession won/lost), low pass success rate

385 and a high number of shots on/off target. In contrast success in
386 a different game may be a result of high numbers of passes
387 made and pass success rate and a low turnover of possession,
388 but low number of shots on/off target.

389 One of the key findings of this study was the higher
390 match-to-match variability observed for technical variables
391 when compared to physical variables. The physical data trends
392 found in the present study are similar to previous findings on
393 EPL populations^{5,6} suggesting that physical variability has
394 remained relatively constant over recent seasons. Although
395 there is inherent match-to-match variability observed in the
396 physical performance of soccer players, the CVs observed may
397 provide further evidence for the adoption of pacing strategies
398 by players to ensure game completion.¹² For instance, sparing
399 low-intensity activity such as walking and jogging in an
400 attempt to preserve essential high-intensity running, could be
401 the reason why total distance covered remains the same but high-
402 intensity is highly variable.^{26,27} In contrast, the variability of
403 technical performance has not previously been analysed. In the
404 present study the contextual factors examined had minimal
405 influence on the variability of player's physical or technical
406 performance. Therefore, the results suggest that the changes in
407 absolute technical performance previously identified^{7-9,25} are as
408 a result of different contexts rather than the variability in
409 performance. Technical performance in matches is not only
410 affected by player ability or capacity, but is highly dependent
411 on team and opposition tactics as well as contextual factors,<sup>7-
412 9,25</sup> consequently external factors have greater influence on
413 players' technical performance.

414 Rampinini et al.⁶ found that physical indicators were
415 less variable when playing against the same opposition,
416 suggesting that playing styles, fitness and tactics could
417 influence variability in match-play. Surprisingly, match
418 location, standard and match result had little effect on overall
419 match-to-match variability of physical and technical parameters
420 in this study. Central defenders, full backs and central
421 midfielders displayed lower variability when playing at home
422 compared to away matches for high-intensity running distance
423 WP. Although previous research has highlighted differences in
424 match indicators^{8,9,25,28}, performance would be expected to vary
425 a similar amount whether matches are at home or away, won or
426 lost or whether playing against a higher or lower standard of
427 opposition. The limited influence of contextual factors on
428 match-to-match CVs would suggest that the game is
429 intrinsically variable and that could be driven by tactics and
430 playing strategies.

431 Although previous research has begun to analyse both
432 technical and physical performance parameters within the same

433 articles^{13,19,29,30} researchers have not analysed the relationships
434 between performance measures.¹ The correlation analysis
435 performed in this study found small-moderate associations
436 ($r=0.22-0.37$, $p<0.001$) between CV values for the number of
437 times tackled per match and the distance covered at high-
438 intensity, high-intensity distance WP, sprint distance and
439 recovery time between high-intensity actions. All other
440 correlations were less than trivial ($r<0.2$). The low correlations
441 observed in this study would suggest that physical match-to-
442 match variability is not related to technical variability, although
443 tactical factors may warrant further study.

444 Despite the novel data presented and analysed, there are
445 some limitations in the present study. The range of observations
446 for each player was high and could have influenced the
447 variability observed. Furthermore the study was restricted by
448 the number of contextual variables available for analysis and
449 the number of observations for each context. Therefore future
450 research could take into account more contextual variables such
451 as the severity of match won/lost and the effect of tactical
452 variables and formations. Future research could also investigate
453 the interaction of the contextual variables on match-to-match
454 variability, i.e. matches at home played against weaker
455 opposition compared to matches played away against stronger
456 opposition.

457 **Practical Applications**

458 The findings of this study provide useful information on the
459 variability of match-play for practitioners in elite soccer.
460 Specifically, it extends previous research, demonstrating that
461 several important contextual factors (match location, standard
462 of opposition, match result) do not influence match-to-match
463 variability. It also presents data for the variability of important
464 technical factors. This information could help with interpreting
465 interventions and provide practitioners with an indication of the
466 number of matches required to gain an accurate assessment of a
467 player's physical and technical performance during match-play.

468 **Conclusion**

469 This is the first study to demonstrate the match-to-match
470 variability of technical as well as physical performance
471 parameters in elite soccer. Positional analysis showed attackers
472 had high variability for defensive variables such as possession
473 lost and the number of tackles made per match. In contrast
474 defensive positions demonstrated higher CVs for attacking
475 variables such as the number of times tackled per match and the
476 number of passes received. Despite the considerable knowledge
477 base linking technical performance and success, the findings
478 from this study highlight the large variability in technical

479 performance and therefore may suggest a cautious approach
480 must be taken when making these associations. In addition,
481 match contexts (match location, match result and opposition
482 standard) had limited influence on match-to-match variability
483 for either technical or physical parameters. The effect of match
484 contexts on match performance as found in previous research is
485 potentially a result of different playing strategies rather than the
486 inherent variability between matches.

487

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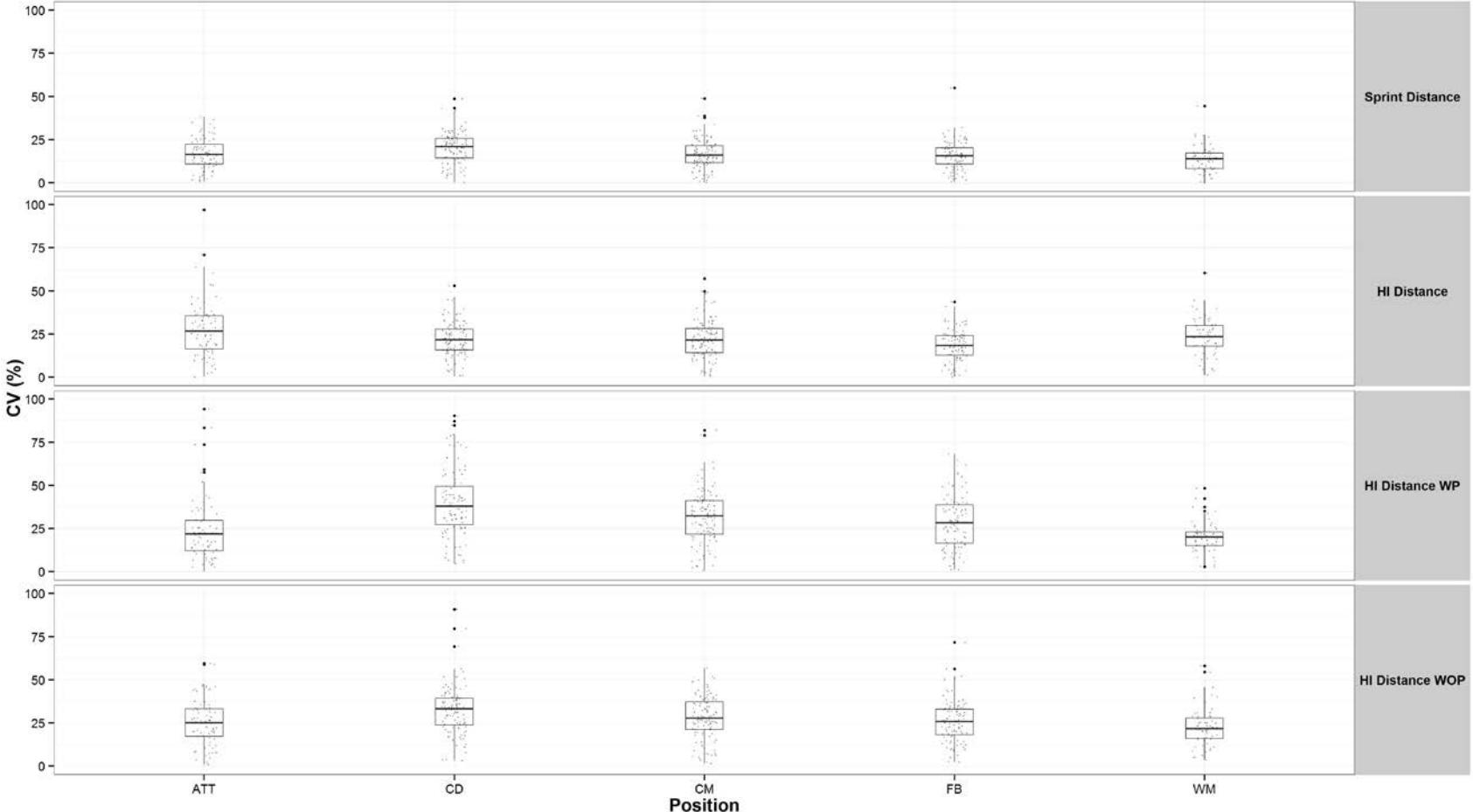
602 **Figure Legends**

603 **Figure 1:** Total CVs for physical performance parameters
604 across all positions. The Box and Whisker plot displays median
605 values, interquartile ranges and outliers for the physical
606 performance in matches in the English Premier League. Each
607 player's observation is jittered and is included as a small dot
608 around the box. The larger dots at the top and bottom of boxes
609 are outliers.

610 **Figure 2:** Total CVs for technical performance parameters
611 across all positions. The Box and Whisker plot displays median
612 values, interquartile ranges and outliers for the technical
613 performance in matches in the English Premier League. Each
614 player's observation is jittered and is included as a small dot
615 around the box. The larger dots at the top and bottom of boxes
616 are outliers.

617 **Figure 3:** A correlation matrix between physical and technical
618 CVs. Data are presented as Pearson's correlations (r values)
619 except the central panel, which includes a histogram of
620 distribution.

621 Figure 1:

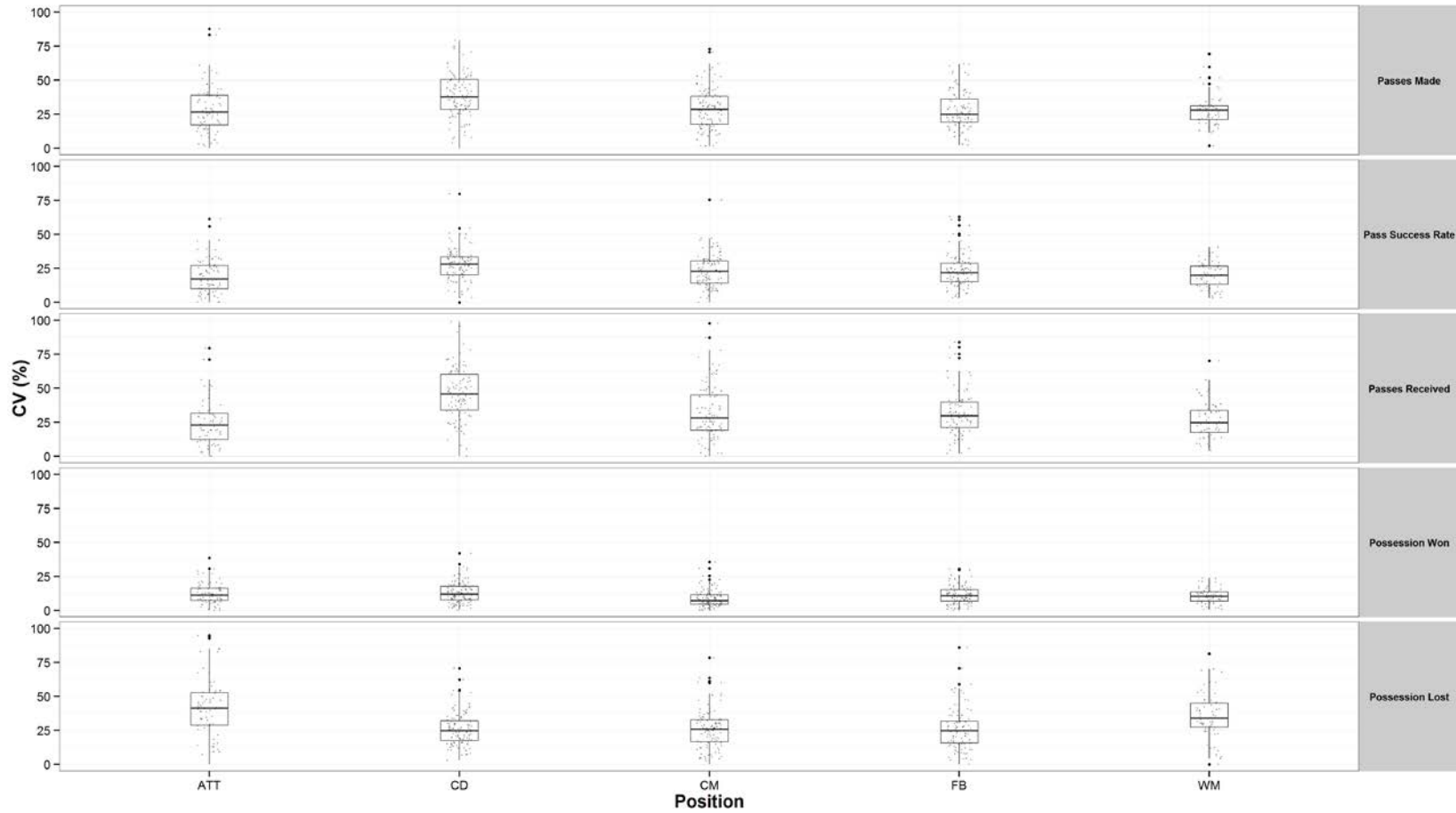


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625 Figure 2

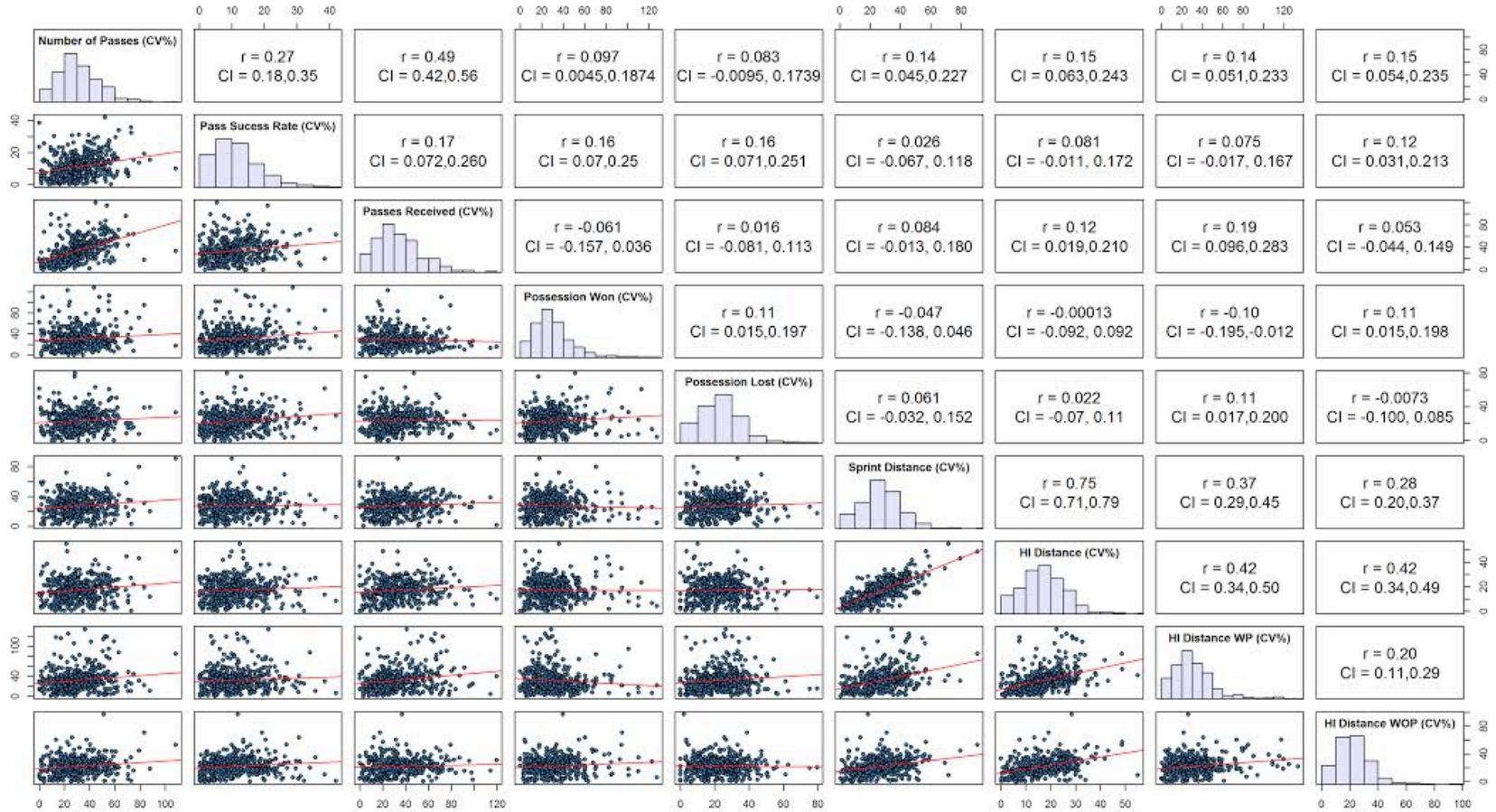


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629 Figure 3:



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