

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 ( $4.9\pm5.9\%$ ) whilst central midfielders the smallest  
28     ( $3.6\pm2.0\%$ ), 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 ( $20.2\pm8.8\%$  and  $13.7\pm7.7\%$ ,  $p<0.05$ , ES: 0.4-  
32     0.8) and sprint distance ( $32.3\pm13.8\%$  and  $22.6\pm11.2\%$ ,  $p<0.05$ ,  
33     ES: 0.5-0.8). Technical indicators such as tackles  
34     ( $83.7\pm42.3\%$ ), possession won ( $47.2\pm27.9\%$ ) and interceptions  
35     ( $59.1\pm37.3\%$ ) 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 ( $144.9\pm58.3\%$ ), passes attempted and  
39     received compared to other positions ( $39.2\pm17.5\%$  and  
40      $46.9\pm20.2\%$ ,  $p<0.001$ , 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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51     Keywords: football, contextual, high-intensity, passing,  
52     variation.

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54     Abstract word count: 244

55

56     Text word count: 3495

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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.<sup>1-3</sup> 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.<sup>1</sup> 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.<sup>4</sup>  
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.<sup>4</sup>  
86    Gregson and colleagues<sup>5</sup> 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.<sup>6</sup> 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.<sup>6</sup> 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.<sup>7</sup> 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.<sup>7</sup> In addition teams  
106    spend less time in the attacking third and more time in the

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

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

## **Method**

### *Players and Design*

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

### *Methodology*

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

## 150 *Match Performance Parameters*

151 Activities were coded into: standing (0-0.6 km·h<sup>-1</sup>), walking  
152 (0.7-7.1 km·h<sup>-1</sup>), jogging (7.2-14.3 km·h<sup>-1</sup>), running (14.4-19.7  
153 km·h<sup>-1</sup>), high-speed running (19.8-25.1 km·h<sup>-1</sup>) and sprinting  
154 (>25.1 km·h<sup>-1</sup>).<sup>3,6,12,13</sup> 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<sup>-1</sup>) 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 players<sup>14</sup> 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 ( $> 2.0-4.0$ ).<sup>15</sup>  
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).<sup>16</sup>  
184 Values are presented as means $\pm$ 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;  $p < 0.05$

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

#### Technical Match-to-Match Variability

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

#### Contextual Match-to-Match Variability

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

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

#### *Correlations between Physical and Technical CVs*

Correlation analysis between the CVs for physical and technical variables mainly produced small magnitude correlations (Fig 3;  $r < 0.20$ ). The variability in the number of times tackled displayed the highest correlations with sprint distance ( $r = 0.25$ ,  $p < 0.01$ ), high-intensity running ( $r = 0.25$ ,  $p < 0.01$ ) and high-intensity distance WP ( $r = 0.37$ ,  $p < 0.01$ ). Nevertheless none of the CV correlations between physical and technical variables illustrated associations greater than a moderate magnitude. Analysis of physical parameters identified very large magnitude correlations between the variability of high-intensity running and sprint distance ( $r = 0.75$ ,  $p < 0.01$ ) and moderate correlations with high-intensity running distance WP and WOP ( $r = 0.42$ ,  $p < 0.01$ ). The CVs for the number of high-intensity activities displayed near perfect correlations with recovery time between high-intensity activities ( $r = 0.96$ ,  $p < 0.01$ ) and large magnitude correlations with high-intensity running distance ( $r = 0.66$ ,  $p < 0.01$ ). Moderate-large magnitude correlations were observed for CVs between sprint distance and high-intensity distance WP ( $r = 0.37$ ,  $p < 0.01$ ), recovery time ( $r = 0.41$ ,  $p < 0.01$ ) and high-intensity running distance ( $r = 0.66$ ,  $p < 0.01$ ). Analysis of technical parameters identified very large magnitude correlations for CVs between possessions won and the number of interceptions ( $r = 0.85$ ,  $p < 0.01$ ) and moderate magnitude correlations with the average number of touches per possession ( $r = 0.34$ ,  $p < 0.01$ ). Moderate magnitude correlations were observed for CVs between the number of passes attempted with pass success, and the number of passes received ( $r = 0.30$ - $0.50$ ,  $p < 0.01$ ).

#### **Discussion**

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

Currently no exact measure of physical performance in elite soccer matches exists, the total distance covered and that performed at high-intensity provide useful indicators of physical performance.<sup>3,4</sup> Both measures correlate with physical

287 capacity but high-intensity running to a higher degree than total  
288 distance covered.<sup>17</sup> This supports the existing contention that  
289 high-intensity running is a better indicator of match  
290 performance than total distance covered.<sup>4,18</sup> 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.<sup>4-6</sup> 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%)<sup>5</sup> and the average variability for all positions (14%).<sup>6</sup> 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.<sup>19,20</sup> Previous research demonstrated that CVs for  
301 sprint distance were greater than high-intensity running  
302 distance<sup>5</sup>, 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.<sup>21</sup>

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.<sup>22,23</sup> 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.<sup>19</sup> 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.<sup>23</sup>

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



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

The relatively high CVs discovered for the number of tackles and times tackled may be due to the low frequency of occurrences in matches. As a result small changes in the frequency of occurrences can have large impacts on the CVs observed.<sup>2,9,7,8</sup> In contrast the numbers of passes attempted and successful passes made are more frequent and hence stable technical parameters. A 70% pass success statistic is deemed a minimum requirement for elite soccer<sup>24</sup> and thus the potential range of this measure is low, resulting in relatively low variability. The high variability observed in the majority of technical parameters highlights the difficulties in assessing the effectiveness of interventions or coaching adaptations on technical performance. Large subject numbers would be required to determine whether improvements in performance would be due to interventions or the inherent variability in performance. In addition, although researchers have previously analysed the parameters that are important for success<sup>2,8,9,25</sup>, the high CVs observed for technical parameters in this study would suggest that success cannot be defined by a small list of elements, but is a combination of factors. Success in one game could be as a result, of a high turnover in possession (high 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<sup>5,6</sup> 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.<sup>12</sup> For instance, sparing  
399 low-intensity activity such as walking and jogging in an  
400 attempt to preserve essential high-intensity running, could the  
401 reason why total distance covered remains the same but high-  
402 intensity is highly variable.<sup>26,27</sup> 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<sup>7-9,25</sup> 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.<sup>6</sup> 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<sup>8,9,25,28</sup>, 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

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

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

## **Practical Applications**

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

## **Conclusion**

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

#### 488 **Acknowledgments**

489 The authors would like to thank Will Jones and Mark Boddy  
490 from Prozone Sports for providing access to the data used in  
491 this study.

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## 602                    **Figure Legends**

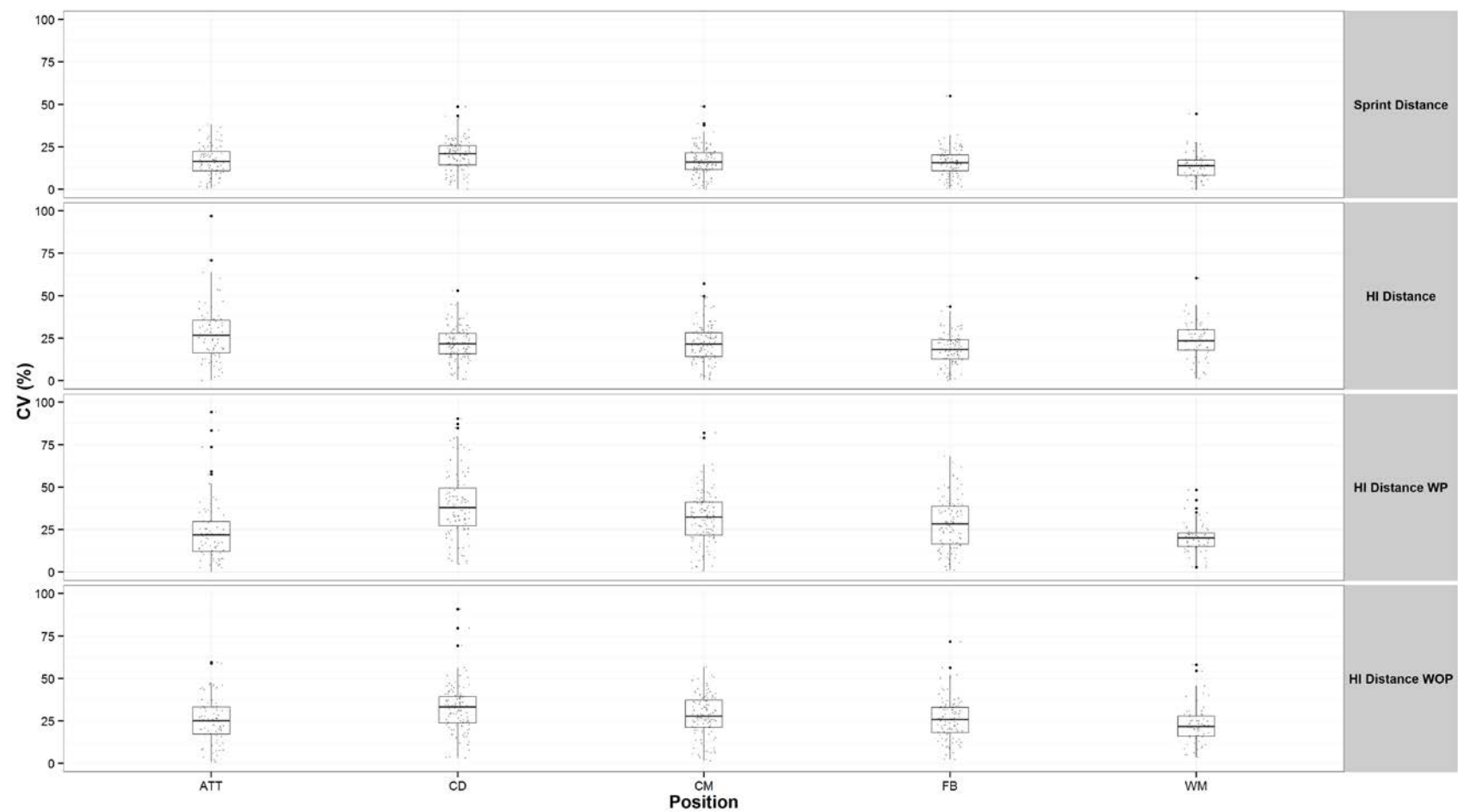
603    **Figure 1:** Total CVs for physical performance parameters  
604    across all positions. The Box and Whisker plot displays median  
605    values, interquartile ranges and outliers for the physical  
606    performance in matches in the English Premier League. Each  
607    player's observation 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:

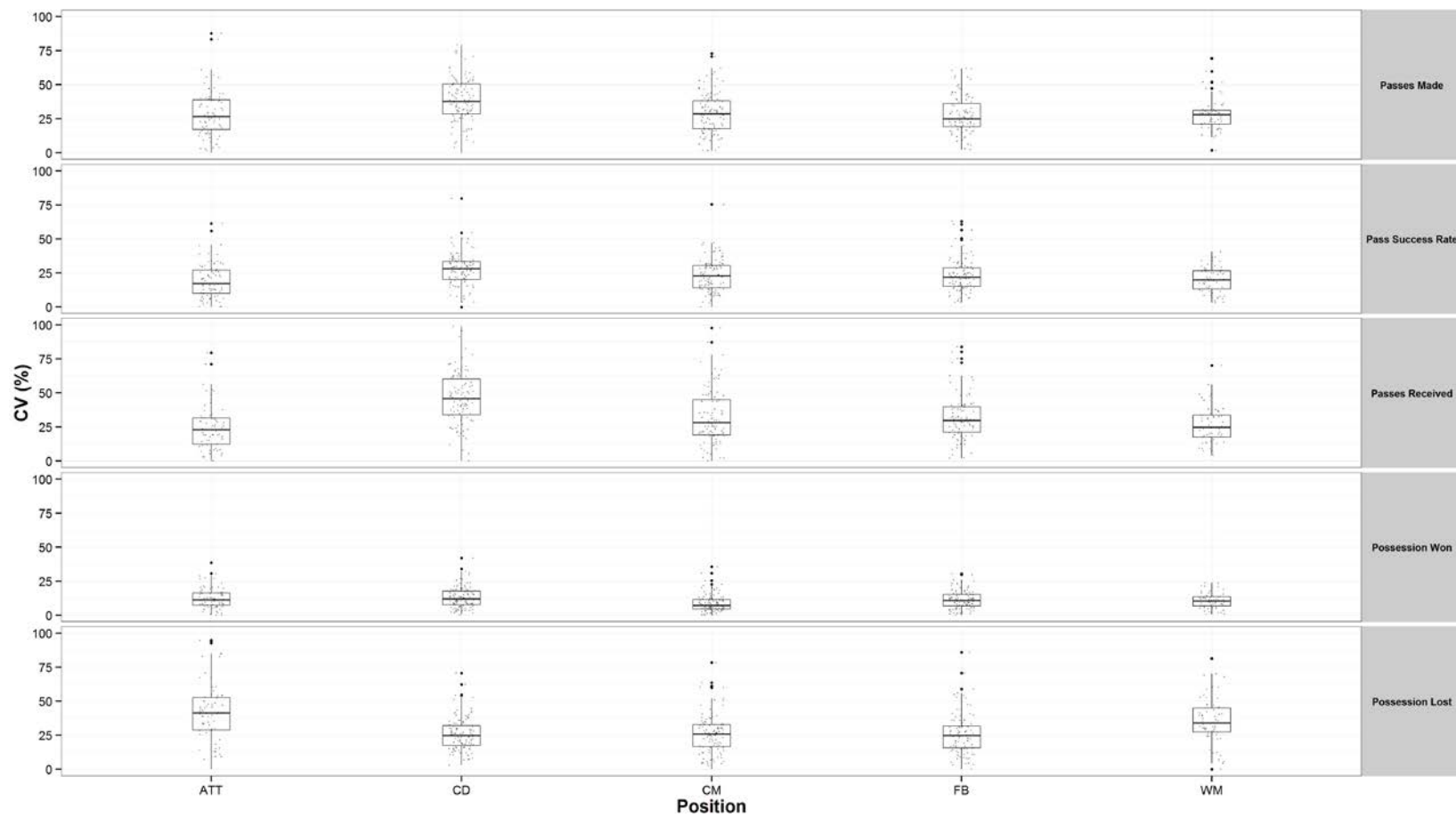


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625 Figure 2

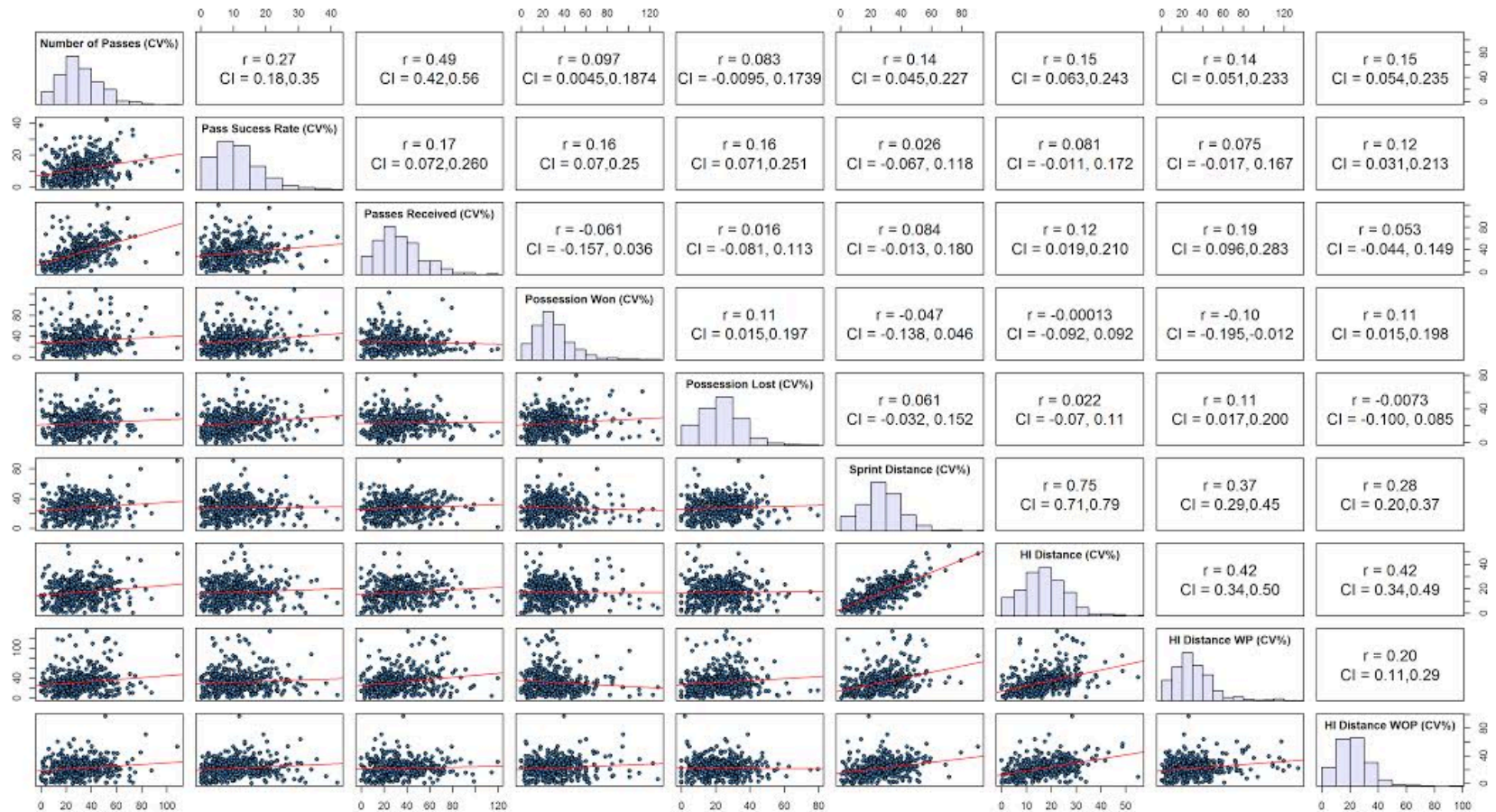


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629 Figure 3:



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