Schuth, G, Carr, G, Barnes, C, Carling, C and Bradley, PS

Positional interchanges influence the physical and technical match performance variables of elite soccer players

Article

Citation (please note it is advisable to refer to the publisher's version if you intend to cite from this work)

Schuth, G, Carr, G, Barnes, C, Carling, C and Bradley, PS (2016) Positional interchanges influence the physical and technical match performance variables of elite soccer players. JOURNAL OF SPORTS SCIENCES, 34 (6). pp. 501-508. ISSN 0264-0414

Positional Interchanges Influence the Physical and Technical Match Performance Variables of Elite Soccer Players

Original article

Abstract

Positional variation in match performance is well established in elite soccer but no information exists on players switching positions. This study investigated the influence of elite players interchanging from one position to another on physical and technical match performance. Data were collected from multiple English Premier League seasons using a computerised tracking system. After adhering to stringent inclusion criteria, players were examined across several interchanges: central-defender to fullback (CD-FB, *n*=11, 312 observations), central-midfielder to wide-midfielder (CM-WM, *n*=7, 171 observations), wide-midfielder to central-midfielder (WM-CM, *n*=7, 197 observations) and attacker to wide-midfielder (AT-WM, *n*=4, 81 observations). Players interchanging from CD-FB covered markedly more high-intensity running and sprinting distance (Effect Size [ES]: -1.56 and -1.26), lost more possessions but made more final third entries (ES: -1.23 and -1.55). Interchanging from CM-WM and WM-CM resulted in trivial to moderate differences in both physical (ES: -0.14-0.59 and -0.21-0.39) and technical performances (ES: -0.48-0.64 and -0.36-0.54). Players interchanging from AT-WM demonstrated a moderate difference in high-intensity running without possession (ES: -0.98) and moderate-to-large differences in the number of clearances, tackles and possessions won (ES: -0.77, -1.16 and -1.41). The data demonstrate that the physical and technical demands vary greatly from one interchange to another but utility players seem able to adapt to these positional switches.

Keywords: football, time-motion analysis, utility player.

Introduction

Time-motion analyses of elite soccer match play demonstrate that players typically cover a total distance of 9-14 km of which 1-3 km is performed at high-intensity (Bangsbo, Norregaard, & Thorso, 1991; Mohr, Krustrup, & Bangsbo, 2003). The physical demands across playing positions vary substantially with central- and wide-midfielders habitually covering more total distance and wide-midfielders and fullbacks displaying superior high-intensity running profiles compared to central defenders and attackers (Bradley et al., 2009; Rampinini, Coutts, Castagna, Sassi, & Impellizzeri, 2007). While technical differences between positions are also evident with the number of passes and pass completion rates greater for central-midfielders than other positions, limited research exists on positional variation in technical performance (Bradley et al., 2013). Due to the complex physical, technical and tactical demands of modern elite soccer, some players often need to play in multiple positions across the season. Match congestion, injury and suspensions also require players to change positions. Therefore, the examination of positional interchanges might be of interest to coaches and applied sports scientists.

Positional interchanges occur when players switch from their orthodox position to another position with a different tactical role (e.g. an orthodox central-defender moves to fullback). Players who commonly transition between positions are often referred to as 'utility' players. However, to the best of our knowledge, no study has explored the impact of between game positional interchanges on the physical and technical match performance variables of elite players. The question arises, whether it's a players' physical capacity or the relative utilisation of this capacity that is responsible for the variation in the match running performances across positions (Bradley et al., 2013). Positional differences have been found for both match running performances and an array of physical capacity tests (Bangsbo, 1994; Mohr et al., 2003). Thus, examining the same players interchanging between positions with different physical demands could provide some insight into the degree to which players tax their physical capacities during games. The submaximal nature of soccer could result in players working well within their physical capabilities, particularly if constrained by a tactical role rather than physical factors. English Premier League and Championship players were found to have similar intermittent endurance test performances but the latter covered more distance in high-intensity running and sprinting during match play, possibly indicating players at different competitive standards tax their physical capacities to varying degrees (Bradley et al., 2013). Furthermore, following a dismissal, elite players have been found to increase their work-rate, suggesting that players do not always tax their full physical capacities (Carling & Bloomfield, 2010). Match running performance and physical capacity relationships are complex with studies typically demonstrating moderate correlations for all playing positions combined (Bradley et al., 2013; Krustrup et al., 2003). Using correlational analysis, Buchheit et al. (2010) found less pronounced positional differences in physical capacities than in the match running performances of elite youth players. Trivial correlations existed between physical capacities and match running performances for selected positions, suggesting the tactical role of a player could limit running during match play.

In relation to these findings, the question arises whether the physical capacity and/or technical skills of players limit their ability to play in another position. Therefore, comparing the magnitude of difference between selected interchanges (within-player design) with those reported within the research literature for positional variation (between-player design) could help to determine if players are able to cope with the physical and technical demands of multiple positions. Thus, the aim of this study was to examine the impact of between game positional interchanges on the physical and technical match performance variables of elite players. From an applied perspective, if some interchanges are particularly demanding then these findings could inform training practices so players are conditioned to cope with multiple positions. Moreover, it would also be of interest to determine if the physical demands within some interchanges are detrimental to technical performances.

Methods

Players and Design

Match performance data were collected from multiple English Premier League seasons (2005-06 to 2012-13). The original data set consisted of 840 players across 6557 observations, from which 9 potential positional interchanges were identified. This included the following: central-defender to fullback (CD-FB), central-defender to central-midfielder (CD-CM), fullback to central-midfielder (FB-CM), fullback to wide-midfielder (FB-WM), fullback to attacker (FB-AT), central-midfielder to wide-midfielder (CM-WM), central-midfielder to attacker (CM-AT), wide-midfielder to central midfielder (WM-CM) and wide-midfielder to attacker (WM-AT).

Numerous inclusion criteria were applied to this large data set to enhance the scientific rigor of the study design. Data were only included if players: (1) had completed the entire 90 min across multiple observations in their orthodox position versus that in another position, (2) completed these interchanges for the same team and (3) were tracked across multiple observations within each interchange (>3 observations). After applying these stringent inclusion criteria, the final sample consisted of 29 individual players across 761 observations (811 individual players and 5796 observations were excluded). Due to the subsequent low number of players and observations, only the CD-FB (11 players, 312 observations), CM-WM (7 players, 171 observations), WM-CM (7 players, 197 observations) and AT-WM interchanges (4 players, 81 observations) were retained for further investigation. Ethical approval was obtained from the appropriate institutional ethics committee and Prozone granted permission to publish the data. The contextual factors related to player observations are detailed in Table 1.

Match Analysis System

Data were obtained from a computerised multiple-camera player tracking system (Prozone Sports Ltd®, Leeds, UK). Player activities were captured during matches by cameras positioned at roof level and analysed using proprietary software to produce a dataset on each player's physical and technical performance. The validity and reliability of this tracking system has been quantified to verify the capture process and data accuracy (Bradley, O'Donoghue, Wooster, & Tordoff, 2007; Bradley et al., 2009; Di Salvo, Collins, McNeill, & Cardinale, 2006).

Physical and Technical Performance Variables

Player activities were coded into: standing (0-0.6 $km \cdot h^{-1}$), walking (0.7-7.1 $km \cdot h^{-1}$), jogging (7.2-14.3 $km \cdot h^{-1}$), running (14.4-19.7 $km \cdot h^{-1}$), high-speed running (19.8-25.1 $km \cdot h^{-1}$) and sprinting (>25.1 $km \cdot h^{-1}$). Total distance represented the summation of distances covered in all categories. High-intensity running consisted of the combined distance in high-speed running and sprinting ($\geq$19.8 $km \cdot h^{-1}$). This was separated into three subsets based on the teams' possession status (with or without the ball or if the ball was out of play). The technical analysis included the frequency of passes and percentage completed, frequency of balls received, possessions won/lost, ball touches, dribbles, shots, number of tackles, clearances, crosses and final third entries.

Statistical Analysis

A magnitude-based inferential statistical approach was adopted based on recent recommendations (Winter, Abt, & Nevill, 2014). Effect sizes (ES) were calculated to determine the meaningfulness of the difference, corrected for bias using Hedges formula and presented with 90% Confidence Intervals (CI) (Batterham & Hopkins, 2006; Cohen, 1988). The ES magnitudes were classified as trivial (<0.2), small (>0.2-0.6), moderate (>0.6-1.2) and large (>1.2). Values are presented as means and standard deviations unless otherwise stated.

Results

Physical Performance Variables

Notable results for players interchanging from CD to FB included moderately higher total distances covered (ES: -1.11 [CI: -1.32 to -0.90], +965m) and large differences in the distance covered running (ES: -1.44 [CI: -1.66 to -1.22], +409m), high-speed running (ES: -1.56 [CI: -1.78 to -1.33], +225m) and sprinting (ES: -1.26 [CI: -1.47 to -1.04], +100m; Table 2). Large differences were also observed for high-intensity running distance (ES: -1.56 [CI: -1.78 to -1.34], +326m) and high-intensity running performed with ball possession (ES: -1.96 [CI: -2.20 to -1.73], +206m; Table 3). Trivial to small increases (ES: -0.14-0.59 [CI: -0.82 to 0.86]) were found for all physical performance variables in players interchanging from CM to WM. In general, trivial to small differences (ES: -0.21-0.39 [CI: -0.46 to 0.64]) were evident for physical performance variables in players interchanging from WM to CM. An exception was the moderate difference (ES: +0.80 [CI: 0.55 to 1.06], -134m) in high-intensity running performed with ball possession. While trivial to small differences were evident for the physical performance variables in players interchanging from AT to WM (ES: -0.51-0.07 [CI: -0.91 to 0.47]), there was a trend for an increase in the distance covered in the majority of the variables. A moderate difference in high-intensity running performed without ball possession was observed for this interchange (ES: -0.98 [CI: -1.40 to -0.57], +160m, Table 3). Small differences were found in the recovery time between high-intensity efforts for the CM-WM (50±20 vs. 44±15 s, ES: 0.34 [CI: 0.05 to 0.64]) and WM-CM interchanges (39±14 vs. 36±13 s, ES: 0.28 [CI: 0.01 to 0.54]). In contrast, moderate differences existed for the CB-FB (74±25 vs. 52±20 s, ES: 0.96 [CI: 0.70 to 1.22]) and AT-WM interchanges for recovery time (59±17 vs. 44±17 s, ES: 0.85 [CI: 0.43 to 1.26]).

Technical Performance Variables

Trivial to moderate differences (ES: -1.18-0.39 [CI: -1.39 to 0.59]) were found for the majority of technical variables in the interchange from CD to FB (Table 4). In contrast, there were large differences in the number of possessions lost (ES: -1.23 [CI: -1.44 to -1.01], +7) and final third entries (ES: -1.55 [CI: -1.77 to -1.32], +5.4). Trivial to moderate differences were evident for all the technical performance variables in players interchanging from CM to WM (ES: -0.48-0.64 [CI: -0.75 to 0.91]). Players interchanging from WM to CM demonstrated trivial to small differences (ES: -0.36-0.54 [CI: -0.61 to 0.79]) for all technical performance variables. While trivial to small differences (ES: -0.51-0.58 [CI: -0.91 to 0.98]) were generally found for the technical performance variables in players interchanging from AT to WM, moderate differences were observed for tackles (ES: -1.16, [CI: -1.59 to -0.74] +2.1) and clearances (ES: -0.77 [CI: -1.18 to -0.36], +0.8). Finally, a large difference was evident for the number of possessions won (ES: -1.41 [CI: -1.85 to -0.98], +6).

Discussion

This is the first study to examine the influence of between game positional interchanges on elite match performance variables. Findings will contribute greatly to the understanding of the demands placed on players transitioning between tactical roles. Previous studies examining elite match demands typically include large samples but have failed to adopt adequate inclusion criteria (Bradley et al., 2009; Rampinini et al., 2007). The present study applied strict inclusion criteria, which reduced the sample from 840 to 29 players. From the outset, caution is needed when interpreting the present findings as a small sample size was used for some interchanges, and this is especially relevant given the highly variable nature of some match variables (Bush, Archer, Hogg & Bradley, 2015a). However, this is an unavoidable drawback given the elite nature of the players and the rarity of the data set (e.g. players moving across positions regularly for the same team using a repeated measures design). Despite these shortcomings the present analytical approach still allowed comparisons to be made regarding the match performance characteristics of players switching positions throughout the season. Some additional limitations are evident, as some factors such as playing formation and context were not controlled for despite them impacting physical and technical match performance metrics (Bradley et al., 2011; Castellano, Blanco-Villasenor & Alvarez, 2011). There were some inconsistencies across interchanges regarding match location (e.g., more home observations) but not outcome or team ranking. However, to further improve our analytical approach, the magnitude of the difference between selected interchanges was compared with those reported within the research literature for positional variation. This was calculated to determine if players were able to cope with the physical and technical demands of multiple positions.

A common finding within the research literature is that FB typically cover greater high-intensity running and sprinting distances during matches compared to CD (Bradley et al., 2009, 2013; Di Mascio & Bradley, 2013; Di Salvo et al., 2007). In agreement with these findings, running demands increased in players moving from CD to FB (Figure 1). It would seem that CD do not tax their physical capacities in their orthodox position to the same extent as the data demonstrate they can cope physically when playing in a more demanding position. However, one may question whether a typical CD could cope with the FB role in the contemporary game given that the physical performances of FB have evolved more in the last decade than any other position (Bush, Barnes, Archer, Hogg, & Bradley, 2015b). A limitation of using distances covered in various speed categories to determine the physical demands of positional interchanges is it fails to account for demanding activities such as accelerations/decelerations and multi-directional movements. For instance, most maximal accelerations do not result in speeds associated with high-intensity running but are metabolically taxing (Varley & Aughey, 2013). Indeed, training data incorporating these taxing activities demonstrate that the high-intensity running demands and the subsequent energy cost of these activities are generally underestimated in CD (Gaudino et al., 2013). In support of this notion, the large effect sizes found for high-intensity running and sprinting distances for this interchange are comparable to those previously reported when orthodox FB are compared against orthodox CD (Andrzejewski et al., 2015; Bradley et al., 2009, 2013; Di Salvo et al., 2010, 2013; Figure 1.). However it should be noted that the observations derived from the data set in this interchange were distributed across an 8-season period, which is an obvious limitation. A more recent study investigating the physical and technical evolution of various playing positions in the English Premier League reported higher absolute high-intensity running and sprint distances for CD and FB (Bush et al., 2015b) than those reported in the present study for the CD-FB interchange. Consequently this could suggest that the physical demands of the FB position are within the reserve capacity of CD but could be close to the upper limit of their physical capabilities.

Soccer performance is complex with some technical variables predicting team success more accurately than physical variables (Carling, 2013; Castellano, Casamichana, & Lago, 2012). Given that the number of passes and pass completion rates have been associated with team success (Castellano et al., 2012; Collet, 2013; Hughes & Franks, 2005; Lago-Ballesteros, Lago-Peñas, & Rey, 2012; Lago-Peñas & Lago-Ballesteros, 2011) it seems imperative that the impact of positional interchanges on these variables are quantified. The present data demonstrate that interchanging from a CD to FB position places greater technical demands on the player in relation to the number of passes performed and balls received in addition to more final third entries. The moderate to large effect size differences for this interchange is comparable to those previously reported in the literature for each orthodox position (Bradley et al., 2013). This finding suggests that CD are able to adapt to the greater technical demands of the FB position, which is unsurprising given that CD passing distribution has increased substantially in the last decade due to teams using the backline more effectively due to possession based play in the English Premier League (Bush et al., 2015b). However, given the higher number of final third entries for FB compared to CD, it could be that the technical demands are somewhat different, especially given the increase in player density and resultant pressure in this area of the pitch (Barreira, Garganto, Castellano, Prudente, & Anguera, 2014; Wallace & Norton, 2014). Thus, players transitioning from CD to FB should not only have the physical prerequisites but also need to be able to distribute the ball in both the defensive and offensive areas of the pitch under varying degrees of opposition pressure (Carling, 2010). Ultimately it seems, that the positional role rather than players' technical abilities determines their technical performance in this interchange.

Typically WM have been found to cover greater high-intensity running and sprint distances than CM during English Premier League matches (Bradley et al., 2009, 2013; Di Mascio & Bradley, 2013; Di Salvo et al., 2007). Although the present study revealed limited differences between the CM-WM and WM-CM interchanges for these physical metrics with CI's that indicated a degree of uncertainty. For instance, regardless of which position was orthodox, both interchanges demonstrated that WM cover marginally more high-intensity running distance during match play than CM with a higher portion of this distance covered when in possession of the ball. It is worth mentioning that our data for both CM-WM and WM-CM interchanges mainly consisted of observations between 2010-2013, therefore comparing trends to more recent data would be more appropriate. One could assume that CM tax their physical capacities to a lesser extent in their orthodox position and are able to increase their running performance while moving to a WM position but the differences between interchanges were minimal. We found comparable high-intensity running distance for CM in the CM-WM interchange to that recently reported (Bush et al., 2015b). However CM could not increase their running performance when moving to WM. This might indicate that the physical demands of WM are close to the limit of CM, which could potentially highlight the importance of position-specific conditioning of players regularly interchanging between CM-WM. Interestingly, negligible differences in sprinting distances were found during match-play for the CM-WM interchange but a more pronounced difference was evident when players switched from WM to CM. In absolute terms, sprint distances were higher for both interchanges than recently reported (Bush et al., 2015b). It might be that coaches are selective and only switch players between CM-WM or WM-CM interchanges when they have the required physical capacities to cope with the unique demands of each midfield position. Research demonstrates that sprinting speeds and the average distance per sprint are lower for CM compared to WM given that the latter have the space along the flanks to be able to achieve higher top speeds and longer sprints (Bradley et al., 2009; Bush et al., 2015b). However, CM could potentially perform more hard accelerations and decelerations due to the limited space available to them within the central regions of the pitch and these actions have been found to be metabolically taxing (Gaudino et al., 2013; Osgnach, Poser, Bernardini, Rinaldo, & di Prampero, 2010). This could mean that the physical demands are more comparable across these positions than initially thought although research is necessary to verify this. The marked discrepancy for sprint distance between the interchange and that found in previously published work (Bradley et al., 2009, 2013) could indicate that players switching between midfield positions use some of the common characteristics of their orthodox position when interchanging, hence the similarity in sprinting performance.

Regarding technical variables, the number of total passes, balls received and final third entries decreased when CM interchanged to WM. This is in agreement with previous work detailing technical differences across positions (Bradley et al., 2013) and potentially suggests that the tactical role of a player rather than their skill level limits their technical performance during matches. Interestingly, the current study reported less pronounced differences in some technical performance variables in WM-CM compared to the CM-WM interchange but again the CI's highlighted some uncertainty for selected variables. For instance, the number of passes, possessions won and balls received were particularly influenced. Although the exact reason for this trend is unknown it could suggest that orthodox WM are unable to fully adapt to the technical requirements when moving to a CM position. However, a major limitation of the current study is the one-dimensional analysis of passing variables. For instance, we only included passing frequency and completion rates and not the direction (forward, sideways and backwards) or distribution of passes (final third or passes leading to a goal scoring opportunity), which would have improved our understanding of the technical demands of various positional interchanges.

The AT to WM interchange revealed only moderate differences covered at high-intensity during matches, which differs from the pronounced differences found within the research literature for these two positions (Bradley et al., 2009, 2013; Di Mascio & Bradley, 2013; Di Salvo et al., 2007). A much greater difference was expected between AT and WM especially given that English Premier League WM usually display the highest intermittent endurance test performance and the AT the lowest (Bradley et al., 2011, 2013). This is in line with previous investigations on Scandinavian elite players, demonstrating that AT performed poorly on aerobic and anaerobic intermittent performance tests when compared to other positions, including

CD (Krustrup et al., 2003, 2006). Bradley et al. (2009) also observed that English FA Premier League AT performed less high-intensity running than their counterparts in the Spanish Primera Division and Serie A (Di Salvo et al., 2007; Mohr et al., 2003). Based on this evidence it could be reasonable to assume that the fitness levels of AT challenge their capacity to meet the physical demands of the WM position. However, the English Premier League has been found to evolve over the last decade with the physical demands undergoing substantial change with the distances covered at high-intensity and sprinting increasing by 30-50% (Barnes, Archer, Hogg, Bush, & Bradley, 2014). Similarly, research has found position-specific evolutionary match performance trends in the EPL (Bush et al., 2015b), with AT increasing their high-intensity running performances during games. Thus, AT may be required to maintain a high level of activity in the modern English Premier League when not directly involved in play to create space to receive passes or to pressure opponents into making mistakes in an attempt to regain possession. However it should be noted, that we found higher values for both AT and WM for high-intensity and sprint distance than recently reported by Bush et al. (2015b). It might indicate that coaches are selective and switch AT to the WM position when AT has the required physical capacity. Orthodox AT also completed more passes and final third entries when moving to a WM position. This is in agreement with the findings of previous research comparing these positions (Bradley et al., 2013). The data suggest that orthodox AT were able to adapt to the technical demands of the WM position and this finding further supports the notion that the positional role rather than the skills of elite players limit their technical performance.

In summary, the data demonstrate that the physical and technical demands vary greatly from one interchange to another but utility players seem able to adapt to these switches. It appears that a player's positional role rather than their physical capacity is the main determining factor of physical and technical match performances. CB-FB interchange might be an exception, where specific conditioning intervention might be needed. From a practical perspective, players regularly interchanging to more demanding positions should be conditioned where possible to be able to cope physically and technically with the switch. These findings have implications for developing position-specific training drills that mimic the characteristics of each position and which provide technical, tactical and physical overload. Practitioners should aim to condition players that interchange regularly to cope with the 'worst case scenarios' in terms of the intense physical demands identified for certain playing positions (Di Mascio & Bradley, 2013). Furthermore, orthodox CD and AT experienced a moderate decrease in recovery times between high-intensity efforts while switching to FB or WM, respectively. This might have implications for injury prevention, as lower than normal recovery times has been identified as a risk factor for match injuries (Carling et al., 2010), further highlighting the importance of special conditioning in case of utility players. In contrast to the CM-WM interchange, the recovery time was not longer for the CM in the WM-CM interchange. This might further support that players switching between midfield positions use some of the common characteristics of their orthodox positions when interchanging. Alternatively, the CD-FB and AT-WM interchanges have very different physical and technical demands and thus could require coach intervention during match-play. For instance, coaches could attempt to use well-timed substitutions to reduce fatigue or in an effort to maintain the technical and tactical performance of the team (Bradley, Lago-Peñas, & Rey, 2014). Finally, the increase of the physical demand did not decrease the technical performance in the CD-FB and CM-WM interchanges.

References

Andrzejewski, M., Chmura, J., Pluta, B., Konarski, J.M. (2015). Sprinting Activities and Distance Covered by Top Level Europa League Soccer Players. *International Journal of Sports Science & Coaching, 10*, 39-49.

Bangsbo, J. (1994). The physiology of soccer--with special reference to intense intermittent exercise. *Acta Physiologica Scandinavica Supplementum, 619*, 1-155.

Bangsbo, J., Norregaard, L., & Thorso, F. (1991). Activity profile of competition soccer. *Canadian Journal of Sport Sciences, 16*, 110-116.

Barnes, C., Archer, D. T., Hogg, B., Bush, M., & Bradley, P. S. (2014). The evolution of physical and technical performance parameters in the English Premier League. *International Journal of Sports Medicine, 35*, 1095-1100. doi: 10.1055/s-0034-1375695

Barreira, D., Garganto, J., Castellano, J., Prudente, J., & Anguera, T. (2014). Evolución del ataque en el fútbol de élite entre 1982 y 2010: Aplicación del análisis secuencial de retardos. *Revista de Psicología del Deporte, 23*, 139-146.

Batterham, A. M., & Hopkins, W. G. (2006). Making meaningful inferences about magnitudes. *International Journal of Sports Physiology and Performance, 1*, 50-57.

Bradley, P. S., O'Donoghue, P., Wooster, B., & Tordoff, P. (2007). The reliability of ProZone MatchViewer: a video-based technical performance analysis system. *International Journal of Performance Analysis in Sport, 7*, 117-129.

Bradley, P. S., Sheldon, W., Wooster, B., Olsen, P., Boanas, P., & Krustrup, P. (2009). High-intensity running in English FA Premier League soccer matches. *Journal of Sports Sciences, 27*, 159-168. doi: 10.1080/02640410802512775

Bradley, P. S., Carling, C., Archer, D., Roberts, J., Dodds, A., Di Mascio, M., ... Krustrup, P. (2011). The effect of playing formation on high-intensity running and technical profiles in English FA Premier League soccer matches. *Journal of Sports Sciences, 29*, 821-830. doi: 10.1080/02640414.2011.561868

Bradley, P. S., Carling, C., Gomez Diaz, A., Hood, P., Barnes, C., Ade, J., … Mohr, M. (2013). Match performance and physical capacity of players in the top three competitive standards of English professional soccer. *Human Movement Science, 32*, 808-821. doi: 10.1016/j.humov.2013.06.002

Bradley, P. S., Lago-Peñas, C., & Rey, E. (2014). Evaluation of the match performances of substitution players in elite soccer. *International Journal of Sports Physiology and Performance, 9*, 415-424. doi: 10.1123/ijspp.2013-0304

Buchheit, M., Mendez-Villanueva, A., Simpson, B.M., Bourdon, P.C. (2010). Match running performance and fitness in youth soccer. *International Journal of Sports Medicine; 31*, 818-825. doi: 10.1055/s-0030-1262838

Bush, M., Archer, D.T., Hogg, R., & Bradley, P.S. (2015a). Factors Influencing Physical and Technical Variability in the English Premier League. *International Journal of Sports Physiology and Performance.* Advance online publication.

Bush, M., Barnes, C., Archer, D. T., Hogg, B., & Bradley, P. S. (2015b). Evolution of match performance parameters for various playing positions in the English Premier League. *Human Movement Science, 39*, 1-11. doi: 10.1016/j.humov.2014.10.003

Carling, C. (2010). Analysis of physical activity profiles when running with the ball in a professional soccer team. *Journal of Sports Sciences*, *28*, 319-326. doi: 10.1080/02640410903473851

Carling C, Bloomfield, J. (2010). The effect of an early dismissal on player work-rate in a professional soccer match. *Journal of Science and Medicine in Sport*, *13*,126-128. doi: 10.1016/j.jsams.2008.09.004

Carling, C., Gall, F.L., Reilly, T.P. (2010). Effects of physical efforts on injury in elite soccer. *International Journal of Sports Medicine, 31*, 180-185. doi: 10.1055/s-0029-1241212

Carling, C. (2013). Interpreting physical performance in professional soccer match-play: should we be more pragmatic in our approach? *Sports Medicine, 43*, 655-663. doi: 10.1007/s40279-013-0055-8

Castellano, J., Blanco-Villasenor, A., & Alvarez, D. (2011). Contextual variables and time-motion analysis in soccer. *International Journal of Sports Medicine,* 32, 415–421.

Castellano, J., Casamichana, D., & Lago, C. (2012). The Use of Match Statistics that Discriminate Between Successful and Unsuccessful Soccer Teams. *Journal of Human Kinetics, 31*, 139-147. doi: 10.2478/v10078-012-0015-7

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed. ed.). Hillsdale, N.J.: L. Erlbaum Associates.

Collet, C. (2013). The possession game? A comparative analysis of ball retention and team success in European and international football, 2007-2010. *Journal of Sports Sciences, 31*, 123-136. doi: 10.1080/02640414.2012.727455

Di Mascio, M., & Bradley, P. S. (2013). Evaluation of the most intense high-intensity running period in English FA premier league soccer matches. *Journal of Strength and Conditioning Research, 27*, 909-915. doi: 10.1519/JSC.0b013e31825ff099

Di Salvo, V., Collins, A., McNeill, B., & Cardinale, M. (2006). Validation of Prozone ®: A new video-based performance analysis system. *International Journal of Performance Analysis in Sport, 6*, 108-119.

Di Salvo, V., Baron, R., Tschan, H., Calderon Montero, F. J., Bachl, N., & Pigozzi, F. (2007). Performance characteristics according to playing position in elite soccer. *International Journal of Sports Medicine, 28*, 222-227. doi: 10.1055/s-2006-924294

Di Salvo, V., Baron, R., González-Haro, C., Gormasz, C., Pigozzi, F., Bachl, N. (2010).Sprinting analysis of elite soccer players during European Champions League and UEFA Cup matches. *Journal of Sports Sciences; 28*, 1489-1494. doi: 10.1080/02640414.2010.521166

Di Salvo, V., Pigozzi, F., González-Haro, C., Laughlin, M.S., De Witt, J.K. (2013). Match performance comparison in top English soccer leagues. *International Journal of Sports Medicine, 34*, 526-532. doi: 10.1055/s-0032-1327660

Gaudino, P., Iaia, F. M., Alberti, G., Strudwick, A. J., Atkinson, G., & Gregson, W. (2013). Monitoring training in elite soccer players: systematic bias between running speed and metabolic power data. *International Journal of Sports Medicine, 34*, 963-968. doi: 10.1055/s-0033-1337943

Hughes, M., & Franks, I. (2005). Analysis of passing sequences, shots and goals in soccer. *Journal of Sports Sciences, 23*, 509-514. doi: 10.1080/02640410410001716779

Krustrup, P., Mohr, M., Amstrup, T., Rysgaard, T., Johansen, J., Steensberg, A., ... Bangsbo, J. (2003). The yo-yo intermittent recovery test: physiological response, reliability, and validity. *Medicine and Science in Sports and Exercise, 35*, 697-705. doi: 10.1249/01.MSS.0000058441.94520.32

Krustrup, P., Mohr, M., Nybo, L., Jensen, J. M., Nielsen, J. J., & Bangsbo, J. (2006). The Yo-Yo IR2 test: physiological response, reliability, and application to elite soccer. *Medicine and Science in Sports and Exercise, 38*, 1666-1673. doi: 10.1249/01.mss.0000227538.20799.08

Lago-Ballesteros, J., Lago-Peñas, C., & Rey, E. (2012). The effect of playing tactics and situational variables on achieving score-box possessions in a professional soccer team. *Journal of Sports Sciences, 30*, 1455-1461. doi: 10.1080/02640414.2012.712715

Lago-Peñas, C., & Lago-Ballesteros, J. (2011). Game location and team quality effects on performance profiles in professional soccer. *Journal of Sports Science & Medicine*, *10*, 465-471.

Mohr, M., Krustrup, P., & Bangsbo, J. (2003). Match performance of high-standard soccer players with special reference to development of fatigue. *Journal of Sports Sciences*, *21*, 519-528. doi: 10.1080/0264041031000071182

Osgnach, C., Poser, S., Bernardini, R., Rinaldo, R., & di Prampero, P. E. (2010). Energy cost and metabolic power in elite soccer: a new match analysis approach. *Medicine and Science in Sports and Exercise*, *42*, 170-178. doi: 10.1249/MSS.0b013e3181ae5cfd

Rampinini, E., Coutts, A. J., Castagna, C., Sassi, R., & Impellizzeri, F. M. (2007). Variation in top level soccer match performance. *International Journal of Sports Medicine*, *28*, 1018-1024. doi: 10.1055/s-2007-965158

Varley, M. C., & Aughey, R. J. (2013). Acceleration profiles in elite Australian soccer. *International Journal of Sports Medicine, 34*, 34-39. doi: 10.1055/s-0032-1316315

Wallace, J. L., & Norton, K. I. (2014). Evolution of World Cup soccer final games 1966-2010: game structure, speed and play patterns. *Journal of Science and Medicine in Sport*, *17*, 223-228. doi: 10.1016/j.jsams.2013.03.016

Winter, E. M., Abt, G. A., & Nevill, A. M. (2014). Metrics of meaningfulness as opposed to sleights of significance. *Journal of Sports Sciences, 32*, 901-902. doi: 10.1080/02640414.2014.895118

Table Legends

Table 1. Relative distribution of observations for each interchange across contextual variables such as match location, outcome, seasonal period and ranking.

Table 2. Distances covered in different speed categories for all positional interchanges. Data are shown as means ± standard deviation. The effect size was calculated and presented with the 90% confidence intervals. The effect size magnitudes were classified as trivial (<0.2), small (>0.2-0.6), moderate (>0.6-1.2) and large (>1.2).

Table 3. High-intensity running subsets for all positional interchanges. Data are shown as means ± standard deviation. The effect size was calculated and presented with the 90% confidence intervals. The effect size magnitudes were classified as trivial (<0.2), small (>0.2-0.6), moderate (>0.6-1.2) and large (>1.2).

Table 4. Technical performance parameters for all positional interchanges. Data are shown as means ± standard deviation. The effect size was calculated and presented with the 90% confidence intervals. The effect size magnitudes were classified as trivial (<0.2), small (>0.2-0.6), moderate (>0.6-1.2) and large (>1.2).

Figure Legend

Figure 1. High-intensity running and sprint distances for all positional interchanges (black) from the present study versus positional differences (grey) based on previous studies (Andrzejewsky et al., 2015; Bradley et al., 2009,2013; Di Salvo et al., 2010, 2013). CD=central defender, FB=fullback, CM=central-midfielder, WM=wide-midfielder, AT=attacker. Data are shown as means ± standard deviation.

Table 1.

Orthodox vs. Interchange	Match Location (%)		Match Results (%)			Period of the year (%)			Team Ranking
	Home	**Away**	**Win**	**Draw**	**Lost**	**August-November**	**December-February**	**March-May**	
Orthodox Central-defender	59	41	33	25	42	46	35	19	14
Interchange Fullback	50	50	39	26	35	40	29	31	11
Orthodox Central-midfielder	55	45	35	22	43	37	39	24	11
Interchange Wide-midfielder	56	44	25	32	43	24	42	34	12
Orthodox Wide-midfielder	63	37	34	34	32	42	32	26	12
Interchange Central-midfielder	46	54	32	27	41	32	46	22	13
Orthodox Attacker	63	37	33	24	43	37	35	28	11
Interchange Wide-midfielder	67	33	40	28	32	37	30	33	11
Total	**57**	**43**	**34**	**27**	**39**	**37**	**36**	**27**	**12**

Table 2.

Orthodox vs Interchange	Distance Covered (m)						
	Total	**Standing**	**Walking**	**Jogging**	**Running**	**High-speed Run**	**Sprinting**
Orthodox Central-defender	9766±810	33±9	3826±232	3952±444	1304±261	477±130	172±71
Interchange Fullback	10731±974	27±8	3760±259	4254±480	1713±321	702±169	272±95
Effect Size Difference	-1.11	+0.64	+0.27	-0.66	-1.44	-1.56	-1.26
90% Confidence Intervals	-1.32 to -0.90	0.43 to 0.84	0.07 to 0.47	-0.86 to -0.46	-1.66 to -1.22	-1.78 to -1.33	-1.47 to -1.04
Orthodox Central-midfielder	11437±642	27±6	3564±210	4643±386	2020±298	845±182	337±130
Interchange Wide-midfielder	11284±701	25±6	3676±199	4405±426	1957±341	871±171	348±112
Effect Size Difference	+0.23	+0.27	-0.55	+0.59	+0.20	-0.14	-0.09
90 % Confidence Intervals	-0.04 to 0.50	0.00 to 0.53	-0.82 to -0.27	0.32 to 0.86	-0.07 to 0.47	-0.41 to 0.13	-0.36 to 0.18
Orthodox Wide-midfielder	11752±531	26±7	3493±251	4605±328	2203±244	1000±177	423±143
Interchange Central-midfielder	11611±918	28±8	3408±368	4676±495	2190±327	937±192	371±109
Effect Size Difference	+0.20	-0.21	+0.29	-0.18	+0.05	+0.35	+0.39
90 % Confidence Intervals	-0.04 to 0.45	-0.46 to 0.04	0.04 to 0.54	-0.43 to 0.07	-0.20 to 0.30	0.10 to 0.60	0.14 to 0.64
Orthodox Attacker	10922±689	27±7	3757±191	4132±412	1731±236	857±119	418±84
Interchange Wide-midfielder	11259±534	26±8	3759±149	4282±257	1840±203	925±166	427±107
Effect Size Difference	-0.51	+0.07	-0.01	-0.40	-0.47	-0.49	-0.09
90% Confidence Intervals	-0.91 to -0.11	-0.32 to 0.47	-0.41 to 0.38	-0.79 to 0.00	-0.87 to -0.07	-0.88 to -0.09	-0.48 to 0.31

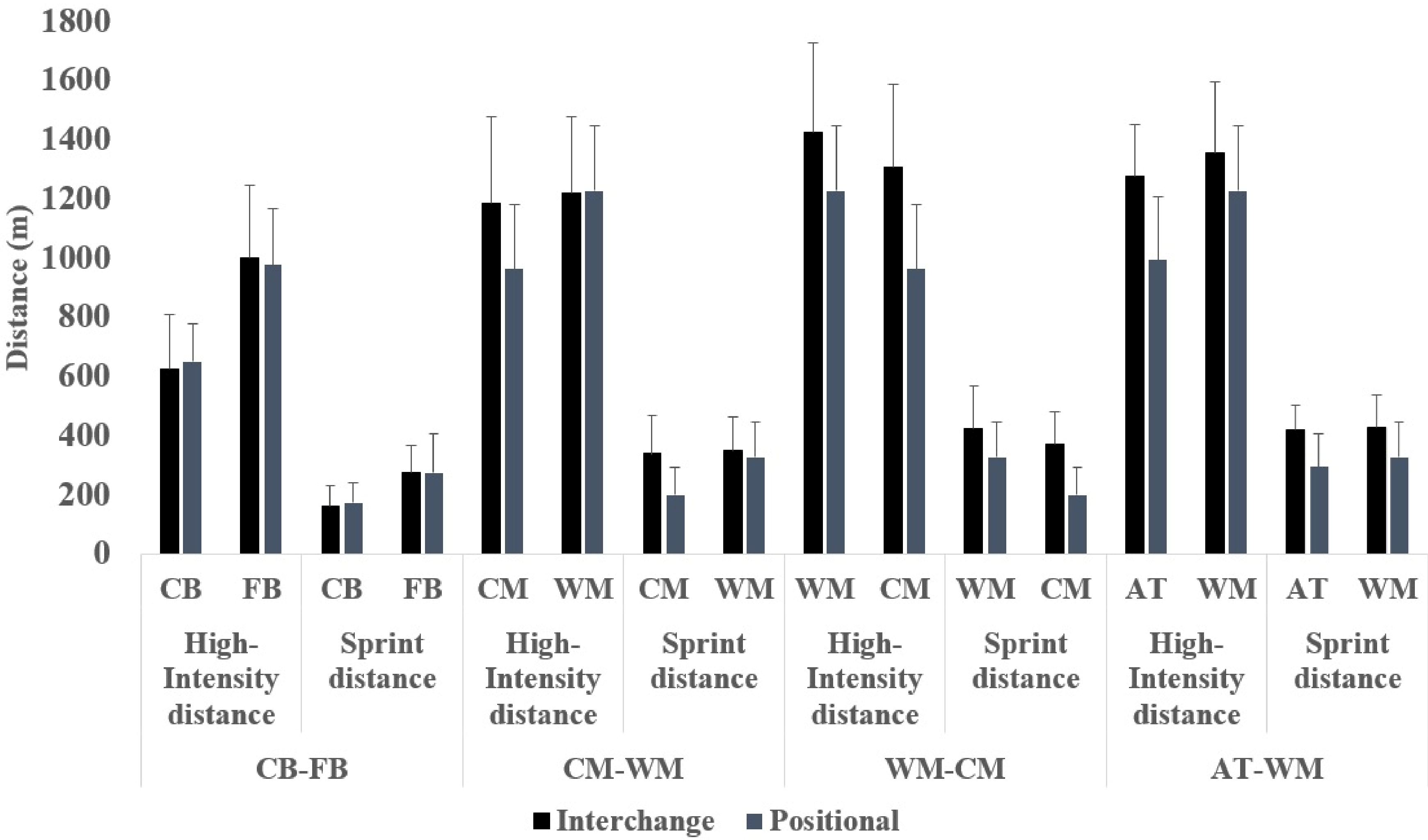
Table 3.

Orthodox vs. Interchange	High-intensity Running Distance (m)			
	Total	**With possession**	**Without possession**	**Ball out of play**
Orthodox Central-defender	649±186	128±67	460±136	56±42
Interchange Fullback	975±246	334±154	555±151	77±45
Effect Size Difference	-1.56	-1.96	-0.67	-0.48
90% Confidence Intervals	-1.78 to -1.34	-2.20 to -1.73	-0.87 to -0.47	-0.68 to -0.28
Orthodox Central-midfielder	1183±293	553±189	571±184	57±39
Interchange Wide-midfielder	1219±257	640±174	526±179	52±34
Effect Size Difference	-0.13	-0.47	+0.24	+0.12
90 % Confidence Intervals	-0.40 to 0.14	-0.74 to -0.20	-0.02 to 0.51	-0.14 to 0.39
Orthodox Wide-midfielder	1424±300	668±171	661±204	92±57
Interchange Central-midfielder	1308±277	534±158	693±228	66±46
Effect Size Difference	+0.40	+0.80	-0.15	+0.48
90 % Confidence Intervals	0.15 to 0.65	0.55 to 1.06	-0.40 to 0.10	0.23 to 0.73
Orthodox Attacker	1275±177	771±144	423±150	79±40
Interchange Wide-midfielder	1352±244	693±150	583±174	75±37
Effect Size Difference	-0.37	+0.53	-0.98	+0.10
90% Confidence Intervals	-0.77 to 0.03	0.13 to 0.93	-1.40 to -0.57	-0.30 to 0.49

Table 4.

Orthodox vs. Interchange	Tackles	Clearances	Dribbles	Possessions	Possessions Won	Possessions Lost	Balls Received	Ball Touches	Passes	Successful Passes (%)	Final 3rd Entries	Total Shots
Orthodox Central-defender	2.3±2.1	3.7±2.9	0.1±0.3	41±14	20±13	18±6	18±9	66±24	21±10	79±12	4.3±2.7	0.3±0.7
Interchange Fullback	2.1±2.0	2.6±2.5	0.2±0.4	49±13	18±13	25±6	30±13	85±29	31±13	75±10	9.7±4.7	0.3±0.6
Effect Size Difference	+0.10	+0.39	-0.34	-0.61	+0.19	-1.23	-1.18	-0.75	-0.87	+0.36	-1.55	-0.01
90% Confidence Intervals	-0.10 to 0.30	0.19 to 0.59	-0.54 to -0.14	-0.81 to -0.40	-0.01 to 0.39	-1.44 to -1.01	-1.39 to -0.97	-0.95 to -0.54	-1.08 to -0.67	0.16 to 0.56	-1.77 to -1.32	-0.21 to 0.19
Orthodox Central-midfielder	3.4±2.3	1.0±1.2	1.0±1.3	59±22	14±7	20±6	44±15	125±45	42±17	82±9	6.9±3.4	1.7±1.4
Interchange Wide-midfielder	2.3±1.8	1.0±2.0	1.6±1.8	51±15	11±6	23±5	40±9	129±32	32±9	80±10	5.8±2.9	2.1±1.8
Effect Size Difference	+0.56	+0.02	-0.40	+0.39	+0.47	-0.48	+0.32	-0.09	+0.64	+0.22	+0.36	-0.25
90 % Confidence Intervals	0.28 to 0.83	-0.24 to 0.29	-0.66 to -0.13	0.12 to 0.65	0.20 to 0.74	-0.75 to -0.21	0.05 to 0.59	-0.36 to 0.17	0.37 to 0.91	-0.05 to 0.49	0.09 to 0.62	-0.52 to 0.02
Orthodox Wide-midfielder	3.3±2.0	1.3±1.3	0.8±1.0	52±16	13±5	24±8	38±11	111±36	33±10	79±9	6.3±3.0	1.6±1.5
Interchange Central-midfielder	3.4±1.9	1.4±1.7	0.5±0.8	53±18	15±6	20±7	38±12	107±36	37±13	82±10	6.9±4.2	1.3±1.3
Effect Size Difference	-0.06	-0.10	+0.29	-0.05	-0.33	+0.54	+0.02	+0.10	-0.36	-0.25	-0.17	+0.22
90 % Confidence Intervals	-0.31 to 0.19	-0.34 to 0.15	0.04 to 0.54	-0.30 to 0.20	-0.58 to -0.08	0.29 to 0.79	-0.22 to 0.27	-0.15 to 0.34	-0.61 to -0.11	-0.50 to 0.00	-0.42 to 0.07	-0.02 to 0.47
Orthodox Attacker	1.5±1.5	0.2±0.6	2.4±2.2	42±14	5±4	20±6	34±9	98±35	21±8	81±8	2.6±1.9	2.8±2.0
Interchange Wide-midfielder	3.6±2.3	1.0±1.5	1.8±1.9	43±9	11±5	23±7	35±7	106±35	25±8	77±14	3.6±1.8	1.7±1.4
Effect Size Difference	-1.16	-0.77	+0.26	-0.02	-1.41	-0.42	-0.05	-0.23	-0.48	+0.42	-0.51	+0.58
90% Confidence Intervals	-1.59 to -0.74	-1.18 to -0.36	-0.14 to 0.65	-0.41 to 0.38	-1.85 to -0.98	-0.81 to -0.02	-0.44 to 0.34	-0.63 to 0.16	-0.88 to -0.08	0.02 to 0.81	-0.91 to -0.11	0.17 to 0.98

Figure 1.



1800
1600
1400
1200
1000
800
600
400
200
0
Distance (m)
CB
FB
CB
FB
CM
WM
CM
WM
WM
CM
WM
CM
AT
WM
AT
WM
High-Intensity distance
Sprint distance
High-Intensity distance
Sprint distance
High-Intensity distance
Sprint distance
High-Intensity distance
Sprint distance
CB-FB
CM-WM
WM-CM
AT-WM
Interchange
Positional