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Abstract

This study examined the effects of teams using high (HPBPT) and low percentage ball possession (LPBPT) strategies on physical/technical indicators during matches in the 2014 FIFA World Cup Finals. This would enable a regression model to be constructed to further understand the impact of different ball possession (BP) on match performance. Data were collected from 346 international soccer players using a multiple-camera computerised tracking system. Players in HPBPT covered similar distances in total and at low, medium and high speeds compared to LPBPT (P < 0.01; Effect Size [ES] trivial-small). Players in LPBPT covered more distance without ball possession but less with ball possession than HPBPT (P < 0.01; ES large). All positions in LPBPT spent less time in the opposing half and attacking third than the players in HPBPT (P < 0.01; ES small-moderate), but all positions in HPBPT completed more short and medium passes than LPBPT (P < 0.01; ES moderate). Players in HPBPT produced more solo runs into the attacking third and penalty area than LPBPT (P < 0.05, ES small). The equation to predict BP from physical and technical indicators highlighted the importance of distances covered (total, with and without ball possession), time spent in the attacking third and successful short passes during matches. Different BP strategies do not influence the activity patterns of international matches although HPBPT spend more time in offensive areas of the pitch.

Keywords: international, football, passing, high-intensity, sprinting.

Introduction

Soccer is a highly complex sport incorporating interplay between physical and technical factors (Bradley, Lago-Penas, Rey, & Gomez Diaz, 2013). Most research has explored the physical (Di Salvo, Gregson, Atkinson, Tordoff, & Drust, 2009) and technical requirements of match-play in isolation (Collet, 2013) but few studies have integrated these facets of match-play to gain a more holistic understanding of soccer performance (Andersson, Ekblom & Krustrup, 2008).

This is especially important given that team success is multifactorial (Van Winckel et al., 2014). Technical indicators predict team success more accurately than physical indicators (Bradley et al., 2013), with ball possession (BP) the most popular indicator (Lago, 2009). Studies on BP have primarily focussed on its determinants, with little attention been paid to its interaction with physical indicators (Lago, 2009; Lago & Martin, 2007). Playing against quality opposition is associated with lower BP (Lago, 2009) although it's debatable that lower quality teams have to cover greater distances at high-intensity to regain possession. BP is also influence by match location, quality of opposition and score line as teams will employ different playing styles when ahead, level or behind (Lago & Martin, 2007). Thus, more research is needed to verify the influence of high and low percentage BP on physical and technical indicators. Only a single study has explored the influence of BP on physical and technical indicators during elite soccer match-play. Bradley et al. (2013) demonstrated that percentage BP does not influence the overall activity profile of a team but impacts on the composition of high-intensity running efforts (with and without ball) and some technical elements of performance.

Although this study provided objective evidence that BP does not impact upon match-play activity profiles, it included a number of limitations. The authors

only examined outdated domestic match-play data from the English Premier League. Ball retention tactics are an important strategy in international soccer given BP demarcates between successful/unsuccessful teams (Castellano, Casamichana, Lago, 2012) and it would be of interest to quantify the interaction of BP and physical demands during modern international soccer competitions such as the FIFA World Cup.

No study has yet quantified the effect of BP on offensive play within the oppositions half, attacking third and penalty area or deliveries or solo runs into these areas. Finally, research has failed to explore the various correlates between BP and physical/technical indicators. This could provide important information to the applied sports scientists regarding physical, technical and tactical preparation especially if selected indices relate highly with BP via multivariate regression analyses. Thus, this study aimed to examine the effects of high (HPBPT) and low percentage ball possession teams (LPBPT) on physical/technical indicators during 2014 FIFA World Cup Finals to enable a regression model to be constructed to further understand the importance of BP.

Methods

Match Data

Match performance data were collected from the 2014 FIFA World Cup Finals database (FIFA, 2014). The tracking statistics were calculated using data from the STATS® provider (Chicago, IL, USA) using a real time optical tracking system. This system operated at 25 frames per second and each frame provided details of players on the field (frame timestamp; player X and Y coordinates). Thus, the distance covered for each player was calculated using X and Y coordinates (Pythagorean

Theorem). Distances covered at different speeds were calculated for each player in terms of absolute distance covered and time spent in different activities (Low/Medium/High). Preliminary work on reliability, validity and application has been conducted to verify the accuracy of this system (Duque, 2010) which highlighted that the system was able to track players effectively during matches based on. Moreover, this data has also been used to explore the effects of heat stress on soccer performance (Nassis, Brito, Dvorak, Chalabi, & Racinais, 2015).

Match Selection Criteria

We selected 55 of 64 matches from the tournament; excluding eight matches that included extra time and a single match were BP was equal. Only outfield players were included in the analysis with players excluded if they did not complete the whole match. So, 346 individual players across 792 observations were included. Data were automatically subdivided into three positional subsets by the data provider based on the players' tactical role in the team: defenders (n=159), midfielders (n=65) and forwards (n=122).

Physical Indicators

Physical indicators were coded into the following activities: distances covered at low ($\leq$11 km.h^{-1}), medium (11-14 km.h^{-1}) and high speed (>14 km.h^{-1}). The total number of sprints (>25 km.h^{-1}) was also quantified. Total distance represented the summation of distances in all categories and was separated into three subsets based on the teams' possession status: with or without ball possession and when the ball was out of play. The top speed attained by each player throughout the game was also included. Additional variables such as the time spent in the opposing half, attacking

third and in the penalty area were reported. Physical indicators were selected based on previous research (Bradley et al., 2009).

Technical Indicators

Match analysis included the coding of technical indicators such as the number of passes, passes received, pass success, tackles, fouls and clearances. Pass distance referred to the overall length of pass and was split into short (<10 m), medium (10-30 m) and long (>30 m). The technical events used were in accordance with those employed previously (Bradley et al., 2011). BP was defined as the proportion of time each team held the ball (Collet, 2013). Moreover, we analysed all matches to determine if BP influenced the final result of all matches (n=55). Although we only selected matches with a winner (n=46), and excluded those that ended in a draw (n=9).

Data Sorting and Cut-Off Analysis

Preliminary *k*-means cluster analyses were performed to identify a cut-off value of BP percentage and classify teams as HPBPT or LPBPT. The results identified cluster 1 (HPBPT) with 56.3 ± 4.6% of BP (range of 51–70%; n=393) and cluster 2 (LPBPT) with 43.9 ± 4.5% of BP (range of 30–49%; n=399).

Statistical Analysis

Descriptive statistics were calculated on each variable and an independent *t*-test was used to compare HPBPT and LPBPT, as well the BP percentage between winners and losers, with significance set at $P < 0.05$ (SPSS V20, Chicago, IL, USA). Effect sizes (ES) were calculated to determine the meaningfulness of the difference (Cohen,

1988) and classified as: trivial (<0.2), small (>0.2–0.6), moderate (>0.6–1.2), large (>1.2–2.0) and very large (>2.0) based on recommendations (Batterham & Hopkins, 2006). Moreover, a binary logistic regression analysis (SPSS 20.0, Chicago, IL, USA) was conducted to create a model to predict HPBPT or LPBPT according to physical/technical parameters. From the total of 34 variables, 12 were selected to execute the logistic regression in accordance with various statistical assumptions (i.e. sample size, absence of multicollinearity, lack of strongly influential outliers and away singularity) (Hosmer, Lemeshow, & Sturdivant, 2013). These variables included: distances covered in total and at low, medium and high speeds, with possession, without possession, time spent in the attacking third, solo runs into the attacking third, tackles, and the success (%) of long, medium and short passes.

Results

Physical Indicators

Cut-off analysis showed HPBPT had substantially more BP than LPBPT ($P < 0.01$; ES very large). Players in HPBPT across all positions covered lower distances in total ($P < 0.01$; ES trivial), at low speeds ($P < 0.01$; ES trivial) and without possession compared to LPBPT ($P < 0.01$; ES large). HPBPT covered greater distances with possession ($P < 0.05$; ES large) and spent more time in the opposition half than LPBPT ($P < 0.05$; ES trivial-small; Figure I).

****Figure I near here****

All playing positions in LPBPT covered more distance without possession and less with possession ($P < 0.01$; ES large; Figure II). Defenders in LPBPT spent less time

in the opposition half and attacking third but covered more distance at low speed than defenders of HPBPT ($P < 0.01$; ES small-moderate; Figures II and III).

****Figure II near here****

****Figure III near here****

Midfielders in LPBPT covered more distance at high speed and produced more sprints than HPBPT ($P < 0.05$; ES small; Figure II and Table I), but spent less time in the opposition half and attacking third than midfielders of HPBPT ($P < 0.01$; ES moderate; Figure III). Forwards of LPBPT spent less time in the opposing half, attacking third and penalty area, but covered more distance in total than HPBPT ($P < 0.05$; ES small-moderate; Figures III and II).

****Table I near here****

Technical Indicators

All playing positions in HPBPT produced more passes (all types) than LPBPT ($P < 0.01$; ES small-moderate; Table II).

****Table II near here****

Only four technical variables exhibited differences between HPBPT and LPBPT: both deliveries/solos runs into the attacking third and penalty area and the number of events for tackles and ball dispossessions were higher for HPBPT than LPBPT ($P < 0.05$, ES small). Unsuccessful tackles were higher for LPBPT than HPBPT ($P <$

0.05, ES small). Defenders and midfielders in HPBPT performed more passes (all types) than LPBPT ($P < 0.01$; ES small-large; Table III). In forwards this trend (all type of passes HPBPT > LPBPT; $P < 0.05$; ES small) was only evident for short and total passes (completed and attempted). Defenders of LPBPT attempted more ($P < 0.05$, ES small) tackles not gaining the ball than defenders of HPBPT, but defenders of HPBPT displayed a higher number of deliveries/solo runs into the attacking third ($P < 0.01$, ES small) and penalty area than defenders of LPBPT ($P < 0.05$, ES small). For midfielders, only delivery/solo runs into the attacking third were higher for HPBPT than LPBPT ($P < 0.01$, ES moderate). Forwards in HPBPT in comparison with LPBPT were caught offside more ($P < 0.05$, ES moderate), produced more delivery/solo runs into the attacking third ($P < 0.05$, ES small), and were tackled more ($P < 0.05$, ES small). The BP of the winners of matches was 51.3 ± 7.5% and it was 48.7 ± 7.5 % for the losers ($P = 0.0991$, ES small). From 46 matches analysed, 57% of matches were won by HPBPT and 43% by LPBPT.

****Table III near here****

Logistic Regression

After the first block of analysis, the overall percentage was 50.4 for the phenomena probability. The r^2 (Cox & Snell) generated by the logistic regression was 0.689 and the model generated could predict 95.5% of the BP percentages in terms of higher or lower values (Hosmer and Lemeshow test). The forward stepwise regression analysis resulted in a higher load prediction (94.8%) associated with the highest number of variables included in the model. Therefore, the equation included four physical indicators (distances covered in total [x1], with possession [x2], without possession

[x3] and time spent in the attacking third [x4]) and one technical indicator (success of short passes [x5]), for predicting BP (*y*):

$$y = \frac{e^{10.627 - 0.001x_1 + 0.011x_2 - 0.009x_3 - 0.179x_4 + 0.027x_5}}{1 + e^{10.627 - 0.001x_1 + 0.011x_2 - 0.009x_3 - 0.179x_4 + 0.027x_5}}$$

If the result of this equation (*y*) is closer to 1, it means a higher BP. Conversely, when *y* is closer to zero, it means that BP is lower. The odds ratios (95% confidence interval, lower - upper) for the variables in the equation were: total distance covered 0.999 (0.998 – 0.999), distance covered with possession 1.011 (1.008 – 1.013), distance covered without possession 0.991 (0.989 – 0.993), time spent in attacking third 0.836 (0.794 – 0.881) and 1.027 (1.000 – 1.005) for success of short passes.

Discussion

This study was the first to examine the effects of teams using different BP strategies on physical/technical indicators during contemporary international competitions. It is also the only study to explore the effect of BP on offensive play within the oppositions half, attacking third and penalty area or deliveries or solo runs into these areas. Finally, research has failed to explore the various correlates between BP and physical/technical indicators using multivariate regression analyses. Our main findings are that physical indicators did not differ between LPBPT and HPBPT, but the latter covered more total distance with possession and less without possession. All positions in LPBPT also spent less time in the opposing half and attacking third than the same position in HPBPT. For technical indicators, players in HPBPT (positions collapsed together) produced more short and medium passes and

completed a greater number of deliveries/solos runs into the attacking third and penalty area than LPBPT.

The distance covered at high speed in a match is an important measure of match running performance given its correlation with physical capacity and its ability to demarcate between various competitive standards, positions and gender in elite soccer (Bradley et al., 2011). Although it's important to remain pragmatic, as match running performance is complex as factors such as context (Castellano, Blanco-Villasenor, & Alvarez, 2011), technical level (Rampinini, Impellizzeri, Castagna, Coutts, & Wisloff, 2009), formation (Bradley et al., 2011), the opponent (Rampinini, Coutts, Castagna, Sassi, & Impellizzeri, 2007), seasonal period (Rampinini et al., 2007), fatigue/pacing (Bradley & Noakes, 2013), surface (Andersson, Ekblom, & Krustrup, 2008) and the environment (Mohr, Nybo, Grantham, & Racinais, 2012), all interact and impact on match running performances. Another factor thought to impact on the physical demands of match play is team BP. Managers, coaches and players typically refer to 'letting the ball do the work' to denote that the team out of possession will have to work harder physically to regain the ball. Some research trends have demonstrated that players' cover more distance in total and at high speed when playing against higher quality opponents (Castellano et al., 2011; Di Salvo et al., 2009; Rampinini et al., 2007). Because playing against higher quality opposition is associated with lower BP (Lago, 2009), the subjective perception of 'letting the ball do the work' would result in a greater total and high speed running distances by LPBPT to regain possession. Bradley et al. (2013) found that players in HPBPT covered a total and high speed running distance that differed <1% of LPBPT (ES trivial). Although their data are from English Premier League it showed possession had limited impact on match

running performance. Our findings also indicated that the distance covered (total/low, medium and high speeds) in the 2014 FIFA World Cup did not differ between LPBPT and HPBPT (ES trivial). Thus, this trend is evident for both domestic and international competitions. Data trends from modern elite domestic/international competitions are important as the physical and technical demands have evolved (Barnes, Archer, Hogg, Bush, & Bradley, 2014; Wallace & Norton, 2014) and thus more research in this area is needed. One potential reason behind the similarity between studies is that teams regardless of standard (domestic/international) will typically optimise their tactical strategy to utilise the physical capacity of its players to ensure the workload is shared and the overall efforts needed to win and use BP are reduced (Doucet, 2007). Thus, the data published thus far does not seem to support the assertion that using high BP strategies makes the opposition work harder to regain possession.

As expected, the total distance covered with possession and without possession was substantially different between LPBPT and HPBPT. The match provider for the FIFA World Cup did not subdivide with possession and without possession across movement classifications (low, medium and high speed running). However, Bradley et al. (2013) illustrated that greater distance covered by players in high speed running occurred with possession than without possession in HPBPT compared to LPBPT. Given the similarity in physical data trends between studies, it is reasonable to think that this would also be the case in the present study. This trend is especially noteworthy as it may be related to the offensive and defensive tactics and could also be associated with playing systems. Research found high speed running with possession in offensive and orthodox systems were ~30% higher than defensive systems (4-3-3 and 4-4-2 vs 4-5-1) in the English Premier League (Bradley et al.,

2011). Contrary, ~20% more distance was covered at high speed without possession in defensive versus offensive and orthodox systems. This coincided with the lowest BP for the defensive systems compared to the offensive and orthodox systems (44 vs 50%). These BP values are similar to those used to define HPBPT and LPBPT in our study (44 vs 56%). However, from visual inspection of the starting and average pitch positions of players across teams in the FIFA World Cup Finals (obtained from the data provider), it is important to note that most teams did not utilise these traditional rigid playing systems (4-4-2, 4-3-3 and 4-5-1) but adopted more dynamic contemporary systems (4-2-3-1 and 4-1-4-1). A noteworthy finding in the present study was that players in HPBPT spent more time in the opposing half and attacking third and produced more deliveries/solo runs into these areas than LPBPT. This could imply that LPBPT set up defensively to counter HPBPT that utilise a more offensive strategy. This would explain why HPBPT players spent more time in the opposing half and covered more distance when attacking and less when defending. However, it is important to note that in the present study no objective data were available for team systems or style of play and thus more research is warranted in this area. This is particularly important, as there is a cultural aspect to team BP with selective nations placing more or less emphasis on this. Finally, added value would also be derived from the data if it could be broken down into smaller time periods. For instance, what impact does changes in score line and tactics have on team BP.

Although team success is complex and multifactorial, technical indicators have been found to predict team success more accurately than physical indicators (Carling, 2013). Although physical performances are not associated with success, they impact technical proficiency (Rampinini et al., 2008), thus they should not be disregarded as contributors to overall performance. However, BP, number of passes

and pass completion rates are all associated with team success and thus are important technical variables (Castellano, Casamichana, & Lago, 2012; Collet, 2013; Lago-Ballesteros, Lago-Penas, & Rey, 2012). We expected HPBPT to be technically superior to LPBPT and our data supports this notion as players in HPBPT performed ~45% more passes than LPBPT, in addition to higher pass completion rates (79 vs 73%). The relative difference for the number of passes between HPBPT/LPBPT was similar to that found in the English Premier League, but the absolute number of passes was different and this could be a result of the higher technical proficiency of international players or the greater emphasis on possession based strategies in the FIFA World Cup. Interestingly, the number of short, medium and long distance passes was greater in HPBPT than LPBPT. The increased pass success rate for HPBPT may be partially explained by the increased proportion of short to medium passes, which are more successful than long passes (success rates: long passes = 50-60%, medium and short passes = 70-80%). Fast transition of the ball to offensive areas of the pitch through a combination of high pass rates and ball speed is advantageous in elite soccer (Wallace & Norton, 2014). Pollard et al. (Pollard, Ensum, & Taylor, 2004) found that the distance between players affected skill execution and increased short-medium passes could reflect closer player proximity in current FIFA World Cup Finals, requiring players to make quick decisions and precise passes to maintain possession. Other passing proficiency metrics include the direction of passes and a limitation of the present study was that forward, sideward and backwards passes were not included. The passing completion rates of both HPBPT and LPBPT are both above the minimum requirement (70%) in elite soccer (Dellal, Hill-Haas, Lago-Penas, & Chamari, 2011) and thus indicate the technical proficiency of players in the FIFA World Cup but the values reported here are still

lower than that reported in modern English Premier League soccer (86% completion rate). Interestingly, despite the substantial differences between the HPBPT and LPBPT in passing variables this did not translated into an increase in the number of goals scored, shots on goal and assists. We also found that the BP of the winners of matches was 51% and 49% for the losers (ES small). High passing rates and ball retention do not have a strong link with success in the present study which means that this relationship is highly complex at international level with others factors probably having an influence such as the efficiency of passing (passes to shots on goal ratio) and the type of offensive strategy (direct and counterattack) (Collet, 2013). Thus, more research is warranted in the area related to key performance indicators in international soccer as BP does not seem to be directly related to more success.

The distinct physical demands and technical requirements for each playing position in elite soccer is one of the most robust findings (Bradley et al., 2011; Bradley et al., 2009; Di Salvo et al., 2009). The magnitude of these positional differences has led some researchers to recommend position specific training and testing (Di Mascio & Bradley, 2013), while others advocate the use of more generic methods (Carling & Collins, 2014). Although our study quantified playing position within three subsets, the data supports the well-established finding that midfielders cover more total and high-speed distance than defenders (Bradley et al., 2009; Di Salvo et al., 2009). The present data demonstrates that the total distance and that covered at various speeds was very similar for defenders and midfielders across HPBPT/LPBPT. Although this trend was evident in forwards, the magnitude of the difference was greater, particularly for the total distance covered and that covered at a medium speed indicating that the activity patterns of forwards are different in

LPBPT than HPBT. The proportion of time spent in the oppositions half, final third and penalty area was also lower for all positions but particularly for forwards in LPBPT compared to HPBPT. These results might be explained by forwards in LPBPT covering more running particularly when the team is not in possession to pressure and close down defenders to regain possession particularly when the forward is alone in a defensive system (Bradley et al., 2011). This highlights that percentage BP impacts on the running profile of selected positions, with noteworthy changes in forwards and midfielders. Again, these findings fall in line with tactical characteristics of defensive and offensive formations and task specific requirements of selected positions (Bradley et al., 2011). Some noteworthy positional trends are also evident for technical indicators. The number of passes was greater across all positions in HPBPT than LPBPT. This trend was evident in both defenders and midfielders for the number of short and medium passes and the pass completion rates but forwards in LPBPT and HPBPT were very similar. This is probably understandable as pass completion rates are usually higher for defenders and midfielders and lowest for forwards, as player density increases the closer to the opposition's goal (Rampinini et al., 2008). This indicates the importance of technically gifted defenders and midfielder for possession based football strategies to possibly build possession from the back through to the offensive areas of the pitch.

The findings from the multivariate analyses highlighted that BP could be predicted by total distance covered, distance covered with possession, distance covered without possession, time spent in the attacking third and the success of short passes. Thus, teams adopting a HPBPT philosophy should consider the above variables as important indicators to adopt to allow ball retention to be maintained. This finding could also be important for recruiting players in all positions with

modern central defenders and midfielders illustrating the most pronounced increases in BP related variables such as short/medium distance passes given there instrumental role in creating and maintain BP sequences in elite soccer (Bush, Archer, Hogg, & Bradley, 2015). Although the reader must be aware of the complexity of match-play and the extraneous variables not included in this analysis that could impact BP. Coaches that intend to prioritise ball retention and an offensive strategy should use drills with high pressure tactics that eventually move the ball into offensive areas of the pitch (particularly with defenders and midfielders). Thus, small-sided drills in selected areas of the pitch, including unequal numbers (i.e. 4 vs 6, 6 vs 8) could be applied to increase ball retention capabilities for high player density situations. High pressure play drills would also be effective in allowing players to cope with different conditions (maintaining possession or breaking it down), please refer to Bangsbo & Peitersen (2002) for numerous drills.

Conclusions

Physical indicators such as the distance covered in total and at low, medium and high speeds did not differ between LPBPT and HPBPT but the latter covered more total distance with possession and less without possession. Defenders, midfielders and forwards in LPBPT also spent less time in the opposing half and attacking third than the same position in HPBPT. For technical indicators, all positions in HPBPT produced and completed more short and medium distance passes than LPBPT and produced more deliveries/solos runs into the attacking third and penalty area than LPBPT. The data demonstrate that high percentage BP does not influence the physical demands of international matches although it is related to more time spent in offensive areas of the pitch. The equation created in this study to predict BP from

physical and technical indicators highlighted the importance of distances covered (total, with possession, without possession), time spent in the attacking third and successful short passes.

References

Andersson, H., Ekblom, B., & Krustrup, P. (2008). Elite football on artificial turf versus natural grass: movement patterns, technical standards, and player impressions. *Journal of Sports Sciences, 26*, 113-122. doi: 10.1080/02640410701422076

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*. doi: 10.1055/s-0034-1375695

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., 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., Lago-Penas, C., Rey, E., & Gomez Diaz, A. (2013). The effect of high and low percentage ball possession on physical and technical profiles in English FA Premier League soccer matches. *Journal of Sports Sciences, 31*, 1261-1270. doi: 10.1080/02640414.2013.786185

Bradley, P. S., & Noakes, T. D. (2013). Match running performance fluctuations in elite soccer: indicative of fatigue, pacing or situational influences? *Journal of Sports Sciences, 31*, 1627-1638. doi: 10.1080/02640414.2013.796062

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

Bush, M. D., Archer, D. T., Hogg, R., & Bradley, P. S. (2015). Factors Influencing Physical and Technical Variability in the English Premier League. *International Journal of Sports Physiology and Performance*. doi: 10.1123/ijspp.2014-0484

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

Carling, C., & Collins, D. (2014). Comment on "football-specific fitness testing: adding value or confirming the evidence?". *Journal of Sports Sciences, 32*, 1206-1208. doi: 10.1080/02640414.2014.898858

Castellano, J., Blanco-Villasenor, A., & Alvarez, D. (2011). Contextual variables and time-motion analysis in soccer. *International Journal of Sports Medicine, 32*, 415-421. doi: 10.1055/s-0031-1271771

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 behavioural sciences* (2nd. ed.). Lawrence Erlbaum, NJ

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

Dellal, A., Hill-Haas, S., Lago-Penas, C., & Chamari, K. (2011). Small-sided games in soccer: amateur vs. professional players' physiological responses, physical, and technical activities.

Journal of Strength and Conditioning Research, 25, 2371-2381. doi: 10.1519/JSC.0b013e3181fb4296

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., Gregson, W., Atkinson, G., Tordoff, P., & Drust, B. (2009). Analysis of high intensity activity in Premier League soccer. *International Journal of Sports Medicine, 30*, 205-212. doi: 10.1055/s-0028-1105950

Doucet, C. (2007). *Football: Entraînement tactique.* Paris: Editions Amphora.

Duque, C. (2010). *Priors for the Ball Position in Football Match using Contextual Information.* (Master Science Degree), School of Electrical Engineering Royal Institute of Technology, Stockholm, Sweden.

FIFA. (2014). Information about Team Tracking Statistics WC (Personal communication ed., pp. 2).

Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied Logistic Regression*: Wiley.

Lago-Ballesteros, J., Lago-Penas, 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, C. (2009). The influence of match location, quality of opposition, and match status on possession strategies in professional association football. *Journal of Sports Sciences, 27*, 1463-1469. doi: 10.1080/02640410903131681

Lago, C., & Martin, R. (2007). Determinants of possession of the ball in soccer. *Journal of Sports Sciences, 25*, 969-974. doi: 10.1080/02640410600944626

Mohr, M., Nybo, L., Grantham, J., & Racinais, S. (2012). Physiological responses and physical performance during football in the heat. *PLoS One, 7*, e39202. doi: 10.1371/journal.pone.0039202

Nassis, G. P., Brito, J., Dvorak, J., Chalabi, H., & Racinais, S. (2015). The association of environmental heat stress with performance: analysis of the 2014 FIFA World Cup Brazil. *British Journal of Sports Medicine, 49*, 609-613. doi: 10.1136/bjsports-2014-094449

Pollard, R., Ensum, J., & Taylor, S. (2004). Estimating the probability of a shot resulting in a goal: the effect of distance, angle and space. *International Journal of Soccer and Science, 2*, 50-55

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

Rampinini, E., Impellizzeri, F. M., Castagna, C., Azzalin, A., Ferrari Bravo, D., & Wisloff, U. (2008). Effect of match-related fatigue on short-passing ability in young soccer players. *Medicine and Science in Sports and Exercise, 40*, 934-942. doi: 10.1249/MSS.0b013e3181666eb8

Rampinini, E., Impellizzeri, F. M., Castagna, C., Coutts, A. J., & Wisloff, U. (2009). Technical performance during soccer matches of the Italian Serie A league: effect of fatigue and competitive level. *Journal of Science and Medicine in Sport, 12*, 227-233. doi: 10.1016/j.jsams.2007.10.002

Van Winckel, J., Tenney, D., Helsen, W., McMillan, K., Meert, J., & Bradley, P. S. (2014). *Fitness in Soccer The science and practical application*: Moveo Ergo Sum / Leuven.

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

Figures Captions

Figure I. Data represents means and standard deviations. [a]Different from HPBPT ($P < 0.01$). [b]Different from HPBPT ($P < 0.05$). WP = with possession, WOP = without possession, BOP = ball out of play. The numbers above the bars are effect size (ES).

Figure II. Data represents means and standard deviations. [a]Different from HPBPT ($P < 0.01$). [b]Different from HPBPT ($P < 0.05$). WP = with possession, WOP = without possession, BOP = ball out of play. The numbers above the bars are effect size (ES).

Figure III. Data represents means and standard deviations. [a]Different from HPBPT ($P < 0.01$). The numbers above the bars are effect size (ES).

Table Captions

Table I. Descriptive results for number of sprints and top speed, *P* values and effect sizes (ES) for HPBPT and LPBPT, considering all players observations and across playing positions.

Table II. Descriptive results. *P* values and effect sizes (ES) for technical indicators across HPBPT and LPBPT (considering all players observations).

Table III. Technical indicators across playing positions for HPBPT and LPBPT.

Table I.

All positions together												
	HPBPT (*n*=393)			**LPBPT (*n*=399)**				**P**	**ES**			
Sprints (repetitions)	32.7 ± 11			33.9 ± 11				.1438	0.10			
Top speed (km.h^{-1})	28.04 ± 2			28.09 ± 2				.7137	0.02			
	Defenders				**Midfielders**				**Forwards**			
	HPBPT (*n*=202)	**LPBPT (*n*=202)**	***P***	**ES**	**HPBPT (*n*=128)**	**LPBPT (*n*=132)**	***P***	**ES**	**HPBPT (*n*=63)**	**LPBPT (*n*=65)**	***P***	**ES**
Sprints (repetitions)	30.6 ± 11	30.3 ± 10	.7625	0.03	33 ± 11	36.4 ± 10[b]	.0131	0.31	38.7 ± 9.6	39.7 ± 8.6	.5128	0.12
Top speed (km.h^{-1})	28.1 ± 2.3	27.9 ± 2.2	.3383	0.09	27.6 ± 2.4	27.9 ± 2.1	.2620	0.14	28.7 ± 1.9	29.1 ± 1.6	.2244	0.22

Note: Data represents means and standard deviations. [b]Different from HPBPT ($P < 0.05$). *P* = Probability, ES = effect size.

Table II.

Technical indicators	HPBPT (*n*=393)	LPBPT (*n*=399)	*P*	ES
Passes				
Long completed	4.8 ± 4	3.2 ± 3[a]	.0001	0.49
Long attempted	7.6 ± 5	5.7 ± 4[a]	.0001	0.44
Medium completed	30 ± 14	19 ± 9[a]	.0001	0.96
Medium attempted	36 ± 15	25 ± 10[a]	.0001	0.95
Short completed	11 ± 6	7.6 ± 4[a]	.0001	0.72
Short attempted	14 ± 7	10 ± 5[a]	.0001	0.67
Total passes completed	46 ± 19	30 ± 12[a]	.0001	1.06
Total passes attempted	58 ± 20	40 ± 13[a]	.0001	1.04
Passing success (%)	79 ± 10	73 ± 11[a]	.0001	0.54
Other variables				
Goals scored	1.1 ± 0.3	1.1 ± 0.3	.8805	0.04
Shots	2.1 ± 1.5	1.9 ± 1.3	.3672	0.09
Assists	1.1 ± 0.3	1.1 ± 0.3	.9907	0.00
Offside	1.4 ± 0.7	1.2 ± 0.5	.0988	0.37
Fouls committed	1.9 ± 1.2	2.0 ± 1.2	.5616	0.05
Delivery/solo runs into attacking third	5.8 ± 4.2	4.2 ± 2.7[a]	.0001	0.56
Delivery/solo runs into penalty area	2.2 ± 1.4	1.9 ± 1.3[b]	.0217	0.24
Tackles gaining the ball	1.4 ± 0.8	1.4 ± 0.7	.8606	0.02
Tackles not gaining the ball	1.7 ± 1	1.9 ± 1.2[b]	.021	0.22
Tackles suffered losing the ball	1.5 ± 0.8	1.3 ± 0.7	.0950	0.24
Tackles suffered not losing the ball	2.0 ± 1.5	1.7 ± 1.1[b]	.0143	0.25
Clearances completed	2.1 ± 1.3	2.1 ± 1.4	.7359	0.03
Clearances attempted	2.3 ± 1.5	2.4 ± 1.6	.3961	0.08

Note: Data represents means and standard deviations. [a]Different from HPBPT ($P < 0.01$). [b]Different from HPBPT ($P < 0.05$). *P* = Probability, ES = effect size.

Table III.

Technical indicators	Defenders				Midfielders				Forwards			
	HPBPT (*n*=202)	LPBPT (*n*=202)	*P*	ES	HPBPT (*n*=128)	LPBPT (*n*=132)	*P*	ES	HPBPT (*n*=63)	LPBPT (*n*=65)	*P*	ES
Passes												
Long completed	5 ± 4	3.3 ± 3[a]	.0001	0.54	6 ± 4	3.8 ± 3[a]	.0001	0.61	1.6 ± 1.9	1.3 ± 1.4	.3282	0.18
Long attempted	8.3 ± 4	6.4 ± 3[a]	.0001	0.5	8.4 ± 5	6 ± 4[a]	.0001	0.53	3.4 ± 3.1	2.9 ± 2.1	.3147	0.18
Medium completed	32 ± 11	21 ± 9[a]	.0001	1.18	36 ± 15	21 ± 9[a]	.0001	1.24	14 ± 7.5	12 ± 5.6	.0939	0.30
Medium attempted	38 ± 12	26 ± 10[a]	.0001	1.09	42 ± 15	26 ± 9[a]	.0001	1.29	20 ± 9.1	17 ± 6.3	.0955	0.30
Short completed	11 ± 6	6.6 ± 4[a]	.0001	0.80	13 ± 6	9.3 ± 4[a]	.0001	0.77	9.5 ± 4.5	7.4 ± 3.3[a]	.0030	0.54
Short attempted	13 ± 7	8.5 ± 5[a]	.0001	0.70	16 ± 6	12 ± 5[a]	.0001	0.82	13 ± 5.2	11 ± 4.1[b]	.0149	0.44
Total passes completed	48 ± 14	30 ± 11[a]	.0001	1.36	55 ± 20	34 ± 12[a]	.0001	1.27	25 ± 11.2	20 ± 7.6[b]	.0110	0.46
Total passes attempted	59 ± 15	41 ± 13[a]	.0001	1.25	66 ± 21	44 ± 13[a]	.0001	1.32	36 ± 14	31 ± 9.2[b]	.0219	0.42
Passing success (%)	81 ± 8	74 ± 10[a]	.0001	0.77	81 ± 9	76 ± 10[a]	.0001	0.54	68 ± 11.4	65 ± 11.3	.1201	0.28
Other variables												
Goal scored	1 ± 0	1 ± 0	.9999	0.01	1 ± 0	1.1 ± 0.3	.9999	0.01	1.2 ± 0.4	1.2 ± 0.4	.8334	0.07
Shots	1.4 ± 0.6	1.3 ± 0.6	.7981	0.04	2 ± 1.4	1.9 ± 1	.6506	0.07	3.1 ± 1.9	2.6 ± 1.8	.1457	0.27
Assists	1.2 ± 0.4	1.1 ± 0.3	.4081	0.35	1.1 ± 0.3	1.2 ± 0.4	.5147	0.26	1 ± 0	1.1 ± 0.3	.9999	0.01
Offside	1 ± 0	1 ± 0	.9999	0.01	1.1 ± 0.4	1.6 ± 0.9	.1983	0.76	1.7 ± 0.9	1.2 ± 0.5[b]	.0177	0.71
Fouls committed	1.7 ± 0.9	1.7 ± 1	.7287	0.04	2.1 ± 1.4	2.1 ± 1.2	.9679	0.01	2.2 ± 1.2	2.3 ± 1.5	.6615	0.09
Delivery/solo runs into attacking third	4.8 ± 3.2	3.4 ± 2.5[a]	.0001	0.51	8 ± 5.1	4.9 ± 3[a]	.0001	0.77	4.4 ± 3	3.3 ± 2.2[b]	.0240	0.42
Delivery/solo runs into penalty area	1.9 ± 1.1	1.5 ± 0.8[b]	.0404	0.34	2.3 ± 1.5	2 ± 1.5	.3249	0.17	2.7 ± 1.6	2.2 ± 1.4	.1262	0.33
Tackles gaining the ball	1.3 ± 0.7	1.4 ± 0.6	.5115	0.11	1.6 ± 1.1	1.4 ± 0.6	.1153	0.31	1 ± 0	1.5 ± 1	.9999	0.01
Tackles not gaining the ball	1.6 ± 1	1.9 ± 1.4[b]	.0175	0.31	1.8 ± 1.2	2 ± 1.1	.4040	0.14	1.6 ± 0.8	1.6 ± 0.8	.8430	0.05
Tackles suffered losing the ball	1.1 ± 0.4	1.1 ± 0.3	.8545	0.05	1.5 ± 0.7	1.3 ± 0.6	.1450	0.34	1.6 ± 1	1.5 ± 0.9	.5483	0.14
Tackles suffered not losing the ball	1.6 ± 1	1.5 ± 0.7	.3367	0.16	1.9 ± 1.3	1.7 ± 1.1	.1419	0.25	2.7 ± 2	2 ± 1.4[b]	.0437	0.40
Clearances completed	2.3 ± 1.4	2.4 ± 1.6	.6157	0.06	1.6 ± 1	1.8 ± 1	.3298	0.20	1.4 ± 0.5	1.3 ± 0.5	.8155	0.08
Clearances attempted	2.5 ± 1.6	2.7 ± 1.7	.4611	0.08	1.6 ± 1.1	2 ± 1.2	.1442	0.28	1.3 ± 0.5	1.4 ± 0.7	.6737	0.15

Note: Data represents means and standard deviations. [a]Different from HPBPT ($P < 0.01$). [b]Different from HPBPT ($P < 0.05$). *P* = Probability, ES = effect size.