

Match Outcome and Running Performance Among UEFA Champions League Soccer Players

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ABSTRACT

This study aimed to examine position-specific differences in running performance (RP) according to the match outcome in UEFA Champions League (UCL). The players' RPs (n=244) were collected during UCL group stage matches (n=20) in the 2020/21 season using semi-automatic optical system InStat Fitness, and classified according to their playing positions as: central defenders (CD; n=79), fullbacks (FB; n=65), central midfielders (CM; n=55), wide midfielders (WM; n=28) and forward (FW; n=17). The RP variables included: total distance covered, low-intensity (LIR) (<14.3km/h), running (14.4–19.7 km/h), high-speed running (HSR) (19.8–25.1 km/h), and sprinting (>25.2 km/h). Match outcome was observed as win, draw and loss. One-way analysis of variance (ANOVA) was used to examine differences in RP according to the match outcome. Significant differences in TD (F-test=4.16, p=0.02) and LIR (F-test=4.51, p=0.01) among match outcomes were observed for FBs. Specifically, FBs covered significantly greater TD when their team won than when lost (p=0.03, d=0.79). In addition, FBs' LIR was significantly greater in won matches than in draw (p=0.04, d=0.92) and lost matches (p=0.03, d=0.77). The RP of players on all other playing position were similar irrespective to the match outcome (F-test=0.08 to 2.84, all p>0.05). These results indicated that winning UCL matches is not strongly influenced by players' physical performance, except for FBs who tended to covered greater total- and low- distance when their teams won. This study indicated limited overall influence of RP on success in matches at elite-level soccer. The findings from this study may help soccer coaches to ensure optimal physical preparation of players in elite soccer.

Keywords: physical performance, winning, elite players, playing positions, football

INTRODUCTION

Soccer is a complex team sport characterized by high physical demands (Teixeira et al., 2021). Aiming to understand such demands, analyses of match running performance (RP) are commonly undertaken using semi-automatic multiple camera systems or global and local positioning system technologies (Buchheit et al., 2014; Modric, Versic, & Sekulic, 2021; De Albuquerque Freire et al., 2022). The high validity and reliability of these systems allow quantification of the total distance covered, distances covered in various speed zones (i.e., jogging, running, high-intensity running, sprinting) and acceleration rates (Chmura et al., 2021). At present, elite soccer players travel 9 to 14 km in total during a game with high-intensity running accounting for 5–15% of this distance (Modric, Versic, & Sekulic, 2020). To ensure that players are optimally prepared for such high physical demands imposed during competitive match play, it is imperative that players are exposed to comparable demands under controlled training conditions (Harper, Carling, & Kiely, 2019).

For this reason, several investigations have analysed the RP that were best associated with winning a match. Briefly, older studies demonstrated that soccer players performed significantly less high-intensity activities when winning than when losing (Castellano, Blanco-Villaseñor, & Alvarez, 2011; Lago-Peñas, 2012), while more recent studies reported no differences in distance covered at higher speeds regardless of the match outcome (García-Unanue et al., 2018; Barrera, Sarmiento, Clemente, Field, & Figueiredo, 2021). In addition, Chmura et al. (2018) and Andrzejewski et al. (2016) in their studies reported that differences in RP according to the match outcome are position-dependent. Specifically, authors reported that wide midfielders and forwards ran significantly longer, while central defenders and fullbacks ran significantly shorter distances at higher speeds in won matches than in lost matches.

Considering that authors of these studies drawn their conclusions observing teams which belongs to the only one country, it is possible that these inconsistencies might be characterized by geographical, cultural, historical and social aspects of observed competition (Sarmiento et al., 2013; Sapp, Spangenburg, & Hagberg, 2018; Tuo, Wang, Huang, Zhang, & Liu, 2019). On the other hand, it possible that evolving nature of soccer had a large effect on results (Barnes, Archer, Bush, Hogg, & Bradley, 2014). Irrespective of causality, association between physical performance and winning outcomes is still unclear. To help clarifying this issue, analysis of recent RP data from soccer competition at elite level which includes teams from different countries seems reasonable. One of the most elite competition that includes teams from different countries is UEFA Champions League (UCL) (Lago-Peñas, Lago-Ballesteros, & Rey, 2011).

In general, studies rarely investigated RP in UCL. To date, only few studies analysed RP of soccer players that competed in UCL. Briefly, Di Salvo et al. (2010) and Minano-Espin et al. (2017) analysed only RP at higher speeds, Bradley et al. (2014) focus was on gender differences in RP, while Modric et al. (2021) analysed only RP in context of ball possession. Evidently, there is no study to evaluate position-specific RP of players that competed in UCL according to the match outcome. The findings from such study may help soccer coaches to identify physical performance required for winning the matches, and tailor players' training programs accordingly. Therefore, this study aimed to examine position-specific differences in running performance (RP) according to the match outcome in UEFA Champions League (UCL).

METHODS

Participants and design

The participants (n=179) in this study were top elite soccer players from teams that competed in the group stage of the UCL in the 2020/21 season. Players' RPs were obtained from 20 matches from groups A (n = 3), B (n = 3), C (n = 4), E (n = 4), F (n = 3) and G (n = 3). From all included matches, six of them were finished without winner. Only the results of players who participated in entire matches were analysed, and goalkeepers were excluded from the analysis due to the specificity of the position. As result, 244 match RPs were retrieved and used as cases for this study. In the line with previous studies (Di Salvo et al., 2010), players' RP was divided according to soccer-specific playing positions as follows: central defenders (CD; n = 79), fullbacks (FB; n = 65), central midfielders (CM; n = 55), wide midfielders (WM; n = 28) and forwards (FW; n = 17). Playing position classification was done based on players' activity on the pitch and the primary area where this activity was performed. All data were anonymized in accordance with the principles of the Declaration of Helsinki to ensure player and team confidentiality. The investigation was approved by the ethical board *** hidden for reviewing ***. Written permission for data used was obtained from InStat Limited (Limerick, Republic of Ireland, 5 June 2021).

Measurements

RP data were collected using a semiautomatic camera tracking system (InStat Fitness, InStat Limited, Limerick, Republic of Ireland). This tracking system includes static cameras installed on the roof of the soccer stadium. Utilizing trigonometry, the camera continuously captures the location of the players. This procedure allowed to quantify the total distance and distance covered in different speed zones. The use of this tracking system has appeared in previous research (Modric, Versic, Drid, et al., 2021). The reliability of this tracking system has been demonstrated, as the tracking system has passed the official Fédération Internationale de Football Association (FIFA) test protocol for Electronic & Performance Tracking Systems (EPTS) (a report is available on the official FIFA webpage) (Modric et al., 2022). RP variables included total distance covered (TD), low-intensity running (LIR) (<14.3 km/h), running (14.4–19.7 km/h), high-speed running (HSR) (19.8–25.1 km/h), and sprinting (>25.2 km/h). The match outcome was observed as loss, draw, win.

Statistical analysis

All data were log-transformed to reduce the nonuniformity of error, and normality was tested using the Kolmogorov–Smirnov test procedure. Homoscedasticity was checked by the Levene test. The statistical analyses were performed on log-transformed data, but the results in table are presented as true-value means and standard deviations. Differences in RP among the match outcomes (win, draw, loss) were analysed by one-way analysis of variance. Scheffe post-hoc test was applied to examine specific differences. The effect size (ES) was evidenced throughout the calculation of Cohen's d, and interpreted as follows: trivial (<0.2), small (>0.2–0.5), moderate (>0.5–0.8) and large (>0.8) (Cohen, 2013). The level of statistical significance was set at $p < 0.05$. All statistical analyses were performed using the Statistica software package (Version 13; TIBCO Software, Palo Alto, CA, USA).

RESULTS

Significant differences in TD (F-test=4.16, $p=0.02$) and LIR (F-test=4.51, $p=0.01$) were observed among various match outcomes for FBs. Specifically, FBs covered significantly greater TD when their team won than when lost ($p=0.03$, ES=0.79, moderate). In addition, FBs' LIR was significantly greater in won matches than in draw ($p=0.04$, ES=0.92, large) and lost matches ($p=0.03$, ES=0.77, moderate). The RP of players on all other playing position were similar irrespective to the match outcome (F-test=0.08 to 2.84, all $p>0.05$).

Table 1. Descriptive statistics and differences in running performance according to the match outcome (data are given as mean \pm SD)

	Match outcome	TD (m)	LIR (m)	Running (m)	High-speed running (m)	Sprinting (m)
CD	Loss	10152 \pm 643	8048 \pm 508	1482 \pm 226	524 \pm 139	98 \pm 87
	Draw	10284 \pm 760	7983 \pm 444	1639 \pm 317	562 \pm 192	102 \pm 72
	Win	10153 \pm 720	7967 \pm 578	1563 \pm 321	543 \pm 138	81 \pm 65
	F (p)	0.31 (0.73)	0.18 (0.83)	2.04 (0.14)	0.39 (0.67)	0.52 (0.59)
FB	Loss	10671 \pm 852 W	7900 \pm 584 W	1797 \pm 385	810 \pm 185	165 \pm 79
	Draw	10825 \pm 526	7949 \pm 330 W	1827 \pm 257	832 \pm 174	220 \pm 121
	Win	11287 \pm 687 L	8309 \pm 468 L, D	1967 \pm 280	830 \pm 148	185 \pm 102
	F (p)	4.16 (0.02)	4.51 (0.01)	1.64 (0.20)	0.11 (0.89)	1.64 (0.20)
CM	Loss	11861 \pm 492	8432 \pm 411	2532 \pm 379	820 \pm 186	79 \pm 65
	Draw	11824 \pm 785	8358 \pm 297	2532 \pm 494	841 \pm 246	95 \pm 67
	Win	11975 \pm 477	8570 \pm 348	2509 \pm 308	805 \pm 218	96 \pm 80
	F (p)	0.28 (0.75)	1.71 (0.19)	0.02 (0.98)	0.13 (0.88)	0.30 (0.74)
WM	Loss	11267 \pm 850	8235 \pm 579	2003 \pm 337	901 \pm 163	129 \pm 45
	Draw	11134 \pm 671	8035 \pm 426	1910 \pm 363	989 \pm 105	206 \pm 74
	Win	10911 \pm 655	8064 \pm 287	1860 \pm 328	817 \pm 211	175 \pm 122
	F (p)	0.43 (0.65)	0.53 (0.59)	0.34 (0.56)	2.84 (0.08)	2.47 (0.10)
FW	Loss	10400 \pm 782	7880 \pm 474	1616 \pm 375	736 \pm 54	168 \pm 75
	Draw	10393 \pm 895	7784 \pm 525	1724 \pm 366	783 \pm 271	104 \pm 79
	Win	10678 \pm 825	8000 \pm 322	1767 \pm 407	768 \pm 247	144 \pm 56
	F (p)	0.20 (0.82)	0.30 (0.74)	0.24 (0.79)	0.08 (0.92)	1.20 (0.33)

CD – central defenders, FB – full backs, CM – central midfielders, WM – wide midfielders, FW – forwards; TD – total distance; LIR – low-intensity running; R – running, HIR – high-intensity running; LSignificantly different ($p < 0.05$) from loss, DSignificantly different ($p < 0.05$) from draw, WSignificantly different ($p < 0.05$) from win.

DISCUSSION

This study was the first to examine position-specific differences in RP according to the match outcome in UCL. Significant differences in RP among various match outcomes were observed only for FBs, while RPs of other players were similar irrespective to outcome of the match. Such finding indicated limited overall influence of RP on winning at elite-level soccer.

High intensity efforts are critical to the outcome of matches as they relate to activities that are key to the final match result such as movements to win the ball and actions with agility to go past defending players (Castagna, Chamari, Stolen, & Wisloff, 2005; Valter Di Salvo, Gregson, Atkinson, Tordoff, & Drust, 2009). Considering that some previous research evidenced greater RPs in more successful teams from various elite soccer competitions (Valter Di Salvo et al., 2009; Rampinini, Impellizzeri, Castagna, Coutts, & Wisløff, 2009; Andrzejewski et al., 2016; Chmura et al., 2018), it is not surprising that in scientific community is often postulated that a high level of RP is important aspect of winning (Hoppe, Slomka, Baumgart, Weber, & Freiwald, 2015). However, this postulation contrasts our main findings showing that RPs, especially at higher speeds, were poorly related to the match outcome.

Specifically, we found that winning outcome were characterized by increased RP only for FBs. In detail, FBs' TD and LIR were ~ 5% longer when team won than when lost (both medium ES), possibly indicating their greater activeness in attacking activities when team winning. On the other hand, RPs (e.g., TD, LIR, running, HSR and sprinting) of all other players were similar irrespective to outcome of the match. These findings clearly suggest that players' physical performance is poorly related to the winning, demonstrating trivial influence of RP on success in elite-level soccer. Although these results may look controversial when taking into account previous considerations that high level of RP is important aspect of winning, results from current study are actually in the line with more recent studies which also demonstrated trivial influence of RP on success (Hoppe et al., 2015; Asian Clemente et al., 2019).

In brief, authors which investigated Spanish La Liga reported similar players' RP at higher speeds irrespective to the final position on the table (Asian Clemente et al., 2019). Similarly, authors which investigated German Bundesliga revealed that players' total distance and high-intensity running were similar irrespective to the total points earned (Hoppe et al., 2015). Therefore, it seems that players' RP is poorly related to the achievement of their teams in the elite soccer. It is most likely the overall technical and tactical effectiveness has a greater impact on results and a team's final league ranking than RP, as previously suggested (Zhou, Zhang, Lorenzo Calvo, & Cui, 2018; Asian Clemente et al., 2019). However, as we herein did not analyse technical and tactical performance, such considerations should be confirmed in future studies by analysing RP integrated with technical and tactical performance.

The present investigation has some limitations that should be considered. This study included only 20 randomly selected matches from the group stage of the UCL; however, this is a very common obstacle in studies involving players who compete in elite soccer (Paul S Bradley et al., 2011; Modric, Versic, Drid, et al., 2021). In addition, contextual factors such as team and opposition quality or match location, which have been shown to influence physical performance in national

soccer competitions (Castellano et al., 2011; Aquino et al., 2020), were not considered in the current study. However, differences in teams' and opponents' quality in UCL are most likely lower than in national competitions, and consequently influence on MRP may be negligible. Also, all observed matches were played without audience or with limited capacity in the stands due to the COVID-19 pandemic (Link & Anzer, 2021); therefore, influence of match location (i.e., home advantage) may be insignificant.

CONCLUSION

This study demonstrated that winning UCL matches is not strongly influenced by players' physical performance, indicating limited overall influence of RP on success in matches at elite-level soccer. However, any conclusion regarding the eventual non-importance of the physical performance in soccer would be (at least) irresponsible. Considering previous studies which demonstrated that UCL is one of the most physically demanding soccer competitions (V. Di Salvo et al., 2010; P. S. Bradley et al., 2014; Miñano-Espin et al., 2017), players still must be able to handle high RP to participate in UCL regardless the fact that it will not assure success in the match. Therefore, it is clear that competing in the UCL require the conditioning of the players to be at highest possible level. Soccer coaches should ensure an adequate conditioning stimulus during the training process aiming to maximise and maintain players' physical capacities while playing in UCL or seeking UCL qualification.

DECLARATION OF CONFLICTING INTERESTS

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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