Original Article

Season physical performance of professional soccer players. Match-play evaluation of a Greek *Super League* team

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Abstract
The aim of this study was to analyze the physical performance of the players in one of the top-3 teams of the national *Superleague* comparing the full-season matches in relation to the tactical position of the players and the match location. Eighteen (n=18) professional players aged 27±3.3yr, with body mass 77.1±6.9kg and stature 180.5±55cmwere assessed. The StatSport GPS Tracker (*FIFA* Approved) recorded in real-time the elite individuals' physical performance in 30 official matches (15 home & 15 away) during the 2018-2019 season. 201 match-play observations were evaluated according to the players' positional role in their team. The covered distances (m) of the starting line-up players (goalkeepers excluded) during the in-season matches were evaluated in 6 intensity zones (Z_1=<1.5m.sec^{-1}, Z_2=1.5-3m.sec^{-1}, Z_3=3-4m.sec^{-1}, Z_4=4-5.5m.sec^{-1}, Z_5=5.5-7m. sec^{-1}, Z_6=>7m.sec^{-1}). For the comparison of the studied variables, the *MANOVA* was applied along with the *Bonferroni* test.The descriptive analysis showed that the match-playperformance of the players was as high as 10289±729m. In addition, significant differences were observed in theplayers' covered distancesin all intensity zones in relation to their positional role ($p<0.001$). Specifically, during the matches, central midfielders (10961±698m), full-backs (10649±668m) and wide midfielders/wingers (10216±498m) covered a greater amount of distances in all playing zones ($p<0.001$), compared to central defenders (9939±559m) and forward players (9728±587m).In contrary, no significant interactionwas recorded between the players'physical performance in all intensity zones and the match location. Moreover, in the maximal intensity zones from 4 to >7m.sec^{-1}, the covered distances by the players were significantly lower ($p<0.05$) for central defenders (1614m) in relation to full-backs (2404m), central midfielders (2354m), forwards (2092m) and wide midfielders/wingers (2085m). Finally, no significant differences were presented between both the players' positional role and their covered distances in all intensity zonesand thematch location. Summarizing, the physical performance of the players during the in-season matches confirms that the studied Greek club meets the high physical conditioning standards of the elite soccerclubs thatparticipated in other European national leagues.
Key Words: football, physical loading, tactics, playing zones, competition location.

Introduction

The soccer players' performance during a match depends, among others, on their physical conditioning, technique and team tactics. These parameters should not be treated separately, but they mustbe considered as a whole, because they constantly interact with each other (Gatti& Vulcano, 2016).Soccer is a low scoring team-oriented sport where match wins are often obtained through the playing performance differences between teams.Furthermore, the total covered distances are representative of the overall severity of exercise and the players' contributions towardsthe total team effort during the match, while the contemporary match is characterized by repetitive high-intensity speeds in the covered distancesby the players of the elite teams (Smpokos, Mourikis&Linardakis, 2018). Moreover, similar design studies have attempted to detect the elements of exertion in soccer matches in order to highlight the necessary parameters for a more qualitative team and individual preparation(Payet et al., 2016;Bilbilis et al., 2019).

Indeed, the work-rate profile of the contemporary match analysis is based on the positional roles of the professional players according to the team formation. The physiological parameter reflects the metabolic demands in soccer (Esposito et al., 2004) and can be used to determine the differences of the players' physical conditioning profile in relation to their team's playing style (Drust, Atkinson, & Reilly, 2007). Thus, in modern soccer the most demanding positional role in internal and external loads during the match is midfielders(central and wide) and wingers (Lago-Penas, 2012). The in-season evaluation in elite clubs across European national

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leagues showed that the playing zones of the above players are supramaximal, covering more than 12000m per official match (Ingebrigtsen et al., 2015). Furthermore, the above positional roles intop-level players recorded higher playing intensities during the match, varying from 115m.min^{-1} for wingers to 120m.min^{-1} for central midfielders (Abbott, Bricley&Smeeton, 2017).

The current technology which is applied in soccer offers the opportunity for a more qualitative match analysis, through internal (i.e. heart rate) and external exertion records [through the recordings of covered distances with different running intensities, acceleration or deceleration, change of direction, energy cost, etc.] (Carling, Reilly, Williams, 2009). Nowadays, a great increase in Global Positioning System (GPS) technologies has been applied in both semi-professional and professional soccer (Gabbett, 2016). The top-soccer clubs use the GPS systems for the performance monitoring, although each of them have their own approach in matches and simulate their workouts in trainingsin order for the elite players to receive the match-specific stimuli and simultaneously practice their physical conditioning with a variety of tactical skills (Tessitore et al., 2006;Gaudino, Alberti&Iaia, 2014). In addition, it is of importance to note that the GPS technology metrics could offer the coaches valuable information in order to manage their players' optimal performance, recovery and injury prevention (Hennessy &Jeffreys, 2018).

In world soccer,the top-clubs analyze in real-time the players' internal and external loads during the match,recordingboth theplayers' GPS-derived performance variables and theteam elements via telemetry tracking or videoanalyses tactical data (Redwood-Brown, Cranton& Sunderland, 2012; Nobari et al., 2021). To the best of our knowledge, only one study hasanalyzed the match-play performance of the players in one of the best clubs which participated in the Greekleague with the use of GPS technology (Smpokos, Mourikis & Linardakis, 2018). The research hypothesis was based on the assumption that the match-play performance of the players, regarding their tactical position,will coincidewith the level of the studied team that participates at the highest national league. Thus, the aim of this study was to analyze the physical performance of the players in one of the top-3teamsof the national*Superleague* comparing thefull-season matches in relation to the tactical position of the players and the match location.

Methods
Participants
Eighteen (n=18) professional players were recorded. Their age was 27±3.3yr, their body mass was 77.1±6.9kg and their stature was 180.5±55cm. Their physical performance was analyzed during the Greek *Superleague* 2018-2019 season in the 30 official matches (15 home &15 away) of the club. The studied players were members of team, which ranked in the third position in the above season and it participated in the qualification rounds ofthe *UEFA Europa League* tournament in 2019-2020 season.The experimental protocol was approved by the institutional review board and was in accordance with the Declaration of Helsinki.

Data Collection
The external loads of the starting line-up players who completed the 90min in the in-season matcheswere evaluated. The analyzed data was collected from the outfield players (the Goalkeeper was excluded)fromthe entire season of 30 weeks. During the *Superleague* official matches, each participant wore in a personal vest a portable transmitter for the real-time recording of selected parameters. The transmitter was the *FIFA* Approved StatSportGPS Tracker-Apex Athlete Series (*StatSports Group Limited, Newry, N. Ireland*)with high-frequency 18 Hz GPS (10Hz GNSS) which recorded in real-time theplayers': covered distances (m) in 6zones of intensities:

    I. $Z_1 = <1.5 \text{m.sec}^{-1}$
    II. $Z_2 = 1.5\text{-}3 \text{m.sec}^{-1}$
    III. $Z_3 = 3\text{-}4 \text{m.sec}^{-1}$
    IV. $Z_4 = 4\text{-}5.5 \text{m.sec}^{-1}$
    V. $Z_5 = 5.5\text{-}7 \text{m.sec}^{-1}$
    VI. $Z_6 = >7 \text{m.sec}^{-1}$

201 match-playobservations were recorded in relation to the players' positional role in the team. More specifically, their measurements per tactical positionduring the full-season *Superleague* matches were:55 for central defenders, 33 for full-backs, 38 for central midfielders, 26 for forward players and 49 for wide midfielders/wingers.

Statistical analysis
Descriptive statistics were calculated for each variable including means (M) and standard deviations (±SD). The normal distribution of the data was verified using the *Shapiro–Wilk* test (p>.05) and the homoscedasticilywas confirmed *by Levene's test*.It is worth noticing, that, where the performance variables were not normally distributed or the homoscedasticily was violated, non-parametric test were conducted (*Kruskal-Wallis test*) to verify whether there were significant group differences. For the comparison of the independent variables ("positional role" and "match location"in relation to the "playing zones"), the multivariate analysis of variance was used (GLM) and the effect size (η^2) was estimated [in accordance to Cohen (1988) the Effect Size (ES) graded as small (ES):0.01; medium ES:0.06; large ES:0.13]. The pair-wise comparisons were performed by

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using the post-hoc *Bonferroni* test.The level of significance was set as $p < 0.05$.The analysis was performed with the use of IBM SPSS v26.0 statistics software(IBM, USA).

Results

The studied participants were professional soccer players of one team competing at the highest national league, which was in the top-3soccer club of the overall ranging board of the *Superleague*season 2018-2019. Regarding the total outcome of the official matches,the evaluated team finished the national league with 19 wins (63.4%), 6 draws (20%) and 5 defeats (16.6%). The players'physical and anthropometrical data in relation to their positional role in the team are presented in table 1.

Table 1. The players' physical and anthropometrical characteristics according to their positional role (mean±SD).

N=18		Age (yrs)	Stature (cm)	Body Mass (kg)
Central Defenders	5	27.8 (3)	187.6 (27.8)	83.3 (2.8)
Full-Backs	2	27.6 (0.5)	173.8 (27.6)	67.1 (0.4)
Central Midfielders	4	25.5 (4.2)	179.8 (25.5)	75.5 (2)
Forwards	3	23.5 (2)	181.4 (23.5)	85.7 (2.7)
Wide Midfielders/Wingers	4	28.6 (2.7)	177.2 (28.6)	73.6 (3.6)

The *MANOVA* results revealed significant differences of the covered distances in all intensity zones of the players in relation to their "positional role" (*Wilks' Lambda* = 0.092; $F_{(24, 650.087)}$=26.564; *p=0.000*; η^2=0.449. In contrary, no significant differences were recorded in the players' match performance in all playing zones according to the team "match location" (*Wilks' Lambda* = 0.950;$F_{(6, 186)}$=1.618; *p=0.144*; η^2=0.050). During the evaluation of the interrelationships, no significant differences were observed between both the players' "positional role" and "matchlocation" with the "covered distances" in the amount of playing zones (*Wilks' Lambda* = 0.898; $F_{(24, 650.087)}$ =0.852; *p=0.670*; η^2=0.027).However, the match-play analyses recorded that central midfielders, full-backs and wide midfielders/wingers covered a greater amount of distances, in all intensityzones in comparison to central defenders and forward players ($F_{(4,191)}$=25.368, p<.000). The table 2 shows the players' performance in the matches, in six intensity zones in relation to their tactical role in the team

Table 2. The players' covered distances (m) in the match in relation to their intensity zone and positional role (mean±SD)

Covered Distances	Total		Central Defenders		Full-Backs		Central Midfielders		Forwards		Wide Midfielders/Wingers		F-values	Sig
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Total	10289.2	728.8	9939.2	559	10649.1	667.6	10961.5	697.1	9728.8	586.6	10215.7	497.6	25.368	.000
Z_1	2728.6	252.5	2696	178.9	2695.7	173	2413.5	150.5	2992.6	193.3	2891.5	165.8	58.197	.000
Z_2	3488.3	367.7	3662.4	274.8	3497.6	238.3	3757.8	272.1	3031.2	430.9	3320.3	228.8	35.104	.000
Z_3	2012.5	354.1	1967.2	310.7	2051.9	232.5	2436.7	308.3	1613.9	197.1	1919.6	208.5	41.188	.000
Z_4	1453.8	321.6	1248.1	220	1527.4	229	1826.2	377.5	1274.8	218.4	1441.1	165.5	34.265	.000
Z_5	481.6	165.8	306.9	102.7	640.5	135.8	466.7	134.1	595.4	108.3	521.9	95.7	54.914	.000
Z_6	124.4	93	58.6	41.1	235.9	62.4	60.6	35.3	221	87.2	121.4	69.4	74.515	.000

Abbreviations: Zones: $1=<1.5m.sec^{-1}$-$2=1.5$-$3m.sec^{-1}$-$3=3$-$4m.sec^{-1}$-$4=4$-$5.5m.sec^{-1}$-$5=5.5$-$7m.sec^{-1}$-$6=>7m.sec^{-1}$

Regarding the players'"covered distances" during the matches and the "match location", the multivariate analysis did not reveal any interaction between the above variables in all intensity zones in the amount of their in-season matches. Thus, in total of 201 match-play observations no significant interactions were recordedin the players'competitive performance in relation to the studied team home or away matches (*Wilks' Lambda = 0.950; $F_{(6, 186)}$=1.618; p=0.144; η^2=0.050*). The table 3 illustrates the covereddistances by the players per intensity zone in relation to their team match location.

Table 3. The players' match performance in relation to the intensity zones and the match location (mean±SD).

Covered distances (m)	Home (N=15)		Away (N=15)		F-values	Sig	η^2
	Mean	SD	Mean	SD			
Z_1	2715.3	259.3	2742.3	246	$F_{(1,191)}$=.367	0.54	.002
Z_2	3460.1	356.5	3517.4	378.5	$F_{(1,191)}$=1.486	0.22	.008
Z_3	2028.6	380.5	1996.5	325.8	$F_{(1,191)}$=.836	0.36	.004
Z_4	1461.7	330.4	1445.6	313.9	$F_{(1,191)}$=.188	0.66	.001
Z_5	469.2	160.1	494.4	171.3	$F_{(1,191)}$=1.199	0.27	.006
Z_6	125.1	97.4	123.7	88.6	$F_{(1,191)}$=1.056	0.30	.005
Total	10260	738.6	10319.3	721.1	$F_{(1,191)}$=.077	0.78	.000

Effect size (η^2): .01=small effect. .06=medium effect. >.13=large effect
Abbreviations: Zones: $1=<1.5m.sec^{-1}$-$2=1.5$-$3m.sec^{-1}$-$3=3$-$4m.sec^{-1}$-$4=4$-$5.5m.sec^{-1}$-$5=5.5$-$7m.sec^{-1}$-$6=>7m.sec^{-1}$

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Discussion

The results showed that the match-playperformance of the players in the 30 matches of the team in the national league of 2018-2019 was approximately 10000m per match. This finding is in accordance with a similar design study, which analyzed the physical performance of the players from a top-club that participated in the *Superleague*and resulted in the factthat the players of an elite teamcover more than 10000m per official match in Greek league(Smpokos, Mourikis, Linardakis, 2018). Regarding the positional role of the players, the current study showed that central midfielders presented the highest match-play performance in relation to the rest of the tactical positions. Thus, central midfielders covered 10961m, full-backs 10649m, wide-midfielders/wingers 10216m. Furthermore, central defenders covered marginally greater distances per match (9939m) than full-backs (9728m)in this team. The above findings follow relevant bibliography,which confirms that midfielders are the most performance-related tactical position during the match in elitesoccer (Konefal et al., 2015; Elyakim et al., 2020). Similarly, it is proven that central and widemidfielders as well as wingers are a highlydemanding positional role especially in transition to attack (Hughes & Lovell, 2019), while central defenders is the positional role with the lowest recorded external loads in amatchin the majority of tactical formations (Ispyrlidis et al., 2020).

As far as the players' speed is concerned,this full-season evaluation study showed that the covered distances in high intensity motion from 4 to >7m.sec^{-1} (maximal intensity zones) were 1614m for central defenders, 2404m for full-backs, 2354m for central midfielders, 2092m for forwards and 2085m for wide midfielders/wingers. These findings confirm that the high level of the studied players' physical conditioning resultsin the high intensity match-play performance. Comparing the above results with playing intensity indicators of other elite teams that participated in national leagues leads to the factthat the studied team had a high intensity match-play performanceduring its official in-season matches (Castellano, Blanco-Villasenor & Alvarez, 2011;Brandley &Noakes, 2013).Interestingly, the amount of the above high-intensity covered distances by the players in all tactical positions (~10000m) confirm that the playing intensities contribute to the effectiveness of the team's technical-tactical parameters, such as ball possession, passing accuracy, total shots, crosses, clearances and interceptions (Modric et al., 2019).

Regarding thematch location, the studied team presented a balance inthe match-play performancein both home and away in-season official matches. More specifically, during the *Superleague* season of 2018-2019 the covered distances by the players was 10280m in home and 10320m in away matches. The above is in accordance with the findings of a recentstudy, which presented that top-clubs have the same high performance regardless the efficiency of the opponent,pursuing the winning outcome in both home and away matches (Joo&Jee, 2019). Specificallyin this team, the covered distances with high playing intensities from 4 to >7m.sec^{-1}did not differ regardless the match location. Notably, the team performed home match-play with covered distances of 2057m while in the away match theteam's performance was 2065m, confirming that the studied team compete witha high intensity performance in both home and away matches.

Conclusion

The prominent finding that emerged from this full-season study was that the players' performanceduring the thirty matcheswas proportional to the team's goal of achieving a top position in the Greek *Superleague*in 2018-2019 season.Furthermore, the GPS-derived performance that was analyzed in the present study showed that theplayers of this team performed equally for the winning outcome in both home and away official matches.In addition, it is of importance to mentionthat during the national*Superleague* matches,the studied elite players covered a great amount of distances with maximal playing intensitiesand they did not differ from players who participated in similar European professional national leagues.Regarding the positional role of the players, this study confirms the highly demandingmatch-play performance of midfielders and wingers and their important role in the transition to the attack phase in any tactical formationof elite soccer clubs. In conclusion, the monitoring of the players'external loads of the studied team, which was in the top-3 of the national league, have a similar in-season overall match-performance profile with the players of the teams which participate in European tournaments (i.e. *UEFA Europa League*). Thefindings of the current study mustbetaken into account by the coaches because the maximal match loadings of the top clubs demand a high level of physical conditioning of theirelite players.

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