Original Article

The effects of match-playing aspects and situational variables on achieving score-box possessions in Euro 2012 Football Championship

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ABSTRACT

The aim of this study was to examine the independent and interactive effects of several match-playing aspects and situational variables on the probability of achieving score-box possessions in the 2012 European Championship. The non-clinical magnitude-based inferences method was used to interpret the true effect of the performance indicators on the response variable. The logistic regression analysis in univariate perspective showed that the probability of achieving score-box possessions was greater in the second half than in the first (OR: 1.23, P<0.05, very likely positive effect), but it was lower when a team performed a direct attack rather than a possession play (OR: 0.49, P< 0.001, most likely negative effect), when the possession started in the right path of the field than in the left (OR: 0.69, P < 0.01, most likely negative effect), and when a team played against highest ranked team (from very to most likely negative effect). In multivariate perspective, the negative effect of the direct attack to the probability of achieving score-box possessions was confirmed, and an interactive effect showed that this outcome was greater in the knockout phase of the tournament than in the relative group-stage (OR: 0.62, P< 0.05, very likely negative effect). **Key words:** TEAM PERFORMANCE ANALYSIS, MULTIDIMENSIONAL FOOTBALL DATA, LOGISTIC REGRESSION ANALYSIS, ONE-OFF TOURNAMENT

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INTRODUCTION

With the ascendancy of video, computer, and sport-specific wearable sensors technologies, performance and match analysis is tightly included in the coaching process as the basis for providing feedbacks useful for the coaches and athletes. Accordingly, the studies on this field have growth in the last years (Lago, 2009). In this respect, recently critical and systematic reviews of the literature relating to performance and match analysis in soccer (Mackenzie & Cushion, 2013; Sarmento et al., 2014, respectively) have outlined the limits that affected those studies. The main limits identified in the aforementioned reviews are: a) the analyses are yet based on the study of isolated performance indicators, defined as the directed and isolated association between those variables and the match-performance outcome; b) they have not adequately accounted for the role of the situational variables in the explanation of the performance outcomes; c) the studies are too much oriented to address the ultimate outcome of the soccer (i.e., the goal) by means of the analysis of the frequency of events (e.g., notational analysis), although this approach has been indicated as not useful for explaining the differences in elite teams' performances (Borrie, Jonsson & Magnusson, 2002). On the contrary, few studies used multidimensional qualitative indicators for assessing the multidimensional factors of the soccer match-performance, as suggested by Gréhaigne and colleagues (2001). These indicators should account for different playing aspects of the team's interactions and are useful to address the differences in team-match performance (Hughes & Bartlett, 2002). Furthermore, the use of possessions into the penalty area (i.e., score-box possessions) for studying the tactical behaviour has been indicated as a valid proxy of the goals scored (Lago-Ballesteros, Lago-Peñas & Rey, 2012; Ruiz-Ruiz, Fradua, Fernandez-Garcia & Zubillaga, 2013). Of note, previous studies (Hughes, 1990; Dufour, 1993) have outlined as the scoring opportunity originating within the score-box area have higher quality with regard to the accuracy on target and the scoring potential than the ones performed outside that area, and this characteristic seemed to be valid also when the sample size was limited (i.e., one-off tournament has lower number of matches than domestic league. (Tenga, Holme, Ronglan & Bahr, 2010b).

Despite these recommendations, the latest studies about the performance and match analysis of the Euro 2012® have only partially accounted for those indications. Leite (2013) and Mitrotasios and Armatas (2014) focused their studies on the relationship between several game-related statistics and the goals scored. Leite stated that the goals were mainly scored in the second half (57.89%) by means of organized attack (44.1%). Mitrotasios and Armatas (2014) extended those findings suggesting that the actions and led to goals started mainly from the opposition's half (56.6%), used more the crosses (43.7%) and the short passes (35.2%) than the other types of actions (e.g, individual action), and were primary ended into the score-box area (92.1%). Shafizadeh, Taylor, and Lago-Peñas (2013) addressed the consistency of the performances of the teams qualified for the knockout phase. In this respect, they used the autocorrelation analysis for evaluating the intra-matches consistency of sixteen performance indicators and the cross-correlation analysis for exploiting the associations of those indicators with the match result. The goals and the offensive-related indicators (e.g., shots accuracy, ball possessions, crosses) showed the highest levels of association with the match results, while the teams who reached the final showed the better consistency in the offensive-related indicators. Sgrò and colleagues (2015) addressed, by means of discriminant analysis, how the final match result (i.e., win or lose) could be characterize by a linear combination of game-related statistics (e.g., goals, shots on goals, number of passes). The cross-validate model of that analysis revealed a classification accuracy of 79.2% and suggested that the goals scored, the assists, and the number of shots were the best predictors for that classification. Most recently, Winter and Pfeiffer (2016) proposed an analysis of that competition by means of a tactical model based on the possible sequences of game states. That model accounted for referee's decisions and team possessions, and it was able to discriminate the match results with a classification accuracy of 64.81%. The best predictors revealed from that analysis were transition play after the loosing

possession over the ball and the offensive efficiency in open play. Finally, the offensive strategies provided by the winning teams were described by means of the intertwined relationship among tactics, pitch location where an offensive action ended up and the time period when an offensive action was led (Sgrò, Aiello, Casella, and Lipoma, 2016). The evidences provided in that study asserted that the tactics used for performing offensive strategies change according to the game periods and the pitch locations. For example, the use of the direct play provided negative interaction effect on the probability to lead offensive action if the action was ended up in the central path, while this tactic performed in the second half produced a positive effect in the aforementioned probability.

Because they used multidimensional qualitative data, only these last studies provided evidences by accounting for some of the indications before mentioned as limits in the aforecited reviews. On the contrary, those studies did not account for the role of the situational variables on the performance of the teams involved in that tournament, since new analyses of EURO 2012 team-match performance are warranted. Indeed, the previous study of the current authors did not consider the matches ended in a draw (Sgrò, et al., 2016). Given these shortcomings, in this study we examined the independent and interactive effects of playing aspects and situational variables on achieving score-box possessions in the Euro 2012® tournament. The likely results of this study could represent a baseline for national coaches and trainers, but also for the researchers. Moreover, this study has addressed the role of the intertwined relationship between playing tactics, pitch location, game period, and situational variables on producing score-box possession and these evidences may extent the knowledge on this field because only few studies have analysed these aspects in one-off tournament competition (Pratas et al., 2012; Sgrò, et al., 2016).

MATERIALS AND METHODS

Materials and procedures

All thirty-one matches played during the last stage of European football championship were used for this study. The tournament involved 16 teams, and initially proceeded with group stage competition format (i.e., four groups with four teams in each group), followed by knockout phase (i.e., four quarter-finals, two semi-finals, and a final). Each team played at least three matches, while the finalists played six matches. In the FIFA Ranking table after the tournament, the position of teams ranged from the first one (Spain – total points: 1691) to the fiftieth (Poland – total points: 560).

The videos of the matches were recorded for the Italian national television RAI on-line repository. The matches were analysed by two skilled operators with almost five years of expertise in notational analysis methodology. The operators watched the videos by means of the software Longomatch (LongoMatch, Ver. 0.20.8, http://longomatch.org) and noted the events in an electronic sheet. Each match was analysed two times, with more than one month of rest between the two analyses for avoiding any possible adverse memory and learning effects. The operators were not involved in the design of the study and performed their analyses separately. Reliability was assessed by means of the intra- and inter-class correlation (ICC) coefficients and was assessed by using the data of 16 randomly selected matches. The ICC coefficients for the intra-observer reliability ranged from 0.88 to 0.96 for the first observer and from 0.89 to 0.98 for the second. The inter-observer reliability coefficient ranged from 0.88 to 0.97. The study followed the rules of the Declaration of Helsinki and the used methodology was approved by the Ethics Committee of the University of Enna.

Performance indicators

A team possession was used as the basic unit of analysis and it has been defined according to the Pollard and Reep (1997):

A team possession starts when a player gains possession of the ball by any means other than from a player of the same team. The player must have enough control over the ball to be able to have a deliberate influence on its subsequent direction. The team possession may continue with a series of passes between players of the same team but ends immediately when one of the following events occurs: a) the ball goes out of play; b) the ball touches a player of the opposing team (e.g. by means of a tackle, an intercepted pass or a shot being saved). A momentary touch that does not significantly change the direction of the ball is excluded.

The outcomes of a team possession were *Score-Box* and *No Score-Box.* The explanation of these outcomes (see Table 1) was in agreement with the definition provided by Tenga and colleagues (Tenga, Holme, Ronglan, & Bahr, 2010b). The proportion of *ScoreBox* possessions on the whole possessions was used for defining the dependent variable with the following formula:

$$Pr(Score\ Box) = \left(\frac{\#\ ScoreBox}{\#\ (ScoreBox + NoScoreBox)} \right)$$

The independent variables were: team possession type, pass number, starting paths, starting zones, halves, quarters, match status, level of tournament, and quality of teams-match. The definitions of those variables are provided in Table 1.

Table 1. The description and the levels of dependent variable and independent variables with the indication of the relative aspect.

Aspects	*Variable*	*Description*	*Levels*
	Team Possession Outcome	Level of offensive success achieving by means of a team possession.	*Score-box*: characterized the offensive team possessions ended into the score-box area with the following actions: goal scoring, scoring opportunity, or possession with high degree of control over the ball*.
			No Score-Box: characterized the offensive team possessions ended out of the score-box area or into the score-box area with low control over the ball*.
Tactics	*Team possession type*	Degree of offensive directness. The categories of this variable were defined according to the ones used from the current authors in previous study (Sgrò et al., 2016).	*Possession Play*: a team possession progresses with a low degree of offensive directness, a high degree of control over the ball and often with long passing sequences including sideways and/or backwards passes.
			Direct Play: team possession, from the start to the end, progresses with a high degree of offensive directness, a low degree of control over the ball, and often using short passing sequences.

	Pass Number	The number of passes achieved in each team possession.	*Short*: <3 passes
			Medium: 3-4 passes
			Long: 5 or more passes
Pitch Location	*Starting Path*	Three areas identified by equally dividing the width of the pitch (see Figure 1a).	*Left*
			Center
			Right
	Starting Zone	Three areas identified by equally dividing the length of the pitch (see Figure 1b).	*First third*
			Middle third
			Final Third
Game Period	*Halves*	The duration of each match divided in two halves.	*First*: 0-45 min.
			Second: 45-90 min.
	Quarters	The duration of each match divided in six quarters of 15 minutes each one.	*First*: 0-15 min.
			Second: 15-30 min.
			Third: 30-45 min.
			Fourth: 45-60 min.
			Fifth: 60-75 min.
			Sixth: 75-90 min
Situational	*Match Status*	Identified if a winning, drawing, or losing team perforfmed the analysed possession.	*Winning*
			Drawing
			Losing
	Tournament level	Identified whether the team possession was performed in the group-stage or knockout phases.	*Group-Stage*
			Knockout
	Team-opposition quality	This variable addresses the distance between the opposing teams with respect to their competitive level. The ranks of the competitive level are defined by equally splitting into three parts the range of points between the first team (Spain) and the last	*A*: a team of Level 1 opposite to a team of Level 3 led the possession.
			B: a team of Level 1 (or 2) opposite to a team of Level 2 (or 3) led the possession.
			C: the level of the opposing teams was the same.
			D: a team of Level 2 (or 3) opposite to a team of Level 1 (or 2) led the possession.

		team one (Poland) in the FIFA end-of-tournament-ranking (updated to 04 July 2012): - Level 1: Spain and Germany; - Level 2: England, Portugal, Italy, Netherlands, Croatia, Denmark, Greece, Russia, and France; - Level 3: Sweden, Czech Republic, Republic of Ireland, Ukraine, and Poland.	*E*: a team of Level 3 opposite to a team of Level 1 led the possession.
Note: *High degree of control over the ball means whether the player had enough space and time to make it easier to execute the intended actions on the ball. Poor degree of control over the ball identified the possessions when the player lacked space and time to make it easier to execute the intended action on the ball (Tenga et al., 2010a).			

The levels of the variables *team possession type* and *pass number* were in agreement with Lago-Ballesteros and colleagues (2012) while the situational variables were chosen in agreement with the indications provided by Mackenzie and Cushion (2013). The pitch locations were identified according to Barreira and colleagues (2011; 2014), as shown in figure 1. In agreement with previous studies (Armatas et al., 2007; Sgrò, et al., 2016), the possessions performed in the extra-time were not considered and the possible injury time was included in the last quarter of each half.

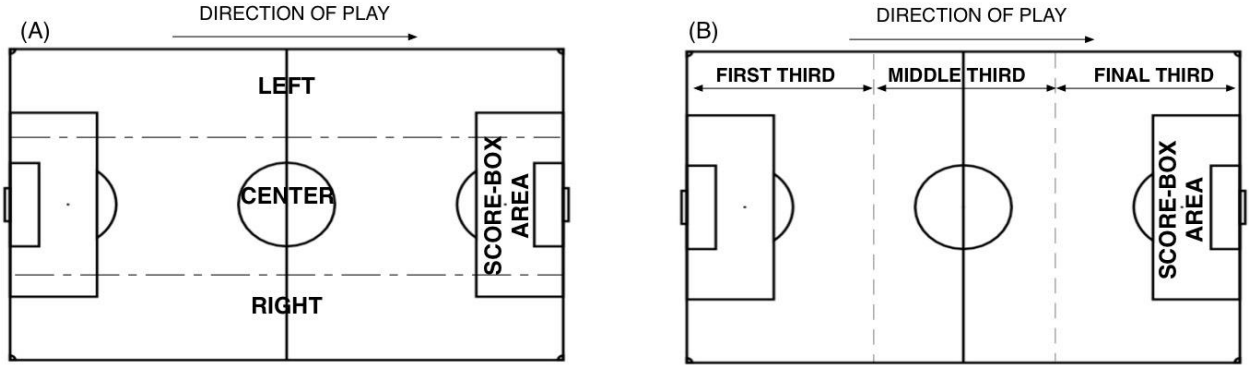

Figure 1. Patterns of pitch space position divided in three paths (A) and in three zones (B) (Adapted from Barreira et al., 2011). The score-box area is also identified.

Statistical Analysis

Statistical analysis was implemented in two steps. At the first step, we investigated the association between the independent variables (i.e., tactics, pitch location, game period, and situational) and probability of producing *score-box possessions* by the Pearson X^2 test of independence.

At the second step, we modelled the proportion of score-box possessions (i.e., PR(Score-Box)) as a function of the several playing aspects and situational variables by means of the logistic regression models, both in univariate and multivariate perspective. In the last perspective, the analyses were conducted to investigate whether there was a conjoint effect on the probability of producing score-box possession of the playing tactics

with the variables related to the pitch location, game period, and situational, separately. Thus, we estimated the effect of each independent variable, adjusted for the other independent variables of the same aspect (i.e., pitch location, game period, and situational) and for the possession type, and also the interactions among them.

Overall, we estimated eight univariate models (i.e., one for each independent variable) and ten multivariate models: three by considering the relationship between the possession type and pitch location variables, three by considering the relationship between the possession type and game period variables, and four by considering the relationship between the possession type and situational variables, respectively. These models were studied by following the principles of the significance and parsimony to identify the minimal adequate model that might be used to describe the current dataset (Collet, 2002). Then, the multivariate models were chosen by assessing the statistical significance of the parameter estimates, and the parsimony of the models (by evaluating the residual deviance using the ANOVA test). In this respect, the current models have the lower number of statistically significant estimates than the other ones and the same, or better, results in the parsimony analysis.

The non-clinical magnitude-based inference method (MBI) was used for assessing the true effect of the estimates in univariate and multivariate models (Hopkins, Marshall, Batterham, & Hanin, 2009). The interpretation of the effects in a negative, trivial, or positive practical sense on the dependent variable (i.e., Pr(Score-box)) was based on the following thresholds: <0.5 % most unlikely; 0.5-5% very unlikely; 5-25% unlikely; 25-75% possibly; 75-95% likely; 95-99.5% very likely; and >99.5% most likely (Batterham & Hopkins, 2006). The effect statistics of the odds ratio were achieved by the spreadsheet developed by Hopkins (2007). For each effect, we reported the odds ratio estimates (OR), 90% confidence limits ($CI_{90\%}$), and the practical inference true effect, as suggested by Hopkins and colleagues (2009). The analyses were conducted using *R* and the alpha level was set to 0.05 in all tests.

RESULTS

Descriptive Statistics

A total of 2173 team possessions were considered and distributed for the score-box and no score-box outcomes. The score-box possessions were performed either using elaborate attack (n=278, 12.8%) or direct attack (n=348, 16.1%).

The first step of analysis exhibited statistically significant associations between many of the independent variables and the score-box possessions (see table 2).

Table 2. Chi-square analysis of the association for possessions outcome according to playing tactics and situational variables

			ScoreBox		*No ScoreBox*		*Chi-square*	*df*	*p*
Aspect	*Variable*	*Levels*	n	%	n	%			
Tactics	*Team possesion type*	*Elaborate attack*	278	38.9	436	61.1	53.18	1	< .001
		Direct attack	348	23.9	1111	76.1			
	Pass number	*Short*	172	18.1	779	81.9	97.61	2	< .001
		Medium	176	34.6	333	65.4			
		Long	278	39.0	435	61.0			
Pitch Location	*Starting path*	*Left*	201	32.5	417	67.5	8.1	2	.014
		Center	272	28.7	675	71.3			
		Right	153	25.2	455	74.8			
	Starting zone	*First third*	132	28.5	331	71.5	7.82	2	.02
		Middle third	378	30.8	849	69.2			
		Final third	116	24.0	367	76.0			
Game Period	*Halves*	*First half*	294	26.7	807	73.3	4.82	1	.028
		Second half	332	31.0	740	69.0			
	Quarters	*First*	99	25.8	284	74.2	7.63	5	.178
		Second	87	25.8	250	74.2			
		Third	108	28.3	273	71.7			
		Fourth	103	29.1	251	70.9			
		Fifth	112	33.8	219	66.2			
		Sixth	117	30.2	270	69.8			
Situational	*Match status*	*Winning*	129	28.8	319	71.2	1.19	2	.55
		Drawing	336	28.0	863	72.0			
		Losing	161	30.6	365	69.4			
	Tournament level	*Group stage*	485	29.0	1188	71.0	0.12	1	.732
		Knockout	141	28.2	359	71.8			
	Team-opposition quality	*A*	19	48.7	20	51.3	12.37	4	.015
		B	229	30.1	531	69.9			
		C	193	29.3	465	70.7			
		D	181	26.2	511	73.8			
		E	4	16.7	20	83.3			

There are significant differences in the proportions of score-box possessions for the following variables: team possession type ($P < 0.001$), pass number ($P < 0.001$), starting paths ($P < 0.05$), starting zones ($P < 0.05$),

halves (P < 0.05), and team-opposition quality (P = 0.05). No significant differences were revealed for the other variables.

Logistic Regression Models

As above mentioned, we investigated whether there were differences in the OR of the probability of achieving a score-box possessions in a double perspective. Accordingly, the OR estimates and their $CI_{95\%}$ and the p-value are reported in table 3 and table 4 for univariate and multivariate models, respectively.

In a univariate perspective (see table 3), we estimated statistically significant reduction and negative effect on the probability of achieving score-box possessions for the following variables:

- team possession type (OR=0.49, P<0.001, 90% confidence limits 0.34 to 0.70, most likely): when the team performed a direct attack rather than a possession play;
- starting path (OR = 0.69, P<0.01, 90% confidence limits 0.57 to 0.86, most likely): only when the team started a possession from the right path rather than the left one;
- team-opposition quality (see table 3 for the relevant ORs, the effects ranged from very likely to most likely): when a possession was performed in a match categorized with the levels B, C, D, or E, respectively, compared to a match categorized to the level A (i.e., baseline).

On the contrary, statistically significant increase and positive effect on the probability of achieving score-box possessions was estimated for the variable:

- halves (OR=1.23, P<0.05, 90% confidence limits 1.05 to 1.44, very likely): when a team performed an action during the second half rather than the first one;
- quarters (OR= 1.46, P<0.05, 90% confidence limits 1.10 to 1.96, very likely): when a team performed an action during the fifth quarter rather than the first one.

The univariate models for all the remaining variables did not revealed any other significant and clear effect.

Table 3. Simple logit models estimated for possessions outcome according to playing aspects and situational variables.

Aspect	**Variable**	**Levels**	**OR**	**CI**(95%)		**p**
Tactics						
	Team possession type	Direct attack vs possession play*	0.491	0.405	0.596	< .001
Pitch Location						
	Starting path	Center vs left*	0.836	0.672	1.042	.110
		Right vs left*	0.698	0.544	0.894	< .01
	Starting zone	Middle third vs first third*	1.116	0.884	1.416	.359
		Final third vs first third*	0.793	0.592	1.059	.117
Game Period						
	Halves	Second vs first*	1.231	1.023	1.484	< .05
	Quarters	Second vs first*	0.998	0.714	1.394	.992
		Third vs first*	1.135	0.825	1.563	.437
		Quarter vs first*	1.177	0.851	1.628	.324

		Fifth vs first*	1.467	1.063	2.028	< .05
		Sixth vs first*	1.243	0.907	1.706	.176
Situational						
	Match status	Drawing vs winning*	0.963	0.758	1.227	.757
		Losing vs winning*	1.091	0.828	1.439	.537
	Tournament level	Knockout vs group stage*	0.962	0.769	1.199	.732
	Team-opposition quality	B vs A*	0.454	0.237	0.872	< .05
		C vs A*	0.437	0.227	0.842	< .05
		D vs A*	0.373	0.194	0.719	< .01
		E vs A*	0.211	0.054	0.678	< .05

Note: *OR: Odds Ratio; CI: Confidence Interval. *The odds ratio reflects the chance to attempt a score-box possession compared to the reference category.*

In a multivariate perspective (see table 4), when the OR of the team possession type was adjusted for the pitch location variables, the estimate multiple logit model yielded only two significant independent effects: the use of the direct attack rather than the possession play (OR:0.49, P<0.001, 90% Confidence Limits 0.39 to 0.62, most likely negative effect) and the possession started from the right path rather than the left one (OR:0.69, P<0.01, 90% confidence limits 0.56 to 0.86, most likely negative effect) led a reduction on the probability of producing score-box possessions.

When we considered the variables related to the match period, in addition to the team possession type, the estimate multiple logit model yielded again only two significant independent effects: the used of the direct play rather than the possession play led to a reduction of the probability to produce score-box possessions (OR:0.48, P<0.001, 90% confidence limits 0.38 to 0.61, most likely negative effect) while the possessions performed in the second half increased the aforementioned probability (OR:1.29, P<0.01, 90% confidence limits 1.1 to 1.51, very likely positive effect).

Finally, the current multiple logit model for the dependent variable controlled for the situational and team possession type variables yielded two independent effects and an interaction term. The probability of producing score-box possessions decreased whether the possessions were performed by means of direct attack (OR:0.55, P<0.001, 90% Confidence Intervals 0.44 to 0.69, most likely negative effect) and the difference between teams' rank were lower than the difference between the one yielded in the matches when a team from group A played against a team of group C (see table 4 for the relevant ORs, the effect ranged from very likely to most likely negative). Finally, an interaction effect revealed that the probability of producing score-box possessions decreased for the possessions played in the knockout stage by means of the direct attack rather than the ones played in the group-stage by means of possession play: OR:0.62, P<0.05, 90% Confidence Limits 0.42 to 0.91, very likely negative effect). The tournament level variable revealed a not statistical significant effect about the probability of increasing score-box possessions in the knock-out stage (OR:1.26, P>0.05, 90% Confidence Limits 0.94 to 1.68, unclear effect).

Table 4. Multiple logit models estimated for possessions outcome as function of tactics playing aspect according to space and time playing aspects and situational variables.

Aspects	*Variable*	*Levels*	OR_{adj}	$CI_{(95\%)}$		*p*
Tactics controlling for space playing variables						
	Team possession type	*Direct attack vs. possession play**	0.490	0.404	0.595	< 0.001
	Starting path	*Center vs left**	0.826	0.661	1.031	0.090
		*Right vs left**	0.694	0.539	0.892	< 0.01
Tactics controlling for time playing variables						
	Team possession type	*Direct attack vs. possession play**	0.482	0.397	0.585	< 0.001
	Halves	*Second vs first**	1.295	1.072	1.565	< 0.01
Tactics controlling for situational variables						
	Team possession type	*Direct attack vs possesion play**	0.553	0.443	0.690	< 0.001
	Tournament level	*Knockout vs group stage**	1.260	0.886	1.785	0.196
	Team-opposition quality	*B vs A**	0.447	0.231	0.868	< 0.05
		*C vs A**	0.446	0.230	0.866	< 0.05
		*D vs A**	0.403	0.208	0.784	< 0.01
		*E vs A**	0.223	0.056	0.725	< 0.05
	*Team poss. type*Lev. of tourn.*	*Direct attack and knockout vs possession play and group-stage**	0.628	0.395	0.994	< 0.05

Note: *ORadj: Adjusted Odds Ratio; CI: Confidence Interval. *The odds ratio reflects the chance to attempt a score-box possession compared to the reference category.*

DISCUSSION AND CONCLUSIONS

The aim of this study was to address the independent and the interactive effects of match-playing aspects and situational variables on producing score-box possessions in 2012 European Football Championship. In this respect, we have gathered multidimensional data related to team match performance and we have analysed those data by means of logistic regression analysis in univariate and multivariate perspective.

We have interpreted the current findings by means of the non-clinical magnitude-based inference method (Hopkins et al., 2009) because it permits us to provide evidence-based conclusions with regard to the nature of the result beyond the significant analysis. Furthermore, this approach allows us to research the smallest worthwhile differences in those result in agreement with the suggestions provided in previous studies (Hopkins et al., 2009; Shafizadeh et al., 2013). The current results seem to extend the knowledge about the analysis of team-match performance in this one-off tournament because provide evidences about the intertwined relationship between tactics, pitch location, game period, and situational variables, respectively. To our knowledge, only a previous study of the current authors has addressed the role of the intertwined

relationship among tactics, pitch location, and game period on the offensive processes of the team involved in EURO 2012, but that study presented some limitations because the independent and interactive effects of the situational variables have not been considered. Finally, the current results have been analysed in the research of the smallest worthwhile differences in the current statistics by considering that the team and the opposite throughout the matches of the tournament had comparable level of strength.

The difference between the two team possession type (3.3%) was partially in agreement with the difference of 4% estimated in previous study (Pollard & Reep, 1997). The current descriptive analysis identified a significant association between the probability of producing score-box possession and the variables of playing tactics, pitch location, and the variable team-opposition quality. With regard to the team possession types, the use of the direct attack strategy seemed to produce a clear and very likely negative effect on the probability to produce score-box possessions. This means that the teams preferred to perform offensive processes based on the use of long sequence of passes as proxy of high control over the ball. The evidence about the effectiveness of the style of play in football competition remains an open-issue in the soccer community, but the current results are in agreement with the ones provided about the strategy used the most by the winning teams in previous one-off tournaments (Yiannakos & Armatas, 2006; Castellano, Casamichana, & Lago, 2012). These results are also in agreement with the ones obtained by addressing the proportion of offensive actions provided by the winning teams in the same tournament (Sgrò, et al., 2016). Further analysis showed that the strength of this evidence changes under the effect of the other team-match performance indicators and the situational variables. Of note, this result confirms the need to address the interaction of several playing aspect, as direct and indirect tactical indicators, and contextual variables in the study of the offensive processes of elite football teams.

The univariate analysis on the probability of producing score-box possession as function of the pitch location variables revealed that this probability decreased when a possession started from the right path rather than the left one (most likely negative effect). Then, in multivariate perspective, this effect remained clear and most likely negative whether the model addressed the conjointly effect of the team possession type variable too. In this respect, the use of the direct attack provided also a most likely negative effect on the probability of producing score-box possessions. This evidence confirmed the need to address the intertwined relationship between possession strategies and space playing aspect with the aim to represent the complexity of the performance of elite teams in football. With regard to the practitioners' point of view, these results seemed to be revealed that the elite national teams preferred to use the possession play strategy as a proxy of the occupation of the pitch in wide direction. Therefore, the teams seemed to use the long and accurate sequences of passes across the sides and this strategy seemed to be more effectiveness for obtaining score-box possession when it started from the right path. These evidences are partially in agreement with the analysis of the offensive strategies in the same tournament (Sgrò, et al., 2016) even if the current result did not reveal a clear interactive effect between playing tactics and pitch location variables. About this difference, we underlined that the dependent variables considered in the two studies and the definition and the use of the pitch location variables were different. Nevertheless, the current result allows us to obtain clear and significant effect about the aforementioned relationship in order to model a specific offensive process (i.e., score-box possessions) from tactical point of views (Gómez, Gómez-Lopez, Lago, & Sampaio, 2012).

With regard to the the time playing aspect, the current logit models provided interesting results. First, the direct attack revealed a clear and very likely negative effect on the probability of producing score-box possessions even if the team possession type was considered conjointly with the game periods variables. Second, the same probability increased with clear and very likely effect in the second half both in univariate

and multivariate perspective. In this respect, the chance to produce scoring opportunity by means of score-box possessions seemed to be related to physical and tactical determinants. Of note, previous studies have outlined that in the second half the physical performances are lower than in the first half (Rampinini, Impellizzeri, Castagna, Coutts, & Wisloff, 2009) and it has also a reflection on player's technical performances. Moreover, in this game period the probability of performed possessions against unbalanced teams is higher than in the first half (Abt, Dickson, & Mummery, 2002), since these evidences seem to support the current clear and positive effect.

Considering the situational variables and the univariate analysis, only the team-opposition quality yielded significant, clear and negative effects on the probability of producing score-box possessions. Therefore, the result seems to suggest that the scoring opportunities within the score-box area are mainly function of the difference of strength between the team and the opposite, but those chances were not related to any others situational aspect. These evidences were partially confirmed by the multivariate results. In this perspective, the model revealed that the use of the direct play strategy produced again a most likely negative effect on the probability to perform score-box possessions. The same effect was obtained when the differences in the teams-strength were lower than the ones yielded in a match that involved a team of the group A against a team of the group C. This means that the differences in the rank among the teams seem to be supported by the offensive effectiveness performed by each team during the tournament. Moreover, this result was in agreement with the one of several studies that addressed the relation between the quality of opposition and the possession of the ball in international and domestic league (Lago, 2009; Lago-Ballesteros et al., 2012; Collet, 2013; Bradley, Lago-Peñas, Rey, & Sampaio, 2014). Furthermore, an interaction effect was yielded: the use of the direct attack in the knockout phase provided a clear and very likely negative effect on the probability to produce scoring opportunity within the score-box area. This result seemed to suggest again that the offensive processes performed by the elite football teams are mainly based on the use of possession play strategy, and this choice was well-established also in relation to the contextual determinants of the game. In this respect, it is noteworthy that the match status did not provide a clear and significant effect on the probability of producing score-box possessions. Nevertheless, Lago (2009) suggested that the situational variables could have distinctive effects on individual players, teams and playing strategy.

The last results confirmed the importance of considering the situational variables in the team-match performance analysis of elite national teams (Lago-Ballasteros et al., 2012; McKenzie e Cushion, 2013) because that's a necessary step for improving the knowledge about the match-team analysis in one-off soccer tournament. Indeed, to the best of author's knowledge, the analysis of the intertwined relationship between playing tactics and situational variables are original with regard to EURO 2012 championship, therefore the current results somewhat extends the evidences provided in previous studies (Shafizadeh et al., 2013; Sgrò, Barresi and Lipoma , 2015; Winter & Pfeiffer, 2016; Sgrò, et al., 2016).

About the possible limitations that affected the current results, this study did not account for any variables directly related to the opponent interactions and it could be useful to better address the within-match variability of tactics playing aspect. Again, considering that the current analyses are related to one-off tournament, in future studies it may be interesting verifying also the validity of these models for describing which team-match playing aspects and situational variables influence the tactical behaviour of national teams over different tournaments and seasons.

In conclusion this study provides several evidences that somewhat confirms and extent the current literature about the analysis of team-match performance in one-off tournament. First, by considering the conjointly effects of playing tactics, game periods, pitch location, and contextual indicators, the current results are in

agreement with the superorganism definition of team-match performance provide by Duarte and colleagues (2012), because each possessions strategies have been analysed in agreement with the typical decision-making problem of each player: how, when, and where perform my offensive processes. Moreover, the current results reveal that this process was also conditioned by several situational variables, such as lopsided competitive scenario and the level of tournament. Finally, these broader measures and indications may represent useful elements for improving the training process of soccer practitioners and for supporting future studies in this field. In this respect, the use of score-box possessions instead of goals scored seemed to support the feasibility of using of the performance analysis methodology for the tournaments with small sample size (i.e., number of matches) and the current results may be considered the reference for comparing the analyses relating to one-off soccer tournament.

REFERENCES

1. Abt, G.A., Dickson, G., & Mummery, W.K. (2002). Goal scoring patterns over the course of a match: Analysis of the Australian National Soccer League. In Spinks, W., Reilly, T. & Murphy, A. Science and Football IV. London: Routledge.
2. Barreira, D., Garganta, J., & Anguera, T. (2011). In search of nexus between attacking game-patterns, momentaneous score and type of ball recovery in European Soccer Championship 2008. In M. Hughes et al. (Eds.), *Research Methods and Performance Analysis*, 226−237, Szombathely, Hungary.
3. Barreira, D., Garganta, J., Machado, J., & Anguera, M. T. (2014). Effects of ball recovery on top-level soccer attacking patterns of play. *Revista Brasileira de Cineantropometria & Desempenho Humano*, *16*(1), 36-46.
4. Batterham, A. M., & Hopkins, W. G. (2006). Making meaningful inferences about magnitudes. *International journal of sports physiology and performance*, *1*(1), 50-57.
5. Borrie, A., Jonsson, G. K., & Magnusson, M. S. (2002). Temporal pattern analysis and its applicability in sport: an explanation and exemplar data. *Journal of sports sciences*, *20*(10), 845-852.
6. Bradley, P. S., Lago-Peñas, C., Rey, E., & Sampaio, J. (2014). The influence of situational variables on ball possession in the English Premier League. *Journal of Sports Sciences*, *32*(20), 1867-1873.
7. 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*, 137-147.
8. Collet, D. (2002). *Modelling binary data*. CRC press.
9. Duarte, R., Araújo, D., Correia, V., & Davids, K. (2012). Sports teams as superorganisms. *Sports medicine*, *42*(8), 633-642.
10. Dufour, W. (1993). Computer-assisted scouting in soccer. *Science and football II*, 160-166.
11. Gómez, M. A., Gómez-Lopez, M., Lago, C., & Sampaio, J. (2012). Effects of game location and final outcome on game-related statistics in each zone of the pitch in professional football. *European Journal of Sport Science*, *12*(5), 393-398.
12. Gréhaigne, J.F., Mahut, B., & Fernandez, A. (2001). Qualitative observation tools to analyse soccer. *International Journal of Performance Analysis in Sport*, *1*(1), 52-61.
13. Hopkins, W. G. (2007). A spreadsheet for deriving a confidence interval, mechanistic and clinical inferences from p value. Sposrtscience 11, 16-20. Retrieved 28 June, 2016, from http://www.sportsci.org/2007/inbrief.htm#xcl2
14. Hopkins, W., Marshall, S., Batterham, A., & Hanin, J. (2009). Progressive statistics for studies in sports medicine and exercise science. *Medicine & Science in Sports& Exercise*, *41*(1), 3-12.
15. Hughes, C. F. (1990). *The winning formula*. London: William Collins.

16. Hughes, M., & Bartlett, R.M. (2002). The use of performance indicators in performance analysis. *Journal of Sports Sciences, 20*(10), 739-754.
17. 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*(13), 1463-1469.
18. 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*(14), 1455-1461.
19. Leite, W. S. (2013). Euro 2012: analysis and evaluation of goals scored. *International Journal of Sports Science*, *3*(4), 102-106.
20. Mackenzie, R., & Cushion, C. (2013). Performance analysis in football: A critical review and implications for future research. *Journal of Sports Sciences*, *31*(6), 639-676.
21. Mitrotasios, M., & Armatas, V. (2014). Analysis of Goal Scoring Patterns in the 2012 European Football Championship. *United States Sports Academy*.
22. Pollard, R., & Reep, C. (1997). Measuring the effectiveness of playing strategies at soccer. *Journal of the Royal Statistical Society: Series D (The Statistician)*, *46*(4), 541-550.
23. Pratas, J., Volossovitch, A., & Ferreira, A. P. (2012). The effect of situational variables on teams' performance in offensive sequences ending in a shot on goal. A case study. *The Open Sports Sciences Journal*, *5*(5), 193-199.
24. Rampinini, E., Impellizzeri, F. M., Castagna, C., Coutts, A. J., & Wisløff, 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*(1), 227-233.
25. Ruiz-Ruiz, C., Fradua, L., Fernández-GarcÍa, Á., & Zubillaga, A. (2013). Analysis of entries into the penalty area as a performance indicator in soccer. *European Journal of Sport Science*, *13*(3), 241-248
26. Sarmento, H., Marcelino, R., Anguera, M. T., CampaniÇo, J., Matos, N., & Leitao, J. C. (2014). Match analysis in football: a systematic review. *Journal of sports sciences*, *32*(20), 1831-1843.
27. Shafizadeh, M., Taylor, M., & Peñas, C. L. (2013). Performance consistency of international soccer teams in Euro 2012: A time series analysis. *Journal of human kinetics*, *38*, 213-226.
28. Sgro, F., Barresi, M., & Lipoma, M. (2015). The analysis of discriminant factors related to team match performances in the 2012 European Football Championship. *Journal of Physical Education and Sport, 15*(3), 460.
29. Sgrò, F., Aiello, F., Casella, A., & Lipoma, M. (2016). Offensive strategies in the European Football Championship 2012. *Perceptual and motor skills, 123*(3), 792-809.
30. Tenga, A., Holme, I., Ronglan, L.T., & Bahr, R. (2010a). Effect of playing tactics on goal scoring in Norwegian professional soccer. *Journal of Sports Sciences*, *28*(3), 237-244.
31. Tenga, A., Holme, I., Ronglan, L. T., & Bahr, R. (2010b). Effect of playing tactics on achieving score-box possessions in a random series of team possessions from Norwegian professional soccer matches. *Journal of Sports Sciences*, *28*(3), 245-255.
32. Winter, C., & Pfeiffer, M. (2016). Tactical metrics that discriminate winning, drawing and losing teams in UEFA Euro 2012®. *Journal of sports sciences*, *34*(6), 486-492.
33. Yiannakos, A., & Armatas, V. (2006). Evaluation of the goal scoring patterns in European Championship in Portugal 2004. *International Journal of Performance Analysis in Sport*, *6*(1), 178-188.

