

STYLES OF PLAY IN ELITE SOCCER: IDENTIFICATION
AND DEFINITION OF THE ATTACKING AND DEFENSIVE
STYLES OF PLAY IN THE ENGLISH PREMIER LEAGUE
AND THE 1ST SPANISH LEAGUE

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Abstract

Deciding on effective team strategies and tactics is fundamental to successful performance in soccer (Carling et al., 2005). Previous studies have addressed the influence of the styles of play when measuring technical and tactical aspects in soccer (Bradley et al., 2011; Duarte, Araujo, Correia, & Davids, 2012; Fradua et al., 2013; James, Mellalieu, & Hollely, 2002; Lago-Peñas, Lago-Ballesteros, & Rey, 2011; Pollard & Reep, 1997; Pollard, Reep, & Hartley, 1988; Tenga, Holme, Ronglan, & Bahr, 2010b; Tenga & Larsen, 2003; Tenga & Sigmundstad, 2011). Different attacking and defending styles of play and associated variables have been identified (Bate, 1988; Hughes & Franks, 2005a; Lago-Peñas & Dellal, 2010; Pollard et al., 1988; Tenga, Holme, et al., 2010b; Tenga & Larsen, 2003). 'Direct' and 'possession' are the styles of play most often described (Bate, 1988; Garganta, Maia, & Basto, 1997; Hughes & Franks, 2005a; Olsen & Larsen, 1997; Redwood-Brown, 2008; Ruiz-Ruiz, Fradua, Fernandez-Garcia, & Zubillaga, 2011; Tenga, Holme, Ronglan, & Bahr, 2010a; Tenga, Holme, et al., 2010b; Tenga & Larsen, 2003; Tenga, Ronglan, & Bahr, 2010; Travassos, Davids, Araujo, & Esteves, 2013). The aims of this thesis were to identify and define the different styles of play in elite soccer, compare the results with the previous styles of play and to classify the observed teams' styles of play.

Data were collected from ninety-seven matches from the 1st Spanish League and the English Premier League from the seasons 2006-2007 and 2010-2011 using the Amisco® system. A total of nineteen variables, fourteen in attack and five in defence were measured in the analysis. Factor analysis using principal component analysis was carried out using the nineteen variables to cluster each team's style of play based on their factor scores.

Six factors, representing the different styles of play, were extracted and in combination explained 87.54% of the variance. Factor 1 explained the largest variance, while each subsequent factor explained less of the variance in descending order. Factor 1 differentiates between teams that use a direct or possession play. Factor 2 distinguishes between teams that usually regain the ball in the wide areas or in the central areas of the pitch. Factor 3 measures how much possession of the ball teams have in the defensive third and the use of centres. Factor 4 represents

the width of the teams' possession. Factor 5 distinguishes between teams that use high or low pressure. Factor 6 measures how the teams progress in the attack.

Playing styles can be defined by specific variables and consequently, teams can be classified by their styles of play. For practical implications, the variables of a team that utilise a style of play can be measured and compared with the reference values of the style of play we want to develop. To improve the performance, a team that utilise a specific style of play should use training tasks that improve the variables typical of that style of play.

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CHAPTER 1

Introduction

1.1 Background

In sports competition, tactical aspects of the game influence the team's success in sport. Furthermore, the team's performance is influenced by the tactical behaviours of the players. As team sports involve two teams that try to succeed over the other, some aspects are relevant in competition. Physiological, psychological, technical and tactical are important aspects that can influence a team's chances of winning a single match or competition. Tactical aspects of invasion games have been evaluated previously in different team sports such as soccer (Camerino, Chaverri, Anguera, & Jonsson, 2012; Hughes & Franks, 2005a; James et al., 2002; Lago-Peñas & Dellal, 2010; Ruiz-Ruiz, Fradua, Fernandez-Garcia, & Zubillaga, 2013; Sampaio & Macas, 2012; Tenga, Holme, et al., 2010b; Tenga, Ronglan, et al., 2010), basketball (Csataljay, O'Donoghue, Hughes, & Dancs, 2009; Gomez, Lorenzo, Ibanez, & Sampaio, 2013; Remmert, 2003), rugby (James, Mellalieu, & Jones, 2005; Jones, Mellalieu, & James, 2004; Vaz, Mouchet, Carreras, & Morente, 2011) and handball (Meletakos, Vagenas, & Bayios, 2011).

Performance analysis is employed to tactically evaluate sports teams (Hughes & Franks, 2008). The application of performance analysis in competition allows valuable data collection of the tactical aspects so that the subsequent evaluation of performance indicators can be used to review and/or develop tactical knowledge. However, to analyse the game from a tactical point of view, different levels of analysis should be considered. Hughes and Franks (2008) described the following levels of analysis: the team, subsidiary units, and individuals. Firstly, when analysing the team, information obtained corresponds to all the players' actions and behaviours that can be extrapolated from the team (e.g. possession of the ball, passing accuracy). Secondly, the analysis of subsidiary units implies that the variables measured correspond to a group of players with any relationship between them, for example defensive or attacking players. Thirdly, if we analyse individuals, the measured variables correspond to each player and the inferences can be made about the performance of an individual in a match or multiple matches to create a normative profile (e.g. shots made by the player, number of passes).

Therefore, when analysing the tactical aspects of the team, subsidiary unit or individual, performance indicators should be measured. Performance indicators are a selection of actions variables that aims to define the aspects of a performance

(Hughes & Bartlett, 2002). Performance indicators should be objectively defined and their values should be interpreted by using a known scale of measurement. Variables that also aim to describe performance but their values are not objectively measured through a known scale cannot be considered performance indicators. These performance indicators are employed to assess the performance depending on the level of analysis; hence performance indicators can be associated with a team, a subsidiary unit or an individual. Scoring indicators and indicators of the quality of the performance are two kinds of performance indicators that can be considered. Examples of the former are goals, points or sets; and examples of the latter are percentage of the possession or passing accuracy.

Previous research has attempted to identify the key performance indicators that determine a successful team or player in different sports such as tennis (O'Donoghue, 2008), basketball (Csataljay et al., 2009), handball (Meletakos et al., 2011), rugby (M. T. Hughes et al., 2012; James et al., 2005; N. M. P. Jones et al., 2004) and soccer (M. Hughes et al., 2012; Lago-Peñas et al., 2011). These studies identified performance indicators that are characteristic of winning or losing teams and therefore suggested that these variables are associated with success.

However, previous studies often measured performance indicators and other variables in isolation. Recently, Mackenzie and Cushion (2013) reported that most of the performance analysis studies in soccer measured performance indicators without considering opposition, venue (i.e. playing home or away), specific information relating to the variables assessed (i.e. area where the shots were taken), and match status; as these factors have been proved to influence performance indicators. Furthermore, player and team behaviours might differ based on the strategy and tactics they employ. The general attacking and defensive behaviours of the whole team are described as their style of play. There is a lack of studies examining the styles of play teams use in competition, and how they influence performance indicators.

Previous research has defined the variables associated with 'direct' and 'possession' styles of play (Bate, 1988; Pollard et al., 1988; Tenga & Larsen, 2003; Hughes & Franks, 2005a; Tenga et al., 2010a; Lago-Peñas & Dellal, 2010). The 'direct' style of play is characterised by long forward passes, low number of passes, short passing sequences, and a low number of touches per ball involvement. In

contrast, 'possession' style of play involves short passes, higher number of passes, long passing sequences, and a high number of touches per ball involvement.

These studies analyse styles of play based on the 'Reep System' (Pollard et al., 1988). Each continuous phase of play in soccer is dissected into different on-the-ball events to create variable categories such as passes or shots. Pollard et al. (1988) used the 'Reep System' to conduct a quantitative comparison between the different styles of play used by English league teams during season 1984-85, and national teams that played in the 1982 World Cup. Six variables were measured to define the different styles of play for the teams observed. These variables were; long forward passes (number of passes taking the ball fewer than 30m closer to the opponents goal line), long goal clearances (number of long clearance made by the goalkeeper), centres (number of crosses), regaining possession in attack (number of times that a team regains possession of the ball within 35m of the opponents' goal line), possession in defence (number of sequences of three or more passes that a team makes in his own half of the pitch), and multi-pass movements (number of passes per game in all sequences containing more than three passes). Factor analysis was conducted to determine clusters of variables that determined a style of play. Results showed that teams' styles of play were mainly dependent on the length and number of passes.

Therefore, a team was classified as having a 'direct' style of play if they had high scores for long forward passes and long goal clearances. In comparison, a team with high scores for possession in defence and multi-pass movements would be classified as having a 'possession' style of play. However, the study only used six variables to define the styles of play. Direction of passes, shots and behaviour of the players without the ball could be important variables when trying to identify styles of play. Moreover, since the game involves an interaction between attack and defence, defensive variables should be included. For instance, the zones where a defending team applies pressure, the position of the team's players when they lose possession and the type of marking that the teams use. Finally, the authors suggest that further studies examine additional variables when conducting factor analysis.

Consequently, the inclusion of additional variables will allow the identification and definition of different styles of play in sport. Furthermore, team tactical analysis would improve if the styles of play were fully considered during the process. Information on a team's dominant playing style(s) and the associated variables

could aid scouting of the opposition, tactical preparation, and monitoring and evaluation of performance during matches and across competitions.

1.2 Aims

This thesis aims to define the different styles of play and identify variables associated with each style of play utilised by elite soccer teams. In addition, each elite soccer team observed in the study will be classified based on their styles of play, so that their playing styles profile can be described and compared to other teams.

1.3 Objectives

The aims of this thesis will be achieved by performing the following objectives:

1. To develop a series of attacking and defensive variables that could be measured and could assist the definition of the styles of play in elite soccer.
2. To capture data of variables from competition match-play through specific match analysis software validated for research purposes (AMISCO).
3. To identify the variables that objectively determines different styles of play by using factor analysis.
4. To define the predominant styles of play employed by the professional teams in elite soccer.

CHAPTER 2

Literature Review

2.1 Strategies and Tactics in Soccer

Strategies and tactics are important factors that influence the outcome of the game and the final result in soccer (Yiannakos & Armatas, 2006). Although other factors influence the performance of a team in competition (e.g. physical or psychological), deciding on effective team strategies and tactics is fundamental to successful performance in soccer (Carling, Williams, & Reilly, 2005). A strategy is defined as the overall plan that is devised and adopted to achieve an aim or specific objective. For example, soccer teams adopt an overall combination of attacking and defensive styles of play and strategy that will increase their probability of success. A style of play is defined as the general behaviour of the whole team to achieve the attacking and defensive objectives in the game. The strategy is normally achieved via the application of specific tactics. Tactics are defined as the specific attacking and defensive actions that give immediate solution to the changeable situations influenced by the opposite team. They are the particular actions performed to fulfil the required strategy (Taylor, Mellalieu, & James, 2005). Other authors define tactics as a process of finding the best ways to use basic tactical principles and deciding which actions will provide the best attacking and defensive options (Bangsbo & Peitersen, 2000; Peitersen, 2001).

Therefore, as strategies and tactics are important factors for soccer performance, it is important to examine them and identify common patterns of behaviour. Consequently the observations of tactics not only provides a conceptual basis to coaching theory, but also provides a useful practical tool for the coaching staff (e.g. coach and analyst) and even the player (James et al., 2002). The information that can be collected from tactical analysis is useful for designing training tasks, improving the performance of the team by correcting mistakes in tactical behaviour and strengthen the actions that are successful for the team, preparing strategies for the next match against other opponents, and even for talent identification.

Performance analysis, specifically match analysis involves the use of video analysis and technology to improve performance in soccer. This kind of analysis requires careful information management and systematic observation techniques (Hughes & Franks, 2008). The main aim of match analysis is to identify the team's strengths to further develop them, and its weaknesses to suggest areas for improvement (Lago-Penas, 2009; Lago-Peñas & Dellal, 2010). Performance analysis in soccer has

increased rapidly due to the improvements in technology. Technology provides new ways of collecting tactical data from competition and training, and also the possibility of measuring variables that could not be measured previously using traditional methods. For instance, time motion analysis, Global Positioning Systems (GPS), or specific match analysis software (e.g. Prozone, Amisco) are tools derived from new technology that provide valid and reliable data for analysis (Randers et al., 2010). These tools were firstly used for training and performance purposes in the professional area, however they are also currently used for the academic and research scopes.

Previous research has examined different performance indicators associated with tactics. According to Hughes and Bartlett (2002), performance indicators are a selection of action variables that try to define the aspects of a performance and should relate to successful outcome. Performance indicators are used to assess the performance of an individual or a team. Numbers of shots, passes, or passing accuracy are examples of performance indicators used when analysing tactics in soccer. In previous studies, they have distinguished between indicators relating to the quality of the performance (e.g. passes per possession) and scoring indicators (e.g. goals scored). These are often used to define the team's performance and identify the key performance indicators associated with success.

2.2 Performance Indicators in Soccer

Soccer is a team sport that involves the participation of two teams consisting of eleven players each. In addition, soccer is considered to be an invasion game that can also be subcategorised as a goal striking game (Hughes & Franks, 2005b) due to its specific rules. The determinant of victory, and therefore the objective of the game in soccer is scoring more goals than the opposition (Carling et al., 2005).

In the literature, a large variety of performance indicators and variables have been considered when measuring tactics in soccer. Performance indicators have been utilised to describe the behaviour of teams and players in competition, and explain the performance of teams. In addition, researchers have used performance indicators to predict the performance of teams and determine key performance indicators associated with success in competitions such as the World Cup (Castellano, Casamichana, & Lago, 2012; Hughes & Franks, 2005a; Lago, 2007; Liu, Gomez, Lago-Peñas, & Sampaio, 2015; Ridgewell, 2011; Ruiz-Ruiz et al., 2013; Scoulding, James, & Taylor, 2004), Euro Cup (Yiannakos & Armatas, 2006), the Champions League (Almeida, Ferreira, & Volossovitch, 2014; Di Salvo et al., 2007; Lago-Peñas et al., 2011), the English Premier League (Adams, Morgans, Sacramento, Morgan, & Williams, 2013; Bradley, Lago-Peñas, Rey, & Sampaio, 2014; Bush, Barnes, Archer, Hogg, & Bradley, 2015; Oberstone, 2009; Redwood-Brown, 2008), the Spanish League (Castellano, Alvarez, Figueira, Coutinho, & Sampaio, 2013; Lago-Peñas & Dellal, 2010; Lago-Peñas & Lago-Ballesteros, 2011; Sala-Garrido, Liern Carrion, Martinez Esteve, & Bosca, 2009), and the Bundesliga (Hiller, 2015; Vogelbein, Nopp, & Hokelmann, 2014; Yue, Broich, & Mester, 2014). Currently, there are variations in the number and type of performance indicators that reliably predict a team's chance of winning a match, however there are performance indicators that can be associated with successful and unsuccessful teams. The most common performance indicators and variables employed to analyse the tactical performance of a team are detailed next.

Goals scored have been measured in previous match analysis studies to assess the performance of soccer teams (Acar et al., 2009; Barreira, Garganta, Pinto, Valente, & Anguera, 2013; Grant, Reilly, Williams, & Borrie, 1998; Partridge, Mosher, & Franks, 1993; Taylor et al., 2005; Yiannakos & Armatas, 2006). Other variables associated with the goals scored were also evaluated to provide additional

contextual information (e.g. part of the body used to score the goal, area in which the goal was scored, the period of the match when the goal was scored). Results indicated that more goals were scored in the second half of the match, and midfielders and forwards have higher frequencies of goals scores in comparison to other positions. Tenga, Holme, et al. (2010b) also considered opponent interactions such as defensive pressure, defensive backup, and defensive cover when measuring goal scoring. They found that counterattacks were more likely than elaborate attacks to lead to goal scoring against an imbalance defence (i.e. a defence with loose defensive pressure, absent defensive backup, and absent defensive cover). Although goal scoring is a variable that could be easily measured to determine some degree of performance efficiency, the occurrence of goals is low in soccer compared to other invasion games like basketball, therefore other performance indicators need to be evaluated to identify patterns of behaviours related to successful performance.

In addition to goals, shots have been measured to assess a team's attacking performance. Shot performance indicators include the pitch location of the shot (Ensum, Pollard, & Taylor, 2005; Hughes, Robertson, & Nicholson, 1988; Pollard, Ensum, & Taylor, 2004), the distance of the shot from the goal (Ensum et al., 2005; Pollard et al., 2004), the outcome of the shot, such as shot on goal; shot to the post; shot out from goal; or goalkeeper's save (Collet, 2013; Corbellini, Volossovitch, Andrade, Fernandes, & Ferreira, 2013; Chervenjakov, 1988; Garganta et al., 1997; Hughes & Churchill, 2005; Lago-Ballesteros & Lago-Peñas, 2010; Lago-Peñas et al., 2011), the surface employed to contact the ball (Corbellini et al., 2013), or just shot frequency (Bate, 1988; Hughes & Franks, 2005a). It was found that shots taken closer to the goal and in central positions are more likely to produce a goal, and that the frequency of shots increase when a team use a direct style of play.

Passes and crosses are variables that have also received considerable attention in research. Passing constitutes an important tactical element because it is a way of moving the ball between players and into space. Therefore, researchers have used a large number of variables to measure and describe the qualitative aspects of passing. For example, length of passes (Ali, 1988; Hughes & Churchill, 2005; Tenga & Larsen, 2003), location of where the pass was made or received (Pollard et al., 1988; Szczepanski, 2008), and the player (i.e. goalkeeper, defender, midfielder, striker) who made the pass (Dunn, Ford, & Williams, 2003). Furthermore, multiple

contextual variables (e.g. venue, quality of the teams) can influence passing performance indicators and other variables (Adams et al., 2013; Lago-Peñas & Lago-Ballesteros, 2011; Lago-Peñas et al., 2011; Rampinini, Impellizzeri, Castagna, Coutts, & Wisloff, 2009; Redwood-Brown, Bussell, & Bharaj, 2012; Taylor, Mellalieu, James, & Barter, 2010; Tucker, Mellalieu, James, & Taylor, 2005). Moreover, crosses are passes directed towards the opposition's penalty box from a wide area. Therefore, crosses have been measured in several studies, mainly to examine the scoring effectiveness of teams using crosses to score a goal (Breen, Iga, Ford, & Williams, 2006; Ensum et al., 2005; Hughes & Churchill, 2005; Lago-Ballesteros & Lago-Peñas, 2010; Lago-Peñas et al., 2011).

Penalty area entries is an additional variable that is considered important in soccer due to its proximity to the goal. Ruiz-Ruiz et al. (2013) reported that losing World Cup teams conceded more entries into their penalty area compared to winning teams, and that winning teams made more entries into the penalty area in comparison to losing teams. Moreover, Ruiz-Ruiz et al. (2013) reported a moderate correlation between the increased chances of scoring a goal and penalty area entries. In the same way, Tenga and colleagues (Tenga, Kanstad, Ronglan, & Bahr, 2009; Tenga, Ronglan, et al., 2010) examined a team's performance in competition by measuring the effectiveness of score box possessions. A score box possession was defined as an entry into the score box (i.e. area including penalty area and an imaginary prolongation of it from 16m to 30 m estimated distance from opponent's goal line) with a high degree of ball control. In contrast, a low degree of ball control means a lack of time and space that makes it more difficult for attacking teams to achieve intended actions. Score box possessions can be used as a variable that represents goals scored when measuring the effectiveness of tactics in soccer. Tenga, Ronglan, et al. (2010) reported that score box possessions can be used as a representative measure for goals scored due to the association between goals scored, scoring opportunities, and score box possessions.

Ball possession is a variable that has been widely analysed in soccer research (Casamichana, Castellano, Calleja-Gonzalez, & San Roman, 2013). Previous research stated that having possession of the ball during competition is associated with successful performance (Bell-Walker, McRobert, Ford, & Williams, 2006; Breen et al., 2006; Carling et al., 2005; Duarte et al., 2013; Hughes & Franks, 2005a; Jones, James, & Mellalieu, 2004; Lago-Ballesteros & Lago-Peñas, 2010; Lago-

Peñas et al., 2011; Oberstone, 2009; Williams, 2003). Specifically, Bartlett, Button, Robins, Dutt-Mazumder, and Kennedy (2012) analysed the attacks of teams in the European Champions League and found that maintaining possession close to the opposition's goal was an indicator of a successful attack. Furthermore, studies have measured ball possession to determine the area of the pitch where the teams spent more time in possession (Ridgewell, 2011; Tenga & Sigmundstad, 2011). In contrast, having more ball possession compared to the opposing team is not necessarily related to the production of scoring chances and goals (Bate, 1988; Wright, Atkins, Polman, Jones, & Sargeson, 2011). Moreover, ball possession can be influenced by other contextual variables in competition such as match location, quality of opposition and match status (Lago-Penas, 2009; Lago-Penas & Martin-Acero, 2007; Lago-Peñas & Dellal, 2010; Taylor, Mellalieu, James, & Shearer, 2008). For example, Collet (2013) reported that possession was a poor predictor of performance once team quality and home advantage were accounted for.

Possession regain is another variable commonly used in soccer tactical analysis. Several studies have reported that specific ball regain areas would increase or decrease the chance of scoring (Garganta et al., 1997; Hughes & Churchill, 2005; Wright et al., 2011). For example, if a team regains possession of the ball closer to the opposition's goal, their chance of having a scoring opportunity increases. According to Hughes and Churchill (2005), 50% of goals scored come from possessions gained in the quarter of the pitch closest to the opposing goal, and 58% of goals scored come from possessions gained in the opposing half of the pitch. In addition, Tenga, Holme, et al. (2010b) analysed 1892 sequences of possession from the Norwegian league (2004 season) and reported an increased chance of scoring when the ball is regained closer to the opponent's goal and the opposition defending players are in an unbalanced position.

According to Sampaio and Macas (2012), position and distribution of the players on the pitch besides the relationship between each of the players as they move are important tactical factors to consider when measuring the performance of a team. Indeed, other novel variables employed include centroid positions and surface areas (Frencken, Lemmink, Delleman, & Visscher, 2011). The centroid position of a team or a group is the mean position of the players, whereas the surface area is the total space covered by the team. These variables show the coordination between the players of the whole team or subsidiary units (e.g. defensive line, midfield line and

attacking line). Therefore, centroid and surface area are variables that show the team dynamics for attacking and defending in soccer.

To sum up, there are a large number of performance indicators and variables in the current soccer literature that have been used to provide insights into tactical factors. Some of these variables can be measured in a simple way (e.g. number of shots, passing accuracy), and others are more complex and requires new technology to analyse them (e.g. direction of passes, surface area covered by players). As new variables and analysis techniques have become available, an increase in the tactical and behavioural analysis in soccer has occurred. Accordingly, playing styles research in soccer has not been widely explored and requires more attention. Measuring a set of different and new variables will allow, the identification and defining the styles of play in soccer. Furthermore, playing style effectiveness and associated variables could be evaluated.

2.3 Styles of Play in Soccer

Styles of play are important when measuring team tactical behaviours because they inform the strategies that teams employ to succeed in competition. Each team tends to utilise specific styles of play (Pollard et al., 1988), and this can be explained by the characteristics of the players and the coach's plan. The coaching philosophy of the coach will influence the team's styles of play during competition. Furthermore, styles of play can vary during the match if the coach needs to adjust the way of playing due to current contextual information such as score or player dismissals (Dobson & Goddard, 2010).

Performance indicators could be influenced by the attacking and defensive styles of play a team uses. Coaching philosophy and players establish a specific collective behaviour that will determine their dominant actions. For example, if a team's style involves them reaching the opposing goal as soon as possible, this could result in shorter sequences of possession. Therefore, it is vital to understand how these styles influence performance indicators so that a more sensitive measure of performance can be achieved. Moreover, research has stated that styles of play should be considered when measuring tactical variables in soccer (Bradley et al., 2011; Duarte et al., 2012; Fradua et al., 2013; James et al., 2002; Lago-Peñas et

al., 2011; Pollard & Reep, 1997; Pollard et al., 1988; Tenga, Holme, et al., 2010b; Tenga & Larsen, 2003; Tenga & Sigmundstad, 2011), however, most of these studies have only mentioned the styles of play without clearly defining them or identifying associated performance indicators and other variables. Previous research measured styles of play as individual tactical variables of performance or mentioned them without providing any analysis. Furthermore, there are a lack of clear definitions, poor consensus and even some misunderstanding about the concept of styles of play. For example, Tenga and Larsen (2003) describe direct style of play as attacks involving direct set plays, counter-attacks, attacks with at least one long pass, attacks with maximum of two passes, and attacks moving fast over and through midfield. In contrast, Hughes and Franks (2005a) considered low passing sequences as the key performance indicator for a direct style of play. They replicated the data presented by Reep and Benjamin (1968) that stated that short possessions were more effective for producing goals. However, they normalised this data with respect to the frequency of the respective length of possessions. This study found that longer possessions were more productive than short possession for producing shots, in contrast with the conclusions done by Reep and Benjamin (1968).

Current literature has described a number of attacking and defending styles of play. High pressure and low pressure have been defined as defending styles (Bangsbo & Peitersen, 2000; Pollard et al., 1988; Wright et al., 2011), depending on the areas where teams apply defensive pressure on the opponent in possession. Attacking styles of play have been defined as direct, possession or elaborate, counterattacking play, total soccer, and crossing. 'Direct' and 'possession' styles of play are the most commonly described attacking styles (Bate, 1988; Garganta et al., 1997; Hughes & Franks, 2005a; Olsen & Larsen, 1997; Redwood-Brown, 2008; Ruiz-Ruiz et al., 2013; Tenga, Holme, et al., 2010a, 2010b; Tenga & Larsen, 2003; Tenga, Ronglan, et al., 2010; Travassos et al., 2013). In addition, attacking styles such as 'counterattacking play', 'total soccer' (Bangsbo & Peitersen, 2000), and 'crossing' (Pollard et al., 1988) have been defined but with no or little information on the key performance indicators for each of these styles.

2.3.1 Direct Style

Direct style is the most commonly mentioned style of play in the literature. Bate (1988) analysed 16 matches from the English national teams and suggested that the direct style of play is characterised by forward passes, forward runs and a low number of consecutive passes. Hughes and Franks (2005a) analysis of the 1990 and 1994 World Cup finals suggested that the direct style of play included short passing sequences of four or less passes. Olsen and Larsen (1997) suggested that direct play involved direct passes over midfield and long passes when analysing the Norwegian national team between 1989 and 1997. Tenga and Larsen (2003) expanded their definition by including attacks that involved direct set plays, counter-attacks, attacks with at least one long pass, attacks with maximum of two passes, and attacks moving fast over and through midfield when analysing as single match between Norway and Brazil. Finally, Redwood-Brown (2008) analysed 120 matches from the 2004-2005 English Premier League and characterised direct play as possessions involving few passes. More recently, Tenga and colleagues (Tenga, Holme, et al., 2010a, 2010b; Tenga, Ronglan, et al., 2010) considered direct style of play to be part of a binary variable defined as a type of team possession that was similar to counterattacks. Their analysis of the Norwegian men's professional league (2004 season) defined direct style as a team possession that starts by winning the ball in open play and progresses by either utilising or attempting to utilise a degree of imbalance from start to the end, or creating or attempting to create a degree of imbalance from start to the end by using an early penetrative pass or dribble.

Previous researchers have defined the direct style of play often using different variables or have just mentioned direct play without attempting to discuss associated variables (Ruiz-Ruiz et al., 2013; Travassos et al., 2013). In contrast to previous work, Pollard et al. (1988) identified a combination of four variables that defined the direct style of play. Their factor analysis determined that a positive score on long forward passes and long goal clearances; and a negative score on possession in defence and multi-pass movements define the direct style of play used by a team.

Furthermore previous research suggested that the direct style of play was an effective method for creating scoring opportunities and scoring goals (Bate, 1988; Garganta et al., 1997). Hughes and Franks (2005a) stated that the conversion ratio of shots to goal was better for direct style play, however Tenga, Holme, et al. (2010b) suggested that direct play was only more effective against an imbalanced defence.

Nevertheless other studies state that direct style of play is not the most productive way of gaining scoring opportunities (Redwood-Brown, 2008).

In conclusion, a low number of passes in the attacking sequence and direct forward passes were the variables most commonly employed to describe the direct style of play.

2.3.2 Possession Style

Possession style of play has also been widely mentioned in previous research. The possession style of play was described as possession play that involves a high number of consecutive passes (Bate, 1988). In addition, Hughes and Franks (2005a) described this style of play as long passing sequences of five or more passes. Tenga and Larsen (2003) suggested that a possession style of play involved long or elaborate play, attacks with only short passes, attacks with five or more passes, and attacks moving slowly or elaborately through midfield were indirect playing strategies (i.e. possession style of play). Pollard et al. (1988) used factor analysis to cluster variables that described the possession style of play. A positive score on possession in defence and multi-pass movements; and a negative score on long forward passes and long goal clearances were associated with the possession style of play. Similarly to the direct style research, there is no consensus on the definition for possession style of play or associated variables.

Previous studies suggested that possession style of play was not as effective as the direct style of play (Bate, 1988). However, possession play can lead to scoring opportunities (Redwood-Brown, 2008). Moreover, possession style of play was more effective than the direct style of play for teams with skilled players (Hughes & Franks, 2005a).

In conclusion, the use of short passes and a high number of passes in an attacking sequence are variables generally used to define the possession style of play.

2.3.3 Other Styles

Counter attacking, total football and crossing are other attacking styles of play described in the literature (Bangsbo & Peitersen, 2000). Counter attacking involves the regain of the ball by a defending player close to their goal, followed immediately by a rapid attacking transition towards the opposition's goal. On the other hand, total

style of play is as an attacking style of play were attacking and midfield players change their positions on the pitch in order to unbalance the organised defence. Finally, the crossing style of play describes team that use long passes and crosses. Konstadinidou and Tsigilis (2005) analysis of the 1999 Women's World Cup finals determined that crossing is an offensive pattern employed by teams in match-play. In contrast, Pollard et al. (1988) defined the crossing style of play through a use of centres. This measure was the number of centres expressed as a percentage of the number of attacks reaching the opponent's half of the field.

In addition to attacking styles, defensive styles of play such as high pressure and low pressure have been described (Bangsbo & Peitersen, 2000; Pollard et al., 1988; Wright et al., 2011). These two defending styles of play are characterised by the specific location on the pitch where teams apply defensive pressure to the opponent in possession. For example, if defending players apply pressure in areas closer to the opponent's goal, they will be utilising the 'high pressure' style. In contrast, the 'low pressure' style of play involves the defending players applying pressure on the opponents once they enter the defending half of the pitch (Bangsbo & Peitersen, 2000; Pollard et al., 1988). Similarly, Tenga and Larsen (2003) described high and low pressure tactics. They considered that the high pressure is characterised by the striker putting pressure on the ball once the opponents' defensive players regain the ball. In contrast, low pressure involves the application of pressure on the ball once it reaches the half-way line. Similarly, Pollard et al. (1988) identified a high pressure style of play by measuring the number of occasions that a team regains possession of the ball within 35 metres of the opponents' goal line, expressed as a percentage of the number of times possession is lost in that area.

2.3.4 Factor analysis to determine styles of play

Factor analysis is a statistical method for identifying clusters of variables. This technique allows the reduction of data sets into factors through the grouping of variables measured. If there are correlations between certain variables, these variables are considered to be part of the same cluster and form a factor (Field, 2013). Styles of play represent the behaviour of the team when attacking and defending. Furthermore, several variables could describe that general behaviour. Therefore, factor analysis can be used to group several variables that could define a specific style of play. After all relevant factors are defined; each factor represents a continuum that determines two opposite styles of play. A positive or negative score on each factor will determine the direction of the style of play, whereas the

magnitude of the score determines their reliance on that style of play. For example, if there are multiple factors identified through factor analysis a team's positive or negative scores for each factor can be plotted to determine the combination and reliance on that style of play.

Pollard et al. (1988) made a quantitative comparison between the different styles of play employed by soccer teams. These authors employed factor analysis to cluster variables and determine the styles of play used by English league teams during season 1984-85, and national teams that played in the 1982 World Cup. The six variables; long forward passes (number of passes taking the ball fewer than 30m closer to the opponents goal line), long goal clearances (number of long clearance made by the goalkeeper), centres (number of crosses), regaining possession in attack (number of times that a team regains possession of the ball within 35m of the opponents' goal line), possession in defence (number of sequences of three or more passes that a team makes in his own half of the pitch), and multi-pass movements (number of passes per game in all sequences containing more than three passes) were measured to define the different styles of play. Factor analysis identified three factors that described six styles of play such as direct style, elaborate style, high use of centres style, low use of centres style, high degree regaining possession in attack style, and low degree regaining possession in attack style of play. These three factors accounted for 92.5% of the variance. Teams' styles of play were mainly dependent on the length and number of passes.

Therefore, a team was classified as having a 'direct' style of play if they had high scores for long forward passes and long goal clearances. In comparison, a team with high scores for possession in defence and multi-pass movements would be classified as having a 'possession' style of play. For example, France had a high score for possession in defence and multi-pass movements, and a low score on long forward passes and long goal clearances. This showed that France employed an elaborate style of play in attack (see figure 1). England had a high score on centres, therefore it determined that England utilised a high use of centres style of play in competition (see figure 1). However, the study only used six variables to define the styles of play. Direction of passes, shots and behaviour of the players without the ball could be important variables when trying to identify styles of play. Moreover, since the game involves interaction between attack and defence, defensive variables should be included. For instance, the zones where a defending

team applies pressure, the areas where the players situate themselves when they lose the possession and the type of marking that the teams use. Finally, the authors suggest that further studies examine additional variables when conducting factor analysis. Thus, before measuring the effectiveness of the styles of play, the different styles of play in soccer need to be defined and categorised.

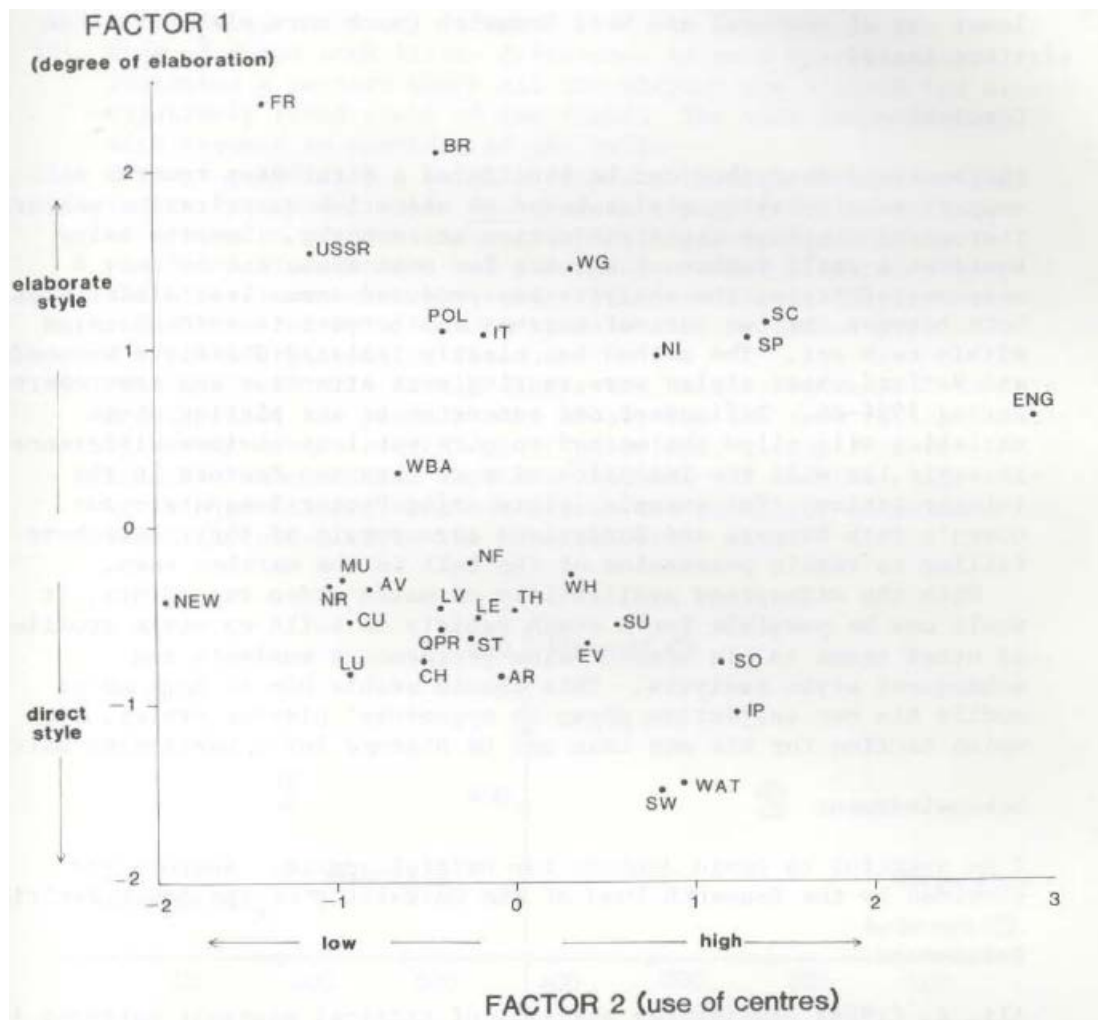


Figure 1. Representation of World Cup and English League teams according to two factors of playing styles (Pollard et al., 1988)

Chapter 3

Analysis of Styles of Play in Soccer

3.1 Introduction

Previous studies highlight the influence of styles of play when measuring variables related to physical (Buchheit & Laursen, 2013; Reilly, 2005), technical and tactical aspects in soccer (Bradley et al., 2011; Duarte et al., 2012; Fradua et al., 2013; James et al., 2002; Lago-Peñas et al., 2011; Pollard & Reep, 1997; Pollard et al., 1988; Tenga, Holme, et al., 2010b; Tenga & Larsen, 2003; Tenga & Sigmundstad, 2011). For instance, styles of play affect physical variables such as distance covered by the players or high intensity running activities. Moreover, styles of play also affect technical and tactical variables like the individual playing area, percentage of ball possession, distance of passes and passing distribution. Therefore, it is important to define different styles of play that soccer teams can adopt during a match when analysing performance data. This study defines styles of play in elite soccer, identifies variables associated with each style of play and compares styles of play used by each team in the analysis.

Current literature has identified a number of attacking and defending styles of play. High pressure and low pressure have been defined as defending styles (Bangsbo & Peitersen, 2000; Pollard et al., 1988; Wright et al., 2011). These two defending styles of play are characterised by the specific location on the pitch where teams apply defensive pressure on the opponent in possession. For example, if defending players apply pressure in areas closer to the opponent's goal, they will be utilising the 'high pressure' style. In contrast, the 'low pressure' style of play involves the defending players applying pressure on the opponents once they enter the defending half of the pitch (Bangsbo & Peitersen, 2000; Pollard et al., 1988).

Attacking styles of play have been defined as direct, possession or elaborate, counterattacking play, total soccer, and crossing. 'Direct' and 'possession' styles of play are the most commonly described attacking styles (Bate, 1988; Garganta et al., 1997; Hughes & Franks, 2005a; Olsen & Larsen, 1997; Redwood-Brown, 2008; Ruiz-Ruiz et al., 2013; Tenga, Holme, et al., 2010a, 2010b; Tenga & Larsen, 2003; Tenga, Ronglan, et al., 2010; Travassos et al., 2013). The 'direct' style is characterised by long forward passes, low number of passes, short passing sequences, and a low number of touches per ball involvement. In contrast, 'possession' style involves short passes, higher number of passes, long passing sequences, and a high number of touches per ball involvement. In addition,

attacking styles such as 'counterattacking play', 'total soccer' (Bangsbo & Peitersen, 2000), and 'crossing' (Pollard et al., 1988) have been defined but with no or little information on the key performance indicators and variables for each of these styles.

An exception is a quantitative comparison between the styles of play used by English league teams during season 1984-85, and national teams that played in the 1982 World Cup (Pollard et al., 1988). Six variables were measured and factor analysis was used to define the different styles of play for the teams observed. The study identified three factors; factor one distinguished between direct and possession (elaborate) styles. Factor two explained the use of crosses. Finally, factor three described the area of the pitch where the team normally regain the ball, making a distinction between a style that entails regaining the possession closer to the opponent's goal and a style that entails regaining the possession away from the opponent's goal. Each team's dependence on a style was categorised based on their factor score for the style of play. For instance, France's national team had a high positive score on factor 1, determining that this team employed a possession (elaborate) style. The variables associated with factor 1 were; long forward passes, long goal clearances, possession in defence, and multi-pass movements. Therefore, France scored high on possession in defence and on multi-pass movements; and had a low score on long forward passes and long goal clearances.

Performance indicators and variables associated with styles of play have been described in parts (Bate, 1988; Hughes & Franks, 2005a; Lago-Peñas & Dellal, 2010; Pollard et al., 1988; Tenga, Holme, et al., 2010b; Tenga & Larsen, 2003), however there is no consensus and/or missing information for some styles. For example, Tenga and Larsen (2003) describe direct play as attacks involving direct set plays, counter-attacks, attacks with at least one long pass, attacks with maximum of two passes, and attacks moving fast over and through midfield. In contrast, Hughes and Franks (2005a) consider low passing sequences as the key performance indicator for direct play. Furthermore, Pollard et al. (1988) identified clear differences between two sets of matches and individual teams within each set using factors analysis, however their analysis was limited due to the small sample of matches and the inclusion of only six variables. They suggested further studies should examine additional variables when analysing styles of play. Direction of passes and ball possession in different areas could be important variables when trying to identify styles of play. Moreover, since soccer involves an interaction

between attack and defence, defensive variables should be included (e.g., areas where defending teams apply pressure). Therefore, the aim of the study was to include a greater number of variables to define different styles of play in elite soccer and identify the associated variables. A secondary aim was to classify the teams observed based on the styles so that a playing style profile can be created.

3.2 Methods

3.2.1 Match Sample

Ninety-seven matches from the 1st Spanish League and English Premier League involving 37 different teams were monitored using a multiple-camera match analysis system (Amisco Pro®, version 1.0.2, Nice, France). From the total sample, 72 matches were from the season 2006-2007, 40 from the 1st Spanish League, involving 18 different teams; and 32 matches from the English Premier League, involving 15 different teams. Furthermore, 25 matches were from the season 2010-2011, all from the 1st Spanish League, involving 16 different teams. The present study follows the research ethics guidelines set out by the Liverpool John Moores University.

3.2.2 Procedure

Teams that participated in both seasons were considered as different teams due to the changes in the squad and technical staff of each team. These changes imply a change in the team's style of play. Moreover, teams with only one match available were excluded from the analysis as it was considered that one match is not enough of a sample to define a team's style of play. Accordingly, 37 different teams were included in the analysis. From the overall sample, there were four or more matches available for fifteen teams, three matches available for eight teams, and two matches available for fourteen teams.

The variables identified in previous soccer research relating to tactics and variables available in the Amisco system were considered to be included in the study. Consequently, an initial set of 96 (58 attacking and 38 defensive) potential variables were developed for the study. Nevertheless, the variables to analyse were reduced due to two reasons. First, some of these variables required a large amount of time to process as they are based in individual events during the match. Second, factor analysis required data to be normally distributed; therefore variables that were not normally distributed were excluded. Therefore, the variables considered most

important for the researcher and the supervisors to describe the styles of play were included in the study. These variables are associated with the spatial and temporal aspects of playing actions because of their importance in tactics. For attacking variables, time of ball possession in different zones of the pitch, direction of passes, passes from specific zones to other zones, crosses, and shots; were considered to be the variables that best explain the styles of play in attack from the initial set of variables. On the other hand, the zones of the pitch where the team regain the ball were the variables considered to describe best the styles of play in defence.

A total of 19 variables (14 attacking and 5 defensive) were included in the study based on research relating to tactics and variables available in the Amisco® system. The attacking and defensive variables, description and measurement methods are presented in tables I and II. For the following variables: possession of the ball in the defensive third, possession of the ball in the middle third, possession of the ball in the attacking third, passes from the defensive third to the middle third, passes from the defensive third to the attacking third, regains in the defensive third, regains in the middle third and regains in the attacking third; the pitch was divided into three spaces parallel to the goal lines to collect the data (see figure 2). In addition, the following variables: possession of the ball in the central areas, possession of the ball in the wide areas, regains in the central areas, and regains in the wide areas; the pitch was divided into three spaces parallel to the touchlines to collect the data (see figure 3).

For the analysis, a team mean score for each variable was calculated and recorded using Microsoft Excel (Microsoft Corporation, Redmond, WA, USA).

Table I. Description and measurement of attacking variables

Variable	Description	Measurement
1. Possession of the ball	Percentage of time that the team has possession of the ball in the match.	Possession of the ball for the team was collected separately for each half of the match as it is provided by the Amisco system. The average from the possession of the two halves for each team was calculated.
2. Possession of the ball in the defensive third of the pitch	Percentage of time that the team has the possession of the ball in the defensive third of the pitch.	
3. Possession of the ball in the middle third of the pitch	Percentage of time that the team has the possession of the ball in the middle third of the pitch from all the time that the team has the possession of the ball.	These variables were calculated by taking the overall time that the team had the possession of the ball and the time that the team had the possession of the ball in the area corresponding to the variable. Hence the percentage (normalised data) was calculated from these data provided by the Amisco system.
4. Possession of the ball in the attacking third of the pitch	Percentage of time that the team have the possession of the ball in the attacking third of the pitch (next to the opposite goal) from all the time that the team have the possession of the ball.	
5. Possession of the ball in the central areas of the pitch	Percentage of time that the team has the possession of the ball in the central areas of the pitch from all the time that the team has the possession of the ball.	
6. Possession of the ball in the wide areas of the pitch	Percentage of time that the team has the possession of the ball in the wide areas of the pitch from all the time that the team has the possession of the ball.	
7. Direction of the passes	A rate that summarise the direction of the passes made by the team. As this number increases, the team tends to use more passes in the direction of the opposite goal.	A score of one was given to the backwards passes, a score of two was given to the sideways passes, and a score of three was given to the forwards passes. The mean of the scores of all the passes made by the team were calculated.
8. Forwards passes	Percentage of passes from the overall number of passes made by the team that are made forwards (towards the opposite goal).	The Amisco system provided the direction of the movements of the ball by looking at the point where the pass started and the point where the pass was received. Consequently, depending of the trajectory of the ball the pass was categorised following the diagram showed in
9. Sideways passes	Percentage of passes from the overall number of passes made by the team that are made sideways.	

10. Backwards passes	Percentage of passes from the overall number of passes made by the team that are made backwards (towards the own goal).	figure 4. Data was normalised by calculating the percentage of these passes according to the total number of passes made by the team.
11. Passes from defensive third to middle third	Percentage of passes from the overall number of passes made by the team that are made from the defensive third (next to the own goal) to the middle third of the pitch.	These variables were measured by calculating the percentage of these kinds of passes from the overall amount of passes made by the team in the match.
12. Passes from defensive third to attacking third	Percentage of passes from the overall number of passes made by the team that are made directly from the defensive third (next to the own goal) to the attacking third of the pitch (next to the opposite goal).	
13. Crosses	Percentage of attacking sequences that finish with a cross in the opposing half from all the attacking sequences made by the team.	Data provided by the Amisco System was collected and normalised by calculating the percentage from all of these events made by a team during the whole match.
14. Shots	Percentage of attacking sequences that finish with a shot from all the attacking sequences made by the team.	

Table II. Description and measurement of defensive variables

Variable	Description	Measurement
1. Regains in the defensive third	Percentage of the number of times that the team regains the ball in the defensive third (next to own goal) from all the regains made by the team.	These variables were calculated by taking the total number of times that the team regained the possession of the ball and the number of times that the team regained the possession of the ball in the area corresponding to the variable. Hence the percentage (normalised data) was calculated from these data provided by the Amisco system.
2. Regains in the middle third	Percentage of the number of times that the team regains the ball in the middle third from all the regains made by the team.	
3. Regains in the attacking third	Percentage of the number of times that the team regains the ball in the attacking third (next to opposite goal) from all the regains made by the team.	
4. Regains in the central areas of the pitch	Percentage of the number of times that the team regains the ball in the middle areas of the pitch from all the regains made by the team.	
5. Regains in the wide areas of the pitch	Percentage of the number of times that the team regains the ball in the wide areas of the pitch from all the regains made by the team.	

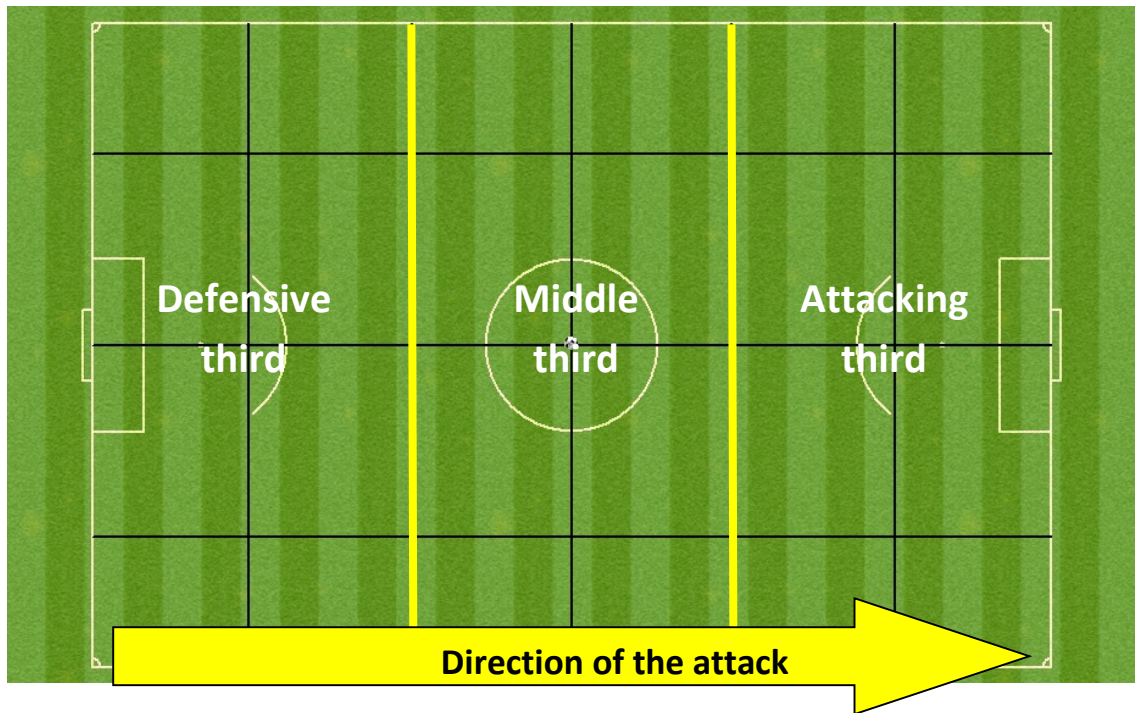


Figure 2. Pitch divisions in three thirds parallel to the goal lines

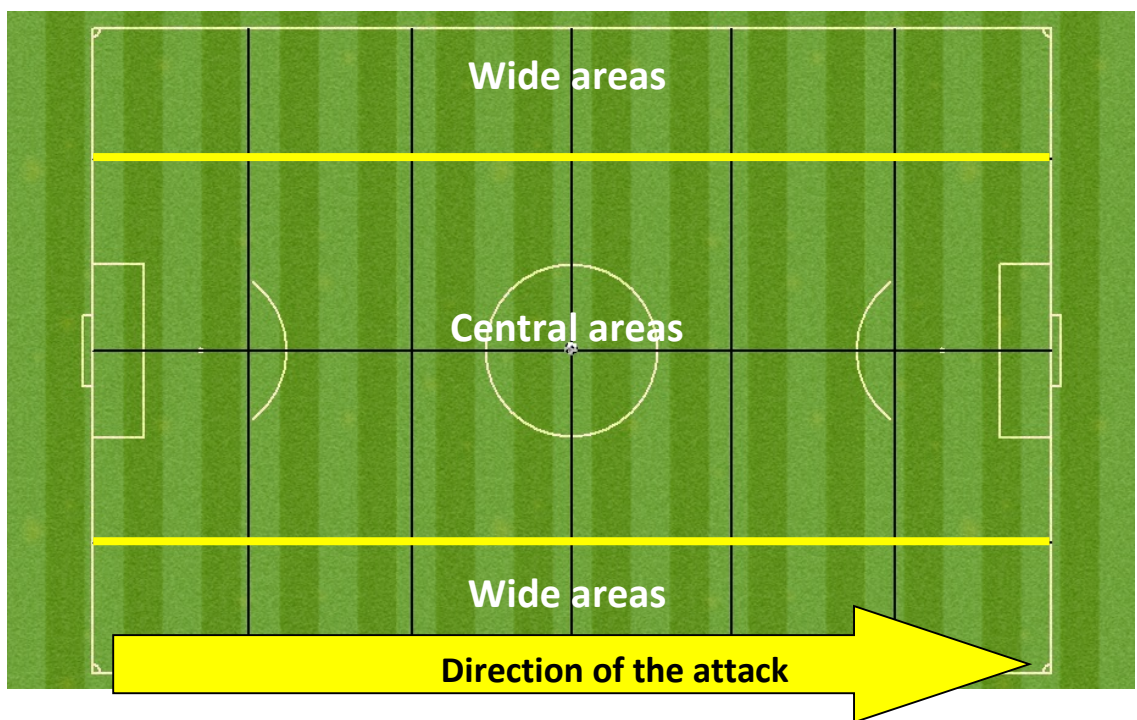


Figure 3. Pitch divisions in three thirds parallel to the touchline

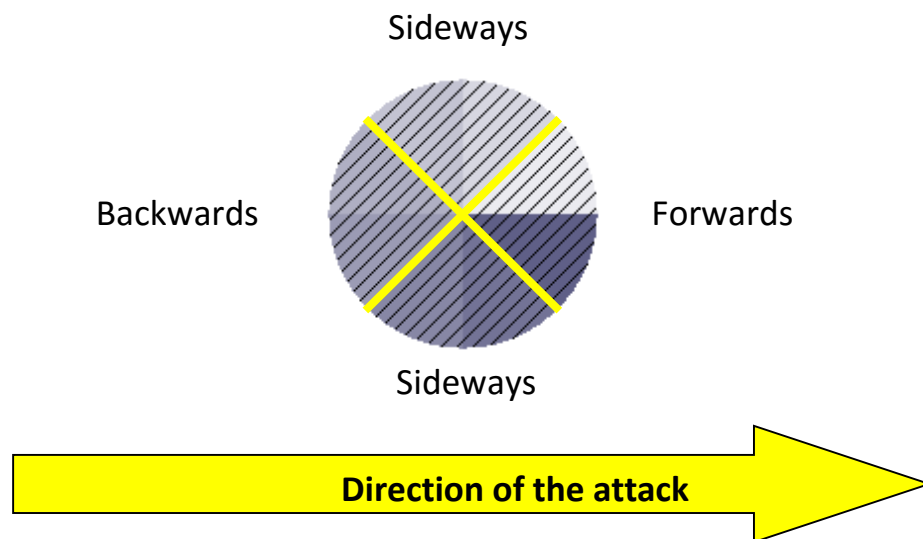


Figure 4. Direction of passes

3.2.3 Statistical Analysis

Exploratory factor analysis using principal component analysis (PCA) was conducted on 19 variables with orthogonal rotation (varimax). For each factor, the variables with the highest factor loading (i.e., the correlation between the variable and the factor) were identified. This technique groups variables into fewer factors that represent different styles of play. In addition, a team's specific style of play can be categorised according to their score for each factor. Statistical analysis was carried out using IBM SPSS Statistics v.20.0 for Windows (SPSS, Chicago, IL USA).

3.3 Results

3.3.1 Descriptive Statistics

The mean and standard deviation of the variables measured are presented in table III. The possession statistics, depending on the area of the pitch, show that the average possession of a team in the defensive, middle, and attacking third were $63.42 \pm 6.42\%$, $32.63 \pm 5.30\%$ and $3.93 \pm 2.04\%$ respectively. Possession in the central areas is higher ($58.36 \pm 5.16\%$) than close to the touchline ($41.63 \pm 5.16\%$). Sideways passes were the most frequent ($49.05 \pm 5.08\%$), forward passes had a frequency of $36.32 \pm 5.03\%$ and backwards passes had the lowest frequency of $14.66 \pm 1.27\%$. Passes from defensive to attacking third ($.74 \pm .44\%$) represented a low percentage of the total number of passes completed by the teams. In addition,

the percentage of passes from the defensive third to the middle third ($8.88 \pm 1.26\%$) was low. The number of attacking sequences that finished using a cross represented $11.42 \pm 4.26\%$ of the total number of attacking sequences, and in the same way the number of attacking sequences that ended in a shot represented $7.30 \pm 2.58\%$.

For defending variables, the percentage of regains in the defensive, middle, and attacking third were $50.67 \pm 4.57\%$, $43.17 \pm 4.03\%$ and $6.14 \pm 2.07\%$ respectively. Percentage of regains in the central areas represented $66.93 \pm 4.45\%$, and the percentage of regains close to the touchline represented $32.96 \pm 4.43\%$ of the overall regains made by the teams.

Table III. Mean and standard deviation for each variable

	Mean	Std. Deviation
possession %	48.61	6.80
possession % defensive third	63.42	6.42
possession % middle third	32.63	5.30
possession % attacking third	3.93	2.04
possession % central areas	58.36	5.16
possession % wide areas	41.63	5.16
average direction of passes	2.21	.05
number of forward passes %	36.32	5.03
number of sideways passes %	49.05	5.08
number of backwards passes %	14.66	1.27
passes from defensive to middle third %	8.88	1.26
passes from defensive to attacking third %	.74	.44
number of crosses % attacking sequences finish opposing half	11.42	4.26
number of shots % attacking sequences	7.30	2.58
number regains defensive third %	50.67	4.57
number regains middle third %	43.17	4.03
number regains attacking third %	6.14	2.07
number regains central areas %	66.93	4.45
number regains wide areas %	32.96	4.43

3.3.2 Factor Analysis

Factor analysis using principal component analysis (PCA) was conducted on 19 variables. Orthogonal (varimax) and oblique rotations were performed and the component correlation matrix of the oblique rotation showed a negligible correlation between factors (see table IV), therefore orthogonal rotation was used (Pedhazur & Schmelkin, 1991). Kaiser-Meyer-Olkin measure verified the sampling adequacy for

the analysis (KMO = .53). Bartlett's test of sphericity ($\chi^2(171) = 2254.53, p < .001$), indicated that correlation between items were sufficiently large for PCA. Moreover, the communalities after extraction were greater than 0.7 in 18 of 19 variables indicating that the sample size is adequate for factor analysis (see table V). Six components had eigenvalues over Kaiser's criterion of 1 (Kaiser, 1960) and in combination explained 87.54% of the total variance (see table VI). The percentage of variance explained by each factor, decreases in descending order from factor 1 to 6. The scree plot was slightly ambiguous and showed inflexion points that would justify retaining four or six factors (see figure 5). Therefore, six factors were extracted following the Kaiser's criterion as the number of variables were less than thirty and communalities after extraction were greater than 0.7 (see table V). The rotated component matrix for the factor loadings identifies the variables associated with each factor (see table VII). Variables with factor loadings greater than 0.7 showed a strong positive or negative correlation that explained most of the variance for that factor. For example, the variables forwards passes and direction of passes correlate positively, and sideways passes and possession of the ball correlates negatively for factor 1.

Table IV. Component correlation matrix for the oblique rotation

Component	1	2	3	4	5	6
1	1	-.290	.219	.126	.203	-.221
2	-.290	1	-.140	-.034	-.230	-.094
3	.219	-.140	1	-.015	.162	-.102
4	.126	-.034	-.015	1	.066	.111
5	.203	-.230	.162	.066	1	.064
6	-.221	-.094	-.102	.111	.064	1

Table V. Communalities of the variables

	Initial	Extraction
possession %	1.000	.892
possession % defensive third	1.000	.950
possession % middle third	1.000	.933
possession % attacking third	1.000	.828
possession % central areas	1.000	.885
possession % wide areas	1.000	.885
average direction of passes	1.000	.936
number of forward passes %	1.000	.949
number of sideways passes %	1.000	.949
number of backwards passes %	1.000	.911
passes from defensive to middle third %	1.000	.745
passes from defensive to attacking third %	1.000	.755
number of crosses % attacking sequences finish opposing half	1.000	.744
number of shots % attacking sequences	1.000	.819
number regains defensive third %	1.000	.955
number regains middle third %	1.000	.877
number regains attacking third %	1.000	.697
number regains central areas %	1.000	.958
number regains wide areas %	1.000	.965

Table VI. Eigenvalues for components and total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.043	37.069	37.069	7.043	37.069	37.069	5.281	27.795	27.795
2	3.243	17.069	54.138	3.243	17.069	54.138	2.796	14.718	42.513
3	2.402	12.640	66.778	2.402	12.640	66.778	2.777	14.617	57.130
4	1.749	9.208	75.986	1.749	9.208	75.986	2.631	13.849	70.979
5	1.159	6.098	82.083	1.159	6.098	82.083	1.879	9.890	80.869
6	1.036	5.453	87.536	1.036	5.453	87.536	1.267	6.667	87.536
7	.687	3.617	91.153						
8	.512	2.695	93.849						
9	.410	2.156	96.004						
10	.312	1.644	97.648						
11	.242	1.276	98.924						
12	.125	.658	99.582						
13	.068	.355	99.938						
14	.011	.060	99.998						
15	.000	.002	100.000						
16	.000	.000	100.000						
17	.000	.000	100.000						
18	.000	.000	100.000						
19	.000	.000	100.000						

Table VII. Rotated Component Matrix for the variables

	Component					
	1	2	3	4	5	6
number of sideways passes %	-.947	.084	.027	.022	-.164	.126
number of forward passes %	.945	-.092	-.065	.036	.179	.102
average direction of passes	.882	-.115	-.094	.102	.174	.309
possession %	-.858	.185	.207	-.154	-.192	.136
passes from defensive to attacking third %	.696	-.396	-.034	.174	-.128	.257
number of shots % attacking sequences	-.640	.170	.461	-.250	.238	.221
number regains wide areas %	-.253	.937	-.052	.093	-.103	-.016
number regains central areas %	.325	-.905	.041	-.120	.126	.018
number regains middle third %	.131	.602	-.116	-.599	-.319	.158
possession % middle third	.072	.156	-.930	.123	.152	-.004
possession % defensive third	-.075	-.168	.869	-.352	-.175	-.078
number of crosses % attacking sequences finish opposing half	-.179	.133	.806	.095	-.003	-.190
possession % attacking third	.049	.121	-.319	.787	.155	.255
possession % central areas	-.588	-.030	.107	-.701	.155	-.109
possession % wide areas	.588	.030	-.108	.701	-.154	.109
number regains attacking third %	-.132	.160	.148	.201	-.759	-.123
passes from defensive to middle third %	.365	-.110	-.208	.322	.672	.027
number regains defensive third %	-.056	-.603	.036	.436	.625	-.083
number of backwards passes %	-.070	-.015	.168	-.191	-.091	-.913

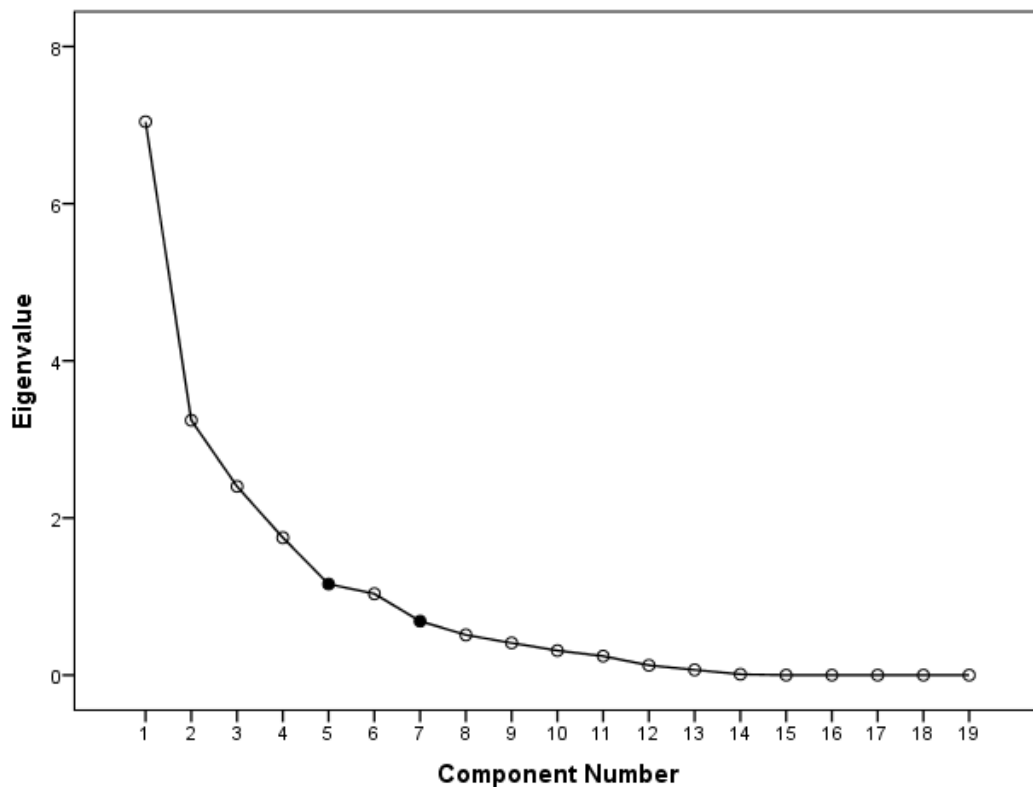


Figure 5. Scree plot for factor extraction

Factor 1 (possession directness) defines how direct a team's possession is. A team with a high score in this factor tends to use a direct style. In contrast, a team with a low score adopts a more elaborate (possession) style. Second, factor 2 (width of ball regain) defines teams that regain the ball close to the touchline or in the central areas of the pitch. A team with a high score regain more balls close to the touchline, whereas a team with a low score regain more balls in the central areas. Factor 3 (use of crosses) defines a team's use of crosses and how much possession of the ball they have in the defensive third. These variables correlate highly, consequently a team that scores high on this factor have a higher percentage of possession in the defensive third and use crosses to finish the attack. Factor 4 (possession width) defines teams that tend to play in wider areas of the pitch if they score high on this factor. In contrast, teams that score low tend to use central areas of the pitch to develop the attack. Factor 5 (defensive ball pressure) defines teams that use a high or low pressure style of play. A high score defines a low-pressure style, whereas a low score defines a high-pressure style. Finally, a high score on factor 6 (progression of the attack) defines teams that progress forward to the opponent's goal, whereas low scoring teams use support players behind the position of the ball to restart the attacking sequence.

These factors can be plotted in different combinations to visually represent team styles, where the location of an individual team on the axes describes how much they adopt that playing style. For example, the team scores for factor 1 are plotted against the scores for the other attacking factors (see figures 6, 7, and 8). Factor 1 was used to plot against the other factors because it explained the highest amount of variance (27.8%). Factor 1, 3 and 4, associated with the attacking styles of play that explained most of the variance, were also plotted in a 3D graph to represent the attacking styles of play employed by the teams analysed from the season 2006-2007 (see figure 10). In addition, team scores for the defensive factors 2 and 5 are plotted in figure 9. Table VIII indicates the number assigned to the teams plotted on figures 6, 7, 8, and 9. Table IX shows the twelve styles of play founded by factor analysis. Tables X and XI show the actual factor scores for each team. In addition, tables XII and XIII represent how depending the teams are on a specific style of play according to the amount of dots that teams have.

Table VIII. Numbers assigned to the teams for figure interpretation

Teams season 2006-2007	Teams season 2010-2011
1. Atletico de Madrid	27. Atletico de Madrid
2. Barcelona	28. Barcelona
3. Betis	29. Bilbao
4. Bilbao	30. Getafe
5. Celta	31. Levante
6. Deportivo	32. Osasuna
7. Espanyol	33. Real Madrid
8. Mallorca	34. Real Sociedad
9. Osasuna	35. Valencia
10. Real Madrid	36. Villareal
11. Real Sociedad	37. Zaragoza
12. Sevilla	
13. Valencia	
14. Zaragoza	
15. Arsenal	
16. Aston Villa	
17. Bolton	
18. Chelsea	
19. Everton	
20. Liverpool	
21. Manchester City	
22. Manchester United	
23. Portsmouth	
24. Tottenham	
25. West Ham	
26. Wigan	

Table IX. Twelve styles of play (8 attacking and 4 defensive) identified by factor analysis

Attacking styles of play	Defensive styles of play
1. Direct (D)	1. Applying pressure and regaining the ball on the wide areas (PW)
2. Possession (P)	2. Applying pressure and regaining the ball on the central areas (PC)
3. Crossing (C)	3. Low pressure (LP)
4. No crossing (NC)	4. High pressure (HP)
5. Wide possession (WP)	
6. Narrow possession (NP)	
7. Fast progression of the possession (FP)	
8. Slow progression of the possession (SP)	

Table X. Factor scores for each team from season 2006-2007

Teams	Scores					
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
1. Atletico de Madrid	-.51104	-.24725	.27390	-.18802	-.05402	.64409
2. Barcelona	-1.64711	-.25919	-1.11409	-1.21434	-.68448	.22039
3. Betis	.96398	.84673	-.58118	3.42384	.04765	1.63110
4. Bilbao	.66436	.86860	-1.05280	-1.07735	-1.31222	-1.03544
5. Celta	-.44900	-1.79584	-.74046	.39255	.88219	.26647
6. Deportivo	.06541	.09492	-.94328	.03401	-.04187	-.10941
7. Espanyol	.28470	-1.56678	-2.15082	-.82413	-1.00224	-1.15329
8. Mallorca	.35700	1.54720	-1.50639	.15702	-.28239	.66218
9. Osasuna	-.05946	.23670	.18339	.09785	-3.14173	-.17852
10. Real Madrid	-.83698	-.18638	-.71240	-.14586	.25400	1.28467
11. Real Sociedad	-.00382	1.09144	.20870	-.17658	-1.21728	-.80148
12. Sevilla	.36083	.76784	-.15563	-.07517	.23724	-.59989
13. Valencia	-.08717	.78125	-.63291	.74429	-1.04354	.96668
14. Zaragoza	-.68834	.39458	-2.16303	.26154	1.09026	.25746
15. Arsenal	-1.00883	-.45202	.43696	-.16128	.89051	.57675
16. Aston Villa	.53885	-2.03291	.63594	-.32614	1.42172	-.84368
17. Bolton	1.54051	-1.58386	.17519	-.43858	-1.02413	.82733
18. Chelsea	-.61102	.42743	1.21049	-.66116	.95002	.65470
19. Everton	1.69707	-1.15591	-.29164	-.61150	1.38114	.93942
20. Liverpool	-.21760	.47903	2.23731	-.47355	.07537	.12787
21. Manchester City	1.25342	.36742	1.00890	-.38664	1.11097	.77026
22. Manchester United	-.64723	.10866	.74123	-.77315	.78312	-.48378
23. Portsmouth	.44347	-.61344	-.93006	-.89991	.57956	.24844
24. Tottenham	-.32705	-.45208	-.53832	.30554	.15705	-2.58422
25. West Ham	-.60347	-1.70607	1.05119	.54345	-.20560	-.28968
26. Wigan	1.31330	-1.54508	.50154	1.42077	-.92469	1.27854

Table XI. Factor scores for each team from season 2010-2011

Teams	Scores					
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
27. Atletico de Madrid	.10630	-.15177	-.28030	.06816	-.05318	-.17410
28. Barcelona	-3.31952	-1.22968	.51736	1.24976	-1.05092	-.06799
29. Bilbao	.84318	-.07709	1.17029	-.68465	-.37891	-.63659
30. Getafe	-.21029	1.56209	-.58700	.56004	1.39182	-.05227
31. Levante	.87269	.39504	-.05473	2.31507	1.53395	-2.80306
32. Osasuna	1.43422	.38931	1.00846	-.64935	-.91547	-.65925
33. Real Madrid	-.92773	.68214	.98742	-1.11577	.51837	1.27644
34. Real Sociedad	.87357	.62921	1.18121	.68047	-1.09513	.50948
35. Valencia	-.57985	1.20193	1.36134	.09318	.07341	-1.67278
36. Villarreal	-1.33630	.89016	.29548	.64875	.49300	.50536
37. Zaragoza	.45894	1.29366	-.75125	-2.11316	.55645	.49779

Table XII. Team styles of play from season 2006-2007 (styles of play correspond to showed in table IX)

Teams	Attacking styles of play								Defensive styles of play			
	D	P	C	NC	WP	NP	FP	SP	PW	PC	LP	HP
1. Atletico de Madrid		•	•			•	•			•		•
2. Barcelona		••		••		••	•			•		•
3. Betis	•			•	••••		••		•		•	
4. Bilbao	•			••		••		••	•			••
5. Celta		•		•	•		•			••	•	
6. Deportivo	•			•	•			•	•			•
7. Espanyol	•			•••		•		••		••		••
8. Mallorca	•			••	•		•		••			•
9. Osasuna		•			•			•	•			••••
10. Real Madrid		•		•		•	••			•	•	
11. Real Sociedad		•	•			•		•	••			••
12. Sevilla	•			•		•		•	•		•	
13. Valencia		•		•	•		•		•			••

14. Zaragoza	•	••••	•	•	•	•	••
15. Arsenal	••	•	•	•	•	•	•
16. Aston Villa	•	•	•	•	•	••••	••
17. Bolton	••	•	•	•	•	••	••
18. Chelsea	•	••	•	•	•	•	•
19. Everton	••	•	•	•	•	••	••
20. Liverpool	•	••••	•	•	•	•	•
21. Manchester City	••	••	•	•	•	•	••
22. Manchester United	•	•	•	•	•	•	•
23. Portsmouth	•	•	•	•	•	•	•
24. Tottenham	•	•	•	••••	•	•	•
25. West Ham	•	••	•	•	•	••	•
26. Wigan	••	•	••	••	••	••	•

Note: The number of dots indicates the degree of utilisation of the style of play by the team, more dots indicate a higher utilisation.

• Score between 0 and ±1. •• Score between ±1 and ±2. ••• Score between ±2 and ±3. •••• Score between ±3 and ±4.

Table XIII. Team styles of play from season 2010-2011 (styles of play correspond to showed in table IX)

Teams	Attacking styles of play								Defensive styles of play			
	D	P	C	NC	WP	NP	FP	SP	PW	PC	LP	HP
27. Atletico de Madrid	•			•	•			•		•		•
28. Barcelona		••••	•		••			•		••		••
29. Bilbao	•		••			•		•		•		•
30. Getafe		•		•	•			•	••		••	
31. Levante	•			•	•••			•••	•		••	
32. Osasuna	••		••			•		•	•			•
33. Real Madrid		•	•			••	••		•		•	
34. Real Sociedad	•		••		•		•		•			••
35. Valencia		•	••		•			••	••		•	
36. Villarreal		••	•		•		•		•		•	
37. Zaragoza	•			•		•••	•		••		•	

Note: The number of dots indicates the degree of utilisation of the style of play by the team, more dots indicate a higher utilisation.

• Score between 0 and ± 1 . •• Score between ± 1 and ± 2 . ••• Score between ± 2 and ± 3 . •••• Score between ± 3 and ± 4 .

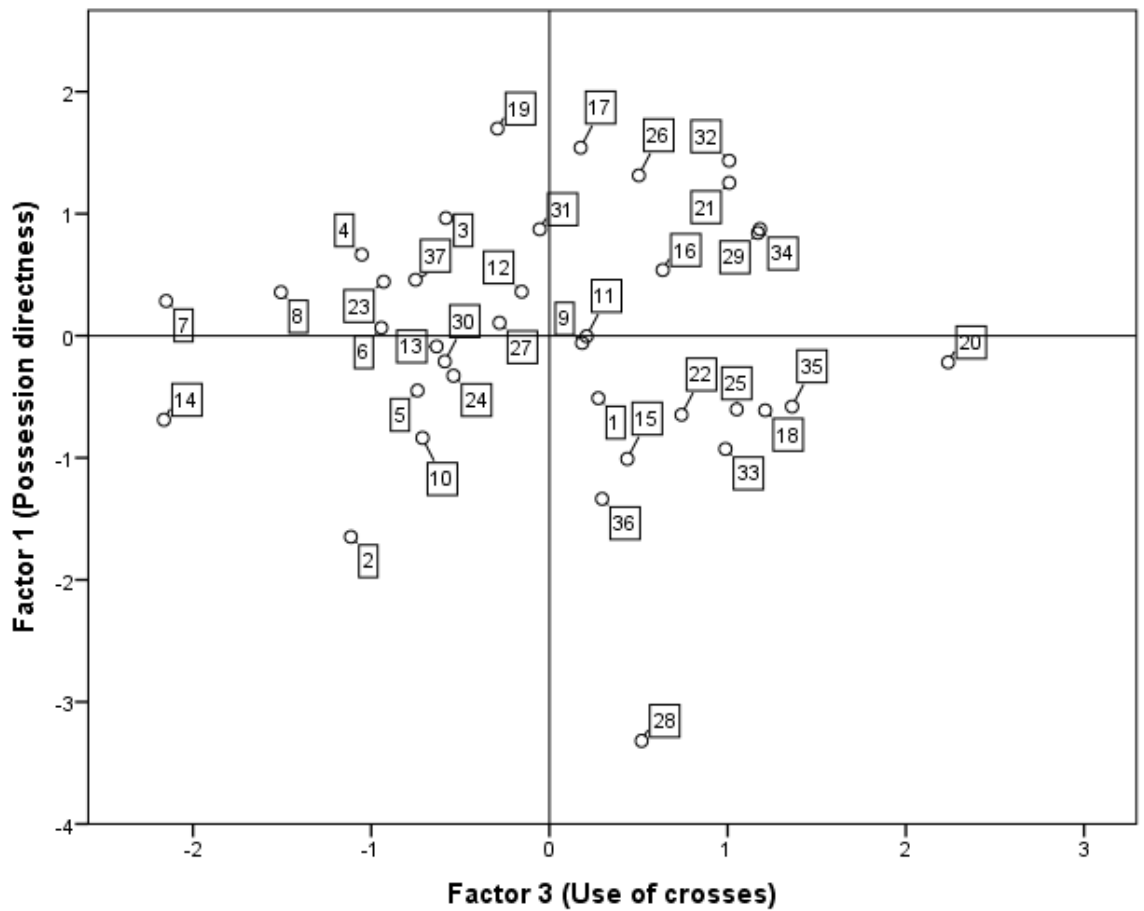


Figure 6. Styles of play of soccer teams according factor 1 and factor 3

Note: Numbers assigned to the teams for figure interpretation were: Atletico de Madrid (1), Barcelona (2), Betis (3), Bilbao (4), Celta (5), Deportivo (6), Espanyol (7), Mallorca (8), Osasuna (9), Real Madrid (10), Real Sociedad (11), Sevilla (12), Valencia (13), Zaragoza (14), Arsenal (15), Aston Villa (16), Bolton (17), Chelsea (18), Everton (19), Liverpool (20), Manchester City (21), Manchester United (22), Portsmouth (23), Tottenham (24), West Ham (25), Wigan (26) for season 2006-2007; and Atletico de Madrid (27), Barcelona (28), Bilbao (29), Getafe (30), Levante (31), Osasuna (32), Real Madrid (33), Real Sociedad (34), Valencia (35), Villareal (36), Zaragoza (37) for season 2010-2011.

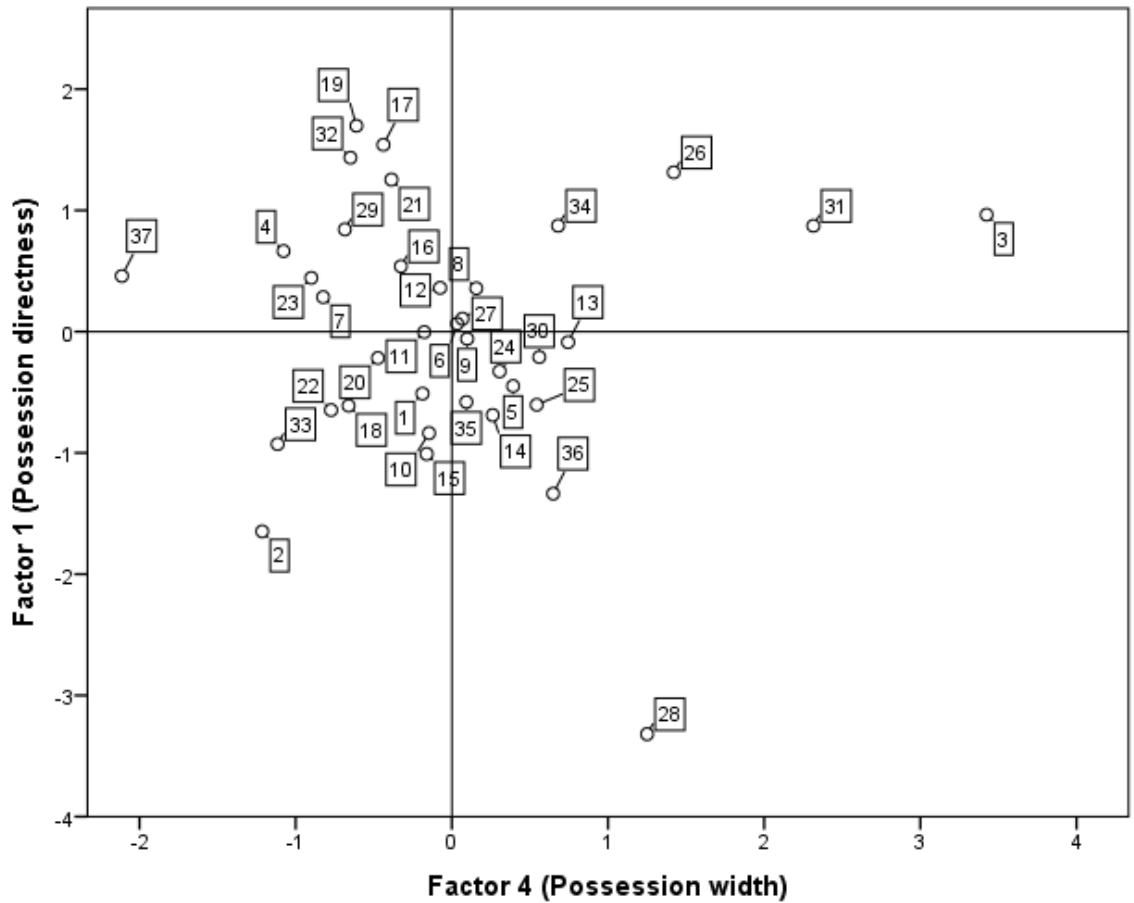


Figure 7. Styles of play of soccer teams according factor 1 and factor 4

Note: Numbers assigned to the teams for figure interpretation were: Atletico de Madrid (1), Barcelona (2), Betis (3), Bilbao (4), Celta (5), Deportivo (6), Espanyol (7), Mallorca (8), Osasuna (9), Real Madrid (10), Real Sociedad (11), Sevilla (12), Valencia (13), Zaragoza (14), Arsenal (15), Aston Villa (16), Bolton (17), Chelsea (18), Everton (19), Liverpool (20), Manchester City (21), Manchester United (22), Portsmouth (23), Tottenham (24), West Ham (25), Wigan (26) for season 2006-2007; and Atletico de Madrid (27), Barcelona (28), Bilbao (29), Getafe (30), Levante (31), Osasuna (32), Real Madrid (33), Real Sociedad (34), Valencia (35), Villarreal (36), Zaragoza (37) for season 2010-2011.

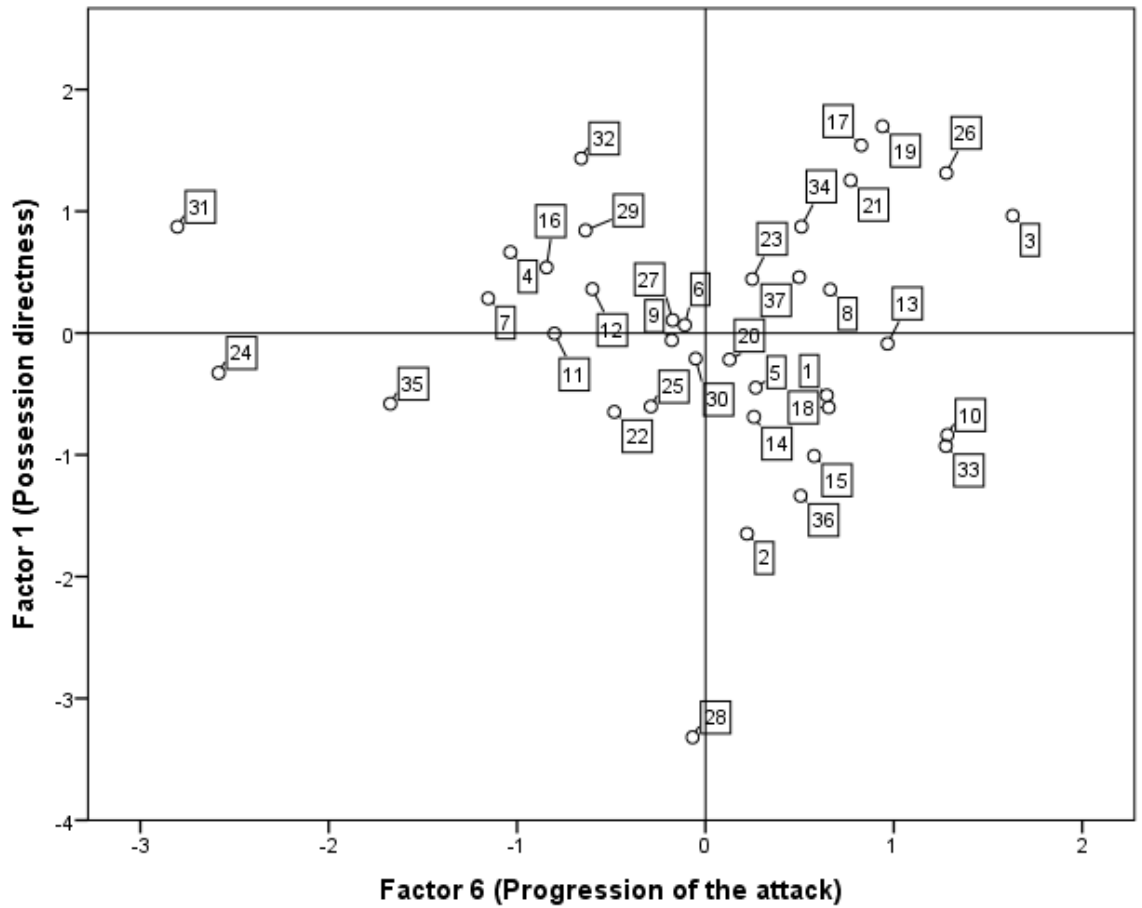


Figure 8. Styles of play of soccer teams according factor 1 and factor 6

Note: Numbers assigned to the teams for figure interpretation were: Atletico de Madrid (1), Barcelona (2), Betis (3), Bilbao (4), Celta (5), Deportivo (6), Espanyol (7), Mallorca (8), Osasuna (9), Real Madrid (10), Real Sociedad (11), Sevilla (12), Valencia (13), Zaragoza (14), Arsenal (15), Aston Villa (16), Bolton (17), Chelsea (18), Everton (19), Liverpool (20), Manchester City (21), Manchester United (22), Portsmouth (23), Tottenham (24), West Ham (25), Wigan (26) for season 2006-2007; and Atletico de Madrid (27), Barcelona (28), Bilbao (29), Getafe (30), Levante (31), Osasuna (32), Real Madrid (33), Real Sociedad (34), Valencia (35), Villarreal (36), Zaragoza (37) for season 2010-2011.

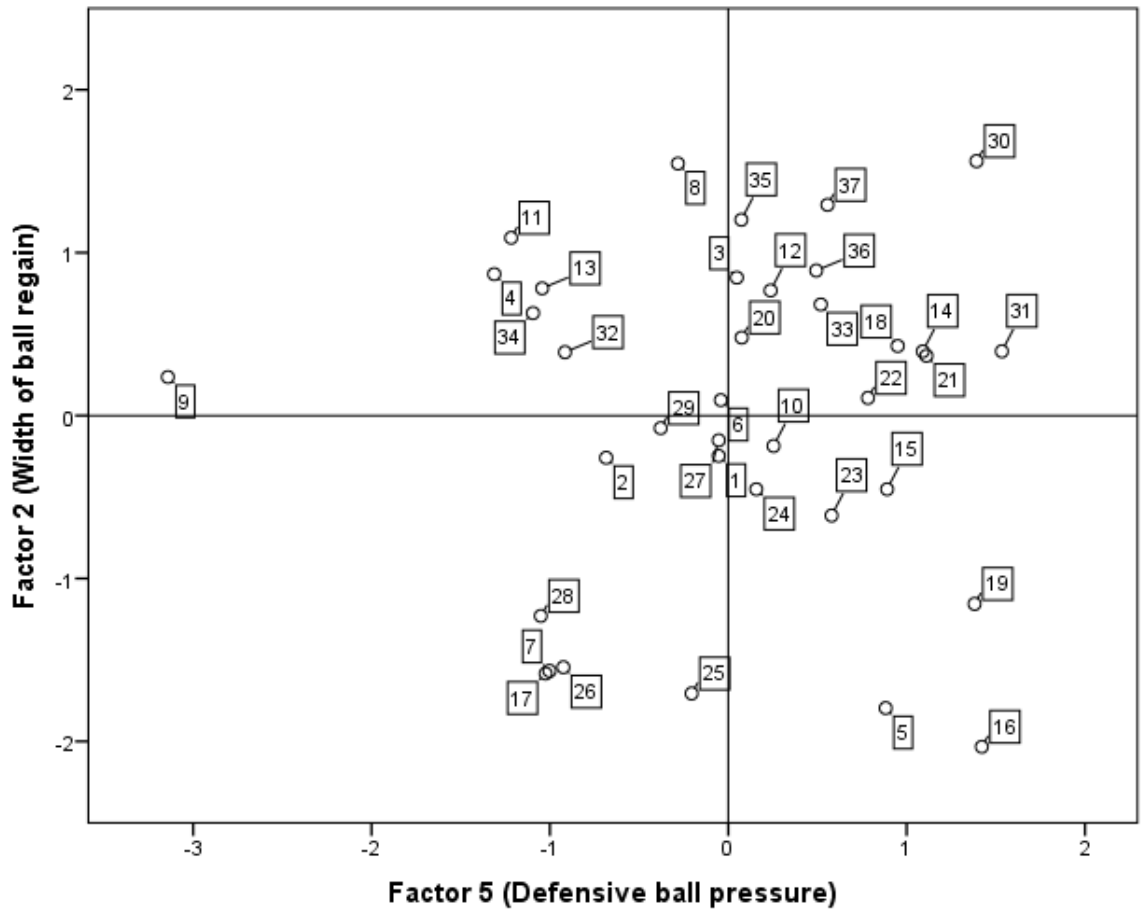


Figure 9. Styles of play of soccer teams according factor 2 and factor 5

Note: Numbers assigned to the teams for figure interpretation were: Atletico de Madrid (1), Barcelona (2), Betis (3), Bilbao (4), Celta (5), Deportivo (6), Espanyol (7), Mallorca (8), Osasuna (9), Real Madrid (10), Real Sociedad (11), Sevilla (12), Valencia (13), Zaragoza (14), Arsenal (15), Aston Villa (16), Bolton (17), Chelsea (18), Everton (19), Liverpool (20), Manchester City (21), Manchester United (22), Portsmouth (23), Tottenham (24), West Ham (25), Wigan (26) for season 2006-2007; and Atletico de Madrid (27), Barcelona (28), Bilbao (29), Getafe (30), Levante (31), Osasuna (32), Real Madrid (33), Real Sociedad (34), Valencia (35), Villarreal (36), Zaragoza (37) for season 2010-2011.

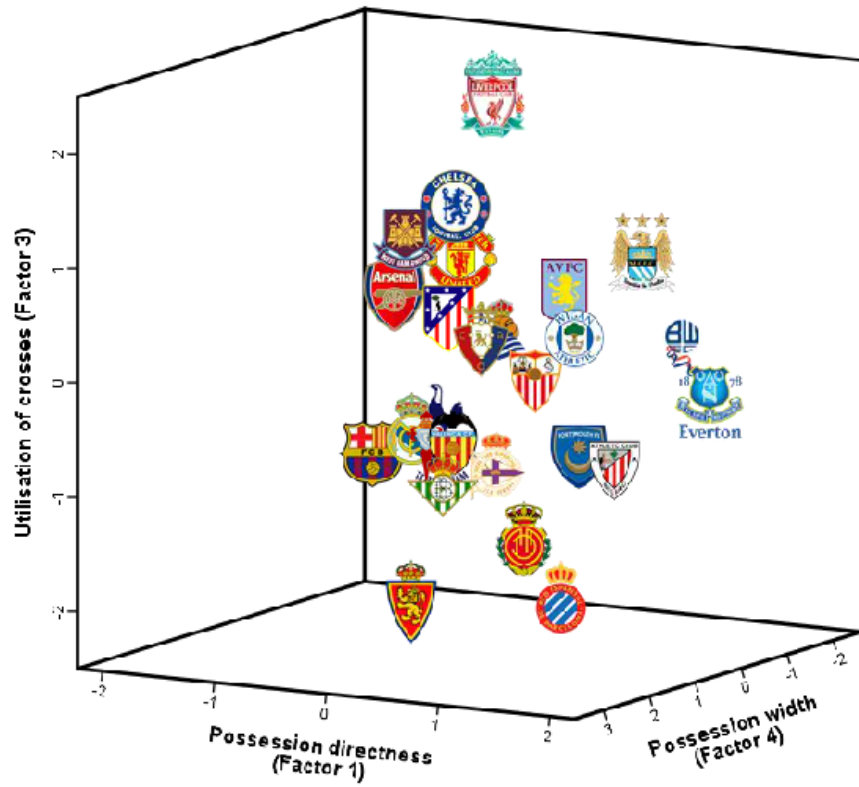


Figure 10. Factor scores for attacking styles of play in the season 2006-2007 (factors 1, 3, and 4)

3.4 Discussion

The aim of the study was to identify and define the styles of play in elite soccer. Previous work (Pollard et al., 1988) was extended through an increased sample size, number of variables and the inclusion of additional defensive variables. Exploratory factor analysis extracted six factors that defined twelve different playing styles split into 8 attacking and 4 defending styles. Each factor defined two different styles of play based on a high (above 0) or low (below 0) factor score on the continuum. Furthermore, the team's score on each factor indicates their reliance on that specific style of play (see table IX, table X, table XI, table XII and table XIII).

Possession directness (factor 1) explained the highest percentage of variance and differentiates the previously reported direct and possession styles (Bate, 1988; Garganta et al., 1997; Hughes & Franks, 2005a; Olsen & Larsen, 1997; Redwood-Brown, 2008; Ruiz-Ruiz et al., 2013; Tenga, Holme, et al., 2010a, 2010b; Tenga & Larsen, 2003; Tenga, Ronglan, et al., 2010; Travassos et al., 2013). Variables for this factor include; 'forward passes', 'direction of the passes', 'possession of the ball' and 'sideways passes'. The latter two variables are negatively associated; the inverse (i.e., higher value) corresponds to the directness of the possession. It is suggested that the tactical principle of playing horizontally causes imbalances in the opposition's defense, therefore increasing the success of the attacking sequence and the opportunity to score a goal (Tenga, Holme, et al., 2010a, 2010b; Tenga, Ronglan, et al., 2010; Tenga & Sigmundstad, 2011). Previously, a direct style was described as being more advantageous than the possession style (Bate, 1988; Garganta et al., 1997). However, Hughes and Franks (2005a) stated that possession style produced more goals than the direct style for successful teams. In comparison, Tenga, Holme, et al. (2010a) reported no difference in goals scored between these styles. Probably, the abilities of the players may influence success when using a direct or possession style.

Factor 2 differentiates two defensive styles, where the ball is regained either closer to the touchline or in central areas. These styles have not been reported previously and are associated with the variables 'regains in the central areas of the pitch' and 'regains in the wide areas of the pitch'. Negative values for the former and positive values for the latter determine where the team regains the ball. Two out of three ball regains occur in central areas, which could be due to the higher

concentration of players. Wright et al. (2011) reported that central ball regains are more likely to result in a scoring attempt compared to wide ball regains. Furthermore, the utilisation of these styles could depend on team formation (number of players per area), player defensive abilities and/or the opponent's attacking abilities. For example, a team with fullbacks, wingbacks or wide midfielders with good defensive aptitudes would probably use pressure to regain the ball in wide areas, whereas opponents weak in these areas will avoid.

Factor 3 defines two styles based on percentage of possession in the defensive third (i.e., time that the team control the ball near their own goal) combined with the use of crosses. Crossing is used to increase the chance of scoring (Ensum et al., 2005; Hughes & Churchill, 2005; Konstadinidou & Tsigilis, 2005; Lago-Peñas, Lago-Ballesteros, Dellal, & Gomez, 2010; Lago-Peñas et al., 2011; Oberstone, 2009; Pollard et al., 2004), however increases in scoring efficiency is not reported consistently (Flynn, 2001). Use of crosses might be more effective for teams that adopt this style and/or have wide midfielders that employ long passing, strikers that create space in the penalty area, win aerial challenges and shot at goal with one touch (Carling et al., 2005; Ruiz-Ruiz et al., 2013). Moreover, this style could be useful when the opposition goalkeeper lacks catching ability and defenders high clearance ability, as the probability of taking advantage of their mistakes are increased. In contrast, this style would be inefficient when playing against defenders with good aerial and positioning abilities (Hughes & Churchill, 2005).

Possession width (factor 4) differentiates the wide and narrow possession styles. These styles are associated with the percentage of ball possession teams have in central or wide areas, it does not necessarily mean that they play wide or narrow in their attacking sequences. 'Possession of the ball in the attacking third of the pitch', 'possession of the ball in the central areas of the pitch', and 'possession of the ball in the wide areas of the pitch' are the variables associated with this factor. The former variable correlated highly with the latter, which could be due to easier maintenance of ball possession in attacking third wide areas compared to central areas. Attacking third central areas are dangerous and result in more attempts at goal, therefore defensive actions will be more intense (Pollard & Reep, 1997; Ruiz-Ruiz et al., 2013; Scoulding et al., 2004; Tenga, Ronglan, et al., 2010; Wright et al., 2011; Yiannakos & Armatas, 2006). For example, British soccer teams (2001-2002) had higher ball entries into central (60.3%) compared to wide (39.7%) areas (James

et al., 2002). Moreover, Hughes et al. (1988) suggested that successful teams have more possession in the central compared to wide areas. The use of a wide or narrow possession style will probably depend on where the team's best players are situated. For example, a team that utilises the wide possession style of play might be more efficient if their best players are wide midfielders and/or fullbacks.

Factor 5 identifies teams that use a high or low pressure defensive styles of play. A high pressure style can influence scoring opportunities because the ball is regained closer to the opponent's goal, while increasing the likelihood of facing an imbalanced defense (Bell-Walker et al., 2006; Garganta et al., 1997; Grant, Williams, Reilly, & Borrie, 1998; Pollard & Reep, 1997; Russell, 2006; Scoulding et al., 2004; Wright et al., 2011). Successful teams from European Leagues and World Cups tend to have higher attacking third regains (Bell-Walker et al., 2006; Garganta et al., 1997). Moreover, Tenga, Holme, et al. (2010a) reported that the probability of producing a score-box possession decreases when a balanced defense is present (i.e. defenders provide defensive backup and cover). The utilisation of high or low pressure styles could be notably influenced by the opposing team's style of play (Cotta, Mora, Merelo-Molina, & Merelo, 2013). For instance, using a high pressure style of play against a team that utilises a possession style of play could be very effective for regaining the ball, while increasing the chances of scoring opportunities. Factors 2 and 5 determine the defensive styles of play for the teams analysed. Several clusters of teams according their scores on these factor determines group of teams that employ similar styles of play in defence (see figure 9). The clusters show a group of teams with similar scores depending on the combination of the positive or negative scores of the factors. There are clusters of teams that employ a wide and low pressure, wide and high pressure, narrow and low pressure, narrow and high pressure styles, and team do not rely strongly in any of the previous defensive styles of play.

Factor 6 describes team progression towards the opponent's goal, however it accounts for the lowest percentage of variance (6.67%). The use of backward passes moves the ball further from the opponent's goal; therefore an increase in backwards passes is more likely to increase the time taken to reach the opponent's goal. For this reason, a high quantity of backwards passes would suggest a slow progression of possession. In contrast, fewer backward passes would suggest a fast progression of possession. These styles are not mentioned in previous studies, and

the only variable associated with factor 6 (i.e. 'backwards passes') makes it complex to explain. The progression of the possession factor could be associated with the directness, however it is different. When using backwards passes the team tries to "reset" the attacking sequence by finding support from a less advanced team-mate to create space and new opportunities to attack. For example, a team that uses a direct style might also use backwards passes to create a new opportunity for scoring. This team would have a slow progression but also score high on possession directness (e.g. Bilbao in both seasons 2006-2007 and 2010-2011).

A secondary aim was to classify the team's styles so that playing style profiles could be created for each team. Positive or negative scores for the six factors would determine how much a team relies on one specific style or combination of these styles. For example, in season 2006-2007, Everton used the direct, no crossing, narrow and fast progression styles of play in attack. In defense they used a low pressure style while applying pressure in central areas to regain the ball. Everton's high score on factor 1 defines a direct style in attack due to the team's high percentage of forward passes, low percentage of sideways passes and possession of the ball. In contrast, during the 2006-2007 season, Barcelona applied pressure in central areas and used high pressure defensive styles, combined with possession, no crossing, narrow and fast progression attacking styles. Barcelona scored high on the percentage of regains in the attacking third, which is one of the variables that define the high pressure style. Moreover, during the 2010-2011 season, Barcelona adopted alternative styles and intensified the use of previously used styles. They used the crossing, wide and slow progression attacking styles, and increased their factor scores for the possession attacking style, pressure in central areas and high pressure defensive styles, compared to the 2006-2007 season. On the other hand, Real Madrid utilized the same possession and fast progression styles of play in attack (see figure 8). These values remained similar between the seasons analysed, determining that Real Madrid did not change these styles of play in attack. These individual examples highlight how a team uses specific attacking and defensive styles of play in a season. Moreover, in the case of Barcelona it highlights changes that occur in the styles of play across two separate seasons, which could be due to the tactical management of the coach and the players.

The present study showed that factor analysis can group variables that are associated between them. Variables that are not associated to any factor show that

are not determinant for describing styles of play. Hence, performance analyst could consider not measure them to determine the styles of play of teams. On the other hand, associated variables describe the styles of play depending on the positive or negative score for the factor. This grouping technique simplifies the way to describe the styles of play of a team, in contrast of simply looking at individual variables. Due to complexity of the factor analysis procedure, the result from this technique could be represented visually for coaches for better understanding. Isolated variables could be understood in an easier way; however, factor analysis provide a more complete information due to the factors that cluster associated variables.

Limitations of this study should be noted. Contextual variables (e.g. playing home/away, opposition level) were not measured and these variables could affect styles of play used by teams. Moreover, styles of play identified by factors in this study by factor analysis are a result from the dataset analysed and specific to the sample collected. For this reason, the styles of play found in this study may not be generalizable. This study provides an introduction to analysing playing styles. Another limitation of the study was the low number of matches for some teams analysed. Several teams had only two or three matches to analyse in the sample and more matches for these teams would have provided a more accurate styles of play profile for them. Consequently, more variables and matches should be considered to supply conclusive definitions for playing styles and generalisability of the data. Further studies should attempt to examine the influence of situational variables in styles of play employed by teams. Influence of the use of styles of play in physical variables should also be an issue for future studies. Moreover, future research should establish the efficiency and effectiveness of playing styles when measuring performance and outcomes (i.e., scoring probability), and effectiveness of specific styles of play against each other.

3.5 Conclusion

Twelve (8 attacking and 4 defensive) different playing styles and associated variables utilised in elite soccer were identified. Furthermore, in ascending order each factor explains a higher percentage of the variance and together explains 87.54% of the variance. The degree to which a team relies on a specific style can be determined based on the team's score for each factor. Findings from this study have several practical implications for performance analysis. First, teams can determine the styles they use and their reliance on specific styles to create playing style profiles and normative profiles for associated variables. These profiles can be

used to benchmark performance during competition or alternatively adjust their styles based on reference values they wish to adopt. Furthermore, teams could use specific training drills to develop styles that they will employ in competition while using the associated performances indicators to monitor change. Second, playing styles profiling can be used on opponents to identify their dominant styles and benchmark their variables. This data could be used to prepare tactics that would perturb the opponent's dominant style(s). Third, recruitment analysts could introduce playing styles profiling into their analysis framework when identifying individual players that they wish to integrate into the team. Finally, previous research provides contradictory evidence when measuring performance indicators and variables associated with success in isolation of factors (i.e., style of play, home advantage, type of competition, quality of opponents, quality of team) that might affect the value. Therefore, differences in variables might be a factor of their playing styles. Researchers should be aware of these different styles and were possible integrate this into their analysis. Moreover, further research should attempt to establish the efficiency and effectiveness of playing styles when measuring performance and outcomes (i.e., scoring probability).

Chapter 4

Synthesis and Recommendations

4.1 Achievement of Aims

This section demonstrates how the aims established in chapter 1 were achieved through the main study of the thesis.

- Aim: To define the different styles of play that are utilised by teams in elite soccer.

This aim was achieved by the completion of the main study. Factor analysis permitted the identification of 12 different styles of play, 8 attacking and 4 defensive. These styles of play were defined depending on the positive or negative values of the variables that were part of each factor.

- Aim: To identify the variables associated with each styles of play.

This aim was achieved alongside the previous one. Factor analysis determined different styles of play from 6 factors, and different variables explained these 6 factors. The number of variables that defined factors varied from 1 to 4. Therefore, by knowing which factors are associated with the styles of play, it is possible to know the variables that define a style of play.

- Aim: To classify the teams observed based on the style of play that they use.

This aim was achieved through the completion of the main study after defining the styles of play and identifying associated variables. Each team has a score for the different factors that determine the styles of play. Depending on the value of the score, a team's playing styles can be established and the magnitude of the score highlights how often they employ the style(s) in competition.

4.2 Discussion of Findings

In chapter 3, the study aimed to define the styles of play and identify the associated variables in elite soccer. A novel approach using factor analysis that included additional variables and new match analysis technology was employed to obtain these findings. Attacking and defensive styles of play were defined in the main study and the variables associated with each style of play were also identified. Furthermore, teams were classified according to their score on each factor. Therefore, a playing style(s) profile can be generated for each team to determine their typical tactical behaviour in competition.

The fulfilment of this study was encouraged due to the dearth of studies on laying styles in soccer. Previous researchers have mentioned playing styles (Bate, 1988; Garganta et al., 1997; Hughes & Franks, 2005a; Olsen & Larsen, 1997; Redwood-Brown, 2008; Ruiz-Ruiz et al., 2013; Tenga, Holme, et al., 2010a, 2010b; Tenga & Larsen, 2003; Tenga, Ronglan, et al., 2010; Travassos et al., 2013), however, only Pollard et al. (1988) tried to define the different styles of play and identify the associated variables. The authors defined the styles of play in soccer by analysing the variables that cluster into factors. Nevertheless, this study had some limitations as the number of matches in the sample was low and only six variables were measured.

This thesis extended the findings made previously by using a new match analysis technology able to measure variables that have not been measured before. The Amisco system, a multiple-camera match analysis system was employed in this research. Moreover, using a larger sample of matches from elite soccer and from two different leagues provided enough data to establish the styles of play. Twelve different styles of play (8 attacking and 4 defensive) were identified in the main study of this thesis. Furthermore, playing styles were classified depending on how each team scored on the six factors.

Factor 1 defined the direct and possession styles of play and explained the highest variance of all the factors. These attacking styles are commonly mentioned in performance analysis literature. Several studies allude to the direct and possession styles and highlight associated performance indicators and variables (Hughes & Franks, 2005a). For example, time of passing sequences or distance of passes were measured to distinguish between direct and possession playing styles. The study

presented in this thesis employed additional variables (e.g. percentage of the possession, direction of passes) to describe the direct and possession styles of play in comparison with previous studies.

Factors 3 (crossing, no crossing), 4 (wide possession, narrow possession) and 6 (fast progression of possession, slow progression of possession) defined the other attacking styles of play and in total accounted for 35.1% of the variance (14.6%, 13.8%, and 6.7% respectively). Apart from the crossing playing style (Pollard et al., 1988), the other attacking styles have not been previously described in the literature. The identification of new attacking styles defined in this thesis could have been due to the large increase in variables included in the factor analysis available because of new match analysis technology.

Furthermore, this thesis identified 4 different defensive styles of play: applying pressure and regaining the ball on the wide areas of the pitch, applying pressure and regaining the ball on the central areas, low pressure and high pressure. Only Pollard et al. (1988) determined a style of play similar to the high pressure style of play. Nevertheless, the other defensive styles of play described in this thesis have not been defined or identified previously in the literature. Factors 2 and 5 explained the defensive styles of play.

Once styles of play were defined and associated variables were identified. Factor analysis allowed for the creation of normative playing style profiles for each team based on their scores across the six factors. These playing styles provide information on the typical tactical behavioural profile a team could use in competition. Therefore, the styles of play that a team utilises in competition can be compared with other styles of play, or can be tested in match-play to check if the players of the team can adequately adopt that playing style. Playing style profiles can also be used to track changes across seasons or monitor performance if a team decides to adjust their playing style for tactical reasons or changes in coaching philosophy. For example, during the 2006-2007 season, Barcelona applied pressure in central areas and used high pressure defensive styles, combined with possession, no crossing, narrow and fast progression attacking styles. Barcelona scored high on the percentage of regains in the attacking third, which is one of the variables that define the high pressure style. Moreover, during the 2010-2011 season, Barcelona adopted alternative styles and intensified their use of previous styles. They used the crossing, wide and slow progression attacking styles, and

increased their factor scores for the possession attacking style, pressure in central areas and high pressure defensive styles, compared to the 2006-2007 season. This example highlights changes that occur in the styles of play across two separate seasons, which could be due to the tactical management of the coach and the players. The findings of the present study have implications in several areas related to soccer. Consequently, the styles of play should be considered for training and performance purposes in soccer.

4.3 Conclusions

The following conclusions can be stated from the findings of the present study:

1. The results from factor analysis show that elite soccer teams can employ twelve different styles of play (8 attacking and 4 defensive) in match-play competition.
2. Variables associated with attacking and defensive styles of play have been identified.
3. A team's score on each factor demonstrated their reliance on a style of play. Furthermore, styles of play utilised by teams can vary across seasons.
4. Variables from a team's specific playing styles can be measured and evaluated against referenced values.
5. Training can be designed to improve the variables associated with the team's styles of play or prepare them to face the styles of play of upcoming opponents.
6. New players can be recruited based on their abilities and the team's playing styles objectives. Characteristics of the new players can be measured to determine how their profile will maintain, enhance or change the team's style of play.

4.4 Recommendations for Future Research

There is future research that could be conducted based on the findings in this thesis. As a consequence of styles of play in soccer, studies can be conducted to determine how they might impact on other areas (e.g. tactics, physiology, coaching). The following proposals are presented as possible areas for extending the research.

Firstly, the next study could employ the same method to establish a new reference data for variables related to each style of play. Several studies have produced reference data for variables measured in elite soccer (Bell-Walker et al., 2006; Breen et al., 2006; P. D. Jones et al., 2004; Lago-Ballesteros & Lago-Peñas, 2010; Scoulding et al., 2004; Wright et al., 2011). These studies measured the frequency of different match actions (e.g. passes, crosses and shots) that soccer teams made in a competition. Reference data was given according to the overall sample, the success of the team, or the teams that participated. The aims of this study could be to establish new reference performance data related to the different styles of play measured in the present study of this thesis, and compare that data between the opposed styles of play to determine the importance of styles of play when measuring variables.

Secondly, future research could examine the influence of situational variables in styles of play adopted by teams. Situational variables have been proved to influence tactical variables in soccer (Almeida et al., 2014; Bradley et al., 2014; Lago-Ballesteros, Lago-Peñas, & Rey, 2012). Ball possession, possession regain, or achieving score-box possession are some of the variables that are influenced by situational variables. Therefore, to measure how the score during a match can change the styles of play employed by teams, how a dismissal can also change team's behaviour, and how the importance of the match can determine the styles of play used by teams could provide more knowledge on the tactical aspects in soccer. The aims of this study could be to examine changes in styles of play adopted by team according to the situational variables in soccer.

Thirdly, further research could focus on effectiveness of the styles of play in competition and the influence of teams employing different styles of play playing against each other. Effectiveness of match actions (Pollard et al., 2004; Pollard & Reep, 1997; Szczepanski, 2008; Tenga, Ronglan, et al., 2010) and players performance (Saez Castillo, Rodriguez Avi, & Perez Sanchez, 2013) have been

analysed in previous studies. They suggested that actions during a game could be analysed to determine their probability of success in a match. Effectiveness is important information and useful information that can be used to increase the chance of scoring, prevent the opposition from scoring, and increase the likelihood of winning the match. These studies quantified and compared the probability of success of the different actions that happen during a match, and established actions that were better for competition based on the predicted value of those actions. However, effectiveness of the styles of play has not been addressed before. The aims of this study could be to identify the effectiveness of the styles of play when competing against other teams and the influence that could have employing a style of play against others. This might provide insights into how certain styles of play in a specific situation might increase the chance of winning.

Another possible study could focus on how styles of play impact physical demands required. Previous research has analysed the physical demands in soccer match-play (Bangsbo, Mohr, & Krstrup, 2006; Bradley et al., 2011; Bradley et al., 2009; Castellano, Blanco-Villasenor, & Alvarez, 2011; Dellal et al., 2011; Di Salvo, Gregson, Atkinson, Tordoff, & Drust, 2009; Gregson, Drust, Atkinson, & Di Salvo, 2010; Rampinini, Coutts, Castagna, Sassi, & Impellizzeri, 2007; Stolen, Chamari, Castagna, & Wisloff, 2005). These studies suggested that players cover specific distances during competition and at different speeds. This research describes the different physical demands a soccer player requires during competition. These studies measured several teams without considering how playing styles might influence the data. Therefore, it could be interesting to analyse the impact of different playing style profile on physical demands during competition.

Chapter 5

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