ANALYSIS OF STYLES OF PLAY IN SOCCER AND THEIR EFFECTIVENESS

Javier Fernández Navarro

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El doctorando D. Javier Fernández Navarro ha realizado la presente Tesis Doctoral Internacional como beneficiario de un contrato predoctoral para la Formación del Profesorado Universitario (FPU13/05369) en la convocatoria del año 2013 de los subprogramas de Formación y Movilidad dentro del Programa Estatal de Promoción del Talento y su Empleabilidad, en el marco del Plan Estatal de Investigación Científica y Técnica y de Innovación 2013-2016 en I+D+i; por resolución de 22 de agosto de 2014 de la Secretaría de Estado de Educación, Formación Profesional y Universidades (BOE-A-2014-9081, publicado el 4 de septiembre de 2014).

“A smooth sea never made a skilled sailor”

English proverb

“Un mar en calma nunca hizo experto a un marinero”

Proverbio inglés

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SUMMARY

SUMMARY

Deciding on effective team strategies and tactics is fundamental to successful performance in soccer (Carling, Williams, & Reilly, 2005). Previous research showed that performance indicators such as passes, shots, or ball regains are useful variables that measure tactical performance of teams in match-play (Hughes & Bartlett, 2002). The influence of contextual variables on these performance indicators and the analysis of their associations with successful team performances have been widely studied (Almeida, Ferreira, & Volossovitch, 2014; Castellano, Casamichana, & Lago, 2012; Lago, 2009; Taylor, Mellalieu, James, & Shearer, 2008). However, no previous research has analysed these aspects in styles of play. Styles of play are tactical behaviours that soccer teams employ in competition (Hewitt, Greenham, & Norton, 2016), and due to difficulties with measuring them, studies analysing them are scarce. Therefore, the evaluation of styles of play in soccer is an area of interest in performance analysis research. The aims of the present Doctoral Thesis were to identify the styles of play that teams employ in elite soccer and their characteristics, examine how contextual variables (i.e. match status, venue, quality of opposition) influence styles of play used by teams, and evaluate the effectiveness of styles of play under different circumstances in competition.

The findings of this Doctoral Thesis showed that styles of play can be identified in soccer from match data using factor analysis. The analysis of 97 games from the Spanish La Liga and the English Premier League from the seasons 2006–2007 and 2010–2011 using a computerised match analysis system demonstrated that attacking and defensive styles of play can be determined through measuring tactical variables of teams and conducting factor analysis in order to cluster variables and obtain styles of play used by teams. In addition, a qualitative approach through expert coach interviews identified different attacking, defensive, and transition styles of play, and their characteristics. Furthermore, they provided insight into possible metrics that could more accurately measure styles of play.

Moreover, contextual variables influenced a team's styles of play and changed their behaviour under certain circumstances during the game. The 380 games of the English Premier League from the 2015-2016 season were analysed and showed that match status, venue, and quality of opposition influenced styles of play. Furthermore, the same sample was analysed to determine the effectiveness of styles of play and how the effectiveness changed according to the contextual variables.

In conclusion, the styles of play used by teams in match-play and their characteristics can be identified in soccer. Contextual variables influence the use and effectiveness of these styles of play during competition. These findings could be useful for coaches and other practitioners when analysing or predicting tactical behaviours of soccer teams.

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RESUMEN

RESUMEN

Decidir las estrategias y tácticas más efectivas del equipo es fundamental para el rendimiento exitoso en fútbol (Carling, Williams y Reilly, 2005). Investigaciones anteriores demostraron que los indicadores de rendimiento como pases, tiros o recuperaciones de balón son variables útiles que miden el rendimiento táctico de los equipos en los partidos (Hughes y Bartlett, 2002). La influencia de las variables contextuales en estos indicadores de rendimiento y el análisis de sus asociaciones con el rendimiento exitoso de los equipos han sido ampliamente estudiados (Almeida, Ferreira, & Volossovitch, 2014; Castellano, Casamichana, y Lago, 2012; Lago, 2009; Taylor, Mellalieu, James, y Shearer, 2008). Sin embargo, ninguna investigación previa ha analizado estos aspectos en los estilos de juego. Los estilos de juego son comportamientos tácticos que los equipos de fútbol emplean en la competición (Hewitt, Greenham y Norton, 2016) y, debido a la dificultad de medirlos, los estudios que los analizan son escasos. Por lo tanto, la evaluación de los estilos de juego en el fútbol es un área de interés en la investigación del análisis del rendimiento. Los objetivos de la presente tesis doctoral fueron identificar los estilos de juego que los equipos emplean en el fútbol de élite y sus características, examinar cómo las variables contextuales (i.e. el marcador, jugar de local o visitante, la calidad de la oposición) influyen en los estilos de juego utilizados por los equipos, y evaluar la efectividad de los estilos de juego bajo diferentes circunstancias en competición.

Los hallazgos de esta Tesis Doctoral demostraron que se pueden identificar los estilos de juego en fútbol a partir de los datos de los partidos utilizando el análisis factorial. El análisis de 97 partidos de la Liga española y la Premier League inglesa de las temporadas 2006-2007 y 2010-2011 utilizando un sistema computarizado de análisis de partidos, demostró que los estilos de juego en ataque y en defensa pueden determinarse midiendo las variables tácticas de los equipos y llevando a cabo un análisis factorial posteriormente para agrupar estas variables para obtener los estilos de juego utilizados por los equipos. Además, un enfoque cualitativo a través de entrevistas a entrenadores expertos identificó diferentes estilos de juego en ataque, defensa y transición, y sus

características. Además, proporcionaron información sobre posibles métricas que podrían medir con mayor precisión los estilos de juego.

Además, las variables contextuales influyeron en los estilos de juego de los equipos y cambiaron su comportamiento en ciertas circunstancias durante el juego. Los 380 partidos de la Premier League inglesa de la temporada 2015-2016 se analizaron y mostraron que el marcador, jugar de local o visitante, y la calidad de la oposición, influyeron en los estilos de juego. Además, se analizó la misma muestra para determinar la efectividad de los estilos de juego y cómo cambió la efectividad de acuerdo con las variables contextuales.

En conclusión, los estilos de juego utilizados por los equipos en competición y sus características se pueden identificar en fútbol. Las variables contextuales influyen en el uso y la efectividad de estos estilos de juego durante la competición. Estos hallazgos podrían ser útiles para los entrenadores y otros profesionales al analizar o predecir los comportamientos tácticos de los equipos de fútbol.

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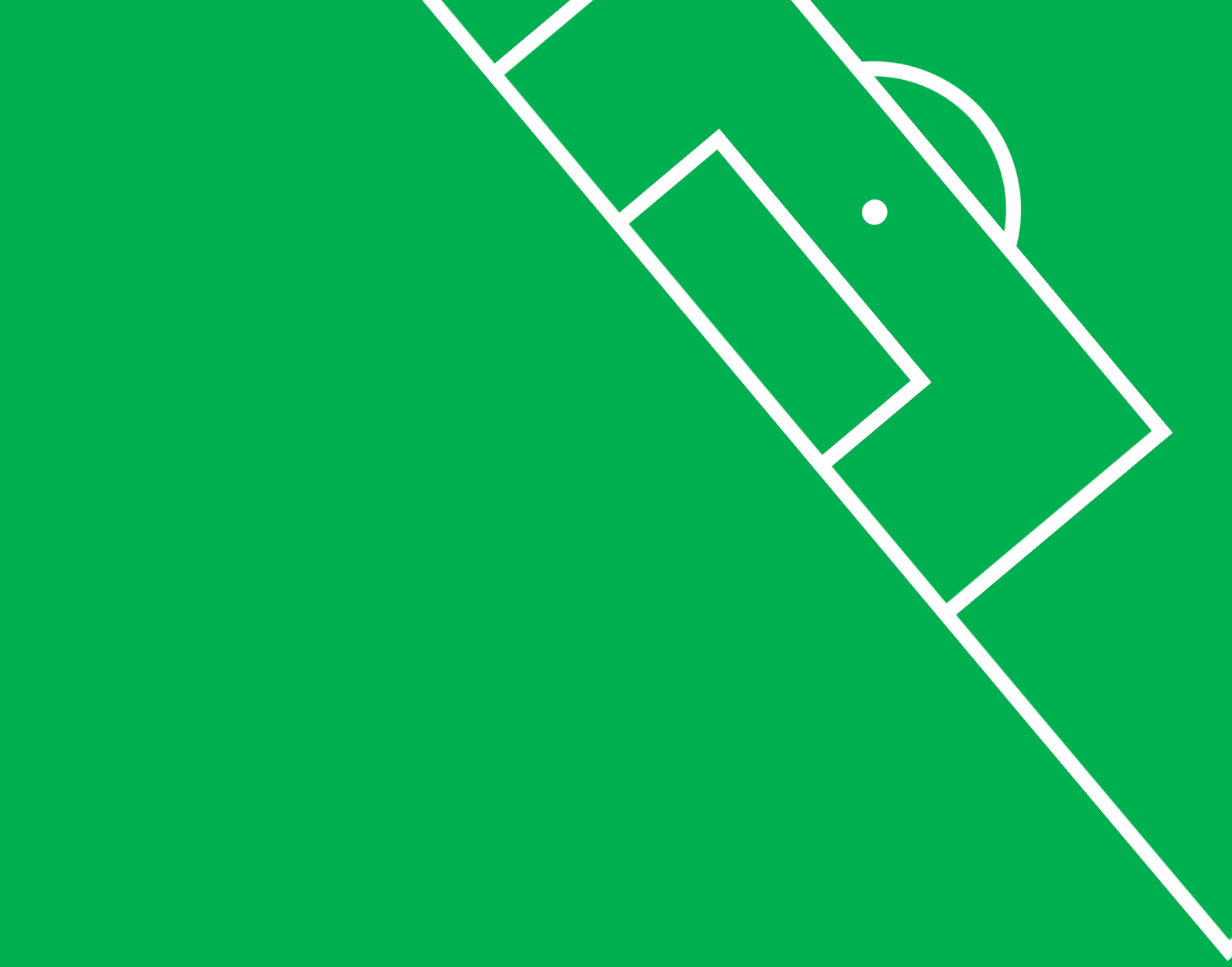


INTRODUCTION

INTRODUCTION

CHAPTER 1: Styles of play as tactical behaviours of teams in soccer

1.1 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 all plans, principles of play or action guidelines decided upon before a match in order to organise the activity of the team and player interaction during the game (Hewitt, Greenham, & Norton, 2016). 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, a characteristic playing pattern demonstrated by a team during match-play (Hewitt et al., 2016). 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 observation 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, Mellalieu, & Hollely, 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-Peñas & Dellal, 2010; Lago, 2009). 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 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.

1.2 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, Fradua, Fernandez-Garcia, & Zubillaga, 2013; Scoulding, James, & Taylor, 2004), Euro Cup (Yiannakos & Armatas, 2006),the Champions League (Almeida, Ferreira, & Volossovitch, 2014; Di Salvo et al., 2007; Lago-Peñas, Lago-Ballesteros, & Rey, 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, Ronglan, and Bahr (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 (Chervenjakov, 1988; Collet, 2013; Corbellini, Volossovitch, Andrade, Fernandes, & Ferreira, 2013; Garganta, Maia, & Basto, 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, Reep, & Hartley, 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, & Bahr, 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 were 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-Peñas & Dellal, 2010; Lago, 2009; Lago & Martin, 2007; 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.

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. These variables can be measured in a simple way (e.g. number of shots, passing accuracy), due to the use of event data for the analysis. On the other hand, the use of positional data allows the analysis of more complex variables 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.

1.3 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 the scoreline 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, Araujo, Correia, & Davids, 2012; Fradua et al., 2013; James et al., 2012; 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 Reep and Benjamin (1968) conclusions.

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; Kempe, Vogelbein, Memmert, & Nopp, 2014; Olsen & Larsen, 1997; Redwood-Brown, 2008; Ruiz-Ruiz et al., 2013; Tenga, Holme, Ronglan, & Bahr, 2010a; Tenga, Holme, et al., 2010b; Tenga & Larsen, 2003; Tenga, Ronglan, et al., 2010; Travassos, Davids, Araujo, & Esteves, 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.

1.3.1 Direct style of play

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 a 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; 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.

1.3.2 Possession style of play

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. Similar 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.

1.3.3 Other styles

Counterattacking, total football and crossing are other attacking styles of play described in the literature (Bangsbo & Peitersen, 2000). Counterattacking 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 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 a team that uses 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 in lost in that area.

1.3.4 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, 2017). 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 that 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.

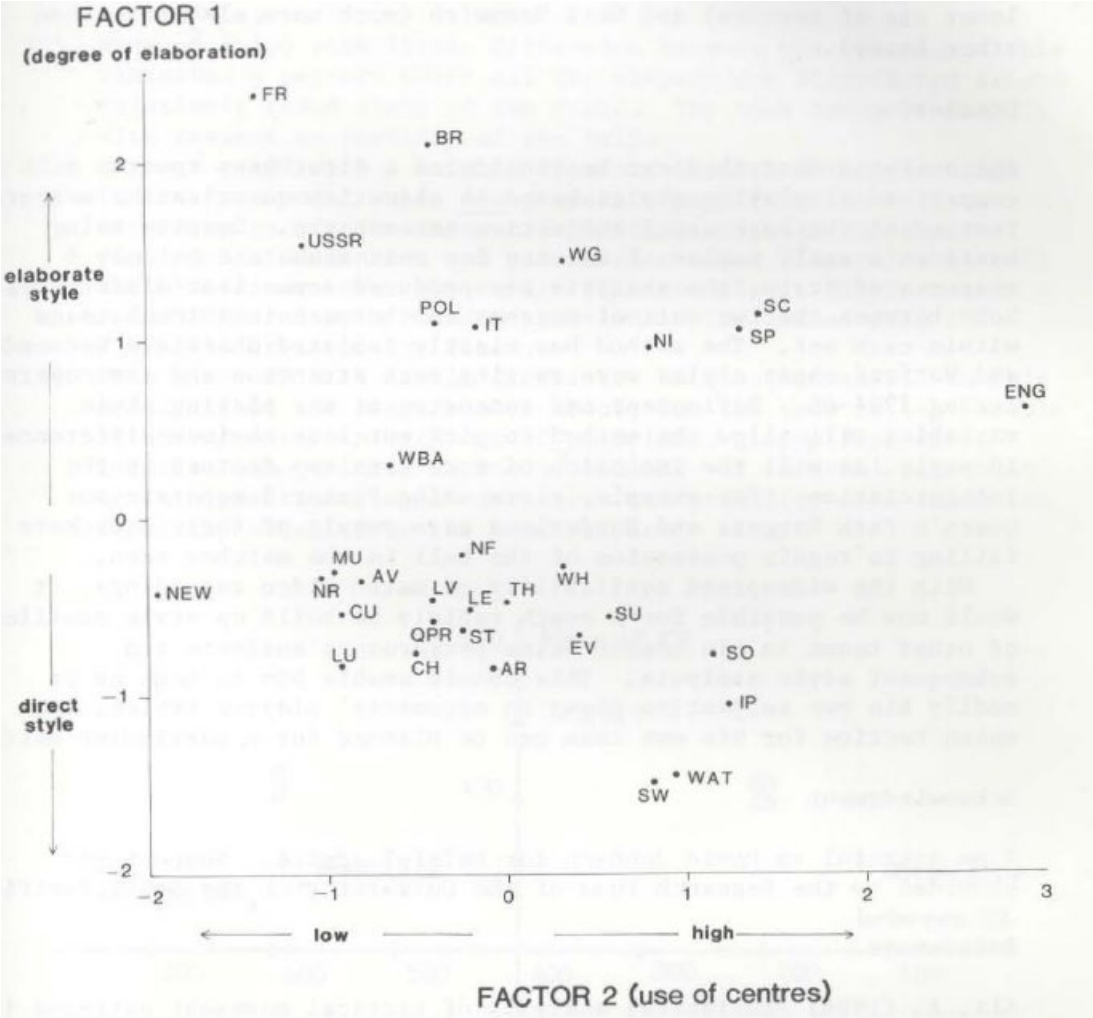


Figure 1. Representation of World Cup and English League teams according to two factors of playing styles (Pollard et al., 1988)

1.3.5 Machine learning to determine styles of play

The use of Machine Learning is a different approach that have also been employed to determine the styles of play in soccer. Machine Learning is an artificial intelligence technology that allows classification and prediction from data (Bunker & Thabtah, 2017). These techniques have been applied in multiple areas and its use is recently becoming popular in sport science. A data provider company, STATS LLC, developed a method to measure styles of play in soccer using a machine learning approach (Ruiz, 2016). By applying the machine learning technique to a data set of soccer games, a style of play membership value is awarded to each possession and therefore, the use of styles of play

by teams could be quantified. Consequently, according to this procedure, several styles of play could appear simultaneously in a possession and the overall analysis of each teams possessions can determine the strength of each style they use. Ruiz (2016) determined beforehand a set of styles of play (i.e. Direct Play, Maintenance, Build Up, Sustained Threat, fast Tempo, Counter Attack, Crossing, and High Pressure) and the variables associated to each of them. For example, for a possession to score on Maintenance style of play, the team must have a passage of play lasting more than 10 seconds. Then, membership value of the Maintenance style of play increases linearly up until 30 seconds where it reaches the maximum (i.e. 100%). This approach seems to be useful for measuring styles of play in soccer. However, no detailed information about the procedure has been reported and the justification for the determination of the styles of play mentioned before is missing.

CHAPTER 2: Measuring the effectiveness of tactical behaviours of teams in soccer

2.1 Analytics in sport

Analytics are a set of tools widely used in the area of business that includes the use of advanced statistics, data management, data visualisation and other fields, and that are being increasingly used in sport (Alamar, 2013). The aim of analytics is to facilitate and support decision making through objective information. Moreover, the use of analytics in sport is useful for multiple purposes, such as assessing players, ranking teams, or predicting scores (Miller, 2015). Therefore, analytics can be useful for performance analysis and the analysis of players and teams during competition in any sport. Analytics uses specific metrics that add more information in comparison to simple variables (e.g. number of shots or number of passes), and provide more insight about how the player or team performs.

Analytics have appeared at different times in history across several sports. For instance, baseball has been one of the first sports to use analytics in their analyses of performance (Lewis, 2004). Basketball or hockey were other sports that followed this trend of using performance analytics, however the use of analytics in soccer is a more recent phenomena. Probably the complexity of this sport has been one of the reasons for the late use of analytics in soccer, in comparison with other sports with less complex structures that have facilitated the analysis of their performance.

The development of advanced metrics in sports has been linked with the progress of technology (Memmert & Raabe, 2018). The possibility of collecting more and more accurate data have promoted the use of analytics. In addition, the improvement of computers and other tools has permitted more complex statistical procedures to be performed in a reduced amount of time to obtain relevant information that can influence performance.

2.2 New metrics for measuring tactical behaviours of teams in soccer

The use of analytics in soccer is useful in developing the use of new metrics that better capture the tactical behaviours of teams (Rein & Memmert, 2016). The performance indicators mentioned previously, used to describe and analyse the performance of soccer teams, were based on event data. This kind of data consists in the recording of information of the ball-events, and consequently, information regarding positioning of the other players is missing. In contrast, positional or tracking data captures the X-Y coordinates of the position of the players, and allows the movements of players and the ball on the pitch to be factored into performance analysis (Memmert & Raabe, 2018). Due to the increasing use of these positional datasets from elite soccer, a variety of metrics have recently appeared in the soccer performance analysis literature.

According to Sampaio and Macas (2012), position and distribution of the players on the pitch, and the relationship between each of the players as they move are important tactical factors to consider when measuring the performance of a team. Indeed, one of the novel variables employed to analyse team performance 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.

Memmert, Lemmink, and Sampaio (2017) also highlighted that positional data can be used to explore the dynamic patterns of team, and suggested performance indicators that capture inter-team and inter-line coordination, team-team interactions and compactness. These measures are based on centroid, stretch indexes, lengths and widths and surface areas covered by players, and therefore, they can only be quantified by the use of positional data. The study also revealed that neural networks are a powerful tool to classify tactical patterns and their dynamic changes.

Positional data has also been used to measure the control of space. Moura, Barreto Martins, Anido, Leite de Barros, and Cunha (2012) utilised the area of the convex hull formed by players' positions to analyse the teams' organisation on the pitch. The results of this study showed that teams in possession of the ball covered a greater area, whereas when teams were not in possession they were more compact. In addition, Voronoi diagrams have been employed to explore how soccer teams control space. Voronoi diagrams consist of cells that divide the pitch according to the position of players and the distances between them, and where the Euclidean distance is used to determine the limit of the cells (see figure 2). Therefore, it can be considered that the area covered by a cell is controlled by one player. Previous research employed this approach to analyse a team's dominance (Kim, 2004) and passing behaviour during games (Perl & Memmert, 2016; Rein, Raabe, & Memmert, 2017).

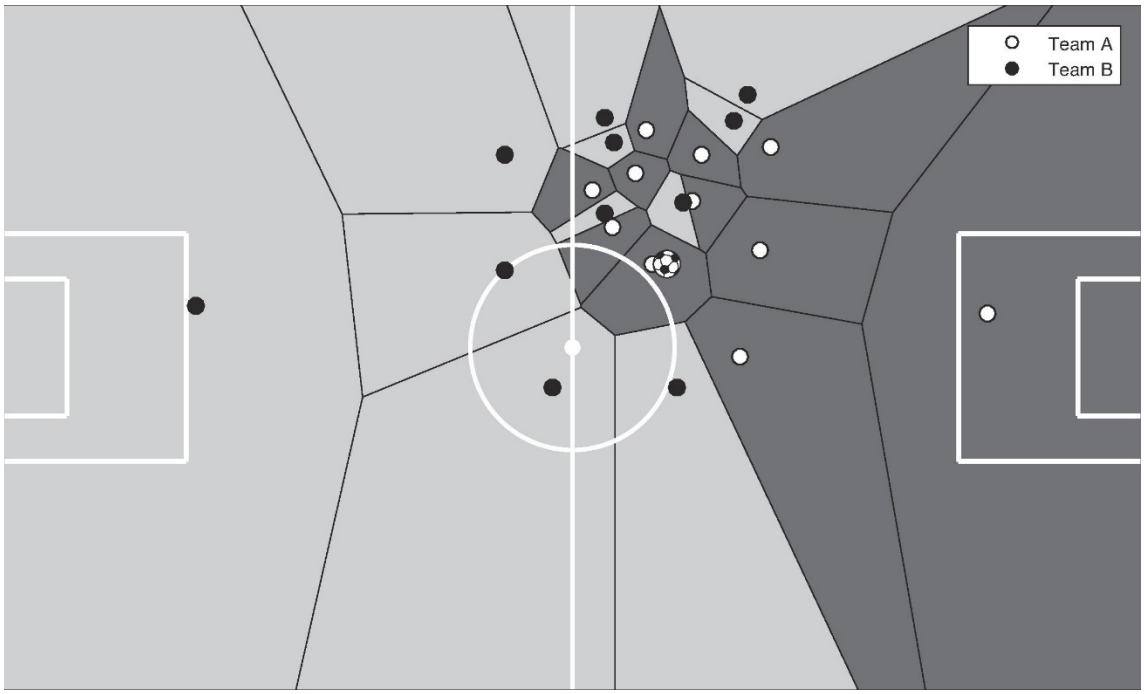


Figure 2. Example of a Voronoi-Diagram for a typical game situation in soccer (Rein et al., 2017)

The use of network approaches has also been employed to study team tactics. This technique involves the modelling of players as nodes and the number of passes between them, where the thickness of the line represents the frequency of the relationship (see

figure 3). The analysis of passing interactions can identify key players in the game while providing specific information on their passing patterns within the team (Arriaza-Ardiles et al., 2018; Clemente, Couceiro, Martins, & Mendes, 2015; Clemente, Martins, Kalamaras, Wong, & Mendes, 2015; Clemente, Martins, & Mendes, 2016; Clemente, Martins, Wong, Kalamaras, & Mendes, 2015; Gama et al., 2014; Goncalves et al., 2017; McHale & Relton, 2018). This analysis of team structures has great applicability to the design of tactics and could be very useful for coaches and other practitioners.

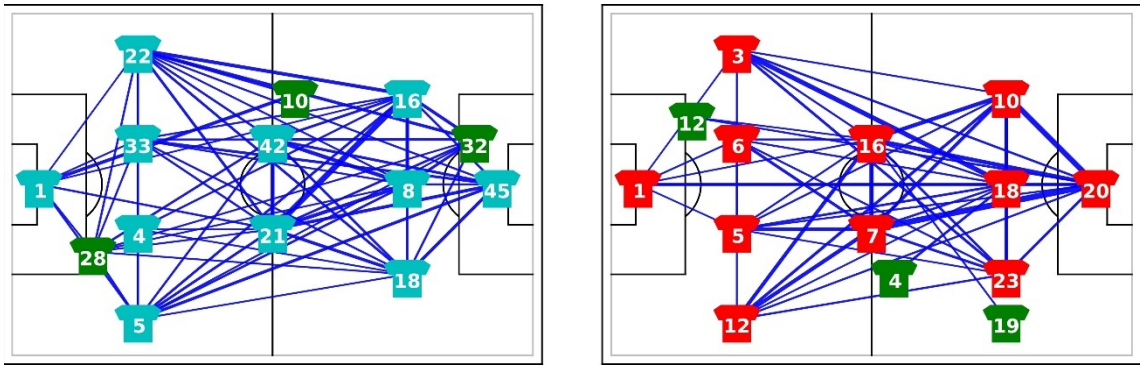


Figure 3. Example of passing networks (McHale & Relton, 2018)

In addition, previous studies employed Machine Learning algorithms to analyse tactical behaviours and structures of teams in soccer. In order to conduct those Machine Learning approaches, a great amount of player tracking data is needed and therefore, complexity of the analysis increases. Teams' formation was identified by using clustering algorithms from positional data (Bialkowski et al., 2016; Bialkowski et al., 2014). These algorithms automatically reveal the different formations used by teams and the average position of players in those formations. Moreover, heatmaps were also used to describe areas covered by soccer players and passing behaviour (Bialkowski et al., 2014; Brooks, Kerr, & Guttag, 2016).

In conclusion, these new approaches and the combination of them can provide insights about the analysis of a soccer team's tactical behaviours that can be used by coaches about their own team and the opposition.

2.3 Effectiveness of tactical behaviours teams in soccer

The exploration of tactical effectiveness has attracted the attention of researchers in soccer. Previous studies employed several approaches of different complexity to analyse the effectiveness of teams and players. Some of them evaluated the effectiveness of soccer tactical behaviours by identifying the key variables associated with successful and unsuccessful teams. Castellano et al. (2012) analysed the match statistics that discriminated between successful and unsuccessful teams. They analysed 177 games from the 2002, 2006, and 2010 World Cups and revealed that total shots, shots on target, and ball possession were the variables that best discriminated between winning and losing teams. Other studies found similar results analysing the 380 games of the 2008-2009 Spanish La Liga season (Lago-Peñas, Lago-Ballesteros, Dellal, & Gomez, 2010) and 288 matches of the UEFA Champions League in several seasons (Lago-Peñas et al., 2011). Another study conducted by Gonzalez-Rodenas, Lopez-Bondia, Calabuig, Perez-Turpin, and Aranda (2016) analysed the effectiveness of counterattack actions in a sample of 452 counterattack possessions from 30 games, and revealed that counterattacks that started in the offensive zones, had initial penetration, and consisted of four or more passes were more effective. In addition, Lago-Ballesteros, Lago-Peñas, and Rey (2012) showed that counterattacks starting in advanced pitch zones against few defenders were more effective at producing a score-box possession. Moreover, Casal, Maneiro, Arda, Losada, and Rial (2014) analysed 783 free kicks from the 2010 FIFA World Cup, UEFA Champions League 2010-2011 season, and the 2010 UEFA European Championships, and showed that free kicks were more effective when they were performed with a ground pass and touched by three or four players. All of this research employed different ways to analyse effectiveness of actions by using event data.

Tenga, Ronglan, et al. (2010) analysed data from 163 games from the Norwegian soccer league of the 2004 season. They measured different variables (e.g. team possession type, starting zone, pass number, pass penetration, team possession outcome) in the 1688 ball possessions and applied a logistic regression approach to evaluate the effectiveness of the attacking actions performed by the teams analysed. The results

found that counterattacks were more effective than elaborate attacks. Moreover, Pollard and Reep (1997) used on-the-ball event data to assess the effectiveness of team possessions. They developed a variable called "yield" that evaluated the expected outcome of a team possession. Later, Szczepanski (2008) enhanced this measure and proposed a procedure to estimate the probability of scoring and conceding a goal during a possession (in open play or set play). The authors considered the area were the action occurred and if the player was under pressure or not. These studies developed metrics able to quantify the probability of scoring from attacking actions and therefore, could be considered the precursors of the Expected Goals (xG) metric. Expected Goals calculates the chance of a goal being scored by a team or player and therefore provides information that can be used to assess the effectiveness of the action or possession. This metric has been developed in different ways and there are many sources that describe the different methods used to calculate it (Rathke, 2017). Furthermore, Kempe et al. (2014) developed an Index of Offensive Behaviour to evaluate the effectiveness of teams and distinguish the attacking style of play employed by them. This index was created from different variables using event data; passes per action, passing direction, target player passes, passing success rate, passing success rate in forward direction, mean passes per attack, game speed, mean time of attack, gain of possession, distance per attack, and relative ball possession rate. Consequently, this index focused in team performance instead individual player performance.

Previous research used spatiotemporal tracking data to quantify the effectiveness of passing in soccer. Rein et al. (2017) used position data from 103 Bundesliga games of the 2011-2012, 2012-2013, and 2014-2015 seasons to evaluate passing effectiveness through the passing effect on majority situations and space control of teams in front of the opposing goal. The number of players between the ball carrier and the goal, and the area controlled by players were considered to measure these variables. The results showed that these measures were related to successful performances of soccer teams. Other research assessed the effectiveness of passing by evaluating how well a pass disrupts the opposing defence with key passes (Cakmak, Uzun, & Delibas, 2018; Goes, Kempe, Meerhoff, & Lemmink; Power, Ruiz, Wei, & Lucey, 2017). Thus, these studies

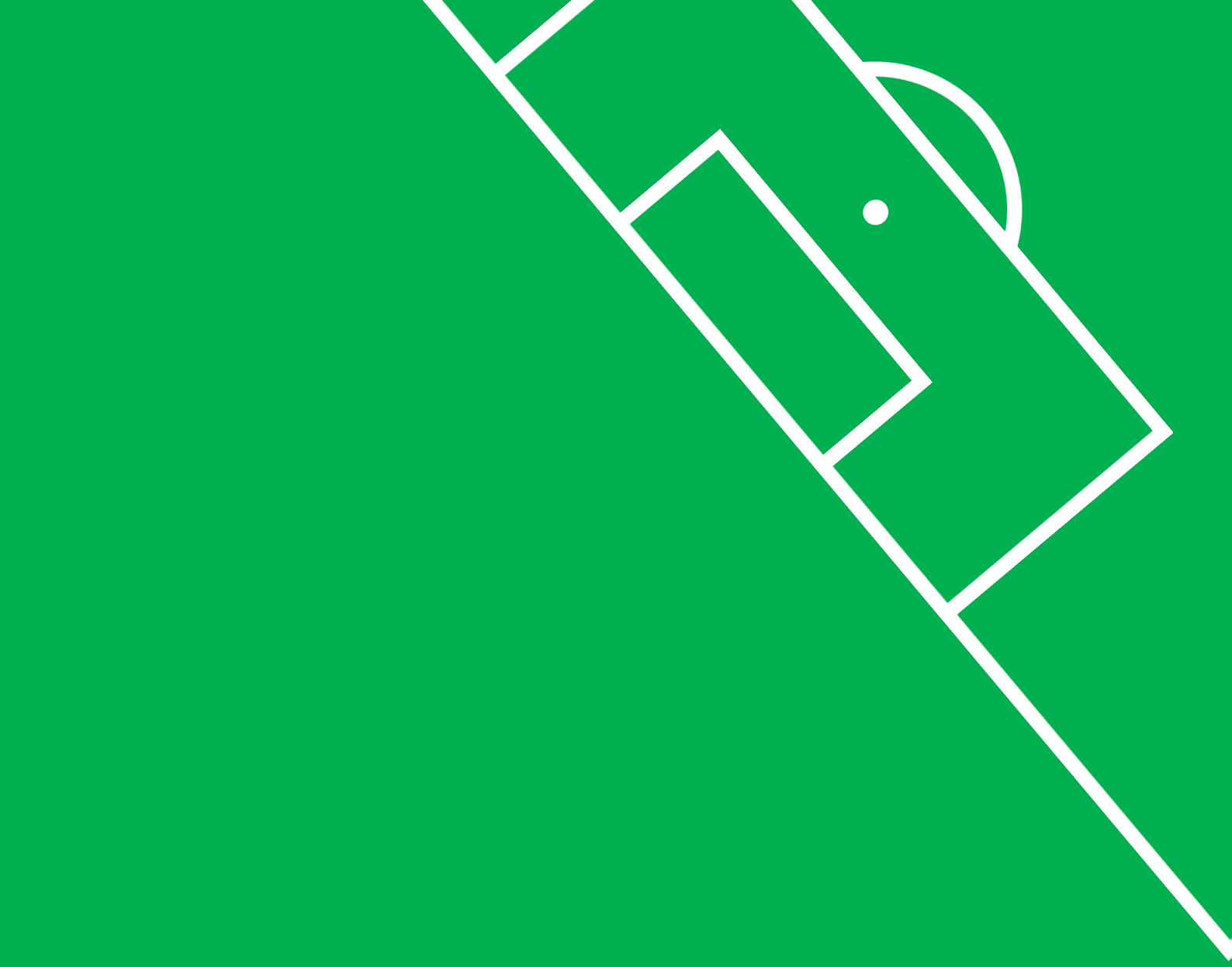
were able to measure the effectiveness of passing in a more complete way in comparison to previous research.

Similarly, Link, Lang, and Seidenschwarz (2016) employed "dangerousity" (i.e. a quantitative representation of the probability of a goal to be scored for every point in time in which the player is in possession of the ball) to measure the effectiveness of attacking performance. The "dangerousity" metric is based on four components (i.e. zone, control, pressure, and density) that contribute to the final metric. They suggested that "dangerousity" can be suitable for measuring the effectiveness of individual actions, passages of play, and the teams' performance.

Lastly, recent research applied Machine Learning approaches to evaluate the effectiveness of tactical behaviour of teams using positional data. Ruiz, Power, Wei, and Lucey (2017) used different Machine Learning techniques (e.g. logistic regression, random forest, multilayer perceptron) to assess the attacking and defensive performance of teams from the English Premier League of the 2015-2016 and 2016-2017 seasons. Expected Goals was employed to evaluate the effectiveness of attacking actions, Expected Save Value was used to measure goalkeeping performance, and a passing difficulty model was employed to capture both attacking and defensive abilities of players and teams. The authors found that the metrics developed were useful at comparing and explaining the success of teams during the seasons. In addition, Le, Carr, Yue, and Lucey (2017) used a Machine Learning approach (i.e. Deep Imitation Learning) to create a "ghosting" model that allowed the most effective solution for a specific defensive situation during the game to be estimated. The model is trained with tracking data of games from previous seasons and provides information about possible trajectories of players that could enhance the performance of the team.

To sum up, most of the research on tactical effectiveness in soccer has employed different approaches using event data, and although these studies provide insights about the variables used to measure effectiveness, the approaches may be limited due to the nature of the data analysed. In contrast, according to the most recent studies, the use of spatiotemporal tracking data and advanced approaches to analyse tactical behaviour showed that it could be very useful for measuring effectiveness in soccer. Even though previous research explored the effectiveness of tactical behaviours in

soccer, no previous studies evaluated the different styles of play in soccer under certain condition in the match-play context.



OBJECTIVES

OBJECTIVES

The main objectives of this Doctoral Thesis were to enhance the understanding and expand knowledge about the styles of play in soccer in an elite competition context, considering the aspects that could affect their performance and evaluating their effectiveness. Several qualitative and quantitative studies were conducted to achieve this aim.

The specific objectives of the studies in this Doctoral Thesis were:

- To explore the concept of style of play and expert coaches' opinions about this topic (Chapter 6).
- To define the different styles of play in elite soccer and identify the associated tactical variables using both quantitative (Chapter 3) and qualitative approaches (Chapter 6).
- To classify the soccer teams according to the styles of play they employ and creating a profile (Chapter 3 and Chapter 6).
- To analyse the effect of the contextual variables (i.e. match status, venue, and quality of opposition) on the styles of play in soccer (Chapter 4 and Chapter 6).
- To evaluate the effectiveness of styles of play in soccer, while quantifying the influence of contextual variables such as match status, venue and quality of the opposition in order to establish the situations were certain styles of play are more effective (Chapter 5).

OBJETIVOS

OBJETIVOS

Los objetivos principales de esta Tesis Doctoral fueron los de mejorar la comprensión y ampliar el conocimiento sobre los estilos de juego en el fútbol en el contexto de la competición de élite, considerando los aspectos que podrían afectar su rendimiento y evaluando su efectividad. Se realizaron varios estudios cualitativos y cuantitativos para lograr este objetivo.

Los objetivos específicos de los estudios en esta Tesis Doctoral fueron:

- Explorar el concepto de estilo de juego y las opiniones de los entrenadores expertos sobre este tema (Capítulo 6).
- Definir los diferentes estilos de juego en el fútbol de élite e identificar las variables tácticas asociadas utilizando enfoques cuantitativos (Estudio I) y cualitativos (Capítulo 6).
- Clasificar los equipos de fútbol según los estilos de juego que emplean y crear un perfil (Capítulo 3 y Capítulo 6).
- Analizar el efecto de las variables contextuales, es decir, el marcador, jugar de local o visitante y la calidad de la oposición en los estilos de juego en fútbol (Capítulo 4 y Capítulo 6).
- Evaluar la efectividad de los estilos de juego en fútbol, mientras se cuantifica la influencia de las variables contextuales, como el marcador, jugar de local o visitante y la calidad de la oposición para establecer las situaciones en las que ciertos estilos de juego son más efectivos (Capítulo 5).

METHODS, RESULTS AND DISCUSSION

METHODS, RESULTS AND DISCUSSION

CHAPTER 3: Attacking and defensive styles of play in soccer: analysis of Spanish and English elite teams

3.1 Background

Strategies and tactics are important factors that influence the outcome of the game and the final result in soccer (Yiannakos & Armatas, 2006). A strategy is defined as the overall plan that is devised and adopted to achieve an aim or specific objective, and is normally accomplished via the application of specific tactics (Carling et al., 2005). For example, soccer teams adopt an overall combination of attacking and defensive styles of play that would increase their probability of success. A style of play could be considered as the general behaviour of the whole team to achieve the attacking and defensive objectives in the game. Performance indicators are a selection of action variables that try to define the aspects of a performance (Hughes & Bartlett, 2002) and can be associated with attacking and defensive tactics in soccer. Previous studies highlighted the influence of styles of play when measuring performance indicators related to physical (Buchheit & Laursen, 2013; Reilly, 2005), technical and tactical aspects in soccer (Bradley et al., 2011; Duarte et al., 2012; James et al., 2002; Lago-Peñas et al., 2011; Pollard & Reep, 1997; Pollard et al., 1988; Tenga, Holme, et al., 2010b; Tenga & Sigmundstad, 2011). For instance, styles of play affect physical performance indicators such as distance covered by the players or high intensity running activities, due to players' different movements as a result of specific behaviours typical of a style of play. Moreover, styles of play can also affect technical and tactical performance indicators such as individual playing area (Fradua et al., 2013), percentage of ball possession (Lago-Peñas & Dellal, 2010; Lago & Martin, 2007), distance of passes and passing distribution (Tenga & Larsen, 2003). These studies showed that styles of play should be accounted for during data interpretation.

Previous studies have identified attacking and defending styles of play. High pressure and low pressure have for example been defined as defending styles (Bangsbo & Peitersen, 2000; 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, considering pressure as reducing the distance to the player in possession and other near opponents in order to regain the ball as quick as possible. 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 defensive players only applying pressure on the opponents in the defensive half of the pitch.

Attacking styles of play have previously been defined as direct, possession, counterattacking, total soccer, and crossing (Bangsbo & Peitersen, 2000; Pollard et al., 1988). '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 contrast to 'possession' style, 'direct' play is characterised by longer passes, low number of passes, short passing sequences, and a low number of touches per ball involvement. Game control was also a performance indicator associated with these styles of play, and was employed by a recent study that utilised indexes calculated from different performance indicators to evaluate the use of the possession and direct styles of play in elite teams (Kempe et al., 2014). These indexes included several passing and ball possession parameters to measure tactical behaviour of teams. In addition, attacking styles such as 'counterattacking play' (Bangsbo & Peitersen, 2000), 'total soccer' (Bangsbo & Peitersen, 2000; Carling et al., 2005), 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.

A previous study that provided information on the performance indicators for different styles of play was 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 performance indicators were measured and

factor analysis was used to define the different styles of play for the teams observed. The study identified three factors; factor 1 distinguished between direct and possession (elaborate) styles. Factor 2 explained the use of crosses. Finally, factor 3 made a distinction between a style that entails regaining the possession closer to the opponent's or own goal. Each team's dependence on a style was categorised on the basis of their factor score for the style of play.

Performance indicators 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 a 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. Previous research suggests that performance indicators for the different styles of play are unclear and that additional indicators should be examined to analyse styles of play. Hence, direction of passes and ball possession in different areas could be, for instance, important performance indicators when trying to identify styles of play. Moreover, additional defensive performance indicators should be considered such as areas where defending teams apply pressure, or time required to recover ball possession (Vogelbein et al., 2014). In addition, soccer involves an interaction between attack and defence (Moura et al., 2013), and this interaction makes it difficult to quantify team performance indicators and tactics without considering the opposition's ones. Consequently, attacking and defensive behaviours of teams should be measured to account for this interaction. The aim of the study was to define different styles of play in elite soccer and identify the associated performance indicators. 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

A total sample of 97 matches from the Spanish La Liga and the English Premier League involving 37 different teams were collected for the study. Matches were monitored using a multiple camera match analysis system (Amisco Pro®, version 1.0.2, Nice, France). From the total sample, 72 matches corresponded to season 2006-2007, 40 matches from the Spanish La Liga and 32 matches from the English Premier League. These two group of matches involved 18 and 15 different teams respectively. Furthermore, 25 matches corresponded to season 2010-2011 and were from the Spanish La Liga. This group of matches involved 16 different teams.

Teams that participated in both seasons were considered as different teams due to possible changes in the squad and technical staff of each team. These changes can lead to a different 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 at least four matches available for 15 teams, three matches available for eight teams, and two matches available for 14 teams.

3.2.2 Procedure

A total of 19 performance indicators (14 attacking and five defensive) were included in the study. Previous research relating to tactics was considered when selecting the following performance indicators for the study; possession of the ball (Jones et al., 2004; Lago & Martin, 2007), crosses (Lago-Peñas et al., 2010; Pollard et al., 1988), and shots (Hughes & Franks, 2005a; Lago-Ballesteros & Lago-Peñas, 2010; Pollard & Reep, 1997). The remaining performance indicators, provided by the Amisco® system, were considered to be relevant to determine styles of play due to the importance of the spatial occurrence of the events for measuring tactical aspects (Castellano et al., 2013). The attacking and defensive performance indicators, description and measurement methods are presented in table 1. For the following performance indicators presented in table 1: 2, 3, 4, 11, 12, 15, 16, and 17; the pitch was divided into three spaces parallel

to the goal lines to collect the data (see figure 4). In addition, for the following performance indicators presented in table 1: 5, 6, 18, and 19; the pitch was divided into three spaces parallel to the touchlines to collect the data (see figure 4). Passing direction was also considered to measure the following performance indicators in table 1: 7, 8, 9, and 10. Trajectories of passes were categorised according to the diagram in figure 5.

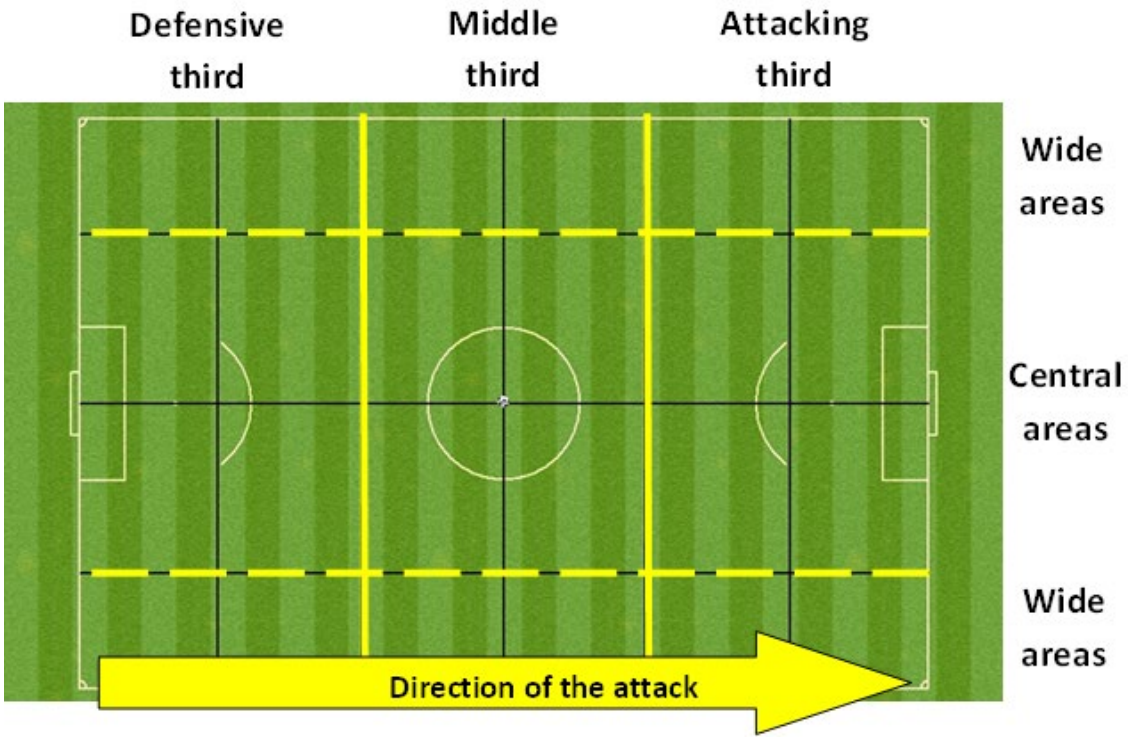


Figure 4. Pitch divisions in three thirds parallel to the goal lines and parallel to the touchlines

Table 1. Description and measurement of attacking and defensive performance indicators

Attacking performance indicators	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. These performance indicators 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 performance indicator. Hence the percentage (normalised data) was calculated from these data provided by the Amisco system.
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.	
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 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 figure 5. Data was normalised by calculating the percentage of these passes according to the total number of passes made by the team.
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).	
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 performance indicators 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 1. (Continued)

Defensive performance indicators	Description	Measurement
15. 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 performance indicators 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 performance indicator. Hence the percentage (normalised data) was calculated from these data provided by the Amisco system.
16. 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.	
17. 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.	
18. 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.	
19. 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.	

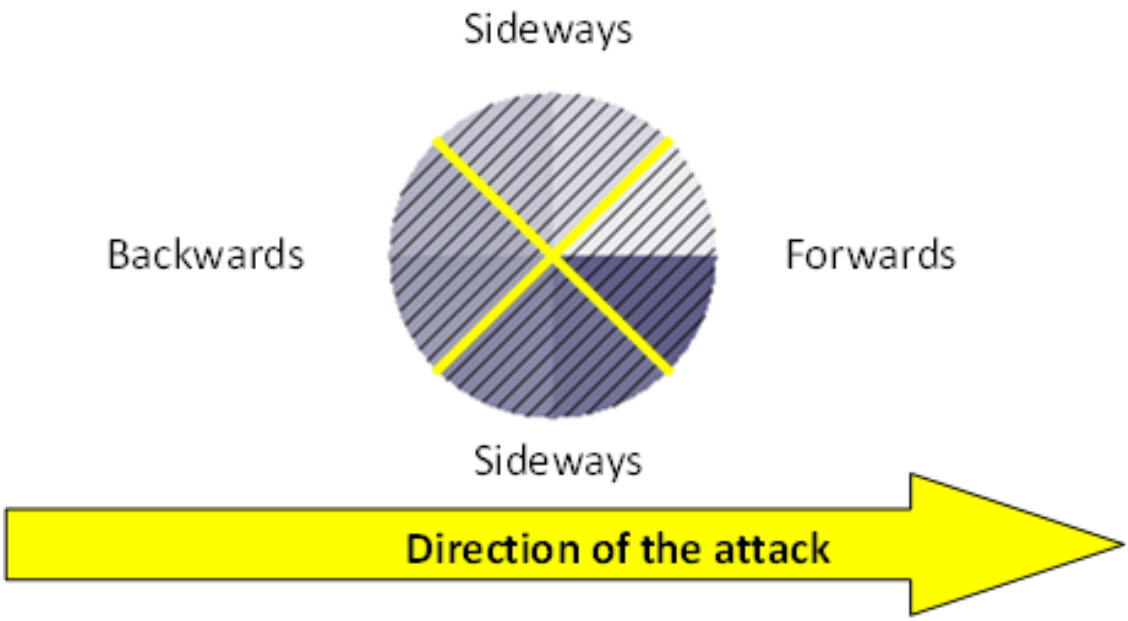


Figure 5. Direction of passes

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

3.2.3 Statistical analysis

Exploratory factor analysis using principal component analysis (PCA) was conducted on 19 performance indicators with orthogonal rotation (varimax). 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 (Field, 2017). For each factor, the performance indicators with the highest factor loading (i.e., the correlation between the performance indicator and the factor) were identified. This technique groups performance indicators 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).

Orthogonal (varimax) and oblique rotations were performed in factor analysis and the component correlation matrix of the oblique rotation showed a negligible correlation

between factors, therefore orthogonal rotation was used (Pedhazur & Schmelkin, 1991). The Kaiser-Meyer-Olkin measure (Kaiser, 1974) and communalities values after extraction (MacCallum, Widaman, Zhang, & Hong, 1999) were employed to verify the sampling adequacy for the analysis. Adequacy of correlations between items was done according to Bartlett's test of sphericity. Kaiser's criterion of 1 (Kaiser, 1960) and interpretation of the scree plot were considered for factor retention. Performance indicators with factor loadings greater than |0.7| showed a strong positive or negative correlation and indicated a substantial value for factor interpretation (Comrey & Lee, 2013).

3.3 Results

The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO = 0.53, and the communalities after extraction were greater than 0.7 in 18 of 19 performance indicators, deeming sample size to be adequate for factor analysis. Bartlett's test of sphericity ($\chi^2 = 2254.53$, df = 171, $P < 0.001$) indicated that correlations between items were sufficiently large for PCA. Six components had eigenvalues over Kaiser's criterion of 1 and in combination explained 87.54% of the total variance (see table 2). The percentage of variance explained by each factor decreased from factor 1 to 6. The scree plot was slightly ambiguous and showed inflexion points that would justify retaining four or six factors. Therefore, six factors were extracted following the Kaiser's criterion as the number of performance indicators was less than 30 and communalities after extraction were greater than 0.7 (Stevens, 2009). The rotated component matrix for the factor loadings identified the performance indicators associated with each factor (see table 3).

Table 2. 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 3. Rotated Component Matrix for the performance indicators

	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**

Note: Factor loadings in bold showed a strong positive or negative correlation

Descriptions of factors were interpreted based on the group of associated performance indicators. Factor 1 (possession directness) defines how direct a team's possession is. A team with a positive score in this factor tends to use a direct (D) style. In contrast, a team with a negative score adopts a more elaborate, possession (P) style. Factor 2 (width of ball regain) defines teams that pressure and regain the ball in wide areas (PW) or in the central areas (PC) of the pitch. A team with a positive score regain more balls close to the touchline, whereas a team with a negative score regain more balls in the central areas. Factor 3 (use of crosses) distinguish between crossing (C) and no crossing (NC) styles. This factor defines a team's use of crosses and how much possession of the ball they have in the defensive third. These performance indicators correlate highly, consequently a team that scores positively 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 using a wide possession (WP) style if they score positively on this factor. In contrast, teams that score negatively tend to use central areas of the pitch to develop the attack using a narrow possession (NP) style. Factor 5 (defensive ball pressure) defines teams that use a high or low pressure style of play. A positive score defines a low-pressure (LP) style,

whereas a negative score defines a high-pressure (HP) style. Finally, a positive score on factor 6 (progression of the attack) defines teams that employ a fast progression (FP) style and usually progress straight to the opponent's goal, whereas negative scoring teams utilise a slow progression (SP) and tend to use more maintenance passes to supporting players behind the position of the ball to look for better options to progress to the opponent's goal.

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 figure 6, 7, and 8). Factor 1 was used to plot against the other factors because it explained the highest amount of variance (27.8%). In addition, team scores for the defensive factors 2 and 5 are plotted in figure 9.

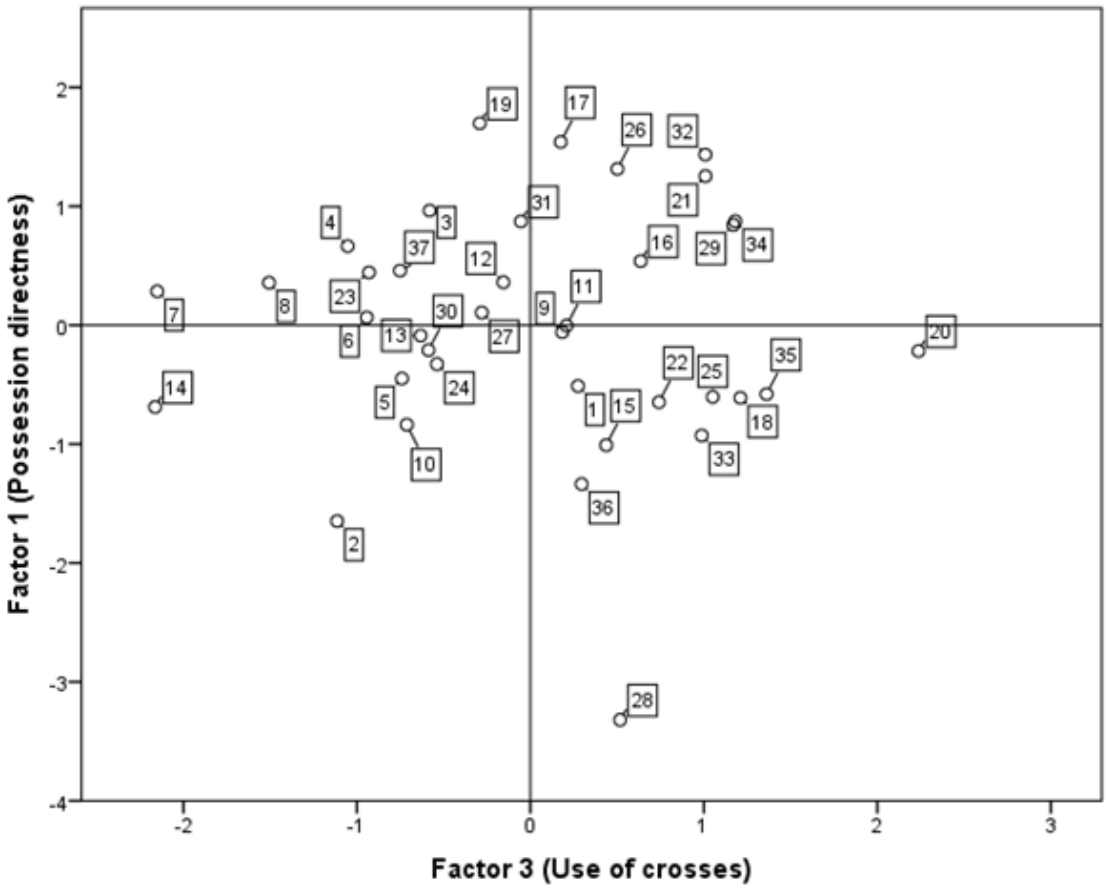


Figure 6. Attacking styles of play of soccer teams according to factor 1 and factor 3

Notes: 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.

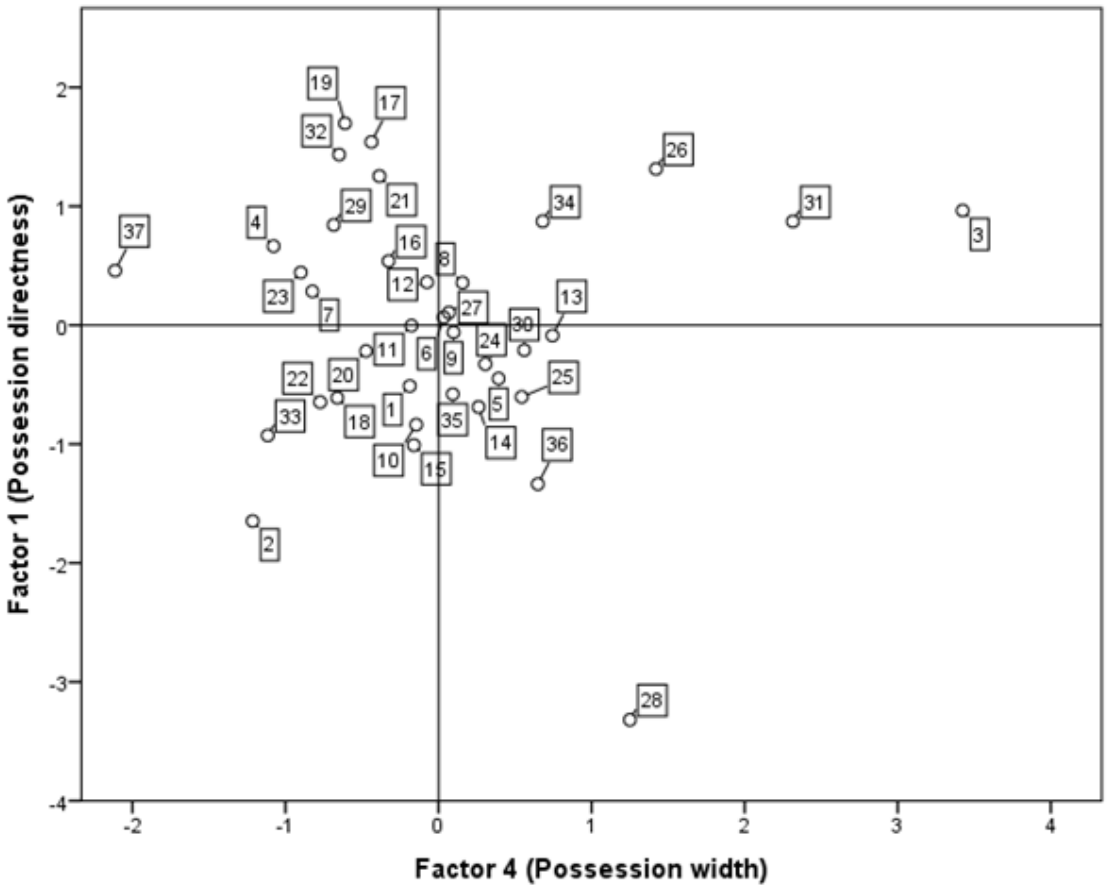


Figure 7. Attacking styles of play of soccer teams according to factor 1 and factor 4

Notes: 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.

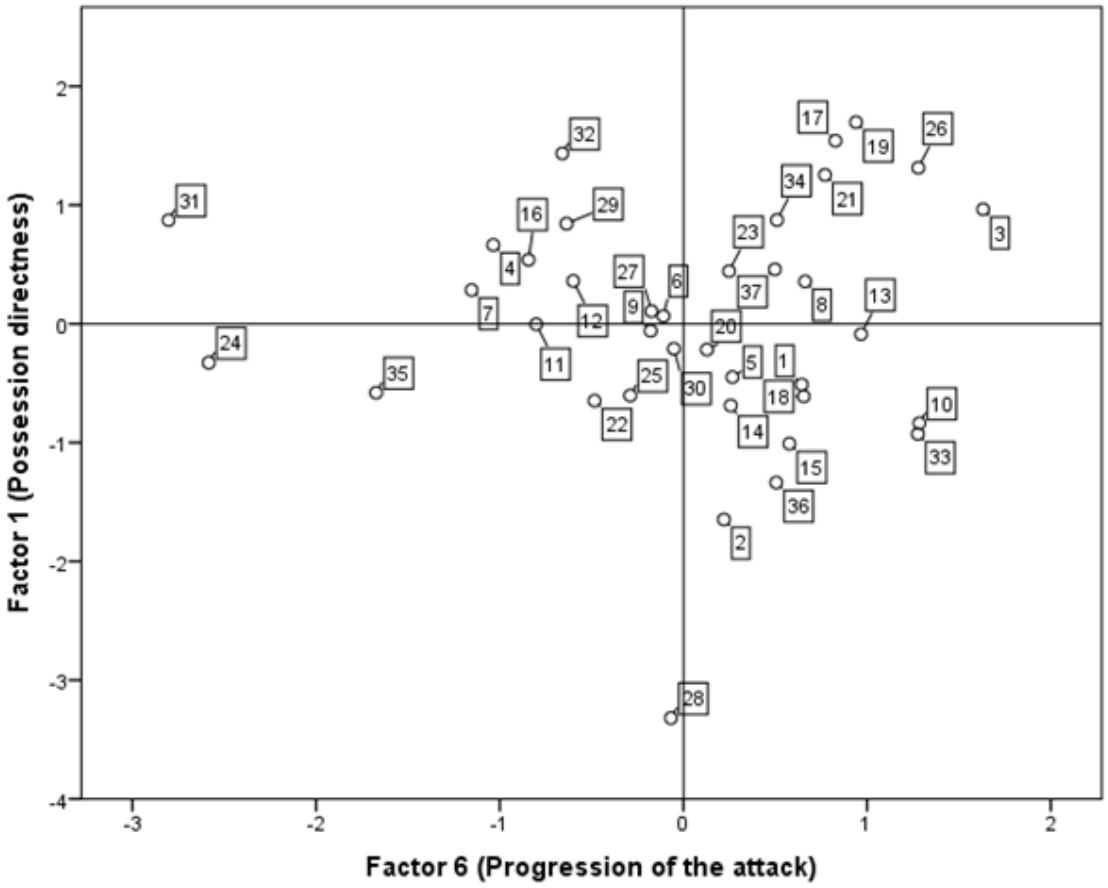


Figure 8. Attacking styles of play of soccer teams according to factor 1 and factor 6

Notes: 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.

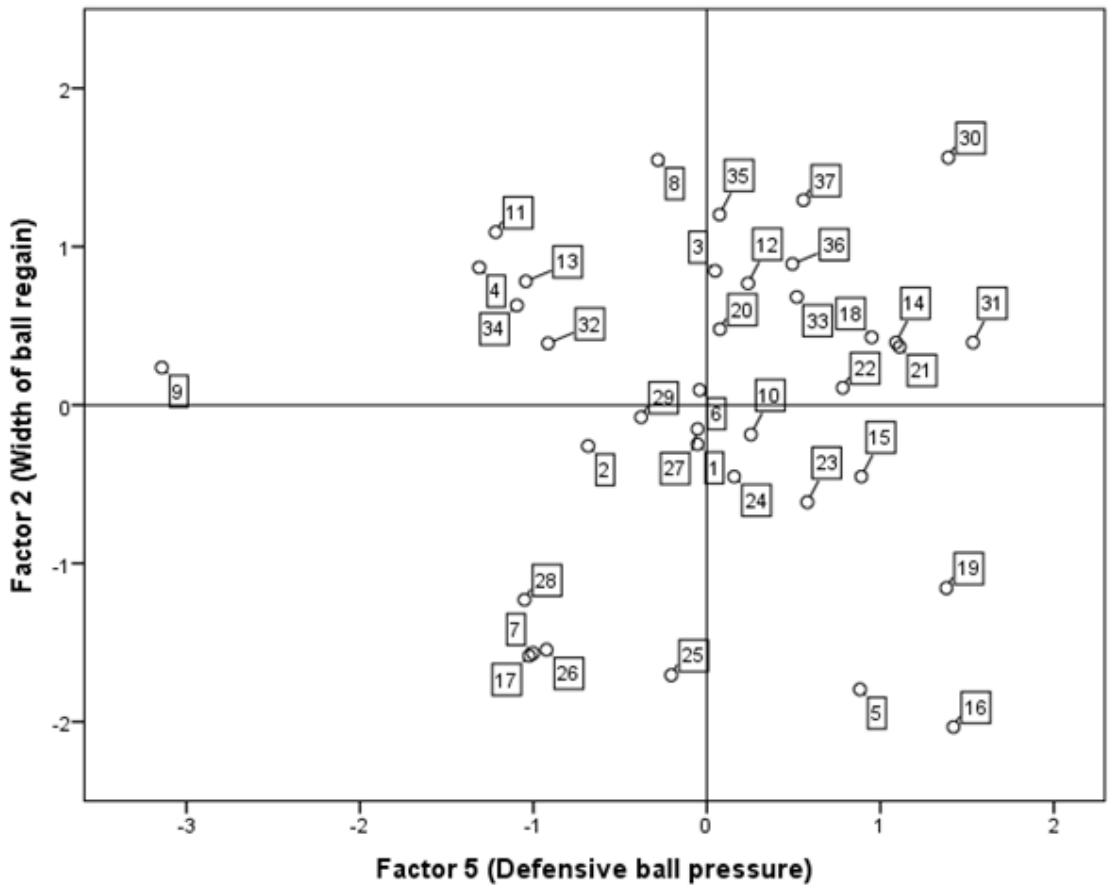


Figure 9. Defensive styles of play of soccer teams according to factor 2 and factor 5

Notes: 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.

Table 4. Teams' attacking and defensive styles of play

Teams (season 2006-2007)	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	●●		●		●●		●●			●●		●

(continued)

Table 4. (Continued)

Teams (season 2010-2011)	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. Villareal		●●	●		●		●		●		●	
37. Zaragoza	●			●		●●●	●		●●		●	

Note: Abbreviations for attacking and defensive styles of play: Direct (D), Possession (P), Crossing (C), No Crossing (NC), Wide Possession (WP), Narrow Possession (NP), Fast Progression (FP), Slow Progression (SP), Pressure on Wide Areas (PW), Pressure on Central Areas (PC), Low Pressure (LP), and High Pressure (HP).

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

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

3.4 Discussion

Defining different styles of play that soccer teams can adopt during a match may be important when analysing performance data. Therefore, the aim of the study was to identify and define the styles of play in elite soccer. Exploratory factor analysis extracted six factors that defined 12 different playing styles, split into eight attacking and four defending styles. Each factor defined two different styles of play based on a positive or negative factor score on the continuum. Furthermore, a team's score on each factor indicates their reliance on that specific style of play (see table 4).

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). 'Sideways passes', and 'possession of the ball' were the performance indicators that correlated negatively with this factor and suggested a possession style. The indicators that correlated positively and suggested a direct style were; 'possession of the ball' and 'sideways passes'. The performance indicator 'passes from defensive to attacking third' was also included for direct style of play interpretation as it showed a high positive score loading for factor 1. During season 2010-2011, Barcelona showed a considerable high score for possession style of play (see table 4). This team demonstrates a good representation of the possession style and it may be due to their playing philosophy and the highly skilled players in the team for passing abilities. It is suggested that the tactical principle of playing sideways causes imbalances in the opposition's defence, 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, for successful teams, possession style produced more goals per possession than the direct style. In comparison, Tenga, Holme, et al. (2010a) reported no difference in goals scored between these styles. Possibly, the long and short passing abilities and skill of players

influence the effectiveness of a direct or possession style. Moreover, opponent's defensive style of play can also have an impact on the team's direct or possession style.

Factor 2 differentiates two defensive styles; a style of play that implies regaining the ball close to the touchline, and a style where ball is regained in the central areas of the pitch. These styles have not been reported previously. Styles of play differentiated by factor 2 are associated with the performance indicators '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. Wright et al. (2011) reported that central ball regains are more likely to result in a scoring attempt compared to wide ball regains. In addition, recent studies showed successful teams normally regain the ball in central areas of the defensive and middle third (Barreira, Garganta, Guimaraes, Machado, & Anguera, 2014; Barreira, Garganta, Machado, & Anguera, 2014). This could possibly be because central areas provide different options of passing to the sides or forwards, whereas regaining the ball in the sides limit passing options due to the touchline. 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. Attacking styles of play of the opposition can also influence the defensive style of play employed by the team. Although the defensive team can lead the opposition players to specific areas of the pitch for conducting an attack (e.g. accumulating players in central areas and leaving free spaces on the sides for doing pressure to opposition in wide areas), a prevalence of an attacking style of play used by the opposition can affect the defensive style employed by the team.

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. Correlation between these indicators could suggest that teams using crossing might have more ball possession in the defensive third so that wide players have time to move into wide areas and execute a cross. Crossing is a tactic to create the chance of scoring (Ensum et al., 2005; Hughes & Franks, 2005a; Konstadinidou & Tsigilis, 2005; Lago-Peñas et al., 2010; Lago-Peñas et al., 2011; Oberstone, 2009; Pollard et al., 2004), however increases in scoring efficiency are not reported consistently (Flynn, 2001). Crossing can also be a risk due to the possibility of losing the ball and produce a counter-

attacking opportunity for opponents. Use of crosses might be more effective for teams that adopt this style and 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 lacks aerial abilities, as the probability of taking advantage of their mistakes would be increased.

Possession width (factor 4), suggest the differentiation between wide and narrow possession styles. These styles are associated with the percentage of ball possession teams have in central or wide areas, however 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 performance indicators associated with this factor. The former performance indicator correlated highly with the latter, which could be due to easier maintenance of ball possession in attacking third wide areas compared to central areas. However, central areas could be larger in surface, so caution should be applied when interpreting this playing style. Moreover, due to the goal position, percentage of possession in central areas could be influenced. Betis was the team, during season 2006-2007, that relied the most on a wide possession style (see table 4). The position of skilled players on the sides of the pitch and the use of playing formations that accumulated players in these areas could explain the high score of this team for this style. Attacking third central areas are dangerous for defensive teams 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 more 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 the abilities of the wide and central players of the team. For example, teams with skilled wide midfielders and/or fullbacks would utilise the wide possession style of play due to the abilities of these players for

maintaining ball possession. Opponent's defensive style of play could also influence the use of narrow or wide possession style.

Factor 5 identifies teams that use high or low pressure defensive styles of play. 'Number of regains in the attacking third' was the performance indicator that correlated negatively with this factor. Moreover, 'passes from defensive to middle third' also had a high positive score loading for this factor, and this could suggest that teams that move the ball from defensive to middle third to build the attack, tend to regain the ball in these areas. In season 2006-2007, Osasuna was the team that employed the high-pressure style in the most emphasised way (see table 4). A high pressure style could cause a risky situation for the defensive team due to the space produced behind the defensive players or the space between players in case that the team failed to keep compactness. However, it can also influence scoring opportunities because the ball can be regained closer to the opponent's goal, while increasing the likelihood of facing an imbalanced defence (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 due to time and space denied to attacking players, while increasing the chances of scoring opportunities.

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 could 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 performance indicator 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 secure or support ball possession by passing the ball to 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 defence 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 performance indicators 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. 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.

In conclusion, 12 (eight attacking and four defensive) different playing styles and associated performance indicators utilised in elite soccer were identified in this dataset.

Furthermore, the selected factors together explained 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 objectively determine the styles they use and their reliance on specific styles to create playing style profiles and normative profiles for associated performance indicators. These profiles can be used to benchmark team's 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 performance indicators. This data could be used to prepare tactics that would perturb the opponent's dominant style(s) and identify strengths and weaknesses of the opposition. 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 provided contradictory evidence when measuring performance indicators associated with success in isolation of factors (i.e., style of play, home advantage, type of competition, quality of opponents, and quality of team) that might affect the value. Therefore, differences in performance indicators might be a factor of their playing styles. Researchers should be aware of these different styles and were possible integrate this into their analysis. 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. These variables could also explain the missed percentage of the variance. Moreover, interaction process should be considered for a more accurate analysis of styles of play as opponent's tactics can also influence the style of play employed by a team. This study provides an introduction to analysing playing styles. More variables and matches should be considered to supply conclusive definitions for playing styles and generalisability of the data. Further research should attempt to establish the efficiency and effectiveness of playing styles when measuring performance and outcomes (i.e., scoring probability).

CHAPTER 4: Influence of contextual variables on styles of play in soccer

4.1 Background

Tactical match analysis represents an important aspect when analysing teams in soccer (Carling et al., 2005; Rein & Memmert, 2016). Previous studies analysed different attacking and defensive tactical variables in soccer such as ball possession (Bradley, Lago-Peñas, Rey, & Gomez-Diaz, 2013; da Mota, Thiengo, Gimenes, & Bradley, 2016; Link & Hoernig, 2017), ball recovery (Barreira, Garganta, Guimaraes, et al., 2014; Liu, Hopkins, & Gomez, 2016), passing variables (Goncalves et al., 2017; Hughes & Franks, 2005a; Redwood-Brown, 2008; Rein et al., 2017), shooting variables (Ensum et al., 2005; Lago-Peñas et al., 2010), pressure (Link, Lang, et al., 2016), set plays (Casal et al., 2014; Casal, Maneiro, Arda, Losada, & Rial, 2015; Link, Kolbinger, Weber, & Stockl, 2016), team formation (Bradley et al., 2011; Carling, 2011), and their link to performance in match play. Furthermore, contextual variables (e.g. match play, venue, quality of opposition) influence tactical variables and should be considered when analysing soccer match play (Mackenzie & Cushion, 2013).

Match status is one of the contextual variables that influence tactical behaviour in soccer. For instance, losing teams tend to defend in more advanced zones of the pitch (Almeida et al., 2014), losing teams increase ball possession compared to winning or drawing teams (Lago, 2009), and losing or drawing teams prefer long passing sequences, whereas winning teams prefer shorter passing sequences (Paixao, Sampaio, Almeida, & Duarte, 2015). These results provide useful insights about the behaviour of the teams when match status changes. Nevertheless, a more detailed classification of the winning and losing states (i.e. winning or losing by smaller or larger margins) could also provide a better estimation of teams' tactical behaviours (Gomez, Lorenzo, Ibanez, & Sampaio, 2013).

Similarly, researchers have investigated the influence of venue (i.e. playing home or away) on tactical variables during match play. Some of the previous findings showed

that away teams regain the ball and place the position of their defensive line closer to their own goal (Santos, Lago-Peñas, & Garcia-Garcia, 2017), and that has an increase in the total passes played in the defensive pitch third and a decrease in the total of passes played in the attacking pitch third in comparison when playing home (Taylor et al., 2010). Home advantage is a phenomenon that has been widely studied in soccer (Lago-Peñas, Gomez, & Pollard, 2017; Pollard, 2006; Pollard & Gomez, 2009), and is often higher when compared to other sports, such as Baseball, Basketball, Hockey, Rugby or Football (Jamieson, 2010). Therefore, venue is an important variable to consider due to its impact on match play performance.

Furthermore, the quality of opposition has an impact on tactical variables. Generally, teams with a higher ranking have higher ball possession values compared to lower ranking teams (Bradley et al., 2014; Lago, 2009). In addition, according to a one team case study, ball recovery location and the defensive line are closer to a team's own goal when the opposition is stronger (Santos et al., 2017). Hence, quality of opposition seemed to affect tactical behaviour in soccer. Moreover, the interaction between venue and quality of opposition shows that teams playing against stronger opposition decrease ball possession compared when playing at home (Lago, 2009). However, previous research examining the influence of opposition quality, venue and match status have often used isolated variables or performance indicators, therefore limiting our understanding of tactical behaviour (Mackenzie & Cushion, 2013).

More recently, styles of play in soccer explain a broader concept of tactical behaviour, where these tactical variables and performance indicators contribute to them. Recent studies proposed a theoretical framework to measure styles of play (Hewitt et al., 2016) and quantified the use of attacking and defensive styles of play in soccer (Fernandez-Navarro, Fradua, Zubillaga, Ford, & McRobert, 2016). Behaviour indexes (Kempe et al., 2014), multivariate statistical approaches (Moura, Martins, & Cunha, 2014), and spatio-temporal analysis (Memmert et al., 2017) have also been used to identify tactics and potentially identify styles of play. A previous study examined the influence of match location on possession types in soccer considered as direct play and possession play. Although this research showed an initial approach to assess the effect of contextual variables on playing tactics related to styles of play, venue was the only contextual

variable employed and a more detailed styles of play framework should be provided (Tenga, Holme, Ronglan, & Bahr, 2010c). As a consequence of the novel research examining styles of play in soccer, no previous research has evaluated the effect of the contextual variables on them. Therefore, the aims of the present study were to analyse the effect of match status, venue, and quality of opposition on the styles of play in soccer.

4.2 Methods

4.2.1 Match Sample

Match data from all 380 games of the 2015-2016 English Premier League (EPL) season were included in the study. There were 38 games for each of the 20 teams participating in the league, so an equal number of matches for every team was available. Data were obtained from a valid and reliable computerised multiple camera match analysis tracking system (STATS LLC, Chicago, IL, USA) (Bradley, O'Donoghue, Wooster, & Tordoff, 2007; Di Salvo, Collins, McNeill, & Cardinale, 2006).

4.2.2 Procedure

A total of 380 individual games files containing all team possessions (N = 94966) for the season were merged into a single file using KNIME Analytics Platform (KNIME GmbH, Konstanz, Germany). Each possession was allocated a percentage membership score for the 8 styles of play defined by STATS (see table 5). Each possession is given a value from 0 to 1 for each of the styles and any possession can score on multiple styles. For instance, a team possession could involve the use of Build Up (.8), Sustained Threat (.5), and Fast Tempo(.25) styles (Ruiz, 2016). Set plays were removed from the dataset as no clear styles occur during these actions. Possessions with values of 0 for every style were also removed as they represented quick turnovers of possession (e.g. a tackle, turnover possession followed by another tackle and turnover or an interception), leaving a total of 68766 possessions for analysis. The contextual variables match status, venue, and quality of opposition were also recorded for each possession. The five match status

categories were losing by two goals or more, losing by one goal, drawing, winning by one goal, and winning by two goals or more. Most of the previous studies have only focused on analysing winning, drawing or losing in match status (Lago, 2009; Santos et al., 2017; Vogelbein et al., 2014). In contrast, other research considered each possible scoreline occurring when analysing team performance (Redwood-Brown, 2008). We believe that distinctions between these losing and winning status based on the number of goals should be made because one goal advantages/disadvantages could influence the styles of play differently compared to two or more goals advantages/disadvantages (e.g. with a two goals advantage, receiving one goal will not change the wining status, however with a one goal advantage, receiving one goal will change the match status to drawing). Venue was categorised as playing home or away, whereas quality of opposition was measured according to the difference in the teams ranking position at the end of the season (Lago-Peñas, Gomez-Ruano, Megias-Navarro, & Pollard, 2016; Lago-Peñas et al., 2017). Therefore, a positive value in this ranking difference indicates facing a strong opposition and, on the other hand, a negative value represents facing a weak opposition. The highest the absolute value of this ranking difference the stronger or weaker opposition is faced (e.g. a ranking difference of +14 shows that the team is facing an opposition team that is 14 positions above in the ranking).

Table 5. Styles of play definitions by STATS LLC

Style of Play	Definition
Direct Play	Captures instances of play where teams attempt to move the ball quickly towards the opposition's goal through the use of long passes. Specifically, it looks at the distance gained forward every time a team makes use of any of the following events: pass, direct free-kick pass, indirect free-kick pass, cross, direct free-kick cross, indirect free-kick cross, goal kick, goalkeeper throw, goalkeeper kick, throw in, or clearance. The forward distance gained must be greater than 20 metres and reaches 100% at 40 metres.
Counterattack	A team regains possession and moves the ball into an attacking area via passes, dribbles or a combination of both. The ball must reach a target location within the opposition's half. This location varies depending on the regain location. The speed of the transition from a regain to a target location determines the Counter Attack value. The quicker the ball is moved up the pitch, the higher the Counter Attack value. Counter attack regains include: goal keeper catch, goal keeper save, interception, clearance, header, tackle and block. Counter Attack distance gained include: touch, dribbling, clearance and pass.
Maintenance	Captures possessions in which a team looks to maintain possession of the ball within the defensive area of the pitch. The time spent in possession directly relates to the Maintenance membership value. The team must have a passage of play lasting more than 10 seconds. From then on, the membership value increases linearly up until 30 seconds where it reaches 100%.
Build Up	Captures long and controlled ball possessions – but is aimed at periods of play where a team is looking for opportunities to attack. The calculation is similar to Maintenance with the differences being the zone on the pitch and the time thresholds. The Build Up area is between the halfway line and the opposition's penalty area and the passage of play must last more than 8 seconds. From then on, the membership value increases linearly up until 25 seconds where it reaches 100%.
Sustained Threat	Similar to Maintenance and Build Up. However, here the focus lies on possessions in the attacking third of the pitch. The time spent in possession must be more than 6 seconds, reaching 100% at 20 seconds.
Fast Tempo	Captures when the team is moving the ball quickly to increase the tempo and speed of the game. Fast Tempo looks at sequences of consecutive individual 'fast possessions'. An individual fast possession must occur in the opposition's half and can be achieved as follows: the player releases the ball to a team mate in less than 2 seconds, or the player dribbles at a high tempo.
Crossing	It occurs if the ball is delivered from a wide area of the pitch with the intention of finding a teammate. All Crossing events in a possession are assigned a value of 100%. The value assigned to the team possession can only be 0% or 100% depending on the occurrence of a crossing event. Crossing events are: cross, corner cross, direct free-kick cross and indirect free-kick cross.
High Pressure	Captures how high up the pitch teams regain possession. The first factor taken into consideration is the location where the team wins the ball: High Press regains are those higher than 5 metres prior to the halfway line. The value increases linearly up until 15 metres into the opposition's half where it reaches 100%. The second factor is the opposition's time in possession prior to the High Press regain happening. To retain the full value established based on the regain location, the opposition must have been in possession for at least 10 seconds. This time factor is introduced to try and capture controlled pressing efforts rather than 'counter press' regains. The combination of these two factors leads to the final High Press membership value. Regain events include: interception, header, tackle and block.

4.2.3 Statistical analysis

A linear mixed model (LMM) was carried out for each of the eight styles using the MIXED procedure of the software SPSS v.23.0 for Windows (IBM, Armonk, NY USA). LMM organises data into a hierarchical structure by creating nesting units. For example, ball possessions are nested into matches. Ball possessions and matches represent two different levels were matches are higher in the hierarchy than ball possessions. In addition, model complexity can increase when more levels are added. For example, balls possessions can be nested into matches, and these matches can also be nested into teams. This represents a 3 levels structure being the unit team the higher in the hierarchy. A cross-classified multilevel design (Heck, Thomas, & Tabata, 2014) was developed considering matches and teams as the nesting levels. Therefore, the variables match and team were considered as random effects. The cross-classified multilevel models are suitable for data structures that are not purely hierarchical. In other words, data structures where units in one level are not nested only in a higher level. For example, matches are nested in two different teams as there are two teams participating in the game. Match status, venue, and quality of opposition (i.e. ranking difference) were considered as fixed effects in the models. In addition, random slopes of these fixed effects and interactions between them were also checked to verify if they had a significant contribution to each model. We applied a general multilevel-modelling strategy (Heck et al., 2014) where we included fixed and random effects in different steps from the simplest to the most complex. The simplest model and the first one to apply was a 'Null' model were only the dependent variable (i.e. the style of play) in the hierarchy structure is modelled. No predictors (i.e. match status, venue, and quality of opposition) are added into this model. Later, the individual level random intercept is developed to examine the effect of the predictors at the individual level. Then, a group level random intercept model is developed including the predictors of the individual level. This model allows us to evaluate the effect of the other predictors on the dependent variable. Next, random slopes of the predictors are added in a following model to check if these variables randomly vary across units. In case any significant results are found when running the models with predictors with random slopes, interactions should be checked in following models to evaluate if they explain the variability in the random slopes. Model comparison for each step was done using the

Akaike information criterion (AIC) (Akaike, 1973) where a lower value represented a better model, and a chi-square likelihood ratio test (Field, 2017). In other words, models were compared by subtracting the log-likelihood of the new model from the value of the old one and considering the degrees of freedom equal to the difference in the number of parameters between the two models. Besides de AIC, a lower value of the chi-square log-likelihood test represented a better model and showed if the changes were significant. These comparisons were done between each model according to the steps described above. After adding an additional predictor, random slope, or interaction, model comparison was performed to assess the improvement in the new model. Final models presented in table 6 were chosen according to better values of AIC, log-likelihood, and significant effect of variables. We used maximum likelihood (ML) estimation for model comparison and for the final model of each style of play we refitted the best model again using restricted maximum likelihood (REML) estimation. ML estimation was employed for model comparison as chi-square likelihood ratio tests requires this type of estimation (Field, 2017; Heck et al., 2014). We reported marginal and conditional R^2 metrics (Nakagawa & Schielzeth, 2013) for each LMM to provide some measure of effect-sizes. The level of significance was set to 0.05.

4.3 Results

The effects of match status, venue and quality of opposition on each of the eight styles of play employed by teams are shown in table 6.

Table 6. Effects of match status, venue and quality of opposition on each of the 8 styles of play measured in the 2015-2016 English Premier League

	Direct Play			Counterattack		
Fixed effects	β	95% CI	*P*	β	95% CI	*P*
Intercept	0.396	0.365, 0.427	<0.001	0.048	0.044, 0.052	<0.001
Match status (-2 or more)	-0.075	-0.097, -0.052	<0.001	-0.004	-0.009, 0.001	0.098
Match status (-1)	-0.052	-0.071, -0.034	<0.001	-0.003	-0.007, 0.001	0.100
Match status (+1)	0.075	0.057, 0.094	<0.001	0.014	0.010, 0.017	<0.001
Match status (+2 or more)	0.070	0.047, 0.093	<0.001	0.018	0.013, 0.023	<0.001
Venue (away)	0.057	0.048, 0.067	<0.001	-	-	-
Quality opposition	0.003	0.002, 0.005	<0.001	-	-	-
Match status (-2 or more) * Quality opposition	-0.003	-0.005, -<0.001	0.022	-	-	-
Match status (-1) * Quality opposition	-0.002	-0.004, -0.001	0.003	-	-	-
Match status (+1) * Quality opposition	0.001	-0.001, 0.002	0.498	-	-	-
Match status (+2 or more) * Quality opposition	0.001	-0.001, 0.003	0.401	-	-	-
Venue (away) * Quality opposition	-	-	-	-	-	-
Random effects	β	95% CI	*P*	β	95% CI	*P*
Match	<0.001	<0.001, 0.001	0.009	<0.001	<0.001, <0.001	0.008
Match status	0.001	0.001, 0.002	<0.001	-	-	-
Quality opposition	<0.0001	<0.001, <0.001	<0.001	-	-	-
Team	0.004	0.002, 0.007	0.004	<0.001	<0.001, <0.001	0.008
Match status	<0.001	<0.001, 0.001	0.006	-	-	-
Residuals	0.177	0.175, 0.179	<0.001	0.028	0.028, 0.028	<0.001
$R^2_{(m)}$		0.016			0.002	
$R^2_{(c)}$		0.049			0.005	

β, beta coefficient; CI, confidence interval. Statistical significance set at $P < 0.05$.
Intercepts represent a draw and playing home.

Table 6. (Continued)

	Maintenance			Build Up		
Fixed effects	β	95% CI	*P*	β	95% CI	*P*
Intercept	0.135	0.122, 0.148	<0.001	0.096	0.083, 0.109	<0.001
Match status (-2 or more)	-0.009	-0.019, 0.001	0.080	0.035	0.025, 0.046	<0.001
Match status (-1)	-0.013	-0.019, -0.006	<0.001	0.025	0.017, 0.034	<0.001
Match status (+1)	-0.022	-0.029, -0.016	<0.001	-0.018	-0.027, -0.009	<0.001
Match status (+2 or more)	-0.024	-0.034, -0.014	<0.001	-0.013	-0.024, -0.002	0.021
Venue (away)	-	-	-	-0.012	-0.016, -0.007	<0.001
Quality opposition	-0.001	-0.001, -<0.001	0.004	-0.002	-0.003, -0.002	<0.001
Match status (-2 or more) * Quality opposition	0.001	<0.001, 0.003	0.015	-	-	-
Match status (-1) * Quality opposition	0.001	<0.001, 0.002	0.013	-	-	-
Match status (+1) * Quality opposition	- <0.001	-0.001, 0.001	0.710	-	-	-
Match status (+2 or more) * Quality opposition	-0.002	-0.003, -0.001	0.001	-	-	-
Venue (away) * Quality opposition	-	-	-	-0.001	<0.001, 0.002	0.019
Random effects	β	95% CI	*P*	β	95% CI	*P*
Match	0.001	0.001, 0.001	<0.001	<0.001	<0.001, 0.001	<0.001
Match status	<0.001	<0.001, 0.001	<0.001	<0.001	<0.001, 0.001	<0.001
Quality opposition	-	-	-	<0.001	<0.001, <0.001	<0.001
Team	0.001	<0.001, 0.001	0.003	0.001	<0.001, 0.001	0.005
Match status	-	-	-	<0.001	<0.001, <0.001	0.020
Residuals	0.058	0.058, 0.059	<0.001	0.047	0.046, 0.047	<0.001
$R^2_{(m)}$		0.002			0.009	
$R^2_{(c)}$		0.030			0.042	

β, beta coefficient; CI, confidence interval. Statistical significance set at $P < 0.05$.
Intercepts represent a draw and playing home.

Table 6. (Continued)

	Sustained Threat			Fast Tempo		
Fixed effects	β	95% CI	*P*	β	95% CI	*P*
Intercept	0.080	0.071, 0.088	<0.001	0.033	0.027, 0.040	<0.001
Match status (-2 or more)	0.020	0.013, 0.027	<0.001	0.006	0.002, 0.011	0.009
Match status (-1)	0.017	0.011, 0.022	<0.001	0.002	-0.001, 0.006	0.250
Match status (+1)	-0.011	-0.016, -0.006	<0.001	<0.001	-0.003, 0.004	0.859
Match status (+2 or more)	-0.010	-0.017, -0.003	0.007	0.012	0.007, 0.016	<0.001
Venue (away)	-0.018	-0.026, -0.014	<0.001	-0.004	-0.006, -0.001	0.006
Quality opposition	-0.001	-0.002, -0.001	<0.001	-0.001	-0.001, -0.001	<0.001
Match status (-2 or more) * Quality opposition	-	-	-	-	-	-
Match status (-1) * Quality opposition	-	-	-	-	-	-
Match status (+1) * Quality opposition	-	-	-	-	-	-
Match status (+2 or more) * Quality opposition	-	-	-	-	-	-
Venue (away) * Quality opposition	-	-	-	-	-	-
Random effects	β	95% CI	*P*	β	95% CI	*P*
Match	<0.001	<0.001, <0.001	0.101	<0.001	<0.001, <0.001	0.012
Match status	<0.001	<0.001, 0.001	<0.001	<0.001	<0.001, <0.001	<0.001
Quality opposition	<0.001	<0.001, <0.001	<0.001	<0.001	<0.001, <0.001	<0.001
Team	<0.001	<0.001, 0.001	0.004	<0.001	<0.001, <0.001	0.006
Match status	-	-	-	-	-	-
Residuals	0.037	0.036, 0.037	<0.001	0.020	0.020, 0.020	<0.001
$R^2_{(m)}$		0.006			0.003	
$R^2_{(c)}$		0.026			0.022	

β, beta coefficient; CI, confidence interval. Statistical significance set at $P < 0.05$.
Intercepts represent a draw and playing home.

Table 6. (Continued)

	Crossing			High Pressure		
Fixed effects	β	95% CI	*P*	β	95% CI	*P*
Intercept	0.174	0.164, 0.183	<0.001	0.076	0.073, 0.080	<0.001
Match status (-2 or more)	0.049	0.037, 0.060	<0.001	0.002	-0.005, 0.009	0.544
Match status (-1)	0.045	0.036, 0.054	<0.001	-0.001	-0.006, 0.003	0.602
Match status (+1)	-0.048	-0.057, -0.040	<0.001	-0.009	-0.013, -0.004	<0.001
Match status (+2 or more)	-0.045	-0.057, -0.033	<0.001	-0.011	-0.018, -0.004	0.003
Venue (away)	-0.040	-0.046, -0.033	<0.001	-0.010	-0.013, -0.006	<0.001
Quality opposition	-0.002	-0.003, -0.001	<0.001	-<0.001	-0.001, -<0.001	0.019
Match status (-2 or more) * Quality opposition	-	-	-	<0.001	-0.001, 0.001	0.831
Match status (-1) * Quality opposition	-	-	-	-<0.001	-0.001, 0.001	0.528
Match status (+1) * Quality opposition	-	-	-	-0.001	-0.001, <0.001	0.051
Match status (+2 or more) * Quality opposition	-	-	-	-0.001	-0.002, -<0.001	0.004
Venue (away) * Quality opposition	-	-	-	-	-	-
Random effects	β	95% CI	*P*	β	95% CI	*P*
Match	<0.001	<0.001, 0.001	0.021	<0.001	<0.001, <0.001	<0.001
Match status	<0.001	<0.001, 0.001	0.009	-	-	-
Quality opposition	<0.001	<0.001, <0.001	<0.001	<0.001	<0.001, <0.001	<0.001
Team	<0.001	<0.001, 0.001	0.22	<0.001	<0.001, <0.001	0.043
Match status	-	-	-	-	-	-
Residuals	0.128	0.127, 0.130	<0.001	0.038	0.037, 0.038	<0.001
$R^2_{(m)}$		0.008			0.001	
$R^2_{(c)}$		0.015			0.005	

β, beta coefficient; CI, confidence interval. Statistical significance set at $P < 0.05$.
Intercepts represent a draw and playing home.

4.3.1 Match status

Compared to drawing, teams losing had a decrease in Direct Play ($P < 0.001$ for losing by one and losing by two or more goals) and Maintenance ($P < 0.001$), and an increase in Build Up ($P < 0.001$ for losing by one and losing by two or more goals), Sustained Threat ($P < 0.001$ for losing by one and losing by two or more goals), and Crossing ($P < 0.001$ for losing by one and losing by two or more goals). In addition, an increase in Fast Tempo ($P < 0.05$) was observed when teams were losing by two or more goals. In contrast, there were decreases in Maintenance ($P < 0.001$ for winning by one and winning by two or more goals), Build Up ($P < 0.001$ and $P < 0.05$ for winning by one and winning by two or more goals respectively), Sustained Threat ($P < 0.001$ and $P < 0.01$ for winning by one and winning by two or more goals respectively), Crossing ($P < 0.001$ for winning by one and winning by two or more goals) and High Pressure ($P < 0.001$ and $P < 0.01$ for winning by one and winning by two or more goals respectively), and an increase in Direct Play ($P < 0.001$ for winning by one and winning by two or more goals), Counterattack ($P < 0.001$ for winning by one and winning by two or more goals) and Fast Tempo ($P < 0.001$) for teams winning by two or more goals.

There was an interaction between match status and quality of opposition for Direct Play, Maintenance, and High Pressure styles. Direct Play decreased more when teams faced stronger opposition and were losing by one, or by two or more goals ($P < 0.01$ and $P < 0.05$ respectively). Maintenance increased when losing by one, or by two or more goals when facing stronger opposition ($P < 0.05$). In contrast, maintenance decreased when winning by two or more goals ($P <0.001$) against stronger opponents. High Pressure decreased when teams were winning by two or more goals against stronger opponents ($P <0.01$).

4.3.2 Venue

Away teams increased Direct Play ($P < 0.001$) and decreased Build Up ($P < 0.001$), Sustained Threat ($P < 0.001$), Fast Tempo ($P < 0.01$), Crossing ($P < 0.001$) and High Pressure ($P < 0.001$), in comparison to home teams. A significant interaction between venue and quality of opposition was observed for Build Up. Away teams decreased Build Up ($P < 0.05$) when facing stronger opponents.

4.3.3 Quality of opposition

There was an increase in Direct Play ($P < 0.001$), and decrease in Maintenance ($P < 0.01$), Build Up ($P < 0.001$), Sustained Threat ($P < 0.001$), Fast Tempo ($P < 0.001$), Crossing ($P < 0.001$) and High Pressure ($P < 0.05$) against stronger opposition.

4.4 Discussion

The aim of the present study was to examine the effect of match status, venue, and quality of opposition on different styles of play in soccer. The findings suggest that these contextual variables influence styles of play and should be considered when reviewing match play. However, these effects showed a small effect size on the styles of play measured. As some styles were infrequent, low values for these styles of play were shown in the normative profiles. Nevertheless, significant results showed that contextual variables produced a change in the average use of a style of play, even if it appeared as a low value. Mixed models also showed that these normative profiles could change across matches and teams, therefore teams demonstrated different tactical behaviours under different contexts. To our knowledge, this is the first study investigating the effect of contextual variables on styles of play used by teams in soccer.

Match status had a significant effect on the eight styles of play measured. For instance, losing teams decreased their use of direct play and increased build up and sustained threat. Whereas, winning teams increased their use of direct play and counterattack, and decreased the use of maintenance, build up, and sustained threat. Maintenance, build up and sustained threat are associated with ball possession, therefore teams who prefer a possession-based approach score higher on these styles. A possible explanation for winning teams reduction in these styles could be a focus on maintaining the advantage through defending, which results in reduced possession time (Jones et al., 2004; Redwood-Brown, 2008). Moreover, this could also explain their increase in the use of direct play and counterattack when winning as these styles allow the team to keep players close to the own goal and taking advantage of the advanced position of opposing teams to try to score. On the other hand, teams losing decreased the use of direct play and increased the use of build up and sustained threat to try maintain the

attack close to the oppositions goal. In addition, the retreat of the opposition team close to their goal could also cause this behaviour. These results are in line with previous studies that showed that ball possession by teams increased when losing and decreased when winning and drawing (Bradley et al., 2014; Jones et al., 2004; Lago, 2009; Lago & Martin, 2007) and that winning teams can take advantage of direct play and counterattack (Garcia-Rubio, Gomez, Lago-Peñas, & Ibanez, 2015).

Fast tempo style of play was affected in the extreme cases of match status (i.e. winning or losing by two or more goals). Teams winning or losing by a high margin of goals increased the use of fast tempo compared to a drawing status. The findings by Wallace and Norton (2014) showed that fast ball movement, generated by a combination of high passing rates and high ball speed, were advantageous in soccer. Therefore, teams losing by two or more goals could employ this style of play to create space in the opposing half and achieve a goal as soon as possible to allow them more possibilities of obtaining draw or win the game. In contrast, teams winning by a margin of two or more goals increased the use of this style possibly as a tactic to avoid intense pressure from the opposing team that is in a hurry to regain the ball and score as soon as possible. Furthermore, crossing decreased when winning and increased when losing. Previous research (Casamichana et al., 2013; Liu et al., 2015) reported that crosses were more frequent for losing teams, which might suggest that losing teams employ this tactic to create more goal scoring opportunities when attacking. The use of high pressure by winning teams decreased. This could help the team 'save' energy in the game as they do not need to make efforts to equalise the game. Interaction between match status and quality of opposition showed significant differences for direct play, maintenance and high pressure. Firstly, losing teams showed a decrease in the use of direct play and an increase in the use of maintenance when facing a stronger opposition, and showed a decrease in maintenance when winning and facing strong opposition. This could be explained by a strong reaction of the losing teams to try dominate possession against better opponents. Secondly, when teams were winning by two or more goals, the use of high pressure decreased when facing strong opposition. The strategy of these teams could be to maintain the scoreline and prevent the other team from scoring by employing a defence close to their own goal.

Venue showed a significant effect for all styles of play except counterattack and maintenance. According to previous research, ball possession increased for home teams (Lago-Peñas & Dellal, 2010; Lago, 2009; Lago & Martin, 2007). Our data supports this previously reported increase in possession for home teams, but more specifically that this is a result of increased possession during build up and sustained threat and a reduction in direct play. Therefore, home teams dominate possession in more attacking areas (i.e. attacking third) compared to away teams (Lago, 2009). Consequently, these results support home advantage phenomena in soccer and other sports. Although this aspect has been widely studied, the reasons for it are not clear (Carron, Loughhead, & Bray, 2005). Crowd support seems to be a major factor (Nevill & Holder, 1999), however, referee bias, psychological factors, familiarity with the pitch and travel effects seems to be also some of the possible explanations (Pollard & Pollard, 2005). In addition, the use of fast tempo, crossing, and high pressure were higher when playing home in comparison when playing away. These styles of play suggest aggressive play that aims to get as many scoring opportunities as possible and seems to be a team behaviour when the team is playing home (Lago-Peñas et al., 2017). Regaining ball possession in advanced zones of the pitch as a consequence of high pressure strategies is linked to success (Almeida et al., 2014), similarly as fast ball movement (Wallace & Norton, 2014). Therefore, this fact could explain this aggressive behaviour by home teams. An interaction between venue and quality of opposition was significant for build up. Teams playing away tend to decrease their use of build up when facing strong opposition. This could be because the stronger team at home team would further dominate ball possession and increase the home advantage effect.

Moreover, quality of opposition demonstrated an effect on all the styles of play except counterattack. Previous research observed that facing a strong opposition was associated with a decrease of ball possession (Lago-Peñas et al., 2011; Lago, 2009). The present study also showed that the direct play increased, whereas maintenance, build up, and sustained threat decreased when facing a stronger opposition. This suggests that weaker teams maintain players closer to their own goal and employ direct play, while stronger teams tend to dominate using possession-based styles. The use of fast tempo decreased when facing a strong opposition. As this style of play requires good

passing and dribbling abilities of players, it is expected that better teams have better players that are able to develop fast tempo in their ball possessions. In addition, results showed that the use of crossing was significantly higher when playing against weak opposition. Previous research indicated contradictory conclusions, showing that losing teams had higher averages for crosses (Lago-Peñas et al., 2010). Difference in crosses might be due different tactical behaviours between the Spanish League and English Premier League. Results of the present study also showed that the use of high pressure increased when facing a weaker opposition. This is in accordance with previous research showing that better ranked teams in the UEFA Champions League were more effective in applying high pressure (Almeida et al., 2014) and that facing a strong opposition made teams regain the ball and locate their defensive line closer to their own goal (Santos et al., 2017). Better teams could feel more confident defending next to the opposite goals, mainly because better players playing in these teams can perform this pressure successfully.

The current study uses a large data set from a full season, however data corresponded to a single league. Consequently, generalisation to other leagues and seasons is limited and should be considered with caution (Mackenzie & Cushion, 2013). As previous research showed with ball possession (Collet, 2013), it is possible that effects of contextual variables on styles of play employed by teams could be diminished in different contexts (e.g. non domestic leagues). In addition, the styles of play defined in this study are a proposal for styles of play in soccer. Maybe other researchers and practitioners could consider different ways to define the same styles of play described in this study or even consider different ones. However, the approach employed in this study is generally in accordance with previous research and practitioners' points of view. Moreover, event data was used for this study and the use of spatio-temporal data could provide a more insightful analysis of team behaviour (Link, Lang, et al., 2016; Memmert et al., 2017). As a consequence of the previous reasons, caution is needed when interpreting the present findings. Future research should extend the investigation to other leagues and seasons to account for more different situations. The results of this study and the approach employed could be used by coaches, performance analysts, and other practitioners in practice. Knowing the behaviour of teams under specific

contextual variables will prepare teams to react to their opponents and improve their tactics on training. Similar models could be applied to evaluate the influence of contextual variables on other leagues and teams.

CHAPTER 5: Evaluating the effectiveness of styles of play in elite soccer

5.1 Background

Soccer is an invasion sport that requires players of two opposing teams to interact directly and concurrently to achieve the games primary objective (i.e., score more or concede fewer goals). Furthermore, due to the continuous action and dynamic environment, teams' transitions often occur rapidly between attacking and defensive phases of play. Hewitt et al. (2016) identified five moments of play that include established attack, transition from attack to defence, established defence, transition from defence to attack, and set plays. During these moments of play, teams increase or reduce space and time to create or restrict attempts at goal.

In contrast to other invasion sports, soccer is a low goal scoring game with a lower prevalence of goal attempts. For example, Tenga, Ronglan, et al. (2010) reported that from 1688 open play team possessions, 80 (4.7%) led to scoring opportunities and 167 (9.9%) score box possessions, whereas the remaining 1441 (85.4%) were other outcomes (i.e., no score box or lost possession in the defensive, middles or attacking third). Therefore, additional event based performance indicators such as ball possession, passes, shots, or ball recoveries have been examined, often in isolation to evaluate team performance and/or provide some insights into general behaviour, rather than measuring tactical behaviour (Bradley et al., 2014; Castellano et al., 2012; Liu et al., 2015).

More recently, researchers have used multiple performance indicators to create behaviour indexes, multivariate statistical approaches and spatio-temporal analysis (Rein & Memmert, 2016). For example, Kempe et al. (2014) developed the Index of Game Control (IGC) and Index of Offensive Behaviour (IOB) using a combination of performance indicators, which were sensitive enough to differentiate tactical behaviours of teams in the Bundesliga 2009-2010 and FIFA World Cup 2010. Clemente, Couceiro, Martins, Mendes, and Figueiredo (2013a, 2013b) used metrics (e.g. weighted

centroids, effective are of play) based on positional data to evaluate attacking and defensive tactical behaviour. Whereas, Fernandez-Navarro et al. (2016) employed principal component analysis to identify 8 attacking and 4 defending styles of play. Moreover, contextual variables such as match status, venue, and quality of the opposition can influence a soccer team's style of play (Fernandez-Navarro, Fradua, Zubillaga, & McRobert, 2018).

In addition to evaluating how performance indicators are associated with successful teams (Castellano et al., 2012; Harrop & Nevill, 2014; Lago-Ballesteros & Lago-Peñas, 2010; Liu, Hopkins, et al., 2016), researchers have assessed the effectiveness of specific attacking or defensive indicators. Collet (2013) evaluated the impact of ball possession on team success in five European leagues, UEFA, and FIFA tournaments from the period 2007-2010. They showed that ball possession predicted team success in domestic leagues, but it was a poor predictor when team quality and home advantage were included. In addition, Vogelbein et al. (2014) analysed ball possession recoveries of successful and unsuccessful teams during the Bundesliga 2010-2011 season and found that top teams required less time to regain ball possession, compared to other teams. Other researchers have focused on the effectiveness of set pieces such as free kicks (Casal et al., 2014; Casal et al., 2015) or penalty kicks (White & O'Donoghue, 2013).

Moreover, the effectiveness of more complex tactical behaviours have also been analysed. Rein et al. (2017) used Voronoi diagrams to analyse pass effectiveness by evaluating how many defending outfield players it bypasses and the space it creates next to the opponent's goal. Ball possessions effectiveness for teams was also evaluated using a quantitative measure (i.e. yield) based on the difference between the probability of scoring a goal and the probability of receiving it (Pollard & Reep, 1997). This measure was extended and applied to single actions in ball possessions (Szczepanski, 2008). These approaches form the basis for novel effectiveness measures employed in soccer match analysis and analytics.

New effectiveness metrics taking into account multiple variables have been developed recently. For example, expected goals (xG) is a metric used to assess the chance of a shot resulting in a goal (Rathke, 2017). Although this metric has become very popular recently in soccer, its origin is unclear. Different blogs and websites show several options for

calculating this metric in soccer and even in other team sports. Despite the use of multiple effectiveness measures for quantifying soccer performance, no previous study has assessed the effectiveness of styles of play in soccer match-play. Therefore, the study aim was to use a novel approach to evaluate the effectiveness of styles of play in soccer, while quantifying the influence of contextual variables such as match status, venue and quality of the opposition.

5.2 Methods

5.2.1 Match Sample

A total of 380 English Premier League (EPL) matches from the 2015-2016 season were used for the study. An equal number of matches (38 games for every team) from 20 teams participating in the league were available from STATS LLC. The validity and reliability of their computerised match analysis tracking system (STATS LLC, Chicago, IL, USA) has been previously quantified (Bradley et al., 2007; Di Salvo et al., 2006).

5.2.2 Procedure

A total of 94966 team possessions were extracted from the 380 EPL matches in the 2015-2016 season. For each of these possessions, a percentage membership score was provided for eight styles of play defined by STATS LLC (see table 5). Each team possession can have multiple scores across styles, therefore, a value between 0 and 100 was assigned to each style of play. Team possessions with a score of 0 across all styles (e.g. quick turnovers of possession) and set pieces were removed from the dataset. After filtering, a total of 68766 team possessions with a score above 0 were included in the model to evaluate playing style effectiveness. The total number of team possessions included for each style of play are shown in table 7.

Table 7. Descriptive statistics of the effectiveness per possession for each style of play

Style of Play	n	Mean ± SD
Direct Play	42266	0.625 ± 3.217
Counterattack	8503	1.607 ± 4.35
Maintenance	24618	0.643 ± 2.596
Build Up	17951	1.559 ± 4.067
Sustained Threat	14809	2.210 ± 5.441
Fast Tempo	4724	2.990 ± 5.729
Crossing	10635	5.085 ± 10.673
High Pressure	14547	0.632 ± 2.758

5.2.2.1 Expected Goals (xG)

Expected Goals (xG) and Ball Movement Points (BMP) metrics (developed by STATS LLC) were used to evaluate the effectiveness of each playing style. The xG measures the conversion probability of a shot based on pitch location and type of finish (e.g., shot, headed shot). The xG assigns a quality value ranging from 0 to 1 for each shot at goal with a higher value indicating a greater likelihood of a scoring opportunity. For instance, a headed shot from the central position on the edge of the six-yard box has an xG value of 0.3185. In other words, 31.85 % of shots taken from this position would end in a goal. Figure 10 shows an example of the xG values for all shots and headers for both teams in a whole match. This xG model is calculated using 31384 shots from three seasons of EPL data (2011-2012, 2012-2013, 2013-2014). Thus, this provided the basis for the Expected Goals model to calculate the likelihood of a shot resulting in a goal. A detailed explanation of the xG model and multiple sources that cover this metric can be found in Rathke (2017).

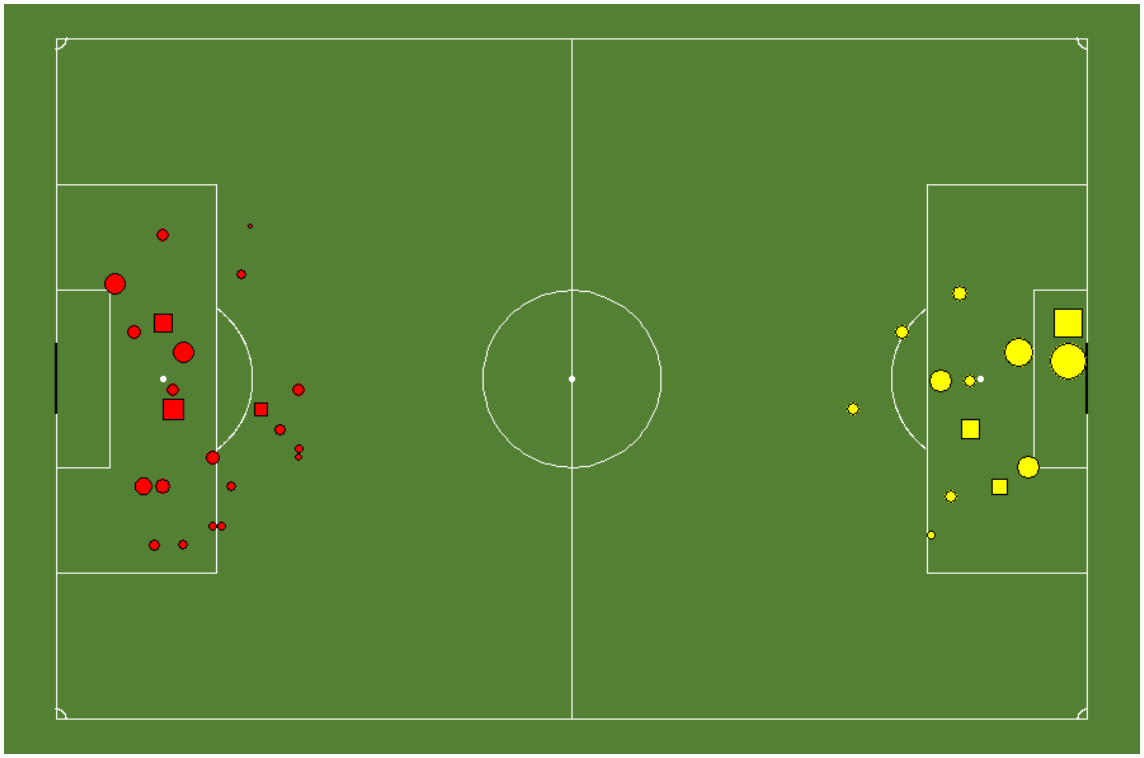


Figure 10. xG values of shots and headers in a match. Team A in red and Team B in yellow. A larger size of the symbol represents a higher probability to score a goal. Squares represent goals

5.2.2.2 Ball Movement Points (BMP)

The BMP is developed based on data from six full EPL seasons (2009-2010 to 2014-2015). To calculate a cumulative score, BMP measures each ball move in a possession according to the danger it causes the opposition. A ball move is characterised by a move start zone (i.e. where the player receives the ball or where the ball is resumed after a foul or ball out of play) and a move end zone (i.e. where the ball is delivered). Every ball move gets a shot score based on how many ball moves occurred prior to a shot. The BMP metric results from the shot score multiplied by the goal expectancy of the shot. For example, an assist with a shot score of 0.61 that leads to a shot with an xG value of 0.45 would result in a BMP value of 0.27. BMP values can be positive if ball moves are successful or negative if possession is lost to the opposition. The negative score equals the value of ball moves which originate at that start zone. Therefore, large negative values entail that the missed opportunity was better in comparison with negative values. The BMP values

of every move in a possession are summed to get the BMP value of the possession. For example, if a possession entails five moves, the sum of the BMP values of those five moves will be the final BMP value of the possession. In order to award BMP values, the pitch is divided into 34 zones as showed in figure 11. Zones in attacking half are more detailed due to the increase in danger as the ball gets closer to the opponent's goal, and the difficulty involved in advancing into these areas.

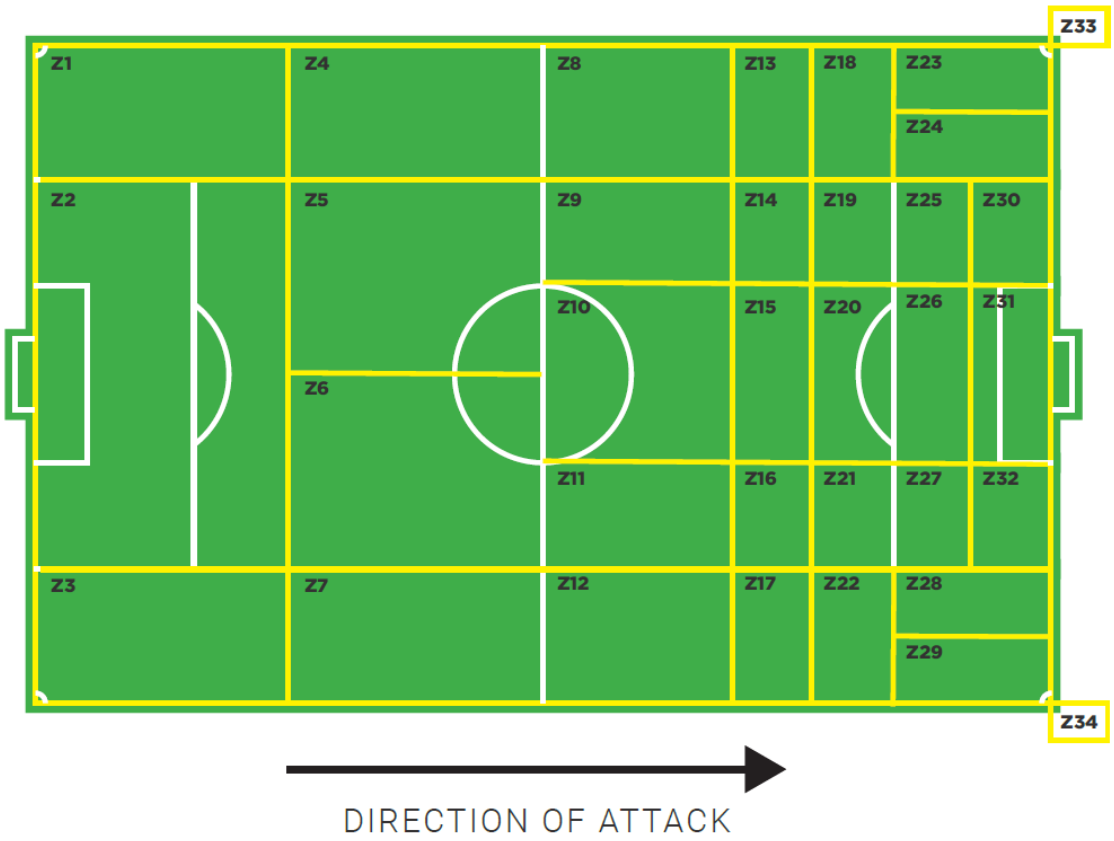


Figure 11. Pitch division to calculate Ball Movement Points (BMP)

5.2.2.3 Possession Effectiveness Index (PEI)

To evaluate the effectiveness of team possessions xG and BMP were combined. In the cases were a team possession ended in a shot, BMP and xG values were added to create a Possession Effectiveness Index (PEI) value. The following equation shows how PEI is calculated for each team possession:

$$PEI = \left(\sum_{i=1}^{n} positiveBMP_i\right) + negativeBMP + xG$$

This value was then multiplied by the styles of play scores to generate an effectiveness score for each style of play during the team possession. In addition, contextual variables match status (i.e. losing by two goals or more, losing by one goal, drawing, winning by one goal, and winning by two goals or more), venue (i.e. playing home or away) and quality of opposition (i.e., measured according to the difference in the teams ranking position at the end of the season), were recorded for each team possession.

5.2.3 Statistical analysis

All statistical tests were conducted using the R statistical software (R Core Team, 2017). A linear mixed model was performed for each of the eight styles of play using the lme4 package (Bates, Machler, Bolker, & Walker, 2015). Matches and teams were considered as nesting levels in this 3-level hierarchical structure (i.e. possessions, matches, teams). Hence a cross-classified multilevel design (Heck et al., 2014) was employed for the analysis. According to this structure, the variables match and team were modelled as random effects. The effectiveness score for each style of play was the dependent variable and contextual variables (i.e. match status, venue, and quality of opposition) were the fixed effects in the models. Random slopes for these fixed effects and their interactions were also checked in case they made a significant contribution to each model. A general multilevel-modelling strategy (Heck et al., 2014) was employed for each model. Consequently, fixed and random effects were included in different steps from the simplest to the most complex.

The Akaike information criterion (AIC) (Akaike, 1973) was used for model comparison in each step of the process. Lower values of the AIC indicated a better model. Chi-square likelihood ratio tests (Field, 2017) were also performed to compare models. In other

words, models were compared by subtracting the log-likelihood of the new model from the value of the old one and considering the degrees of freedom equal to the difference in the number of parameters between the two models. Besides de AIC, a lower value of the chi-square log-likelihood test represented a better model and showed if the changes were significant. These comparisons were made after the addition of a new variable, random slope, or interaction to evaluate if the model improved. The maximum likelihood (ML) estimation was used for model comparison and restricted maximum likelihood (REML) estimation was employed for the refitted final best model of each style of play (Field, 2017; Heck et al., 2014). Marginal and conditional R^2 metrics (Johnson, 2014; Nakagawa & Schielzeth, 2013) were provided for each LMM as a measure of effect size. The level of significance was set to 0.05.

5.3 Results

Descriptive statistics for each style of play's effectiveness is presented in table 7.

Table 8 shows the effectiveness for the eight styles of play measured in the English Premier League during the 2015-2016 season and the influence of contextual variables (i.e. match status, venue and quality of opposition). The results are presented in order, from the most to least effective styles of play per possession (intercept scores) for Crossing (5.053), Fast Tempo (2.872), Sustained Threat (2.153), Counterattack (1.508), Build Up (1.496), High Pressure (0.678), Maintenance (0.660) and Direct Play (0.648) based on reference circumstances (i.e. drawing and playing home).

Table 8. Effectiveness of the 8 styles of play controlling for contextual variables

	Direct Play				Counterattack			
Fixed effects	β (SE)	95% CI	t	*P*	β (SE)	95% CI	t	*P*
Intercept	0.648 (0.035)	0.579, 0.717	18.342	<0.001	1.508 (0.078)	1.356, 1.660	19.448	<0.001
Match status (-2 or more)	0.178 (0.062)	0.056, 0.301	2.856	0.004	-0.040 (0.184)	-0.400, 0.320	-0.218	0.828
Match status (-1)	0.038 (0.046)	-0.051, 0.128	0.840	0.401	-0.312 (0.136)	-0.580, -0.045	-2.289	0.022
Match status (+1)	-0.024 (0.045)	-0.111, 0.064	-0.532	0.595	0.355 (0.134)	0.093, 0.617	2.656	0.008
Match status (+2 or more)	0.155 (0.061)	0.036, 0.274	2.558	0.011	0.766 (0.171)	0.431, 1.100	4.482	<0.001
Venue (away)	-0.084 (0.032)	-0.146, -0.022	-2.657	0.008	-	-	-	-
Quality opposition	-0.018 (0.002)	-0.022, -0.013	-7.294	<0.001	-0.015 (0.006)	-0.028, -0.002	-2.313	0.023
Venue (away) * Quality opposition	-	-	-	-	-	-	-	-
Random effects	Estimate	SD			Estimate	SD		
Match	0.017	0.132			0.097	0.311		
Venue	-	-			-	-		
Quality opposition	-	-			-	-		
Team	0.009	0.093			0.020	0.142		
Residuals	10.298	3.209			18.706	4.325		
$R^2_{(m)}$		0.002				0.007		
$R^2_{(c)}$		0.005				0.013		

β, beta coefficient; SE, standard error; CI, confidence interval. Statistical significance set at $P < 0.05$.
Intercepts represent a draw and playing home.

Table 8. (Continued)

	Maintenance				Build Up			
Fixed effects	β (SE)	95% CI	t	*P*	β (SE)	95% CI	t	*P*
Intercept	0.660 (0.044)	0.573, 0.746	14.986	<0.001	1.496 (0.090)	0.335, 0.518	16.632	<0.001
Match status (-2 or more)	0.056 (0.061)	-0.063, 0.176	0.924	0.355	-	-	-	-
Match status (-1)	-0.009 (0.047)	-0.101, 0.082	-0.202	0.840	-	-	-	-
Match status (+1)	-0.060 (0.050)	-0.158, 0.038	-1.196	0.232	-	-	-	-
Match status (+2 or more)	0.151 (0.064)	0.025, 0.277	2.343	0.019	-	-	-	-
Venue (away)	-0.078 (0.033)	-0.143, -0.013	-2.350	0.019	-	-	-	-
Quality opposition	-0.015 (0.003)	-0.020, -0.009	-5.350	<0.001	-0.025 (0.005)	-0.017, -0.010	-4.904	<0.001
Venue (away) * Quality opposition	-	-	-	-	-	-	-	-
Random effects	Estimate	SD			Estimate	SD		
Match	0.014	0.117			0.074	0.273		
Venue	-	-			-	-		
Quality opposition	-	-			-	-		
Team	0.022	0.147			0.139	0.373		
Residuals	6.683	2.585			16.272	4.034		
$R^2_{(m)}$		0.003				0.003		
$R^2_{(c)}$		0.008				0.016		

β, beta coefficient; SE, standard error; CI, confidence interval. Statistical significance set at $P < 0.05$.
Intercepts represent a draw and playing home.

Table 8. (Continued)

	Sustained Threat				Fast Tempo			
Fixed effects	β (SE)	95% CI	t	*P*	β (SE)	95% CI	t	*P*
Intercept	2.153 (0.100)	0.425, 0.630	21.451	<0.001	2.872 (0.109)	2.659, 3.086	26.345	<0.001
Match status (-2 or more)	-	-	-	-	-	-	-	-
Match status (-1)	-	-	-	-	-	-	-	-
Match status (+1)	-	-	-	-	-	-	-	-
Match status (+2 or more)	-	-	-	-	-	-	-	-
Venue (away)	-	-	-	-	-	-	-	-
Quality opposition	-0.029 (0.007)	-0.016, -0.009	-4.012	<0.001	-0.032 (0.013)	-0.057, -0.007	-2.549	0.012
Venue (away) * Quality opposition	-	-	-	-	-	-	-	-
Random effects	Estimate	SD			Estimate	SD		
Match	0.115	0.339			0.336	0.580		
Venue	-	-			-	-		
Quality opposition	-	-			0.006	0.081		
Team	0.155	0.394			0.073	0.269		
Residuals	29.240	5.407			31.682	5.629		
$R^2_{(m)}$		0.002				0.002		
$R^2_{(c)}$		0.011				0.035		

β, beta coefficient; SE, standard error; CI, confidence interval. Statistical significance set at $P < 0.05$.
Intercepts represent a draw and playing home.

Table 8. (Continued)

	Crossing				High Pressure			
Fixed effects	β (SE)	95% CI	t	*P*	β (SE)	95% CI	t	*P*
Intercept	5.053 (0.193)	4.675, 5.431	26.218	<0.001	0.678 (0.037)	0.605, 0.752	18.092	<0.001
Match status (-2 or more)	0.130 (0.367)	-0.590, 0.850	0.354	0.723	-	-	-	-
Match status (-1)	-0.473 (0.273)	-1.008, 0.062	-1.733	0.083	-	-	-	-
Match status (+1)	-0.026 (0.339)	-0.692, 0.639	-0.077	0.938	-	-	-	-
Match status (+2 or more)	1.446 (0.437)	0.589, 2.304	3.306	<0.001	-	-	-	-
Venue (away)	-	-	-	-	-0.119 (0.049)	-0.216, -0.023	-2.421	0.016
Quality opposition	-0.056 (0.015)	-0.086, -0.025	-3.600	<0.001	-0.023 (0.004)	-0.031, -0.014	-5.150	<0.001
Venue (away) * Quality opposition	-	-	-	-	0.017 (0.006)	0.006, 0.029	2.891	0.004
Random effects	Estimate	SD			Estimate	SD		
Match	0.358	0.598			0.098	0.313		
Venue	-	-			0.067	0.259		
Quality opposition	-	-			<0.001	0.015		
Team	0.289	0.538			0.003	0.052		
Residuals	112.747	10.618			7.508	2.740		
$R^2_{(m)}$		0.004				0.003		
$R^2_{(c)}$		0.010				0.013		

β, beta coefficient; SE, standard error; CI, confidence interval. Statistical significance set at $P < 0.05$.
Intercepts represent a draw and playing home.

Direct Play effectiveness was influenced by match status, venue, and quality of opposition. Direct Play was significantly more effective when losing or winning by 2 or more goals ($P < 0.01$ and $P < 0.05$ respectively), whereas when playing away ($P < 0.01$) and against stronger opposition ($P < 0.001$) it was significantly less effective. Specifically, direct play effectiveness decreased by -0.018 for each position difference in opposition strength based on the teams ranking. For Counterattack, contextual variables match status and quality of opposition influenced effectiveness. Counterattack effectiveness was significantly higher when winning by one goal ($P < 0.01$) and 2 or more goals ($P < 0.001$). In contrast, it was less effective ($P < 0.05$) when losing by one goal and decreased by -0.015 for each position differences in team ranking when facing stronger opposition ($P < 0.05$). Maintenance effectiveness was significantly influenced by match status, venue, and quality of opposition. Maintenance was more effective ($P < 0.05$) when winning by 2 or more goals, and less effective ($P < 0.05$) when playing away. In addition, Maintenance effectiveness decreased ($P < 0.001$) by -0.015 for each position difference in team ranking when facing stronger opposition.

For Build Up, Sustained Threat and Fast Tempo, only quality of opposition influenced effectiveness. The effectiveness of Build Up, Sustained Threat and Fast Tempo decreased by -0.025 ($P < 0.001$), -0.029 ($P < 0.001$) and -0.032 ($P < 0.05$) respectively for each position difference in team ranking when facing stronger opposition. Crossing was influenced by match status and quality of opposition. Effectiveness for Crossing was significantly higher ($P < 0.001$) when winning by 2 or more goals. On the other hand, Crossing was less effective ($P < 0.001$) when facing a stronger opposition, by a value of -0.056 for each position of difference in the ranking. High Pressure was affected by venue and quality of opposition. The effectiveness of High Pressure was significantly lower ($P < 0.05$) when playing away. Effectiveness was also lower ($P < 0.001$) when facing a stronger opposition (-0.023 for each position of difference in the ranking). Results showed that there was an interaction between venue and quality of opposition for High Pressure. This interaction demonstrates that effectiveness of High Pressure was lower by a value of -0.004 (-0.023 + 0.017) for each position of difference in the ranking when facing a strong opposition and playing away. The marginal and conditional R^2 that

measures the effect size of the fixed and random effects respectively, showed very small effect sizes, ranging from 0.002 to 0.035.

5.4 Discussion

The present study examined the effectiveness of styles of play in soccer and the influence of contextual variables (i.e. match status, venue, and quality of opposition). This study showed that the PEI metric, calculated from Expected Goals (xG) and Ball Movement Points (BMP), could be used to measure the effectiveness of styles of play in soccer, and how this changes under different contextual variables. Similar to previous research (Pollard & Reep, 1997; Szczepanski, 2008), the results of this study highlight the importance of employing new metrics to evaluate the effectiveness of tactical behaviour in soccer, while controlling for variables that could affect performance. To our knowledge, no previous study has evaluated the effectiveness of styles of play in soccer and the influence of contextual variables.

Direct play showed a mean effectiveness of 0.648 per possession when drawing and playing home. The effectiveness of direct play significantly increased in both extreme match status situations of losing by two goals or more and winning by two goals or more. A possible explanation could be that when teams score, losing teams often see increased possession (Lago, 2009; Lago & Martin, 2007) in an attempt to score as soon as possible and reduce their deficit. Therefore, increased possession in attacking zones leaves space behind advancing defenders for the opposition to exploit. In contrast, teams losing by two goals or more, with the aim of scoring quickly, would accumulate more players in the attacking third and use direct play to their benefit. Previous studies investigated the effectiveness of direct and possession play but did not assess how contextual variables influenced each of these styles. Most reported that possession play was more effective in comparison with direct play (Hughes & Franks, 2005a; Kempe et al., 2014; Sgro, Aiello, Casella, & Lipoma, 2016). However, others showed contradictory results indicating that direct play was more effective (Lago-Ballesteros et al., 2012; Yue et al., 2014). These contradictory results may be due to the different leagues used in the sample for the analysis, or the different ways of evaluating effectiveness.

Counterattack seemed to be more effective when teams were winning and like direct play, winning teams take advantage of space behind the opponent when they are in advanced positions on the pitch. In contrast, the effectiveness of counterattack decreased when teams were losing by one goal. Teams with a minimum score advantage retreat their position closer to their own goal and consequently, the defence was better prepared and more balanced (Tenga, Holme, et al., 2010b) when facing opposition counterattacks. These results contrast with previous research that investigated effectiveness in counterattacks and did not find significant effects among contextual variables (Gonzalez-Rodenas et al., 2016). Maybe this could be due to the small sample size employed in the study (30 matches) and the possible differences between the USA MLS league and EPL.

Maintenance and crossing styles of play were more effective when teams were winning by two or more goals. Teams could be using maintenance to keep possession of the ball closer to their own goal, allowing the opponent to press high so that it leaves space behind them. In addition, the high press by the losing opponent would leave fewer players for defending crosses, therefore increasing the effectiveness of this style of play. Liu, Hopkins, et al. (2016) reported a negative relationship between crosses and the probability of winning, however when match status alters it can become an effective tactic. Surprisingly, there was no significant effect on the effectiveness of build up, sustained threat, fast tempo, and high pressure styles of play when match status altered. Apparently, the effectiveness of these possession-based styles of play and high pressure was not influenced by winning or losing states of teams during match-play.

The effectiveness of direct play, maintenance, and high pressure decreased when teams played away from home. The home advantage phenomenon could explain this effect and a positive association with match outcome and playing at home has been reported previously in soccer (Lago-Peñas et al., 2017; Pollard, 2006; Pollard & Gomez, 2009). Our findings partially agree with previous research and showed that venue influenced the effectiveness of only three styles of play analysed. It is possible that for certain styles of play, venue has less influence on effectiveness, whereas other contextual variables such as match status or quality of opposition have a greater influence.

Quality of opposition is the only contextual factor the influences all the styles of play. They all showed a decrease in effectiveness when facing a stronger opposition and an increase against weaker teams. The results showed an effect that ranged from -0.015 to -0.056 per position in the final ranking when facing a stronger opposition. Therefore, the effect increased when the difference in ranking between two teams was greater. As we might expect, better teams with better players have better effectiveness values for all styles irrelevant of their preferred style of play. Our findings are in line with quality of opposition effect on match outcome in UEFA Champions League matches (Garcia-Rubio et al. (2015). In addition, we showed an interaction between venue and quality of opposition for high pressure. Unexpectedly, the interaction diminished the decrease in effectiveness for high pressure due to the quality of opposition. In other words, for teams playing away, the decrease of effectiveness when using high pressure style of play was lower in comparison when playing at home. It seemed that venue was a more important factor in combination with quality of opposition when teams played away. This is supported by research highlighting the impact of the home advantage phenomenon in soccer (Jamieson, 2010).

This study presents a novel approach for measuring the effectiveness of styles of play, however some caution must be observed. The effect sizes for the mixed models were small for all the styles of play, showing that there was large variation unexplained by the model. The complex nature of soccer and its chaotic organisations could be a reason for this unexplained variation and highlights the complex nature of fully evaluating performance in soccer. Moreover, the xG and BMP metrics are based on shooting data and it is possible that good opportunities not ending in a shot should be considered when modelling effectiveness measures. In addition, the data collected for the analysis is only one full season from the 2015-2016 EPL. Therefore, the generalisation of results to other leagues and seasons is limited (Mackenzie & Cushion, 2013), however, this approach can be used to model data from other leagues and seasons for comparison purposes.

More importantly, the models developed in this study have some practical implications. For example, coefficients for individual teams can be extracted to identify the effectiveness of styles of play across different contextual situations. Teams can also be

compared to evaluate how effectively they employ their styles of play under specific contextual situations. For example, team A was the most effective when using Direct Play and showed an increased effectiveness 0.15 above the average, when compared to other teams. In addition, performance analysts, coaches and other soccer practitioners could use similar approaches to evaluate their team and the opposition's tactical behaviour. This useful information could be used to assess how effective teams are when applying styles of play during match play, and which strategies are better under specific circumstances. Information from these analytical models should be considered cautiously and should serve as support for making tactical decisions. A team may feel comfortable using a specific style of play in a certain moment of play and could employ it even though data might suggest otherwise. Finally, this analysis of performance could aid the tactical preparation for upcoming matches and the development of training drills to enhance the tactical play of soccer teams.

CHAPTER 6: Elite coaches' perceptions of styles of play in soccer and their characteristics

6.1 Background

Tactical match analysis in soccer is an area of research that has received increased attention over the last decade (Sarmento et al., 2018; Sarmento, Marcelino, et al., 2014). Due to the developments in technology and access to big data, recent research has used new metrics and approaches to analyse team tactics and behaviour (Jayal, McRobert, Oatley, & O'Donoghue, 2018; Rein & Memmert, 2016). One of the benefits of these new approaches and metrics is the possibility of quantifying styles of play in soccer. Styles of play describe the general tactical behaviour of soccer teams, however there are challenges in identifying and capturing these objectively Previous studies have proposed a set of variables to measure styles of play (Hewitt et al., 2016), have analysed styles of play using attacking and defensive variables (Fernandez-Navarro et al., 2016; Tenga & Larsen, 2003), or analysed how contextual variables influence them (Fernandez-Navarro et al., 2018). For example, Tenga and Larsen (2003) used 41 variables, 23 attacking and 18 defending, to compare styles of play of two soccer teams. In addition, Fernandez-Navarro et al. (2016) employed 14 attacking variables (e.g. ball possession, direction of passes) and five defensive variables (e.g. ball regains in certain areas of the pitch) to conduct factor analysis and determine different styles of play in English and Spanish elite soccer.

Although there are several studies that examine the styles of play in soccer and show the variables that describe them, there is no consensus on the styles of play. Bangsbo and Peitersen (2000) identified build up, direct and counterattacking styles of play in attack; and block defending, low-pressure and pressure styles of play in defence. In contrast, (Fernandez-Navarro et al., 2018) presented eight styles of play in attack (i.e. direct, counterattack, maintenance, build up, sustained threat, fast tempo, crossing and high pressure styles of play). In addition, when different authors considered the same styles, differences among the set of variables that describe each style were present. For

instance, Fernandez-Navarro et al. (2016) and Tenga and Larsen (2003) mentioned direct as one of the styles of play analysed in the study. The former identified a high number of forward passes, high number of passes from defensive to attacking third of the pitch, low number of sideways passes, and a low-ball possession percentage as the variables that determine a direct style of play; whereas the latter considered long passes, attacks with a maximum of two passes, and fast build up attacks over and through midfield as variables defining direct style of play.

Research regarding styles of play in soccer has been conducted by experienced researchers using predominantly quantitative approaches. Nevertheless, the opinion of experts in the sport could provide additional insights into styles of play. Previous studies have benefited from the input and evaluation of experts' when examining research questions. For example, Jokuschies, Gut, and Conzelmann (2017) enhanced the knowledge of player assessment and talent identification by exploring criteria used by expert coaches. Similarly, other studies have investigated coaches' perceptions to expand knowledge about leadership power (Konter, 2012), sports science relevance (Martindale & Nash, 2013), or sources of learning (Stoszkowski & Collins, 2016). Moreover, Sarmento et al. (2013) reported that elite coaches believed culture and strategic-tactical factors had the most influence on the way teams played in the English Premier League, Spanish La Liga, and Italian Serie A. The study showed that coaches considered that direct style of play characterised the English league, the Italian league was characterised by the defensive tactical rigour, and the Spanish league was characterised by having greater control throughout the game. In addition, Sarmento, Anguera, et al. (2014) interviewed high-performance soccer coaches about their opinions on counterattack patterns of play used by three soccer teams. Coaches interpretation of the patterns of play were influenced by tactical aspects and the characteristics of the players in the team. Therefore, experiential knowledge from expert coaches' can aid and improve our understanding of how to measure a team's style of play and tactics, and factors that could influence them.

No previous research has interviewed true expert coaches to examine their knowledge of styles of play in soccer and their associated characteristics. The use of qualitative approaches such as interviews with expert coaches could improve our understanding of

concepts and variables associated with patterns of play in sport performance (O'Donoghue, 2010). Moreover, interviews allow more in-depth exploration of styles of play topics and themes compared to other qualitative approaches. For instance, the association between game structure or how different contextual variables affect styles of play could be explored with expert coaches. Therefore, the aims of the present study were to (1) define the concept of style of play in soccer, (2) investigate the characteristics of the styles of play in elite soccer, (3) and explore the contextual factors that affect styles of play during competition.

6.2 Methods

6.2.1 Participants

Elite soccer coaches (N = 10) were interviewed for this study based on the following inclusion criteria: (1) they were the head coach of the first team in any of the top 5 leagues (i.e. Spanish La Liga, English Premier League, Italian Serie A, German Bundesliga, and French Ligue 1) according to the UEFA coefficients for country (https://www.uefa.com/memberassociations/uefarankings/country/) or national team; and (2) from the time of their interview they were currently coaching or had previously (within the last 3 years) coached in these leagues or nationally. These criteria ensured that coaches interviewed were considered to be 'true' experts. The coaches interviewed have coached 3723 games across 20 domestic leagues and 10 international competitions. In addition, they have won 31 titles (see table 9). The experience of the soccer coaches in high-level teams (i.e. a first division of the country or a national team) ranged from 1 to 16 years ($M_{experience}$ = 10.3, SD = 5.48).

Table 9. Career record of participant coaches

Country	League/Competition	Games	Titles
International (clubs)	Champions League	133	2
	UEFA Cup/Europa League	217	3
	European Supercup	5	3
	Intercontinental Cup	2	1
International (national teams)	World Cup	31	1
	UEFA Euro Cup	28	1
	Africa Cup	1	-
	Asian Football Confederation Championship	3	-
	Confederations Cup	10	-
	Friendly	49	-
Spain	La Liga	2240	3
	Spanish Cup	402	2
	Spanish Supercup	6	3
England	English Premier League	90	-
	FA Cup	7	-
	English Football League Cup	7	1
France	Ligue 1	32	-
	Coupe de France	4	-
Portugal	Primeira Liga	30	-
	Cup of Portugal	3	-
	Portuguese League Cup	5	1
Greece	Greek Superleague	159	5
	Greek cup	31	3
Russia	Russian Premier League	6	-
Turkey	Turkish Super Lig	17	-
Ukraine	Ukrainian Premier League	108	-
	Ukrainian Cup	11	-
United Arab Emirates	Arabian Gulf League	60	-
	Arabian Gulf Cup	18	1
	UAE President's Cup	8	1

6.2.2 Instrument

A semi-structured interview was used to explore coaches' opinions and thoughts through conversation. This approach, alongside an interview guide, allowed the researcher to cover questions in depth and ensure that a systematic data collection process was used for each coach interviewed (Patton, 2015). The initial version of the interview guide was prepared using a deductive analysis of the styles of play literature in soccer (Fernandez-Navarro et al., 2016; Hewitt et al., 2016; Sarmento et al., 2013), and informed by the first author; a performance analysis researcher and soccer UEFA

Pro license holder. In addition, a lecturer in performance analysis with 13 years of experience and proficient in qualitative research, and another lecturer in football and UEFA Pro coach reviewed the interview guide to ensure validity. Pilot interviews were conducted with a psychology researcher with experience in qualitative research, and a soccer coach UEFA A license holder in order to make necessary revisions to ensure that the questions in the interview guide were clear. Minor changes to the questions improved clarity and intelligibility of them. The interview guide was prepared in English and Spanish because these were the languages that the author conducting the interviews was able to speak. The final version of the interview comprised different sections were the first one entailed warm-up questions in order to establish coaches' comfort and confidence (Guest, Namey, & Mitchell, 2012). The rest of the questions covered the topic of styles of play in soccer, to understand coaches' points of view about the definition of the concept, characteristics, and variables affecting styles of play. The interview guide is included in the annexes.

6.2.3 Procedure

Purposeful sampling was used to get the information-rich cases required for this study (Patton, 2015). A first attempt to contact the coaches were made through their club offices, agents or themselves by email or phone. The email contained the information of the study regarding purpose, methodology, benefits, discomforts, and risks of participation in the study. Club office personnel, agents or coaches accepted, declined, or did not respond to the first contact attempt. A follow-up email was sent when no response was received in two weeks after first contact attempt. When 10 coaches confirmed participation, no more attempts were made to contact additional coaches. Roller and Lavrakas (2015) suggested that the inclusion of between six and a dozen coaches may be sufficient for offering insights into the research questions due to the limited availability (O'Donoghue, 2010) and small number of hard-to-reach individuals. Once coaches confirmed participation, a time and location for the interview was arranged, and the information sheet and informed consent was resent to prior to the interview. Interviews were conducted face-to-face between October 2016 and May

2017 by the first author in a relaxed setting agreed with the coach. Informed consent was provided by the coaches before the interview began and were reminded about purpose, methodology, benefits, discomforts, and risks of participation of the study. The semi-structured interview followed the interview guide with the addition of probing questions when appropriate to deepen the response to a question (Patton, 2015). Interviews were recorded using an Olympus WS-311M digital voice recorder and were transcribed verbatim. Interviews took between 20 and 62 min (M = 44 min).

6.2.3 Data analysis and trustworthiness

After transcription, thematic content analysis was conducted to identify, analyse and report patterns within the data (Braun & Clarke, 2006). This approach implies the deductive and inductive analysis of data and allows the appearance of new themes not previously identified in the literature. We employed the following process described by Braun and Clarke (2006) to conduct thematic analysis: (1) data familiarisation, (2) generating initial codes, (3) searching for themes (gathering data relevant to each to each potential themes), (4) reviewing themes, (5) defining and naming themes, and (6) producing the report. The qualitative data analysis software Nvivo 11 (QSR International, Melbourne, Australia) was used to conduct the analysis. To ensure validity and trustworthiness of data, two of the authors performed a collaborative coding process where themes were discussed in each stage of the process to reach a consensus about the organisation and meaning of themes (Auerbach & Silverstein, 2003). A high level of agreement was reached between researchers and minor changes in reorganisation and refinement of themes were required. Lastly, a *critical friend* independent of the research process reviewed the data collection, analysis, and identification of themes performed by the researchers in order to guarantee that a rigorous and accurate process was conducted (Sparkes & Smith, 2014). This *critical friend* was an experienced researcher in sport psychology and the use of qualitative research approaches.

6.3 Results

Findings are presented from the more general to the most specific issue regarding styles of play in soccer.

6.3.1 Phases of play

Findings showed that coaches referred to the phases of the game when identifying the styles of play. Phases of play, or moments of play (Hewitt et al., 2016) are discrete phases or states occurring during the game, however they can influence other phases. These phases of play are: established attack, transition attack-defence, established defence, and transition defence-attack. Set pieces is also considered in this framework and can lead to or come from any of the previous phases. Teams will employ different styles of play depending on, if the team has the ball or not (i.e. attacking or defending); and, if the team is attacking or defending from a restart, or from a ball regain or lose (i.e. transitions). Consequently, it is necessary to consider the five phases of the game when identifying styles of play in soccer, as it was reported by the coaches. Therefore, different styles of play could be employed in each of the phases. Figure 12 shows the styles of play identified by the coaches and the phases of the game in which they could be used.

> When you are playing, there is that continuum that has to do with moving from being a possessor to a non-possessor, it has to do with how you have used the ball, and how those characteristics have been, those contexts that remain from the loss of possession. This will also indicate if you can press high, if you can't press high and if you decide or do not decide to do it.
>
> Coach 4

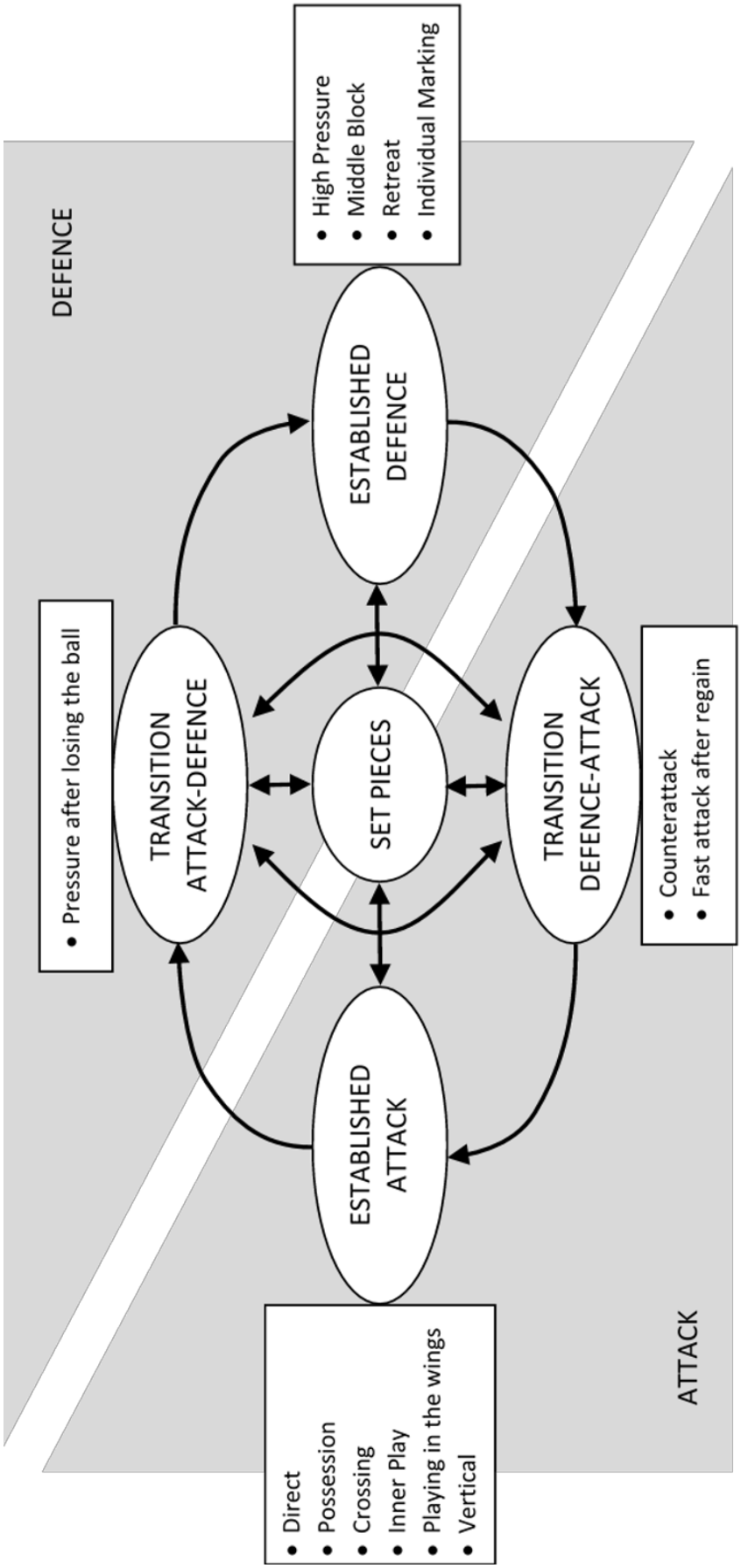


Figure 12. Styles of play for each phase of the game

6.3.2 Styles of play

Several coaches reported that the phases of the game (i.e. established attack, established defence, transitions, and set pieces) are connected, therefore the styles of play employed by a team depend on these phases of play. In other words, when using a specific style of play in a particular phase of the game (e.g. established attack), once the game moves onto a different phase (e.g. attack-defence transition), the new style of play could evolve from the previous style of play. Therefore, the team's style of play used in attack is connected with the style of play in defence and vice versa. For instance, some coaches revealed that when losing the ball during a possession style, the most suitable style to use afterwards was a pressure style. This is due to the actual position of players at the moment of losing the ball that favour a pressure style.

> If you are proposing a pressure after regain, you are proposing... it is because you come from a positional position; you are in a positional position and you are high, and if you are proposing a pressure, that is your way of defending, to stay there.
>
> Coach 9

> And then later when you do not have the ball there is a basic question, if what you want is to face the opponent very high in the pitch, of course if you have possession, one thing leads to the other, you have possession and you have taken the ball to there and you have the team very high positioned, if you want the ball you will try to push them very high in the pitch.
>
> Coach 10

6.3.2.1 Style of play concept

When questioned about the style of play concept in football, there was confusion around terminology because some coaches used different terms when referring to styles of play. Systems of play, game model, and idea of play were terms used when referring to styles of play. After a period of conversation during the interviews, coaches then employed a common terminology that helped them to better explain their ideas. From this point, a hierarchical classification from low to high-level complexity could be used based on the coaches' responses: (a) "system of play" means the initial positioning of the players on the pitch (i.e. formations) such as 1-4-4-2 or 1-4-3-3; (b) "style of play" are prevailing patterns of behaviours that emerge from players interacting during different phases or moments of the game (e.g. direct or possession styles of play); and

(c) “game model” is considered as the principles of play inherent to a specific team. Therefore, a team can use several systems of play to develop a style of play, and employ several styles of play in their game model.

> Because for me, one thing is the style of play, which can frame any of the modalities that choose it, both defensive and offensive. And another thing for me is the model, which would be for me a last achievement, a last "step", whatever you want to call it. Someone usually designs the style according to the players that have the squad.
>
> Coach 9

All coaches highlighted that players can define a team’s style of play. One coach stated that midfield players (i.e. midfielders) are more likely to define a team’s preferred style of play. In contrast, another coach stated that the strikers are the ones that define a team’s style of play.

> It [the style of play] is mainly defined by the squad that you have, the group of players you are managing. That allows you from that moment to try to make a custom-made suit.
>
> Coach 2

> But the fundamental thing, the style... and often goes according to the characteristics of the players, no, it always depends on the characteristics of the players. … I believe, a style of play, is defined by the midfield line. I think it is, how the midfielders play, so does a team. I do not know if it's simplifying too much, but it's a point that for me is... even defensively.
>
> Coach 5

> The concept of style of play, it's very elastic because depending on the squad that a coach has, I personally value the level of the team and players. Then, depending on that they choose a more offensive or more defensive system, you value the characteristics of the players a lot... I do not limit myself to say, hey, my system is this and everybody has to play with this system, but depending on the level of the players that I have, I try to apply one thing or another.
>
> Coach 6

> There is always a trend, let's say, but I believe that within the trend, then, what is important in the style of play are the players that you have. Either because you have them, or because you choose them. Because at the end of the day, the players are the ones that define the way a team plays. I think the most appropriate thing is to play

> depending on the players you have. Regardless of whether everyone has a specific tactical sensitivity towards a way of playing or another way of playing. … The styles of play usually have to do with the characteristics of the forwards.
>
> Coach 7

> The style is formed according to the characteristics of the players, and from there we get a way to play.
>
> Coach 9

Finally, some reported that culture and the coaches' personality were other characteristics that could influence a team's styles of play. However, all coaches agreed that players are the main aspect to consider when deciding upon styles of play.

6.3.2.2 Number of styles of play in soccer

The coaches identified several attacking and defensive styles of play. Firstly, some coaches initially stated that there are infinite styles of play due to the multiple teams and coaches. However, once terminology was clarified, they defined a specific number of styles. All coaches identified the two most mentioned attacking styles of play the literature (i.e. direct and possession styles of play), and most of them (> 80 %) also identified two well-known defensive styles (i.e. pressure and retreat styles of play). In general, most coaches described additional styles of play in attack and defence. Some coaches considered other styles as different styles of play, whereas others considered them variations of the two main attacking styles or just attacking tactics. Only one coach identified and considered set pieces as a style of play. Therefore, a total of 14 styles of play were identified, with each coach mentioning between two and 10 styles (see table 10).

> If we are very radical, a combination football and a more direct football; if we reduce it to that. A more combinative style and a more direct style, I do not know if we can reduce it in those two big...
>
> Coach 5

Table 10. Styles of play identified by coaches

Style of play	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Direct	X	X	X	X	X	X	X	X	X	X
Possession	X	X	X	X	X	X	X	X	X	X
Crossing	X	X					X	X		X
Inner play								X		
Playing in the wings	X							X		
Vertical							X			
High pressure	X		X	X		X	X	X	X	X
Middle block								X	X	
Retreat	X	X	X	X		X	X	X	X	X
Individual marking					X					
Counterattack		X	X	X	X	X	X	X	X	X
Pressure after losing the ball		X	X	X	X			X	X	X
Fast attack after regain									X	
Set pieces		X								

6.3.2.3 Styles of play in soccer and their characteristics

The coaches' interviews identified the following styles of play and their characteristics.

Styles of play in Established Attack

Direct style of play

Coaches stated that this style is typically characterised by long passes directed close to the opposition's goal, short passing sequences, players in the attacking line that are proficient at aerial play and second phase plays after long balls. In addition, direct play entails the omission of the creation zone (i.e. midfield area) so that play takes place in the finishing zone. More specifically, they described that midfielders are more likely to provide a supporting role during the second phase. Consequently, the strikers have a greater leading role, mainly aerial challenges, keeping ball possession closer to the oppositions defensive area and/or flicking the ball on for other players. Some coaches highlighted that direct play could be performed using; i) a player with the ability to gain the ball from aerial challenges, or ii) a player that has the speed to exploit the space behind a defender when the ball is passed into these areas. Some coaches stated that direct play is often used if players (i.e. goalkeeper and the defensive line) do not have the ability to pass out from the back.

> Or direct play in which the participation of the midfielders is more in a second action or in a clearance action or flick-on action. And this direct play has less prominence at the time of elaboration and the search for control of play and the ball.
>
> Coach 2

> Is not the same a direct play of players who receive to the foot and that from there gives prominence to the second wave, that a more direct style to the space because we have attackers of a certain profile. … Direct play believes in the straight line. Believe in the straight line and arrive in a short time to the places where the transcendental things happen.
>
> Coach 4

> There is little elaboration, the defence little goes through the midfield area, plays a long ball with the forwards, the midfielders make more of a second move play, the look for clearances, but there is no support with short play. Well, that's a clear characteristic of the direct game, the word itself says it.
>
> Coach 6

> When you are going to play more direct it means that you will have players up there who will be able to win an aerial challenge, or players who are going to be very mobile to run to the wings, and what you are going to do later is going to be, accompany with the defence.
>
> Coach 10

Although most of the coaches considered that specific systems of play are not better or worse when adopting certain styles of play, some coaches declared that maybe a system of play with two strikers (e.g. 1-4-4-2) could be more suitable when using direct play. This approach involves two players in the attacking line and increases the chance of pairing them against two opposition centre-backs. In addition, coaches suggested that direct style could be beneficial against high defensive pressure because direct play bypasses the defending teams high press by passing the ball into the next advanced zone.

> If the opponent is pressing on your own half of the pitch, trying to keep the ball in your own half of the pitch is complicated and risky, then the best way is to try to put the ball in their half of the pitch, make the team to advance, put them in the opposite half of the pitch and make to the opposition the same thing they are doing to you.
>
> Coach 3

> When the opponent does a very high pressure to us, what he does is accumulating players in our half of the pitch, we manage to attract pressure and we play direct.

> More than anything because what the opponent does when he presses you is to unprotect their defensive zone, and then when you unprotect the defensive zone what you do is to send the ball in the area in which they have fewer players.
>
> Coach 10

Possession style of play

Coaches described a possession style of play using a variety of terms such as possession, combinative, or elaborated. However, they considered that this style of play is characterised by short passing, supporting play from nearby players, a high number of passes per possession, generating and occupying spaces through short passing, having technical and skilled players, high participation of midfielders in the game, and progress through defensive lines and zones usually from the back. Several coaches highlighted that in some cases the goalkeeper might use a longer pass before short passing to start play. They justified this approach if their more skilled players were in advanced lines that required a line of opposing players to be skipped in order for these skilled players to receive the ball.

> [Possession style of play] is much more based on the number of passes, is much more based on the play with close players, in which the ball and players progress and reach certain spaces at the same time. … You can play an elaborate style and it does not stop being elaborated by playing with intermediate players, or by playing with distant players so that those allow the closer players to play.
>
> Coach 4

> The elaborate is the one that tries a more combinative soccer, of passes and short distance supporting, and needs much more touch of ball to arrive at the opposite goal.
>
> Coach 6

> If you are going to try to overcome the rival through overcoming lines, combining, is having a possession style of play. … If a team wants to have possession it has to have a very good inner play. In other words, it has to have inner play, if you do not have inner play you can't have the possession. That's clear. And to have inner play you need technically good players, and then you have to have a minimum number of players to put in the central areas.
>
> Coach 10

Similar to direct play, almost all of the coaches believed that a possession style of play can be achieved by using several systems of play. Nevertheless, some coaches claimed that a system of play with three players in the defensive line, such as the 1-3-4-3 would be more suitable because it allows play to start from the back before transitioning to the four midfield players. In addition, the 1-4-3-3 would also be suitable for a possession style as it allows for width and depth in the build-up. Moreover, some coaches suggested that a possession style could be beneficial when facing a retreat style, if the possession team has players able to switch play using mid-distance passes as a tactic for disorganising the defensive block.

Crossing style of play

This style of play was mentioned by a few coaches, and the main characteristics were the availability of attacking players proficient in aerial play and headers. Generally, these players would be taller and have good jumping ability. In addition, wing players would be good at medium and long distance passing, and crossing.

Inner play style of play

One coach identified this style and stated that teams tend to create more scoring chances and progress through the central areas of the pitch. From this statement, it can be inferred that there should be a considerable presence of players in these central areas or that the ball spends more time in them. Results of chapter 3 found similar conclusions about this style.

Playing in the wings style of play

This style can be considered the opposite of the previous one. Two coaches revealed that wide players with dribbling and crossing abilities, would be essential to this style.

Vertical style of play

This style was reported by one coach and determined that it is similar to the possession style of play, however runs with the ball and forward passes tend to dominate this style. In addition, the coach stated that in the vertical style of play, passes do not have to be aerial, and that progression through horizontal zones is done without bypassing any zone. The coach that identified this style believed that it could be useful to use it against a high pressure style of play, because it allows a team to invade unprotected space behind opposition's players.

Styles of play in Established Defence

High pressure style of play

Coaches identified the following characteristics for this style: a compact block of players positioned high up the pitch (i.e. close to the opponent's goal), players able to repeat physical efforts, closing passing lines and reducing opponents' space. Some coaches highlighted that it is important to have a fast defensive line for this style because of the space left behind the defensive team that could be exploited by the opposition. One of the coaches claimed that the high pressure style can be divided into 'pressed' or 'pressing'. In the former, players are positioned in a high block close to the opponents and not allowing the goalkeeper any option to play to their closest teammates, subsequently forcing a long pass. In contrast, the latter consists of a similar high block, however a few metres are afforded to the opposition to allow the goalkeeper to play out from the back and then apply pressure.

> The high pressure has as a component, from my point of view, the attempt to force imminently the regain of the ball by the opposing team, to force errors; but fundamentally it has to do with not giving time for the opposing team to feel attacking despite having possession of the ball.
>
> Coach 4

> If you have quick defenders, you can defend closer to midfield, because behind your back you do not take risks if they are fast players.
>
> Coach 6

> Today we defend in a high block, therefore the block you will always be in ¾ of the opposite side of the pitch, medium, high, medium, high, and you will choose your movements for everything. To press, to close spaces, to reduce the opponent, and your defence will always be in that advanced situation.
>
> Coach 9

Almost all of the coaches said that any system of play can be employed with the high pressure style. However, one of the coaches suggested that the 1-4-2-3-1 could be beneficial because the attacking players are already in positions that cover most of the opposing defence. Several coaches suggest that the high pressure style can be used to counteract the possession style because it does not allow the opposing team to play comfortably from the start of their possession, which often resulted in forcing long passes.

> If a team is a specialist in pressing high, it is a risk to start the play with short passing from behind in situations where you are being pressured high.
>
> Coach 8

Middle block style of play

Two coaches identified the middle block, or average retreat style of play, and that is characterised by a block of players positioned in the centre of the pitch, away from their own goal but with very little space behind the defensive line. Two coaches identified this as an individual style, however the other coaches considered middle block as a variation of high pressure and retreat styles.

Retreat style of play

This style of play was also named as low block by some coaches. A compact, organised block of players close to their own goal, with the purpose of limiting space and offering defensive support to teammates. The coaches stated that this defensive style was useful when the objective of teams is to defend their own goal or even to create space behind the opposite defending line in order to exploit it when they transition into attack.

> Even though we can regain the ball very high, as a coach I am interested in regaining it a little more retreated because I think that the opposing team is going to mess up with

> the ball, it is going to be exposed in that circulation, it is not going to be a quality circulation and will allow my players with enough speed and skill to occupy those spaces, if not now, in the near future will be given the conditions to be able to have that space and play direct when we regain the ball.
>
> Coach 4

> They are teams that rely more on the order, on the positioning, on the defensive tactics, rather than on duels. The pressure style is based more on duels, and this one is based more on the tactical ability to read the game and to position, and to establish defensive support systems...
>
> Coach 7

> Let's say that in a low block it is very important to reduce spaces, it is very important to know if you are doing it in a zonal way or individually, or mixed, we work it absolutely zonal. They are sections in contact with the opposing player when he enters your area, and from there we are strong when defending. But the reduction of spaces, the discomfort of the players not letting them think and that they always have their backs to the play, to close the passing lines, make the players to go to press, that the ball does not reach them and they go to press an additional line more, that always favours, they are moving away from the areas of influence to score goal... and above all I would tell you that intensity. You must put a lot of intensity to all of this. Because in a low block stopped, you're practically giving the opponent the full advantage.
>
> Coach 9

One coach suggested that the retreat style could be beneficial against a team that play in the wide areas. The compact nature of this style close to their own goal reduces the danger from crosses and second phase plays.

Individual marking style of play

Only one of the coaches identified this style of play, and according to him, this style was characterised by the whole team defending using individual marking. Consequently, defending players were following the opposition to wherever they would go on the whole pitch.

Styles of play in Transition Defence-Attack

Counterattack style of play

Most of the coaches highlighted that the main characteristic of the counterattack is speed and fast attacking players that can exploit the space behind the defenders to reach the oppositions goal. Moreover, almost all coaches claimed that although counterattack can be considered as an attacking style, it is a combination of the retreat and direct style. This style is based on the defence-attack transition and as a consequence, both the conditions for retreat and fast attack must be met to be a counterattack.

> Counterattack, which is a type of play with little touch of the ball and getting to the opposite goal as soon as possible.
>
> Coach 6

> The counterattack is a very clear occupation of spaces behind the opponent's back. I mean, it is... I move away from the other goal, I leave an important space that I will occupy later on, at the time I make a regain of the ball. The counterattack starts from a defensive attitude, not an offensive attitude. Part of a defensive attitude that is: I get compact, I choose if I compact in half block, or if I compact even in low block, in my own side of the pitch, with all the players in my own side, I know how to reduce, I know where I want to regain the ball, and I know how I have to go. And when you go, you go with few players at high speed to occupy that space on the back of the defence. It really is based on a transition, defence-attack. This is how the counterattack is based.
>
> Coach 9

> Every time you are retreating, in the end you are almost forced to... in the end what you do is searching for space later on, what always happens with the long play.
>
> Coach 10

According to coaches, counterattack can be used against a possession style of play. The possession style of play entails the accumulation of player close to advanced attacking areas, therefore defending teams could retreat and once they regain the ball, use the counterattack to exploit space left by the opposition. One of the coaches said that counterattack could also be used against a team that employs a direct play, when the

attacking team is developing their second play and their players are in advanced positions. Therefore, this space behind the block of players can be exploited in a counterattack.

Fast attack after regain style of play

One coach mentioned this style of play based on the defence-attack transition phase. This style is similar to the counterattack, however in the fast attack after regain, the defensive block of player is in advanced positions, comparison to the retreat tactic employed during the counterattack. Therefore, counterattack transitions from a retreat style of play once the ball is regained, whereas fast attack after ball regain follows the high pressure style of play. One of the coaches claimed that fast attack after regain style of play is suitable against a possession style of play, due to the high pressure component.

Styles of play in Transition Attack-Defence

Pressure after losing the ball style of play

Similar to counterattack, the pressure after losing the ball style of play is based on a transition, specifically an attack-defence transition. Coaches believed that this style is characterised by immediate pressure upon losing possession. Typically, players are positioned high up the pitch when possession is lost and make short high intensity runs to close down space and apply pressure to the player in possession.

> The pressure after losing the ball is a team, which is good because it is very aware because the defensive line is much ahead and as soon as the ball is lost, all players go there quickly.
>
> Coach 1

> Because of how they built the play... how he was able to interpret that precisely those efforts so obvious and so intense of 3-4 seconds... And then, far from representing something that demanded too much effort from them was precisely, had to do with an economy of the effort. Check it out if you lose the ball there, and we are together there, what better space and what better conditions than these to be able to press.
>
> Coach 4

Styles of play in Set Pieces

Set pieces style of play

Only one of the coaches identified set pieces (e.g. corners, free-kicks) as a possible style of play employed by teams. The coach claimed that there are teams that tend to play to cause a foul action in order to force a set piece. These teams have specialist players that perform the set pieces.

6.3.2.4 Teams representative of styles of play

When asked to describe teams that are representative of the styles of play, coaches mentioned one or several teams as a reference. Teams addressed by coaches provide good examples of how teams conduct the styles of play and could also be useful for practitioners aiming to get insight on the topic. Hence, watching videos of these team could give graphical examples of these ways of playing. Table 11 shows the teams that coaches considered the most representative for each style.

Table 11. Teams representative of each style of play

Style of Play	Teams	Coaches citing the team
Direct	Athletic Bilbao (old times)	4
	Athletic Bilbao (2015-2017)	3
	Eibar (2016-2017)	3
	Atletico Madrid (2012-2014)	2
	Sevilla (2005-2011)	2
	Chelsea (2004-2007)	1
	Real Madrid (2010-2013)	1
	Atletico Madrid (2012-2013)	1
	Italy National Team (World Cup 2014)	1
	Sevilla (2015-2016)	1
	Watford (2015-2016)	1
Possession	Barcelona	10
	Spain National Team	3
	Bayern Munich (2013-2016)	3
	Germany National Team (current)	2
	Las Palmas (2016-2017)	2
	Real Sociedad (2016-2017)	2
	Real Madrid	1
	Real Madrid (80's – early 90')	1
	Ajax Amsterdam (1985-1988)	1
	Ajax Amsterdam (1991-1997)	1
	Villareal (2009-2010)	1
	Italy National Team (2010-2014)	1
	Betis (2011-2014)	1
	Rayo Vallecano (2012-2016)	1
	Villareal (2015-2016)	1
	Tottenham (2016-2017)	1
	Sevilla (2016-2017)	1
Crossing	Athletic Bilbao (2015-2017)	3
	Eibar (2016-2017)	2
	Sevilla (2005-2011)	1
	Malaga (2016-2017)	1
	Deportivo La Coruña (2016-2017)	1
	Real Madrid (2016-2017)	1
	Alaves (2016-2017)	1
Inner play	Las Palmas (2016-2017)	1
	Celta (2016-2017)	1
Playing in the wings	Eibar (2016-2017)	1
	Malaga (2016-2017)	1
	Deportivo La Coruña (2016-2017)	1
	Athletic Bilbao (2016-2017)	1
Vertical	Arsenal (2003-2006)	1

Table 11. (Continued)

Style of Play	Teams	Coaches citing the team
High pressure	Barcelona	6
	Milan (1987-1991)	3
	Italy National Team (2010-2014)	1
	Athletic Bilbao	1
	Athletic Bilbao (2016-2017)	1
	Tottenham (2016-2017)	1
	Betis (2016-2017)	1
	Liverpool (2016-2017)	1
	Borussia Dortmund (2016-2017)	1
	Monaco (2016-2017)	1
	Sevilla (2016-2017)	1
	Eibar (2016-2017)	1
	Germany National Team (current)	1
Middle block	Liverpool (2016-2017)	1
	Atletico Madrid (2016-2017)	1
	Real Sociedad (2016-2017)	1
	Athletic Milbao (2016-2017)	1
	Malaga (2016-2017)	1
Retreat	Atletico Madrid	5
	Leicester (2015-2016)	2
	Juventus	1
	Villarreal (2013-2016)	1
	Las Palmas (2016-2017)	1
	Real Sociedad (2016-2017)	1
Counterattack	Real Madrid	4
	Atletico Madrid	3
	Villareal (2016-2017)	2
	Italy National Team (Euro Cup 2000)	1
	Chelsea (2004-2005)	1
	Real Madrid (2010-2013)	1
	Leicester (2015-2016)	1
Pressure after losing the ball	Barcelona	3
	Spain National Team	1
Fast attack after regain	Barcelona	1
	Espanyol (2016-2017)	1
	Liverpool (2016-2017)	1
	Borussia Dortmund (2016-2017)	1
	Monaco (2016-2017)	1
	Sevilla (2016-2017)	1

6.3.2.5 Contextual variables

Findings showed that coaches identified match status, quality of opposition, players sent off, time left, injuries, and venue as the contextual variables that influence the styles of play in soccer. Several coaches claimed that the retreat or counterattack styles of play was more appropriate when winning, whereas high pressure and direct styles of play are more likely to be adopted when losing as a way of creating more scoring chances. Some coaches highlighted that match status can vary styles of play due to the behaviour of the opposing team. For example, when a team is winning they will retreat due to the attacking behaviour of the opposition. Match status is a contextual variable that influences styles of play.

> It changes everything according to the scoreline. … It is clear that when the scoreline... it decides a lot the work you are doing. If you are losing, the pressure has to be high, very high, to try to attack as much as possible, or if there is little time left; and the opposite way, if you are winning, you have a positive result and because of this the retreat is much more intense, you will protect more your goal, which gives more initiative to the opposing team, but trying that the opposing team do not create chances.
>
> Coach 6

> No, I do not think there is any coach that retreat the team behind when it is winning. I think that the reaction of the opposing team when it is losing, often causes more defensive situations than... of that type, but it is not that you inertially retreat, but the opposition, because of its impulse to try to turn around a scoreline, it has moments in which it is able to dominate and generates more situations.
>
> Coach 8

> When you have to defend a scoreline when you see that your team is a bit tired; when it suits you, you see that the opposition is dominating, the inertia of the match sometimes comes to you... makes you set back a little.
>
> Coach 10

Quality of opposition was also identified by coaches as an important contextual variable to consider during match-play. Although some coaches stated that weaker teams usually use retreat and counterattack styles of play against better teams; they agreed that the team's main game model should be used. However, some minor changes against teams could be made during play to adapt to particular opponents.

> When you play against a big team, the big team always thinks that you are going to retreat, that you are going to defend and that you are going to try to play direct and counterattack.
>
> Coach 2

> Normally it is better to have a plan, and with small issues you have to know how to adapt also to the situation of the opposition.
>
> Coach 5

> I do not think there is one more convenient system than another, but depending on what you want... or on the characteristics of the rivals, it depends on many factors. … It is not the same to play against a big team, than to play against a team that is in the low positions of the ranking.
>
> Coach 6

Coaches reported that periods of inferiority due to a player being sent off or an injury were contextual variables influencing styles of play. Some of them stated that a high pressure style of play becomes difficult when having one player less than the opposing team. In contrast, if your team had a numerical advantage, the high pressure style of play could be effective.

> For me it is necessary to do it [high pressure style of play] always; unless you are in inferiority, or that you have an injured player in the pitch, or that we have been already 80 minutes pressing...
>
> Coach 3

> When the opponent has one less player, obviously you have one more player to press.
>
> Coach 10

Coaches also said that the remaining time during a game may change a team's styles of play. There were contrasting opinions amongst the coaches about styles of play to use when there is little time remaining in the game. For example, if a team is losing it might be useful to adopt a style that moves the ball closer to the opposition's goal quickly (e.g. direct play), whereas when winning, a style of play that protects their own goal using all players (e.g. retreat) might be preferred. However, other coaches suggest that irrespective of the time remaining, teams should employ their normal style of play and focus on performing more familiar quality actions.

> The time left, the scoreline... But, do you know what happens? It depends, it depends on the time left and the scoreline more than anything.
>
> Coach 1

Venue was reported as a contextual variable influencing styles of play by only one coach. This could suggest that it is not considered to be as influential as the other variables reported. Moreover, coaches mentioned combinations of several contextual variables that could influence styles of play. Therefore, maybe the combination and interaction between these variables (e.g. match status and time left) might be more important than measuring them in isolation when exploring how they influence playing styles.

6.4 Discussion

The aims of this study were to (1) define the concept of styles of play in soccer, (2) investigate the characteristics of the styles of play in elite soccer, (3) and explore the circumstances that affect styles of play during competition by conducting qualitative interviews with elite coaches. Results of this study suggest that certain styles are of play are easily identified and there was reasonable consensus between the coaches when defining styles, however there were styles that only some of the coaches identified. These styles identified by unanimity are also mentioned consistently in the literature (i.e. direct and possession styles of play). In addition, several of the other styles identified can also be found in the literature. Coaches stated that the phases of the game needed to be considered when identifying styles of play in soccer and the connection between different styles when transitioning between these phases. Moreover, characteristics of the styles of play, and other variables that affect them were also determined.

Some interviews revealed that terminology was a problem when referring to the style of play concept. Terms such as system of play (Vilar, Araujo, Davids, & Bar-Yam, 2013), game model (Mendes, Clemente, & Mauricio, 2018; Sarmento, Anguera, et al., 2014), or idea of play were used by some coaches to address styles of play. Coaches in this study came from different backgrounds and used the variety of coach learning resources

(Stoszkowski & Collins, 2016), which could explain difference in terminology when describing similar concepts. We suggest that agreement around terminology could reduce confusions when communicating with other professionals. As a consequence, this would ensure some consensus across soccer literature and other learning sources that could expand coach knowledge and education.

Coaches highlighted that the phases of the game were important when describing styles of play in soccer. Hewitt et al. (2016) suggested that there are key repeating phases or moments that they included in a moments of play framework. Previous styles of play research has only addressed styles of play that were in the attack or defence phase (Fernandez-Navarro et al., 2016; Tenga & Larsen, 2003). However, no previous studies have measured styles of play within different phases of the game (i.e. established attack, established defence, transitions, and set pieces). It should be noted that understanding these phases of the game depends on the team in possession of the ball. As coaches reported, the use of specific styles of play depends on which styles were used previously, and that change of style will depend on the new phase of the game that teams develop.

A total of 14 different styles of play were reported by the soccer coaches. All coaches identified the direct and possession styles of play, styles consistently mentioned in previous research (Fernandez-Navarro et al., 2016; Kempe et al., 2014; Tenga & Larsen, 2003). Direct and possession styles are well-known styles, and this may be the reason for the coaches' ease of identification. Other attacking styles of play reported were considered variants of the direct and possession styles. A coach's background and training could influence how they identify and define styles of play. The most identified defensive styles of play were high pressure and retreat. High pressure and retreat are widely known defensive styles, reported in previous literature, therefore they might be easier to identify (Fernandez-Navarro et al., 2016; Fernandez-Navarro et al., 2018; Tenga & Larsen, 2003).

During the interviews, coaches defined the characteristics (i.e., performance indicators) of these styles of play. These performance indicators could be used to design metrics to measure the various styles of play. For example, direct style performance indicators reported in the literature (e.g. long passes, shot passing sequences) (Aquino, Munhoz Martins, Palucci Vieira, & Menezes, 2017; Hughes & Franks, 2005a; Tenga & Larsen,

2003) and additional characteristics (e.g. second plays, aerial play) were also reported by the coaches. Some of these other characteristics are more challenging to measure, which could be explain why they have not been reported in research. Measuring second plays might require tracking the movement of ball and players through positional data rather than just event data. Rein and Memmert (2016) suggested that new tracking technologies would allow this positional data to be analysed to inform performance. In addition, coaches reported similar possession style characteristics in previous studies (e.g. short passes, high number of passes per possession) (Tenga & Larsen, 2003), and new characteristics (e.g. support play from closer players, progression by overcoming lines). These additional characteristics could be integrated to create new performance insights and/or refine our ability to capture styles of play in soccer.

Coaches identified characteristics of other attacking styles of play such as crossing, inner play, playing in the wings, and vertical. Few studies have identified it as a style of play in soccer (Fernandez-Navarro et al., 2016; Fernandez-Navarro et al., 2018), whereas classify crossing as an attacking action or playing tactic (Liu, Gomez, Goncalves, & Sampaio, 2016; Liu, Hopkins, et al., 2016; Pulling, Eldridge, Ringshall, & Robins, 2018). In this study, only half of the coaches considered crossing as a style of play. A few coaches identified inner play and playing in the wing, whereas as only one study defined these opposite styles of play as a wide or narrow possession style (Fernandez-Navarro et al., 2016). These styles are characterised by possession in central or wide areas, therefore some coaches considered them as variants of the direct and possession styles. The vertical style of play was only mentioned by one coach and did not appear in the literature. According to the coach's opinion, vertical play consisted in a possession style of play were not aerial forward passes predominate. It seems that this style is a variant of the possession style and this could be the reason for only one coach identifying it.

High pressure and retreat were identified as the two main defensive styles of play. Previous research distinguished between these two styles of play (Bangsbo & Peitersen, 2000; Fernandez-Navarro et al., 2016) and other studies included high pressure as one of the styles of play in soccer (Fernandez-Navarro et al., 2018). The other styles of play identified by coaches, middle block and individual marking were not mentioned in the literature before. Middle block was described as a mix of high pressure and low block,

and individual marking is, apart from zonal, mixed and combined; one of the different types of marking that teams employ in defensive strategies. Maybe coaches did not identified these styles of play because of these reasons. Previous studies have employed event data to measure defensive styles, therefore this may be the reason a high pressure or retreat style of play because they are on based on the pitch location of the ball regain. The more recent availability and use of positional data could improve the identification and categorisation of defensive styles through the tracking of player movement in relation to teammates, opposition and the ball (Link, Lang, et al., 2016).

The coaches identified counterattack, pressure after losing the ball and fast attack after regain as transitions styles of play. Only counterattack has been mentioned in previous studies (Bangsbo & Peitersen, 2000; Fernandez-Navarro et al., 2018), however it was considered to be an attacking style of play. Although counterattack entails an attacking action, it needs a previous retreat style of play before that action. The coaches supported this and consider this style of play as a transition style, or a combination of 2 styles of play, one in attack and another one in defence. Similarly, pressure after losing the ball (also referred as counterpressing by practitioners) and fast attack after regain were also formed by one style in attack and another in defence. Identifying transitions in the game can often be difficult and as a consequence it is challenging to accurately identify these transitions styles of play. Set pieces are attacking or defending actions that restart the game and are considered as a phase of the game (Hewitt et al., 2016). Nevertheless, one of the coaches considered it as a style of play. Players in the team are often required to perform specific behaviours that create an opportunity for set pieces.

Coaches reported the teams that were most representative of the styles in competition. For example, Barcelona were the best team at employing a possession style of play. In addition, a number of authors have reported similar associations between the possession style of play and Barcelona (Camerino, Chaverri, Anguera, & Jonsson, 2012; Fernandez-Navarro et al., 2016). Coaches also described other teams as examples of possession style of play, that are previously mentioned in the literature. For example, Kempe et al. (2014) showed that Bayern Munich was an example of possession style of play in the Bundesliga. Coaches also reported that Barcelona used high pressure and the pressure after losing the ball styles of play. In contrast, many coaches identified Atletico

Madrid as a team that employs the direct, counterattack, and retreat styles of play. Finally, the coaches provided a list of teams and the styles that they were likely to use (see table 11). A deeper analysis of these teams could help refine models for analysing styles of play.

Many of the coaches believed that no one specific style of play is more effective against another style, however, some coaches stated that certain styles could counteract other styles. For instance, some coaches reported that a high pressure style of play could be useful against a possession style of play, or that direct play could be useful to avoid the high pressure. According to coaches, it seems that players are the most important aspect when choosing a style of play against a specific opponent. Maybe some styles could provide a useful solution against other styles, but the characteristics of players in the team could lead to more complex strategies and styles of play could not be too decisive. Further research is required to understand the effectiveness of certain styles against other styles.

Coaches also believed that contextual variables influence the styles of play, specifically, match status, quality of opposition, players sent off, time left, injuries, and venue. Previous research has reported that contextual variables influence playing tactics (Bradley et al., 2014; Lago-Peñas & Gomez-Lopez, 2014; Paixao et al., 2015; Santos et al., 2017). Moreover, a recent study revealed how contextual variables influence styles of play in soccer (Fernandez-Navarro et al., 2018). For example; a winning match status, playing home, and facing a strong opposition would increase the use of direct play. Therefore, evidence and coaches' beliefs corroborate that contextual variables greatly influence the teams' styles of play. Coaches reported that match status and time left to finish the game were the contextual variable that most influence a team's styles. Naturally, the main objective of teams is to win a game, and they would change their play in order to get a favourable result at the end of the game.

This study has some limitations that should be noted. Although the coaches interviewed were elite coaches in top teams and participated in the highest-level competitions, all of the coaches were Spanish. When invited, coaches from different countries did not confirm that they would like to participate in the study, therefore the sample only included the thoughts of Spanish coaches. Future studies might explore the opinions of

coaches from different countries and how they differ or agree with the present research. Nevertheless, the coaches interviewed in the study had experience training in top leagues of different countries, so their opinion would be representative of the elite coaches in soccer.

The findings of the present study showed how elite coaches define styles of play in soccer and their characteristics. This helped to confirm and provide new insights into the different approaches in previous research used for analysing styles of play in soccer. The new characteristics provided by coaches would help to design metrics in order to measure styles of play in soccer more accurately. Given the expertise of the coaches interviewed, soccer practitioners could consider the findings useful for a better understanding of the styles of play and how they can be analysed.

GENERAL DISCUSSION

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The aims of this Doctoral Thesis were to enhance and expand understanding and knowledge about the styles of play in elite soccer, examine their effectiveness, and evaluate the aspects that could affect their performance. In order to achieve this aim, both qualitative and quantitative approaches were employed.

Styles of play and their characteristics were defined using a data-driven approach that measured specific attacking and defensive variables, and interviews with true expert coaches. Results from chapters 3 (quantitative) and 6 (qualitative) identified several styles of play. Direct and possession styles of play, the attacking styles more commonly addressed in research (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), were identified by all the coaches and the factor analysis. This suggest that these styles are easier to identify as there is agreement between the analysis of data and expert opinions. Nevertheless, the variables that contribute to these styles differ according to the results. Although variables such as long forward passes, short passing sequences, or omission of the midfield area were common variables for coaches and data, second plays after long balls and aerial play of strikers were new variables given by coaches that were not previously measured for direct play. Similarly, a high number of passes per attacking sequence and short passes were variables identified by data analysis and coaches for possession style of play. However, coaches suggested that supporting play from close players and progressing by line breaking (i.e. breaking attacking line, midfield line and defensive line of the opposition gradually) would be suitable variables to measure possession play. These additional variables proposed by the coaches were not present in the literature probably due to the lack of or difficulty involved in capturing this information and the need for positional data.

In the same way, data analysis and coaches determined variables that contribute to the most common styles of play in defence (i.e. high pressure and retreat) (Bangsbo & Peitersen, 2000; Pollard et al., 1988; Wright et al., 2011). For high pressure style of play,

data analysis and coaches identified that ball regains in advances zones of the pitch describe this style. Nevertheless, coaches provided a more detailed description of the variables that could be used to measure the high pressure style of play. For instance, the block of players positioned high up the pitch need to be compact to reduce space for the opposing players. In contrast, regaining the ball in areas close to their own goal is a variable that is used to identify the retreat style. Coaches agreed that this variable is adequate for measuring this style, however being able to measure how compact the defensive block is and the position of defensive support could more precisely quantify the retreat style of play. During the established defence phase, the team is out of possession, positional data in addition to event data about when and where the ball was regained could provide additional situational information. For example, Andrienko et al. (2017) and Memmert et al. (2017) used positional data to quantify pressure and measure the compactness of soccer teams respectively. Therefore, spatiotemporal data is needed to better analyse these defensive styles.

Other attacking and defensive styles of play were also identified by data analysis and some of the coaches. Attacking styles crossing and possession width were identified and defined, and previously described in research (Bangsbo & Peitersen, 2000; Pollard et al., 1988). Only some coaches mentioned these styles, whereas other coaches identified styles such as vertical, middle block, individual marking, counterattack, pressure after losing the ball and fast attack after regain that have not been previously defined by data analysis. Some coaches did not identify these as styles but rather as variation of the most common styles. For example, vertical style is a variation of the possession style, whereas middle block is a variation of high pressure or retreat styles. In addition, these were not identified by the data analysis process because specific variables that characterise them are not captured by event data. Therefore, results revealed agreement between the data and coaches when identifying the most common styles, however, spatiotemporal data and new variables are required to measure the styles of play that only some coaches identified, such as vertical, middle block, individual marking, counterattack, pressure after losing the ball and fast attack after regain.

The coaches identified examples of teams that represent specific styles of play in soccer that correspond to data analysis approaches. Therefore, the factor analysis approach

used to classify teams was sensitive enough to determine how reliant a specific team was on a style of play and how they compared to teams using similar styles. For example, Barcelona was the team that coaches considered to be the most representative of the possession style of play, and similarly, data analysis showed that Barcelona was the team with the highest score for possession style. In addition, there is a general consensus when observing Barcelona in competition and previous studies that suggest they are heavily reliant on the possession style (Andrienko et al., 2017; Bradley et al., 2014; Casal, Maneiro, Arda, Mari, & Losada, 2017; Chassy, 2013; Paixao et al., 2015; Wang, Zhu, Hu, Shen, & Yao, 2015). In the same way, data analysis and coaches agreed when situating Athletic Bilbao and Atletico Madrid as direct style teams, and Barcelona as a team that employs high pressure. There were also some differences between how teams were classified according to their styles of play and the coaches' opinions. For example, factor analysis classified Atletico de Madrid as a high pressure team, however, several coaches suggested that this was more representative of a retreat style of play. These discrepancies could be due to the fact that this team employs both strategies and could depend on the contextual variables that influence styles (see chapter 4). In addition, data collected for chapter 3 used a small sample of matches for each team. Therefore, is possible that those matches analysed showed situations where the style of play was different from their typical style.

The contextual variables such as match status, venue, and quality of opposition influenced a team's styles of play. Results from data analysis (chapter 4) and coaches' opinions agreed in many of those cases. For example, coaches stated that when facing a strong opposition, teams usually employ a direct or counterattack style of play. Data analysis (chapter 4) supported these statements, for example a team's direct play increased and possession style decreased when facing a stronger opposition. In addition, quality of oppositions is a key contextual variable that influences a team styles of play. However, there was differences between coaches' opinions and data analysis when considering match status. For example, data analysis (chapter 4) showed an increase in direct and counterattack styles, compared to a decrease in possession style when winning. Similarly, several coaches suggested that, but other coaches said that direct play could be a style adequate to use when losing as a way to the likelihood of scoring.

Differences between coaches' criteria and data analysis could be due to multiple reasons. First, data analysis (chapter 4) showed a general tendency, however a detailed analysis of teams could reveal different behaviours. Statistical models in chapter 4 are based on data from a whole league, therefore the mixed model can be used to isolate and explore individual teams so that they can be profiled to predict the impact of contextual variables. Second, as data collected in chapter 4 only captured attacking sequences, there could be missing data that coaches did consider. Moreover, the low variation that the model accounted for suggested that there could be missing data that coaches take into consideration when evaluating how contextual variables affect styles of play, due to their experiential knowledge and experience.

Chapter 5 analysed the effectiveness of styles of play and there were similarities and differences with these styles of play used by teams (chapter 4). Playing against a stronger opposition decreased the effectiveness of all styles of play. This is in line with the results of other studies that showed that playing against a better team decreased the probability of success (Collet, 2013; Lago-Peñas et al., 2011). Direct play was the only style that increased in use when facing a stronger opposition, showing that teams usually employ this style even in these situations. Teams would think that using this style against a stronger team could provide scoring chances without moving all the team to attacking zones and therefore, protecting their own goal. This was supported by some of the expert coaches who suggested that certain styles of play would be better against strong opposition. Similarly, when playing away, the effectiveness of direct, maintenance, and high pressure styles of play generally decreased, however the use of a direct style by teams increased in these situations (see chapter 4). When considering match status, differences were found between the styles of play that teams use and the effectiveness of those styles. According to data in chapters 4 and 5, teams tend not to use the most appropriate style in a specific situation, whereas others do. For example, using a direct and/or counterattack style when winning was more effective, and the use of these styles generally increased in these situations. In contrast, effectiveness increased using the following styles in these situations: direct play when losing by 2 or more goals, maintenance and crossing when winning by 2 or more goals. Surprisingly, teams generally behaved in the opposite way and the use of these style in those

situations decreased. It seems that coaches and players preferred that different strategy because they rely more in those styles or considered that their players are more suitable for the style of play chosen (different to the one that analysis suggested to be more effective). After all, expert coaches stated that players are the determinant aspect when developing tactics and styles of play and this reason could explain that coaches employed different styles, according to their knowledge and experience. However, coaches and team staff should conduct the respective analysis to check which styles of play are more suitable for them in every situation.

In summary, data analysis approaches are sensitive at detecting styles of play in soccer, the influence of contextual variables and their effectiveness. However, although these approaches are useful for this purpose, they are not currently sensitive enough to capture all the aspects present in the game. Therefore, positional data could improve data analysis approaches by capturing more aspects of the game. There was agreement between the objective analysis approaches and the true expert coaches' experience and knowledge regarding the styles of play and their characteristics, the factors that influence them, and the teams that use them. However, there were also some differences between the findings from quantitative and qualitative approaches. Quantitative data analysis is objective and systematic, nevertheless, it is not able to capture every aspect in the game. On the other hand, the qualitative approach takes advantage of expert coaches' knowledge to cover detailed aspects (Memmert et al., 2017). Therefore, both approaches seem to complement each other being a useful way to provide performance analysis in soccer (O'Donoghue, 2010). Future studies may continue the analysis of styles of play by developing new metrics that measure the tactical behaviours described by expert coaches for each style. Consequently, the measurement and analysis of styles of play in soccer would be more precise according to experts' opinions.

CONCLUSIONS

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Specific conclusions

1. Expert coaches and data-driven approaches helped to clarify the concept of style of play in soccer (chapter 3 and chapter 6). Coaches provided insights about many aspects to consider when teams employ styles of play (e.g. characteristics, combinations of styles, situations more suitable to use them, ways con counteract other styles).

2. The different styles of play and the variables that contribute to them was revealed by using factor analysis on the sample of games. The clustering technique allowed to group the variables that determine the attacking and defensive styles of play in soccer (chapter 3).

3. Teams' score for each factor demonstrated their dependence on each style of play (chapter 3). Teams can then be classified according to the styles of play that they use in competition.

4. Contextual variables (i.e. match status, venue, and quality of opposition) influence differently the use of styles of play in soccer match play (chapter 4). Consequently, contextual variables should be accounted for when analysing styles of play in soccer.

5. The effectiveness of styles of play can be measured using a mixed model approach. Moreover, Possession Effectiveness Index (based on xG and BMP metrics) could be useful for measuring the effectiveness of team possessions and in combination with styles of play scores, an effectiveness measure can be created for team possessions. In addition, styles of play showed different effectiveness depending on match status, venue and quality of opposition (chapter 5).

General conclusion

Styles of play in soccer can be quantified and analysed by using analytics to evaluate the different variables that contribute to them. Contextual variables (i.e. match status, venue, and quality of opposition) affect the use and effectiveness of styles of play employed by teams in competition. These finding may be useful for practitioners aiming to analyse the game and achieve a better performance of their teams.

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ANNEXES

ANNEXES

Interview guide

COACH BACKGROUND

- How many years have you been coaching?
- How many years have you been coaching in elite level (top league of a country or national team)?
- Can you tell me about how you decided to become a coach?

STYLE OF PLAY DEFINITION

- From your point of view, can you define the concept of 'Style of Play' in football?

STYLES OF PLAY IN FOOTBALL

- How many styles of play you consider there are in football?

- Can you describe the styles of play you consider there are in football?
    - Name of the style of play
    - **Description of the style of play**
        - Characteristics of this style of play (for example: possession, players involved, type of passes, areas of influence, etc):
        - Are any systems of play (formations), **most adequate** for the utilisation of this style of play?
        - Are any systems of play (formations), **least adequate** for the utilisation of this style of play?

    - From your point of view, which teams are the most representative of this style of play?
        - Name of the team and the season (the team may correspond to any league or national team, both recent or previous times). If you consider that a specific game played by a specific team is representative of this style of play, please highlight that game by indicating the competition, round, season, opponent or date (for example: Bayern Munich against Liverpool FC in Champions League semi-finals of season 2010-2011).

    - On what circumstances is it appropriate to use this style of play?

    - Against what other styles of play is appropriate to use this style?

Guía de la entrevista

TRASFONDO DEL ENTRENADOR

- ¿Cuántos años tiene de experiencia como entrenador?
- ¿Cuántos años ha estado como entrenador en alto nivel (primera división en un país o selección nacional)?
- ¿Puede hablarme de cómo decidió convertirse entrenador?

DEFINICIÓN ESTILO

- Desde su punto de vista, defina el concepto de 'Estilo de Juego' en fútbol

ESTILOS DE JUEGO EN FÚTBOL

- ¿Cuántos estilos de juego considera que hay en fútbol?

- Puedes describir los estilos de juego que considera que hay en fútbol
    - Nombre del estilo de juego
    - **Descripción del estilo de juego**
        - Características de este estilo de juego (por ejemplo: posesión de balón, jugadores involucrados, tipo de pases, áreas de influencia, zona de presión, etc.):
        - ¿Cuáles son los sistemas de juego (posicionamiento), **más adecuados** para la utilización de este estilo de juego?
        - ¿Cuáles son los sistemas de juego (posicionamiento), **menos adecuados** para la utilización de este estilo de juego?

    - Desde su punto de vista, ¿qué equipos son los más representativos de este estilo de juego?
        - Nombre del equipo y la temporada. El equipo puede corresponder a cualquier liga o selección nacional, tanto de la actualidad como de una época anterior (por ejemplo: Ajax de Amsterdam de la temporada 2008-2009). Si considera que un partido específico jugado por un equipo concreto representa este estilo de juego, por favor, indique de qué partido se trata (por ejemplo: Bayern Munich - Liverpool FC en las semifinales de la Champions League de la temporada 2010-2011).

    - ¿En qué circunstancias es adecuado utilizar este estilo de juego?

    - ¿Contra qué otros estilos de juego es adecuada su utilización?

Papers derived from the Doctoral Thesis

- **Fernandez-Navarro, J.**, Fradua, L., Zubillaga, A., Ford, P. R., & McRobert, A. P. (2016). Attacking and defensive styles of play in soccer: analysis of Spanish and English elite teams. *Journal of Sports Sciences*, 34(24), 2195-2204.
- **Fernandez-Navarro, J.**, Fradua, L., Zubillaga, A., & McRobert, A. P. (2018). Influence of contextual variables on styles of play in soccer. *International Journal of Performance Analysis in Sport*, 18(3), 423-436.
- **Fernandez-Navarro, J.**, Fradua, L., Zubillaga, A., & McRobert, A. P. (2018). Evaluating the effectiveness of styles of play in elite soccer. Manuscript submitted for publication.
- **Fernandez-Navarro, J.**, Fradua, L., Zubillaga, A., Morris, R., & McRobert, A. P. (2018). Elite coaches' perceptions of styles of play in soccer and their characteristics. Manuscript in preparation.

Short curriculum vitae

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Education

2014-2018	PhD Student in Biomedicine, University of Granada, Spain
2012-2016	Master of Philosophy (MPhil), Liverpool John Moores University, UK
2013-2014	PGCE, Physical Education specialisation (Grade: 9.35/10), University of Granada, Spain
2007-2012	BSc(Hons) Sports Sciences (Grade: 9.35/10 best academic record award), University of Granada, Spain

Visiting researcher

2017	Institute of Training and Computer Science in Sport, German Sport University Cologne, Germany. Supervisor: Dr. Daniel Memmert (3 months)
2016	The Football Exchange, Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, UK. Supervisor: Dr. Allistair McRobert (3 months)

Teaching

2017	BA Sport Science, Humboldt University of Berlin, Germany (visiting teacher). Funding: Erasmus+ Programme, European Commission (1 week)
2017-2018	BSc Sport Science, University of Granada, Spain. Subjects: Fundamentals of Football, Sports Specialisation: Football

2016-2017	BSc Sport Science, University of Granada, Spain. Subjects: Fundamentals of Handball, Fundamentals of Football
2015-2016	BSc Sport Science, University of Granada, Spain. Subjects: Fundamentals of Volleyball, Fundamentals of Basketball
2013	BSc Sport Science and BSc Science & Football, Liverpool John Moores University, UK. Subjects: Applied Sport and Exercise Science, Applied Science and Football

Management activities

2012	VII International Congress on Sport Sciences, Granada, November 15-17, 2012 (The Spanish Association of Sport Sciences). Member of the local organising committee

Research projects

2017-2020	Analysis and development of the talent of young soccer players belonging to the Granada Club de Fútbol training center. Funded by University of Granada.
2017-2018	Integration of digital teaching tools for the teaching and learning of the sports technique in athletics, cycling and soccer. Funded by University of Granada: 947€
2010-2012	Development of the competences related to the diagnosis and sports planning through the application of multimedia technological resources. Funded by University of Granada: 5000€

Publications

1. **Fernandez-Navarro, J.**, Fradua, L., Zubillaga, A., & McRobert, A. P. (2018). Influence of contextual variables on styles of play in soccer. *International Journal of Performance Analysis in Sport*, 18(3), 423-436.
2. **Fernandez-Navarro, J.**, Fradua, L., Zubillaga, A., Ford, P.R. & McRobert, A.P. (2016): Attacking and defensive styles of play in soccer: analysis of Spanish and English elite teams, *Journal of Sports Sciences*, 34(24), 2195-2204.
3. **Fernandez-Navarro, J.**, Ruiz-Ruiz, C., Caro, O., Zubillaga, A., & Fradua, L. (2015). Análisis de la efectividad de las acciones defensivas de presión en campo contrario en la liga española. *Futbol-Tactico*, 101, 140-150.
4. Caro, O., Fradua, L., Zubillaga, A., & **Fernandez-Navarro, J.** (2014). Analysis of Small Game Areas of 4vs4 and 7vs7 in Spanish Professional Football. In J. Cabri, P. Pezarat Correia & J. Barreiros (Eds.), *Proceedings of the 2nd International Congress on Sports Sciences Research and Technology Support (icSPORTS 2014)* (Vol. 1, pp. 231-235). Rome, Italy.

Communications

1. **Fernandez-Navarro, J.**, Lopez-Barrera, G., Caro, O., Zubillaga, A., & Fradua, L. (2017). Analysis of technical participation of U-12 and U-10 football players in 8-a-side match play. (World Conference on Science and Soccer, 31 May - 2 June 2017, Rennes, France).
2. Fradua, L, Caro, O., Zubillaga, A., & **Fernandez-Navarro, J.** (2016). Influence of pitch zone and game result in the7v7 game area dimension in Spanish professional football: Extrapolating from match analysis to SSGs design. (XI World Congress of Performance Analysis and Sport, 16-18 November 2016, Alicante, Spain).
3. **Fernandez-Navarro, J.**, Ruiz-Ruiz, C., Zubillaga, A., & Fradua, L. (2016). Influence of Situational Variables in Gaining Possession of the Ball in Advanced Zones of the Pitch in Soccer. (XI World Congress of Performance Analysis and Sport, 16-18 November 2016, Alicante, Spain).
4. **Fernandez-Navarro, J.**, Ruiz-Ruiz, C., Zubillaga, A., & Fradua, L. (2015). Análisis de la efectividad de las acciones defensivas de presión en campo contrario en la liga española. (Congreso Mundial de Entrenadores de Fútbol. Centenario de la RFAF 1915-2015, 12-14 June 2015, Sevilla, Spain).
5. **Fernández Navarro, J.**, Fradua, L., Zubillaga, A., Caro, O. & McRobert, A.P. (2015). Influence of styles of play on possession performance indicators in elite soccer (WCSF conference 20-23 May 2015, Copenhagen, Denmark).
6. Caro, O., Zubillaga, A., Fradua, L., & **Fernandez-Navarro, J.** (2015). Influence of pitch zone in game area dimension in professional spanish football (WCSF conference 20-23 May 2015, Copenhagen, Denmark).
7. **Fernández Navarro, J.**, Ford, P.R., Scott, M., Fradua, L., Zubillaga, A. & McRobert, A.P. (2014). Attacking and defensive styles of play in elite soccer (ECSS conference 2-5 July 2014, Amsterdam,
8. The Netherlands).
9. Caro, O., Fradua, L., Zubillaga, A., Anon, A., & **Fernandez-Navarro, J.** (2013). Influence of period on the distance from the goal line to the less advanced outfield player in Spanish first division soccer teams (ECSS conference 26-29 June 2013, Barcelona, Spain).

Reviewer for scientific journals

1. PLOS ONE
2. International Journal of Performance Analysis in Sport
3. Human Movement
4. Journal of Sport and Health Research

Other merits

2017 UEFA Pro Football License (Spanish Football federation)
2014 FPU Scholarship (Ministry of Education, Spain)

2013 Higher Education Academy Associate Fellowship membership

2013 Award for being one of the 28 bests academic records in the University of Granada in the year 2012. Award of 1000€ by the Caja Rural Bank – University of Granada.

2012 Prozone Performance Analysis – Level 1

2012 Award for best academic record of the BSc Sports Sciences degree (9.35/10) 2007-2012 in the University of Granada.

2011 Collaboration in Department Scholarship (Ministry of Education, Spain)

2011 Initiation to Research Scholarship (University of Granada, Spain)

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