



ELSEVIER

Contents lists available at ScienceDirect

## Human Movement Science

journal homepage: [www.elsevier.com/locate/humov](http://www.elsevier.com/locate/humov)

Full Length Article

# Match play demands of 11 versus 11 professional football using Global Positioning System tracking: Variations across common playing formations

Peter J. Tierney<sup>a,\*</sup>, Andrew Young<sup>a</sup>, Neil D. Clarke<sup>b</sup>, Michael J. Duncan<sup>b</sup><sup>a</sup>Coventry City Football Club, Coventry, UK<sup>b</sup>Human Performance Laboratory, Coventry University, Coventry, UK

## ARTICLE INFO

## Article history:

Received 28 December 2015

Revised 23 May 2016

Accepted 26 May 2016

## Keywords:

GPS

Formation

Match-play

Position

Training load

## ABSTRACT

This study aimed to examine Global Positioning System (GPS) determined movement patterns across the 5 most common playing formations (4-4-2; 4-3-3; 3-5-2; 3-4-3; 4-2-3-1) employed in 11 versus 11 football match play in England. Elite male footballers ( $n = 46$ ) were monitored over the course of a season; total distance (TD), high speed running (HSR), high metabolic load distance (HMLD), high speed accelerations (Acc) and decelerations (Dec) data was collected for analysis. It was found that 3-5-2 formation elicited higher TD ( $10528 \pm 565$  m,  $p = 0.05$ ), HSR ( $642 \pm 215$  m,  $p = 0.001$ ), and HMLD ( $2025 \pm 304$  m,  $p = 0.001$ ) than all other formations and above average Acc and Dec ( $34 \pm 7$ ,  $p = 0.036$  and  $57 \pm 10$ ,  $p = 0.006$ ), with 4-2-3-1 eliciting the highest Acc and Dec ( $38 \pm 8$  and  $61 \pm 12$ ). Positional data showed that CM in 4-3-3 covered >11% TD than in 4-4-2 ( $p = 0.012$ ). FW in 3-5-2 covered >45% HSR than in 4-2-3-1 ( $p = 0.004$ ). CM in 4-3-3 covered >14% HMLD than in 4-4-2 ( $p = 0.367$ ). FW in 4-3-3 performed >49% accelerations than in 4-2-3-1 ( $p = 0.293$ ). WD in 3-5-2 performed >20% more decelerations than in 4-4-2 ( $p = 0.161$ ). This study is important for coaches understanding, that positional physical characteristics are influenced by the demands of playing in different formations during match play.

© 2016 Elsevier B.V. All rights reserved.

## 1. Introduction

Within the game of football, laboratory and field based testing (Bangsbo, Mohr, Poulsen, Perez-Gomez, & Krstrup, 2006; le Gall, Carling, Williams, & Reilly, 2010) have been widely used as a means to understand the physiological and movement demands involved. To further this understanding, there has been an increased focus on in-game analysis and data collection (Buchheit et al., 2014). The technical and tactical nature of football has shown that the physical characteristics are multifactorial (Bradley et al., 2013) and that the physiological demands have changed as the nature of the game has further evolved (Barnes, Archer, Hogg, Bush, & Bradley, 2014; Malone et al., 2015). There is a scarcity of research that has quantified directly the individual movement specific requirements and physiological demands involved in 11 versus 11 match play in football (Bradley et al., 2013). To date, there has been limited examination as to how different playing formations and positions alter the physiological and technical demands required (Dellal et al., 2012; Russell et al., 2015). It is important

\* Corresponding author at: Coventry City Football Club, Leamington Road, Ryton on Dunsmore, Coventry CV8 3FL, UK.

E-mail address: [pete.tierney@ccfc.co.uk](mailto:pete.tierney@ccfc.co.uk) (P.J. Tierney).

to evaluate the match play demands in football, for each position within different playing formations in order to better guide conditioning coaches and sport specific coaches to individual demands involved during football match play.

The use of Global Positioning Systems (GPS) has become increasingly popular, quantifying movements such as distance covered, accelerations, decelerations, changes of direction and various speed distances (Dellaserra, Gao, & Ransdell, 2014; Vickery et al., 2014). Recently, FIFA amended their rules to allow for the use in competitive match play of electronic performance tracking systems such as direct worn GPS devices (FIFA, 2015). Since the start of the 2015–2016 Football League season in England, players have now been allowed to wear such devices (FA, 2015). These recent developments now allow for player movement and energy costs to be quantified (Akenhead, Hayes, Thompson, & French, 2013; Nevill, Holder, & Watts, 2009).

Thus allowing for a better understanding of the physiological characteristics required to perform at elite level football. Compared to methods of tracking players such as time motion, video and hand notation systems, GPS units that are worn directly by individual players has been reported as having greater reliability and validity (Austin & Kelly, 2014; Randers et al., 2010). Specifically, when used for various measures such as accelerations, decelerations, high speed running and total distance (Stevens et al., 2015). Furthermore, if used in an integrated approach where training and match play demands are measured using differing methods these differences are far greater magnified (Vickery et al., 2014).

Although GPS tracking shows great potential for developing a far greater understanding of football science (Buchheit et al., 2014); no study to date has provided an overview of the different demands for each playing position within different playing formations. The present study sought to address this issue by examining match movements of individual positions and in various formations within 11 versus 11 football match play in England.

## 2. Methods

### 2.1. Experimental approach to the problem

This study was designed to evaluate the match play demands across various formations of 11 vs 11 in professional football using portable GPS tracking, and to examine the match-play demands for the various playing position employed in different playing formations. Elite level football players from under 21s and under 18s squads were monitored during the course of competitive matches of 90 min duration during the 2014 season (August 2014–May 2015). Formations selected were from the 5 most popular employed in 11 versus 11 competitive match play, these were; 4-4-2, 4-3-3, 3-5-2, 3-4-3 and 4-2-3-1 (Table 1). All matches were played outdoor on natural grass pitches, dimensions of playing area length 100 m and width  $66 \pm 2$  m. Games were played during the afternoon or early evening between 13:00 h and 20:30 h on dates set in the fixture schedule and in accordance with the football league rules and regulations (Football League, 2014). All players abstained from any strenuous activity 24 h before and no player participated less than 72 h between matches. Players maintained their normal routines pre and post-match as professional football players.

### 2.2. Subjects

Full time professional football players with at least 2 years' playing experience of elite level football at a professional football club ( $n = 46$ , with a mean age  $20 \pm 3$  years, height of  $179 \pm 5$  cm, body mass of  $79.5 \pm 6.3$  kg and estimated body fat percentage of  $6.9 \pm 1.5\%$ ) respectively participated in this study. Informed consent was provided by each player. Academic ethics approval was obtained even though the data was obtained from activities that players routinely undertook as part of the monitoring process during the course of the football season. This was to conform with parental consent which was also given for any player under the age of 18 years. Participants completed a health screen questionnaire prior to the study, in addition each participant's capabilities to participate in physical activity was assessed by a Doctor and qualified Physiotherapist.

**Table 1**

Monthly distribution of total number of games and players evaluated across all formations during the season.

Formation	Month	August	September	October	November	December	January	February	March	April	May	Total
4-4-2	Number of games	n = 2	n = 0	n = 1	n = 1	n = 1	n = 0	n = 1	n = 1	n = 2	n = 0	9
	Number of players	n=16	n=0	n = 8	n = 7	n = 9	n = 0	n = 7	n = 7	n = 12	n = 0	66
4-3-3	Number of games	n = 1	n = 1	n = 1	n = 2	n = 1	n = 0	n = 0	n = 0	n = 1	n = 0	7
	Number of players	n = 8	n = 6	n = 6	n = 14	n = 7	n = 0	n = 0	n = 0	n = 9	n = 0	50
3-5-2	Number of games	n = 2	n = 1	n = 2	n = 1	n = 1	n = 2	n = 0	n = 0	n = 1	n = 0	10
	Number of players	n = 15	n = 8	n = 13	n = 9	n = 7	n = 18	n = 0	n = 0	n = 8	n = 0	78
3-4-3	Number of games	n = 0	n = 2	n = 0	n = 0	n = 0	n = 3	n = 1	n = 0	n = 0	n = 0	6
	Number of players	n = 0	n = 14	n = 0	n = 0	n = 0	n = 19	n = 6	n = 0	n = 0	n = 0	39
4-2-3-1	Number of games	n = 0	n = 0	n = 0	n = 0	n = 2	n = 0	n = 3	n = 3	n = 3	n = 0	11
	Number of players	n = 0	n = 0	n = 0	n = 0	n = 13	n = 0	n = 18	n = 21	n = 20	n = 0	89

Download English Version:

<https://daneshyari.com/en/article/7291104>

Download Persian Version:

<https://daneshyari.com/article/7291104>

[Daneshyari.com](https://daneshyari.com)