A SEASON-LONG COMPARISON OF SOCCER REFEREE MATCH DEMANDS BETWEEN THE ENGLISH PREMIER LEAGUE AND CHAMPIONSHIP

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INTRODUCTION

- Soccer is one of the most watched sports in the world; therefore, the level of scrutiny on a game can be huge. As such, the need for decisions within the game to be correct is incredibly important.
- Key decisions rest with the match officials, who have significant perceptual-cognitive demands placed upon them during a 90-minute match.
- An elite level referee will be required to make approximately 3 decisions per minute during a game (Helsen & Bultynck, 2004); many of which may significantly alter the course and/or result of the game.
- Components of physical fitness for referees have been studied at length throughout various levels of soccer around the world.
- To date however, they have not yet been compared in detail between the English Premier League and Championship nor at different points in the season to determine any differences between officials.

OBJECTIVES

- The aim of this study was to give an insight and comparison into the demands English Premier League, and Championship soccer placed upon match referees while considering each quarter of the season.
- It was hoped this would allow a more in-depth understanding of referees, which may in turn aid physical training and talent development.

METHODOLOGY

Participants

- Ten Premier League and ten Championship officials were randomly selected from all Professional Game Match Officals Ltd (PGMOL) officials who officiated during soccer matches within the 2017/2018 season.

Procedure

- The 20 participants officiated over 332 Premier League and Championship games in total. All officials were informed in writing and orally of the procedures over the course of the season and provided their consent before they were included within the study.
- All participants had at least 2 years experience of refereeing at each respective level. Participants match activities were monitored using microsensor units containing a 10 Hz global positioning system (GPS), a 100 Hz triaxial accelerometer (MinimaxX v5.0, Catapult Innovations™, Melbourne, Australia) and integrated heart rate monitor (Polar, Warwick, UK).
- Physical loading was quantified for each game using key parameters as described previously (Di Salvo et al., 2007). These included average heart rate and total number of accelerations and decelerations performed at varying intensities.

Data Analysis

- Descriptive statistics were calculated for each variable and data normality was assessed. RMANOVA were used to examine differences in match performance, such as total distance covered, sprinting distance, etc, between officials at differing levels across the season. Where differences were found Tukey's post hoc tests were used to determine localized effects. For univariate analyses unpaired T-Tests or the non-parametric equivalent were used. Statistical significance was accepted at $P < 0.05$.

RESULTS

Average Heart Rate

- There was a significant difference for the level of official ($P < 0.01$) with Premier League officials having a higher mean match heart rate throughout the season compared to the Championship officials. There was also a tendency towards a difference in mean match HR across the season with both sets of officials having a higher mean HR in quarter 4 vs. quarters 2 ($P = 0.075$) and 3 ($P = 0.1$) (Figure 1).

Total Acceleration and Decelerations

- Throughout the season Premier League referees performed fewer accelerations at 1.0 to 1.5 and 1.5 to 2.0 m/s^2 compared with Championship counterparts. Premier League referees also performed fewer decelerations at 0.0 to 1.0, 1.0 to 1.5 and 1.5 to 2.0 m/s^2 compared with Championship counterparts (Table 1).

Table 1 – Showing the total number of accelerations and decelerations across a full season for Premier League (Prem) and Championship (Champ) officials. * denotes differences between Prem vs. Champ

		Season Quarter			
	League – Speed (m/s^2)	1	2	3	4
Accelerations	Prem 0-1	1142 ± 25.1	1168.5 ± 16.2	1150.2 ± 15	1159.4 ± 22.9
	Champ 0-1	1152.4 ± 16.5	1146.3 ± 13.7	1136.5 ± 12.8	1151.1 ± 12.7
	Prem 1-1.5	51.7 ± 4.3 *	44.4 ± 2.8 *	42.4 ± 2.6 *	46.4 ± 3.9 *
	Champ 1-1.5	59.4 ± 2.8	50.3 ± 2.4	50 ± 2.2	52.8 ± 2.2
	Prem 1.5-2	10.7 ± 1.7 *	12.2 ± 1.1 *	11.4 ± 1 *	9.7 ± 1.6 *
	Champ 1.5-2	18.9 ± 1.1	13.6 ± 0.9	13.6 ± 0.9	14.9 ± 0.9
	Prem 2-2.5	2.1 ± 0.6	1.6 ± 0.4	1.8 ± 0.3	1.8 ± 0.5
	Champ 2-2.5	3.4 ± 0.4	2.8 ± 0.3	3.5 ± 0.3	3.3 ± 0.3
	Prem 2.5-3	0.9 ± 0.2	0.2 ± 0.1	0.1 ± 0.1	0.3 ± 0.2
	Champ 2.5-3	0.3 ± 0.1	0.3 ± 0.1	0.2 ± 0.1	0.4 ± 0.1
Decelerations	Prem 0-1	1191.8 ± 23.1	1183.4 ± 14.9	1161.7 ± 13.8	1177.1 ± 21
	Champ 0-1	1213.7 ± 15.1 *	1197.4 ± 12.6 *	1198.2 ± 11.8 *	1205.6 ± 11.7 *
	Prem 1-1.5	35.7 ± 2.7	28 ± 1.7	25.7 ± 1.6	29 ± 2.4
	Champ 1-1.5	38.1 ± 1.7 *	29.7 ± 1.4 *	29.9 ± 1.4 *	33.5 ± 1.3 *
	Prem 1.5-2	5.2 ± 1	6.1 ± 0.6	6.3 ± 0.6	5.9 ± 0.9
	Champ 1.5-2	6.8 ± 0.6 *	6.7 ± 0.5 *	7.5 ± 0.5 *	7.7 ± 0.5 *
	Prem 2-2.5	1.2 ± 0.4	1.1 ± 0.2	1.3 ± 0.2	1.1 ± 0.3
	Champ 2-2.5	1.6 ± 0.2	1.1 ± 0.2	1.4 ± 0.2	1.4 ± 0.2
	Prem 2.5-3	0.2 ± 0.1	0.1 ± 0.1	0.3 ± 0.1	0.3 ± 0.1
	Champ 2.5-3	0.2 ± 0.1	0.2 ± 0.1	0.3 ± 0.1	0.2 ± 0.1
	Prem 3-4	0.1 ± 0.2	0.2 ± 0.1	0.2 ± 0.1	0.4 ± 0.1
	Champ 3-4	0.2 ± 0.1	0.2 ± 0.1	0.2 ± 0.1	0.3 ± 0.1

- Championship officials display a lower average heart rate across the season than their Premier League counterparts. This is likely a result of the lower intensity of the game at the relatively lower level.
- Championship games showed significantly higher incidences of total accelerations and decelerations throughout the season compared to Premier League referees. This may be linked to a relatively lower level of experience in these officials resulting in a reduced ability to read the game.
- This may in turn mean that the Championship officials are more reactive to movement of the players and ball, therefore leading to greater incidences of high-intensity movements.

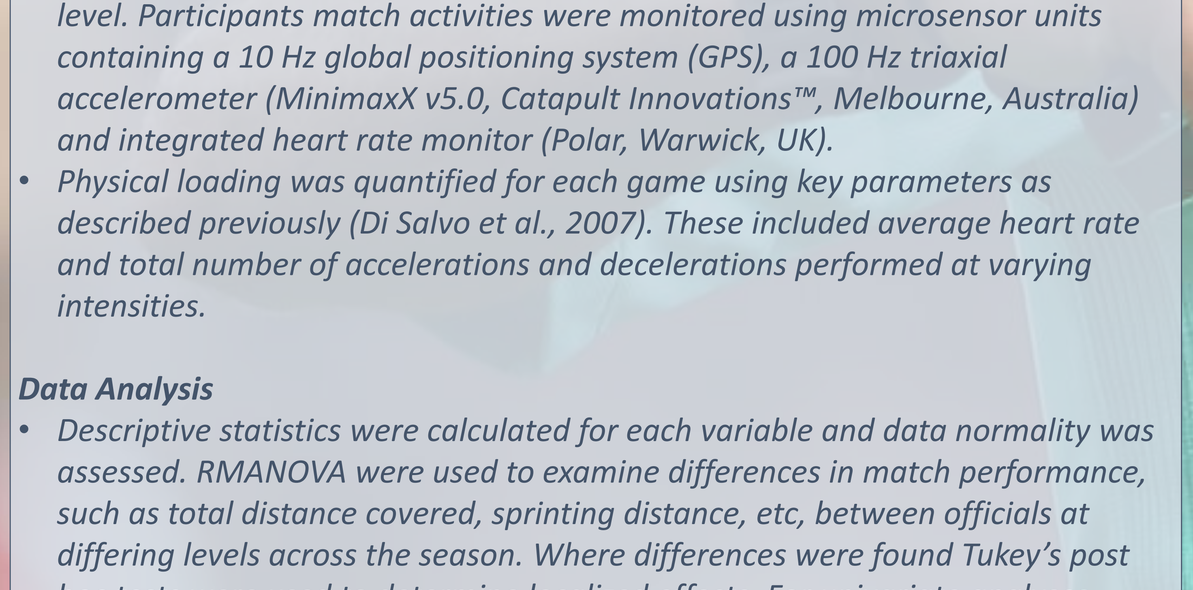

Figure 1. Mean heart rate across a full season for Premier League (Prem) and Championship (Champ) officials. * denotes differences between Prem vs. Champ ($P < 0.01$). $ denotes differences between quarter 4 and 3 ($P = 0.1$). ^ denotes differences between quarter 4 and 2 ($P = 0.075$).

CONCLUSION

Taken together the findings presented here might suggest that;

- Premier League referees should consider their aerobic fitness requirements during training due to operating at a higher average heart rate during matches.
- Conversely, Championship referees might consider anaerobic fitness and strength training as a training aim to cope with the demands of frequent changes of direction during matches in which they officiate.
- These data may also be useful during physical performance pathway planning as referees progress through the ranks towards the Premier League.

References

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