applied sciences

MDPI

Article

Understanding the Influence of the Head Coach on Soccer Training Drills—An 8 Season Analysis

Steve Barrett [1,*], Matthew C. Varley [2], Samuel P. Hills [3], Mark Russell [3], Matt Reeves [4], Adam Hearn [5] and Christopher Towlson [6]

[1] SPARC, Playermaker, London NW1 8NZ, UK
[2] Sport and Exercise Science, School of Allied Health, Human Services and Sport, La Trobe University, Melbourne, VIC 3086, Australia; m.varley@latrobe.edu.au
[3] School of Social and Health Sciences, Leeds Trinity University, Leeds LS18 5HD, UK; S.Hills@leedstrinity.ac.uk (S.P.H.); m.russell@leedstrinity.ac.uk (M.R.)
[4] Sport Science and Medicine Department, Leicester City Football Club, Leicester LE2 7FL, UK; Matt.Reeves@lcfc.co.uk
[5] Sport Science and Medicine Department, Coventry City Football Club, Coventry CV8 3FL, UK; adam.hearn@ccfc.co.uk
[6] Department of Sport Health and Exercise Science, University of Hull, Hull HU6 7RX, UK; c.towlson@hull.ac.uk
* Correspondence: sbsportscience@me.com; Tel.: +44-77-0204-1019

Received: 20 October 2020; Accepted: 9 November 2020; Published: 17 November 2020

Featured Application: An analysis of the external training loads associated to different training drills across 8 seasons, while examining the influence of the head coach.

Abstract: Soccer players perform a variety of training drills to develop the physical, technical and tactical qualities required for match-play. The role of coaches in prescribing training suggests that players may not always meet physical targets set by conditioning staff. To quantify the physical outputs elicited by different training drill types, 183 professional soccer players were monitored over 8 seasons using Microelectromechanical Systems during normal training, yielding 65,825 drill observations [362 ± 341 observations·player^{-1}]. Linear mixed models assessed the influence of drill type, head coach and playing position on physical output. Drills lasted ~14 min, eliciting total distances and high speed running of ~1000 m and 40 m, respectively. Conditioning drills elicited substantially greater relative high-speed running [18.8 ± 27.2 m.min^{-1}] and Sprint [3.5 ± 9.4 m.min^{-1}] distances than all other drill types. The proportion of training drill types used and external outputs elicited per drill were affected by the head coach. Midfielders recorded the highest total distance [77.3 ± 36.1m.min] and PlayerLoad™ [8.29 ± 3.54] of any playing position, whilst the lowest outputs were recorded by goalkeepers. This study provides reference data for practitioners when seeking to manipulate training prescription to achieve physical output targets whilst also meeting the team's technical and tactical objectives.

Keywords: football; monitoring; training load; coaching staff; drill categories

1. Introduction

Soccer is an intermittent, primarily aerobic activity [1], with bouts of high intensity efforts such as high speed running (HSR) Sprinting and accelerations/decelerations performed throughout [2]. To ensure that players are prepared to cope with the physical demands of match-play whilst minimizing the risk of injury, it is imperative that training sessions provide a stimulus, such as training load, that is sufficient to elicit adaptations [3]. Conversely, excessive training loads or large fluctuations in a player's physical loading patterns can increase injury-risk in team sport players [4–6]. Ongoing monitoring and manipulation of a player's physical loads within the context of a periodized preparation program therefore represents a fundamental task for applied practitioners working in soccer [7].

Soccer training activities are aimed to develop the physical, technical and tactical aspects ready for match play [3]. Technical and tactical objectives represent the primary focus of in-season training programs, as training prescription may be determined predominantly by the team's technical coaches based on the perceived technical/tactical needs of a squad [8–10]. As these training drills or sessions are based around team cohesion/performance, they may not elicit the specific physical outputs for an individual player intended by the practitioner [9,11]. Knowledge of the typical physical output elicited during different types of training drills may allow practitioners to estimate a player's upcoming training loads. For example, during single game weeks, professional soccer teams seek to maximize player readiness by typically prescribing their most physically demanding training sessions ~3–5 days in advance of the upcoming fixture [8–10]. A substantial reduction in loading is then provided during the ~24–48 h before the match to allow sufficient recovery time [8–10]. Although this form of within-microcycle periodization is commonplace within professional soccer, researchers investigating this topic have often reported loading patterns as a function of days for example, ['match day minus one, etc.] without reporting the specific training drills used [8–10]. Substantial differences in internal and external training loads have been reported during small-sided games (SSG) compared with straight line running activities [12] and between SSG conducted under different constraints for example, variations in pitch dimensions, the number of players involved, etc. [3,13]. As these findings highlight the role of training session design in modulating the type and magnitude of the stimulus provided, practitioners and coaches may benefit from information regarding the physical output associated with a wider variety of different training drills. Such insights could assist the design of varied training programs that provide the desired physical, technical and tactical stimulus in advance of the upcoming fixture or series of fixtures.

Frequent changes in coaching staff is a characteristic of professional soccer. Given the head coaches role in designing training programs [10], a change in personnel may influence a player's physical outputs during training and match-play, depending on the head coaches instructions for the team and each playing position. A study of 36 teams across 17 countries reported that the head coach's leadership style was associated with player injury rates [14], whilst increases in the incidence of injury have been observed following a change of head coach in Turkish professional soccer [15]. Despite an overall injury incidence rate of 2.3 muscle injuries per 1000 h of training and match-play exposure, this value increased to rates of 5.3 and 4.5 in the 14 days and 30 days after a change in head coach, respectively [15]. Given the relationship between fluctuations in training load and increased injury-risk [4–6], it is possible that such observations reflect substantial changes in players' physical outputs accompanying a change in staff. This may be due to differences in training philosophy for example, a preference for certain types of training drills or activities and a change within the playing style [6,12] between incoming and outgoing head coaches. Therefore, this study aimed to quantify the external physical outputs elicited by different types of training drills performed by professional soccer players. The influence of the head coach and playing position within these training drills was also assessed.

2. Materials and Methods

2.1. Experimental Approach to the Problem

To assess the external training loads of professional outfield soccer players during six different types of training drills, senior players from teams competing in the English Premier League [n = 1], English Championship [n = 1] and English League One [n = 1]were quantified using micromechanical electrical systems [MEMS] worn during their normal in-season training sessions between 2012/2013 and 2018/2019. Physical outputs were categorized according to the type of training drill being performed, the identity of the head coach at the time and the typical playing position of each player (Goalkeeper, Wide Defenders, Centre Defenders, Centre Midfielders, Wide Midfielders and Forwards; [16–18]). Linear mixed models were used to assess the extent to which external training loads were influenced by these three factors.

2.2. Subjects

After institutional ethical approval had been obtained, professional soccer players [n = 184: age: 25 ± 8 years; stature: 1.80 ± 0.09 m; body mass: 85.2 ± 8.6 kg] from teams competing in the top three tiers of English professional soccer [Premier League: n = 53, Championship: n = 93 and League One: n = 37] volunteered to participate in this study. All participants were briefed about the risks and benefits of participation, providing their written informed consent before data collection took place during the 2013/14 to 2018/19 English domestic seasons. The final dataset consisted of 65,825 individual training drill observations [mean: 362 ± 341 observations·player^{-1}, range: 5–1639 observations·player^{-1}], amounting to ~15,140 h of monitoring.

2.3. Procedures

Players' external loads during normal training sessions were quantified via MEMS (Micromechanical Electrical Systems; Optimeye S5, Catapult Sports, Melbourne, Australia), which were worn between the scapulae within a customized, tight-fitting neoprene garment. The Optimeye S5 unit (Firmware version 6.72–6.88) contains a 10Hz Global Positioning Systems (GPS) chip alongside a tri-axial piezoelectric linear accelerometer [Kionix: KXP94] sampling at 100 Hz. A GPS sampling rate of 10 Hz has demonstrated good reliability [coefficient of variation; CV% = 2.0–5.3%] for assessing instantaneous velocity [19] and small-to-moderate typical errors of the estimate [1.87%–1.95%] when measuring Sprint speed [19]. The accelerometers within the MEMS devices have also produced good reliability [CV% = 0.9–1.1%] during laboratory and field tests [20]. Units were calibrated before each season using the manufacturer's calibration jig and to the manufacturers recommended values. Calibration values were monitored regularly during the study period to ensure that the accuracy of each conformed to the manufacturer's guidelines. Each player wore the same unit throughout the study period to avoid inter-unit variation. In accordance with the manufacturer's recommendations, MEMS were activated outside for ~15 min before each session commenced to minimize the risk of erroneous data arising from poor GPS signal quality [16,21]. Data was downloaded within the same software version [Catapult Sprint 5.1.7] and were only included if the number of satellites exceeded six and the horizontal displacement of positioning was <1.5 [16,21]. All players and head coaches were familiar with these procedures, which were used as part of their routine monitoring practices.

The training drills completed throughout the study period were grouped into six categories according to their primary training objective. These categories are defined as 'conditioning' (CON), 'position-specific training' [PS], 'possession' (POS), 'SSG,' 'tactical' (TAC) and 'technical' (TEC) drills, with the definitions of each below. The definitions and categories were selected based upon the most used terminology within the previous research into different drills used in soccer and coaching manual resources [3,13,22]. Once the definitions were written, these were then shown to each of the head coaches involved within the project to ensure that these definitions were appropriate.

Conditioning [CON]—Drills designed specifically to exercise the player's physical capabilities. This will include drills with or without the ball, which are designed to exercise a specific part of the players physical performance as the main objective.

Position-Specific training [PS]—Drills where the demands of the exercise are aimed at specific units of the team, with positions separated and coached as a unit [goalkeeper, defenders, midfielders and forwards] or an individual.

Possession [POS]—Drills designed to mimic similar demands of match play, with the aim of the session to keep the ball away from the opposing team, with no goals to score in.

Small-Sided Games [SSG]—Drills designed to mimic similar demands of match play, with the aim of the session to keep the ball away from the opposing team, with no goals to score in.

Tactical [TAC]—Drills designed to educate the players in the tactical roles they play within a team shape. These include set-pieces and open play team shape.

Technical [TEC]—Drills aimed to specifically work on a skill aspect of soccer such as passing, shooting, defending and foot work with a ball, working as an entire group.

These categories were established using multiple resources.

In addition to drill duration, the variables profiled were Total Distance, HSR [defined as distance covered at a speed >5.5 $m \cdot s^{-1}$], Sprint distance covered [>7 $m \cdot s^{-1}$]. The number of high acceleration [>2 $m \cdot s^{-2}$] and high deceleration [<−2$m \cdot s^{-2}$] efforts alongside the maximum velocity achieved were also quantified for each drill. All dwell times for the number of efforts detected were set at 0.3 s [19]. Velocity data was calculated using the Doppler-shift method. Finally, PlayerLoad™ during each drill was quantified via the 100 Hz accelerometer. All variables for each drill were expressed both as absolute and relative to drill duration that is, variable·min^{-1}, to provide an indication of drill 'intensity' [the rate of physical output]. Information regarding the identity of head coach at the time [n = 9] and the playing position of each player that is the positional category in which the individual typically played at the time of data-collection [goalkeepers, defenders, midfielders, forwads]] was also recorded for each drill.

2.4. Statistical Analysis

Following satisfactory checks for normality of distribution, linear mixed models were used to assess differences in physical outputs whilst accounting for the repeated measurement of individuals and the unbalanced number of observations. Separate models were constructed for each dependent variable, with 'player identity' being included in all models as a random effect. Training 'drill category,' 'head coach' at the time of data collection and the primary 'position' of the individual player, were specified as fixed effects to assess their influence. A step-up approach to model construction was used, whereby fixed effects were sequentially added to the model in the order specified above and were retained if they demonstrated statistical significance that is $p < 0.05$, and improved the model fit based on an Akaike's information criterion assessment [23]. In the event of significant fixed effects, Bonferroni-adjusted pairwise comparisons and standardized effect sizes, ES, with associated 90% confidence intervals, CI, were calculated to investigate differences between the levels of each fixed effect. Analyses were completed using R Studio (V 3.6.1) using the *lme4* and *emmeans* packages and ES were interpreted as: *trivial* [ES <0.2], *small* [0.2≤ ES <0.6], *moderate* [0.6≤ ES <1.2], *large* [1.2 ≤ ES<2] and *very large* [≥2] effects [24].

3. Results

Of the 65,825 drills analyzed, the respective contributions from each category were CON: 10%, PS: 4%, POS: 27%, SSG: 33%, TAC: 11% and TEC: 15%. Drill category, head coach and playing position each influenced all dependent variables [all $p \leq 0.001$], except that position did not affect relative sprint distance.

3.1. The Influence of Drill Category

Table 1 shows the overall mean physical outputs per drill and highlights differences elicited by the six drill categories when head coach and position were constant. Pairwise comparisons highlighted that duration [all $p \leq 0.001$; ES: 0.08–1.46, trivial to large], absolute [all $p \leq 0.001$, except for $p = 0.031$ for PS versus POS; ES: 0.05–1.09, trivial to moderate] and relative [all $p \leq 0.001$; ES: 0.02–2.70, trivial to very large] total distance, relative PlayerLoad™ all [$p \leq 0.001$; ES: 0.14–0.99, trivial to moderate], the relative number of high accelerations [all $p \leq 0.001$; ES: 0.06–0.63, trivial to moderate] and the relative number of high decelerations [all $p \leq 0.001$; ES: 0.06–0.97, trivial to moderate] differed for all between-drill comparisons. Moreover, absolute HSR [all $p \leq 0.001$; ES: 0.16–0.77, trivial to moderate], absolute PlayerLoad™ [ES: 0.14–0.99, *trivial to moderate*] and the number of high accelerations [all $p \leq 0.001$; ES: 0.02–0.60, trivial to moderate] differed for all comparisons except for similar values being recorded for PS and TEC.

Absolute sprint distance was similar between PS and TAC but differed for all other comparisons [all $p \leq 0.001$, except for $p = 0.002$ for differences between PS and SSG; ES: 0.11–2.00, trivial to very large], whilst maximum velocity differed in all comparisons [$p \leq 0.001$, ES: 0.19–1.21, trivial to large] except that maximum velocity during CON was similar to values recorded during both TAC and TEC. Relative HSR during SSG, TAC and TEC was similar to PS, whilst SSG was also similar to TAC for this variable. Relative sprint distance did not differ from SSG during TAC or TEC and relative sprint distance was similar to CON during TAC. All other pairwise comparisons highlighted significant differences in relative HSR [all $p \leq 0.001$; ES: 0.15–0.93, trivial to moderate] and relative sprint distance [all $p \leq 0.001$, except for $p = 0.033$ for POS versus

TEC and $p = 0.003$ for TAC versus TEC; ES:0.10–0.53, trivial to small] between drill categories. The number of high decelerations was similar between CON and PS and between PS and TEC, whereas high deceleration differed between all other pairs of drills [all $p \leq 0.001$, except for $p = 0.002$ for CON versus TEC; ES: 0.06–0.84, trivial to moderate.

Table 1. Descriptive statistics and differences in mean training loads (i.e., per drill) overall and between drill categories.

	Duration	Total Distance		High-Speed Running		Sprint Distance		Maximum Velocity	PlayerLoad™		High Accelerations		High Decelerations	
Drill category	(min)	Absolute (m)	Relative (m·min⁻¹)	Absolute (m)	Relative (m·min⁻¹)	Absolute (m)	Relative (m·min⁻¹)	(m·s⁻¹)	Absolute (AU)	Relative (AU·min⁻¹)	Absolute (#)	Relative (#·min⁻¹)	Absolute (m)	Relative (#·min⁻¹)
Overall	13.82 ± 9.13	996 ± 772	75.9 ± 36.0	36 ± 77	3.4 ± 10.4	5 ± 21	0.5 ± 3.2	5.6 ± 1.5	103.42 ± 74.59	8.04 ± 3.49	15 ± 19	1.05 ± 1.04	11 ± 14	0.7 ± 0.7
Conditioning (CON)	7.15 ± 9.53 ^{b,c,d,e,f}	628 ± 753 ^{b,c,d,e,f}	102.4 ± 52.9 ^{b,c,d,e,f}	105 ± 169 ^{b,c,d,e,f}	18.8 ± 27.2 ^{b,c,d,e,f}	19 ± 51 ^{b,c,d,e,f}	3.5 ± 9.4 ^{b,c,d,e,f}	6.0 ± 1.5 ^{b,c,d,f}	64.42 ± 77.27 ^{b,c,d,e,f}	10.56 ± 5.08 ^{b,c,d,e,f}	9 ± 12 ^{b,c,d,e,f}	1.5 ± 1.3 ^{b,c,d,e,f}	6 ± 9 ^{c,d,e,ff}	0.9 ± 1.0 ^{b,c,d,e,f}
Position-specific (PS)	16.63 ± 8.79 ^{a,c,d,e,f}	771 ± 540 ^{a,cc,d,e,f}	48.1 ± 24.7 ^{a,c,d,e,f}	22 ± 75 ^{a,c,d,e}	1.6 ± 6.7 ^{a,c,d}	7 ± 27 ^{a,c,dd,f}	0.5 ± 2.6 ^{a,c,d,f}	5.1 ± 1.9 ^{a,c,d,e}	75.14 ± 52.81 ^{a,c,d,e}	4.72 ± 2.50 ^{a,c,d,e,f}	13 ± 17 ^{a,c,d,e}	0.8 ± 0.8 ^{a,c,d,e,f}	7 ± 7 ^{c,d,e}	0.4 ± 0.4 ^{a,c,d,e,f}
Possession (POS)	11.96 ± 5.54 ^{a,b,d,e,f}	777 ± 603 ^{a,bb,d,e,f}	63.8 ± 33.4 ^{a,b,d,e,f}	12 ± 31 ^{a,b,d,e,f}	0.8 ± 1.9 ^{a,b,d,e,f}	1 ± 6 ^{a,b,d,e,f}	0.1 ± 0.4 ^{a,b,d,e,ff}	4.7 ± 1.6 ^{a,b,d,e,f}	88.67 ± 56.24 ^{a,b,d,e,f}	7.47 ± 2.93 ^{a,b,d,e,f}	13 ± 16 ^{a,b,d,e,f}	0.9 ± 1.0 ^{a,b,d,e,f}	9 ± 11 ^{a,b,d,e,f}	0.7 ± 0.7 ^{a,b,d,e,f}
Small-sided games (SSG)	14.74 ± 8.53 ^{a,b,c,e,f}	1373 ± 790 ^{a,b,c,e,f}	96.3 ± 21.1 ^{a,b,c,e,f}	39 ± 52 ^{a,b,c,f}	2.5 ± 2.7 ^{a,c,e,f}	4 ± 12 ^{a,bb,c,e,f}	0.3 ± 0.7 ^{a,b,c}	6.3 ± 1.0 ^{a,b,c,e,f}	138.00 ± 77.72 ^{a,b,c,e,f}	9.79 ± 2.48 ^{a,b,c,e,f}	20 ± 22 ^{a,b,c,e,f}	1.2 ± 1.1 ^{a,b,c,e,f}	16 ± 16 ^{a,b,c,e,f}	1.0 ± 0.7 ^{a,b,c,e,f}
Tactical (TAC)	22.25 ± 11.05 ^{a,b,c,d,f}	1275 ± 898 ^{a,b,c,d,f}	57.3 ± 27.6 ^{a,b,c,d,f}	49 ± 73 ^{a,b,c,f}	2.1 ± 2.9 ^{a,c,d,f}	7 ± 18 ^{a,c,d,f}	0.3 ± 0.8 ^{a,c,ff}	6.0 ± 1.5 ^{b,c,d,f}	123.03 ± 86.11 ^{a,b,c,d,f}	5.54 ± 2.65 ^{a,b,c,d,f}	19 ± 20 ^{a,b,c,d,f}	0.8 ± 0.7 ^{a,b,c,d,ff}	15 ± 15 ^{a,b,c,d,f}	0.6 ± 0.5 ^{a,b,c,d,f}
Technical (TEC)	12.51 ± 8.61 ^{a,b,c,d,e}	660 ± 481 ^{a,b,c,d,e}	56.8 ± 23.9 ^{a,b,c,d,e}	19 ± 52 ^{a,c,d,e}	1.3 ± 3.3 ^{a,c,d,e}	2 ± 14 ^{a,b,c,d,e}	0.1 ± 0.8 ^{a,b,cc,ee}	5.0 ± 1.4 ^{a,c,d,e}	73.54 ±50.12 ^{a,c,d,e}	6.36 ± 2.41 ^{a,b,c,d,e}	11 ± 14 ^{a,c,d,e}	0.9 ± 0.9 ^{a,b,c,d,ee}	5 ± 8 ^{aa,c,d,e}	0.4 ± 0.5 ^{a,b,c,d,e}

AU: Arbitrary units, , #:Count ^{a}: Significantly different from conditioning drills ^{b}: Significantly different from position-specific drills ^{c}: Significantly different from possession drills ^{d}: Significantly different from small-sided games drills ^{e}: Significantly different from tactical drills ^{f}: Significantly different from technical drills. A single letter indicates differences at the $p \leq 0.001$ level, whereas two of the same letter indicates differences at the $p < 0.05$ level. Data are presented as mean ± standard deviation.

3.2. The influence of Head Coach

For each head coach assessed, Figure 1 shows the proportion of all training drills that was accounted for by each drill category. Between-head coach differences were identified in 80.0% of all pairwise comparisons within drill comparisons. Table 2 displays the results of these analyses alongside descriptive statistics for each head coach. For ease of interpretation, Table 3 provides the number and proportion of significant differences identified from the 36 pairwise comparisons for each dependent variable and includes ES data where significant differences were present.

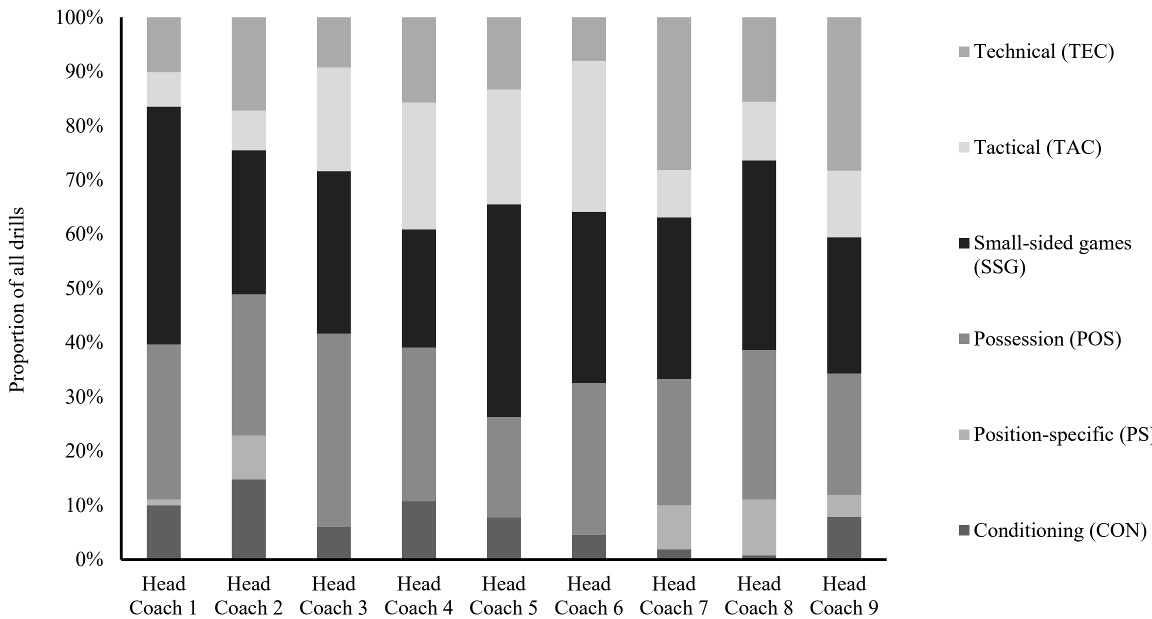

Figure 1. Proportion of training accounted for by each drill category for each Head Coach.

Table 2. Descriptive statistics and differences in mean training loads (i.e., per drill) between managers.

	Duration	**Total Distance**		**HSR**		**Sprint Distance**		**Maximum Velocity**	**PlayerLoad™**		**High Accelerations**		**High Decelerations**	
Head Coach ID	(min)	Absolute (m)	Relative (m·min^{-1})	Absolute (m)	Relative (m·min^{-1})	Absolute (m)	Relative (m·min^{-1})	(m·s^{-1})	Absolute (AU)	Relative (AU·min^{-1})	Absolute (#)	Relative (#·min^{-1})	Absolute (m)	Relative (#·min^{-1})
1	10.30 ± 5.20 ^{b,c,d,e,f,g,h,i}	778 ± 545 ^{b,c,d,e,f,g,h,i}	81.7 ± 46.7 ^{bb,cc,d,e,f}	32 ± 49 ^{b,c,f,g,h,i}	5.2 ± 14.9 ^{b,c,d,e,f,g,h,i}	3 ± 12 ^{b,c,dd,f}	0.6 ± 3.8 ^{c}	5.5 ± 1.6 ^{b,c,f,g,h,i}	86.84 ± 53.17 ^{b,c,d,e,f,gg,h,i}	9.14 ± 4.34 ^{b,c,d,e,f,ii}	2 ± 4 ^{b,c,d,e,f,g,i}	0.2 ± 0.5 ^{b,c,d,e,f,g,h,i}	2 ± 4 ^{b,c,d,e,f,g,i}	0.3 ± 0.5 ^{b,c,d,e,f,g,h,i}
2	14.59 ± 9.09 ^{a,c,d,e,f,g,h,i}	1064 ± 815 ^{a,c,e,f,g,h,i}	74.9 ± 31.8 ^{aa,d,e,f,g,hh}	46 ± 95 ^{a,c,d,e,g,h,i}	3.8 ± 10.0 ^{a,c,d,g,h,i}	7 ± 27 ^{a,c,d,e,gg,h,i}	0.7 ± 3.7 ^{c,d,ee,i}	5.6 ± 1.6 ^{a,c,d,e,g}	108.99 ± 79.56 ^{a,c,e,f,g,h,ii}	7.81 ± 3.11 ^{a,d,e,f,g,h}	25 ± 22 ^{a,c,d,e,f,g,h,i}	1.8 ± 1.1 ^{a,c,d,e,f,g,h,i}	16 ± 15 ^{a,c,d,e,g,h,i}	1.1 ± 0.8 ^{a,cc,d,e,f,g,h,i}
3	17.91 ± 9.51 ^{a,b,d,e,f,g,h,i}	1413 ± 954 ^{a,b,d,e,g,h,i}	76.8 ± 29.8 ^{aa,d,e,f,g,hh}	58 ± 96 ^{a,b,d,e,f,g,h,i}	3.7 ± 9.2 ^{a,b,d,e,f,g,h,i}	9.2 ± 36.4 ^{a,b,d,e,f,g,h,i}	0.8 ± 4.25 ^{a,c,d,e,f,g,g,h,i}	5.8 ± 1.5 ^{a,b,d,e,f,g}	142.32 ± 91.46 ^{a,b,d,e,g,h,i}	7.95 ± 2.95 ^{a,d,e,f,g,h}	22 ± 16 ^{a,b,d,e,g,h,i}	1.2 ± 0.7 ^{a,b,d,e,f,g,h,i}	21 ± 16 ^{a,b,d,e,f,g,h,i}	1.1 ± 0.7 ^{a,bb,d,e,f,g,h,i}
4	19.82 ± 15.56 ^{a,b,c,e,g,h,i}	1153 ± 984 ^{a,c,e,f,g,h,i}	60.3 ± 29.2 ^{a,b,c,f,g,h,ii}	39 ± 69 ^{b,c,f,g,h,i}	2.1 ± 4.4 ^{a,b,c,ee,f}	5 ± 17 ^{aa,b,c,ii}	0.3 ± 1.1 ^{b,c,gg}	5.3 ± 1.7 ^{b,c,e,f,g,h,i}	121.21 ± 94.73 $^{a,c,e,f,g,h,ii\ i}$	6.52 ± 2.73 ^{a,b,c,ff,g,h,i}	18 ± 16 ^{a,b,c,e,g,h,i}	1.0 ± 0.7 ^{a,b,c,e,g,h,i}	16 ± 15 ^{a,b,c,e,f,g,h,i}	0.8 ± 0.7 ^{a,b,c,g,h,i}
5	14.90 ± 7.12 ^{a,b,c,d,f,g,h}	1015 ± 640 ^{a,b,c,d,f,h,i}	67.6 ± 28.6 ^{a,b,c,f,g,h,ii}	34 ± 83 ^{b,c,f,g,h,i}	2.6 ± 7.3 ^{a,c,dd,gg,hh,i}	3 ± 14 ^{b,c,f}	0.3 ± 1.64 ^{bb,c}	5.3 ± 1.6 ^{b,c,d,f,g,h,i}	105.48 ± 64.71 $^{a,b,c,d,f,h\ i}$	7.03 ± 2.76 ^{a,b,c,g,h,i}	16 ± 11 ^{a,b,c,d,f,g,h,i}	1.0 ± 0.6 ^{a,b,c,d,g,h,i}	14 ± 11 ^{a,b,c,d,f,g,h,i}	0.9 ± 0.6 ^{a,b,c,g,h,i}
6	20.81 ± 12.09 ^{a,b,c,e,g,h,i}	1403 ± 1079 ^{a,b,d,e,g,h,i}	66.7 ± 29.7 ^{a,b,c,d,e,g,h,i}	48 ± 86 ^{a,c,d,e,g,h,i}	2.3 ± 5.3 ^{a,c,d,g,h,i}	6 ± 20 ^{a,c,e,h,i}	0.3 ± 2.0 ^{c}	5.6 ± 1.6 ^{a,c,d,e,g,ii}	138.13 ± 101.30 ^{a,b,d,e,g,h,i}	6.67 ± 2.70 ^{a,b,c,dd,g,h,i}	22 ± 18 ^{a,b,e,g,h,i}	1.1 ± 0.7 ^{a,b,c,g,h,i}	20 ± 17 ^{a,c,d,e,g,h,i}	0.9 ± 0.6 ^{a,b,c,g,h,i}
7	12.05 ± 7.79 ^{a,b,c,d,e,f,h,i}	905 ± 560 ^{a,b,c,d,e,f,h,ii}	82.9 ± 29.7 ^{b,c,d,f,h,i}	4 ± 13 ^{a,b,c,d,e,f}	0.4 ± 1.8 $^{a,b,c,ee,f,i\ i}$	3 ± 13 ^{bb,c,hh,i}	0.4 ± 1.8 ^{cc,dd,i}	5.9 ± 1.2 ^{a,b,c,d,e,f,h,i}	90.85 ± 54.55 ^{aa,b,c,d,f,h,ii}	8.42 ± 2.94 ^{b,c,d,e,f,h,i}	6 ± 5 ^{a,b,c,d,e,f,h,i}	0.5 ± 0.4 ^{a,b,c,d,e,f}	4 ± 4 ^{a,b,c,d,e,f,h,i}	0.4 ± 0.4 ^{a,b,c,d,e,f}

8	8.04 ± 5.36 ^{a,b,c,d,e,f,g,i}	551 ± 306 ^{a,b,c,d,e,f,g,i}	80.9 ± 30.3 ^{bb,cc,d,e,f,g,i}	2 ± 11 ^{a,b,c,d,e,f}	0.2 ± 2.2 ^{a,b,c,ee,f}	2 ± 11 ^{b,c,f,gg}	0.2 ± 2.2 ^{c}	5.7 ± 1.1 ^{a,d,e,g}	56.72 ± 30.38 ^{a,b,c,d,e,f,g,i}	8.46 ± 3.33 ^{b,c,d,e,f,g,i}	4 ± 4 ^{b,c,d,e,f,g,i}	0.6 ± 0.5 ^{a,b,c,d,e,f}	3 ± 3 ^{b,c,d,e,f,g,i}	0.4 ± 0.4 ^{a,b,c,d,e,f}
9	13.86 ± 8.41 ^{a,b,c,d,f,g,h}	998 ± 715 ^{a,b,c,dd,ee,f,gg,h}	74.8 ± 27.3 ^{d,e,f,g,h}	12 ± 50 ^{a,b,c,d,e,f}	0.8 ± 3.9 ^{a,b,c,e,f,gg}	2 ± 10.5 ^{b,c,dd,f,g}	0.1 ± 1 ^{bb,c,g}	5.8 ± 1.3 ^{a,d,e,ff,g}	100.99 ± 68.82 ^{a,bb,c,dd,f,gg,h}	7.70 ± 2.66 ^{aa,d,e,f,g,h}	9 ± 9 ^{a,b,c,d,e,f,g,h}	0.7 ± 0.6 ^{a,b,c,d,e,f}	7 ± 9 ^{a,b,c,d,e,f,g,h}	0.5 ± 0.5 ^{a,b,c,d,e,f}

AU: Arbitrary units, HSR: High-speed running, #:Count ^{a}: Significantly different from manager 1 ^{b}: Significantly different from manager 2 ^{c}: Significantly different from manager 3 ^{d}: Significantly different from manager 4 ^{e}: Significantly different from manager 5 ^{f}: Significantly different from manager 6 ^{g}: Significantly different from manager 7 ^{h}: Significantly different from manager 8 ^{i}: Significantly different from manager 9. A single letter indicates differences at the $p \leq 0.001$ level, whereas two of the same letter indicates differences at the $p < 0.05$ level. Data are presented as mean ± standard deviation.

Table 3. Outcomes of pairwise comparisons of external load variables (i.e., per drill) between managers.

Manager Identities Being Compared	Variables that did not Differ Between Managers	Number of Variables that Differed	Percentage of Variables that Differed	Effect Sizes
1–2	Relative SPR	35	97.2%	0.05–1.76, trivial to large
1–3	None	36	100%	0.04–1.74, trivial to large
1–4	Absolute HSR, relative SPR, maximum velocity	33	91.7%	0.12–1.42, trivial to large
1–5	Absolute HSR, absolute SPR, relative SPR, maximum velocity	32	88.9%	0.22–1.57, trivial to large
1–6	Relative SPR	35	97.2%	0.08–1.57, trivial to large
1–7	Relative TD, absolute SPR, relative SPR, relative PL	32	88.9%	0.07–0.88, trivial to moderate
1–8	Relative TD, absolute SPR, relative SPR, relative PL, high accelerations, high decelerations	30	83.3%	0.05–1.76, trivial to large
1–9	Relative TD, absolute SPR, relative SPR	33	91.7%	0.20–1.07, trivial to moderate
2–3	Relative TD, relative PL	34	94.4%	0.01–0.61, trivial to moderate
2–4	Absolute TD, absolute PL	34	94.4%	0.01–0.83, trivial to moderate
2–5	Relative HSR	35	97.2%	0.04–0.81, trivial to moderate
2–6	Absolute HSR, relative HSR, absolute SPR, relative SPR, maximum velocity, high decelerations	30	83.3%	0.15–0.79, trivial to moderate
2–7	Relative SPR	35	97.2%	0.20–1.46, trivial to large
2–8	Relative SPR, maximum velocity,	34	94.4%	0.19–1.40, trivial to large
2–9	Relative TD, relative SPR, relative PL, maximum velocity	32	88.9%	0.08–1.21, trivial to large
3–4	None	36	100%	0.15–0.56, trivial to small
3–5	None	36	100%	0.12–0.49, trivial to small
3–6	Absolute TD, absolute PL, high accelerations	33	91.7%	0.07–0.45, trivial to small
3–7	None	36	100%	0.08–1.44, trivial to large
3–8	Maximum velocity			0.14–1.56, trivial to large
3–9	Relative TD, relative PL, maximum velocity	33	91.7%	0.20–1.04, trivial to moderate
4–5	Relative TD, absolute HSR, absolute SPR, relative SPR, relative PL, relative high decelerations	30	83.3%	0.01–0.41, trivial to small
4–6	Duration, absolute SPR, relative SPR, high accelerations, relative high decelerations, relative high decelerations	30	83.3%	0.04–0.25, trivial to small
4–7	Relative HSR, absolute SPR	34	94.4%	0.08–1.08, trivial to moderate
4–8	Relative HSR, absolute SPR, relative SPR	33	91.7%	0.27–1.24, trivial to large
4–9	Relative HSR, relative SPR	34	94.4%	0.18–0.71, trivial to moderate
5–6	Relative HSR, relative SPR, relative PL, relative high accelerations, relative high decelerations	31	86.1%	0.03–0.60, trivial to moderate
5–7	Absolute TD, absolute SPR, relative SPR, absolute PL	32	88.9%	0.38–1.21, trivial to large
5–8	Absolute SPR, relative SPR	34	94.4%	0.47–1.39, trivial to large
5–9	Duration, absolute SPR, relative SPR, absolute PL	32	88.9%	0.03–0.75, trivial to moderate
6–7	Absolute SPR, relative SPR	34	94.4%	0.23–1.29, trivial to large
6–8	Relative SPR, maximum velocity	34	94.4%	0.27–1.41, trivial to large
6–9	Relative SPR	35	97.2%	0.10–0.93, trivial to moderate

7–8	Absolute HSR, relative HSR, relative SPR, relative high accelerations, relative high decelerations	31	86.1%	0.01–0.78, trivial to moderate
7–9	Absolute HSR, relative high accelerations, relative high decelerations	33	91.7%	0.10–0.49, trivial to small
8–9	Absolute HSR, relative HSR, absolute SPR, relative SPR, maximum velocity, relative high accelerations, relative high decelerations	29	80.6%	0.21–0.83, trivial to moderate

SPR: Sprinting, HSR: High-speed running, PL; relative PlayerLoad™.

3.3. The influence of Playing Position

When drill category and head coach were held constant, drills for midfielders [all $p \leq 0.001$; ES: 0.34–1.50, small to large] and forwards [all $p \leq 0.001$, except for $p = 0.002$ for relative HSR and $p = 0.008$ for absolute sprint distance; ES: 0.15-1.35, trivial to large] elicited higher physical outputs for all variables except for relative sprint distance, when compared with goalkeepers. Moreover, with the exception of absolute PlayerLoad™ and relative sprint distance, center defenders exceeded goalkeepers in relation to all dependent variables [all $p \leq 0.001$, except for $p = 0.003$ for both relative HSR and absolute sprint distance; ES: 0.20–1.48, small to large]. Centre midfielders covered greater absolute total distance per drill than forwards [$p = 0.012$; ES: 0.15 [CI: 0.13, 0.16], trivi*al*] and wide defenders [$p \leq 0.001$; ES: 0.19 [CI: 0.18, 0.20], trivial], whilst also surpassing center defenders for relative total distance [$p = 0.002$; ES: 0.02 [CI: 0.00, 0.03], trivial], absolute HSR [$p \leq 0.001$; ES: 0.09 [CI: 0.07, 0.10], trivial] and absolute and relative PlayerLoad™ [both $p \leq 0.001$, ES: 0.10–0.26, trivial to *small*]. Relative distance covered was lower [$p = 0.018$; ES: 0.04 [CI: 0.03, 0.06], trivial] but relative PlayerLoad™ [$p = 0.008$; ES: 0.03 [CI: 0.01, 0.04], trivial] was greater for forwards compared with center defenders.

4. Discussion

The aim of this study was to quantify the external physical loads elicited by different categories of training drills performed by professional soccer players while assessing the influence of manager identity and playing position. On average, drills lasted ~14 min and elicited distances covered and HSR of ~1000 m and 40 m, respectively. However, all physical variables differed as a function of drill type and manager identity, with playing position influencing all variables except for relative sprint distance. Acknowledging that the demands of training may also be influenced by factors such as the specific task constraints [3,13], knowing the external load responses associated with each training drill may be valuable for practitioners as a guide. Based on the methods used in this study, practitioners may also find it beneficial to create their own drill data sets to help support their own team and individual specific training prescriptions [3], while accounting for the influence of any coaching staff changes.

Development of technical and tactical skills typically represent the primary focus of in-season training [3,9,11], with specific session content being mostly determined by head coaches or senior coaching staff [10]. However, soccer players also require well-developed aerobic and anaerobic energy systems to cope with the varied demands of match-play in addition to adequate lower-limb strength and range of motion to perform frequent high-speed actions such as sprint, jumping and changes of direction [1,3]. It is therefore imperative that preparation programs expose players to a volume and intensity of stimulus that can elicit [or at least maintain] these necessary adaptations. The current study observed that TAC were typically the longest training drills, although by far the greatest absolute and relative HSR and sprint distances were elicited by CON. Conversely, absolute acceleration and deceleration outputs were highest for SSG and TAC drills (Table 1), whereas SSG and CON drills had the highest relative outputs. Given the consistency of these differences within head coaches, practitioners may use the current information to consider the implementation of these drill types within the microcycle. This information may also be valuable when designing 'top-up' training sessions for substitutes or unused squad members in an effort to compensate for reductions in match-day loading when compared with players who complete a full match [22,25]. Subject to the existence of practical and regulatory restrictions [22,25], practitioners may select the type of drill to implement during top-up sessions based upon recorded deficits in specific external load variables. Practitioners have adopted the use of stimulating the most demanding sections of match-play to create specificity within an individual's training program/ top-up sessions [22,25]. In combination with the proposed method of monitoring different drill categories, practitioners and coaches can help prescribe relevant training drills for these type of sessions and ensure players training is specific to their external training loads [22].

Although the overall proportion of training drills from each category was CON: 10%, PS: 4%, POS: 27%, SSG: 33%, TAC: 11% and TEC: 15%, substantial variation was observed between managers. For example, the proportion of training drills accounted for by SSG ranged from 22–44% for each of the nine head coaches whilst the contribution from TAC varied between 6–28%. Such observations likely reflect between-head coach differences in training philosophies or priorities and highlight that a change in staff could profoundly affect the loading patterns of individual squad members. As each drill category elicits a distinct external load profile, sudden changes in training composition may produce concomitant fluctuations in overall loads. Moreover, it is notable that head coach identity influenced all external load variables even when drill category was held constant. Understanding the playing philosophy of coaching staff and their team strategy can provide specific information for practitioners when prescribing and designing training drills for their players [9,12]. For example, the use of different formations [4-4-2,4-3-3,4-2-3-1 etc.] has been shown to alter the physical demands of match play [18], with the perception of both coaches and practitioners suggesting the specificity of training should be reflective of the outputs required during match play [10,26]. The use of position specific based conditioning drills has elicited higher heart rate responses from players then SSG [12]. However, the design and response to these types of drills may vary as shown with the large fluctuation in the use of conditioning [1%–14%] and position specific drills [0%–10%], depending on the head coach. Increases in injury-risk reported following changes in team management staff [15] and the findings of the current study may suggest the potential that deviations in training loads could somewhat explain these findings. An increase use in a specific training drill category by a head coach, may incur specific increased physical outputs (Table 1), which practitioners should consider as part of their planning and prescription to support their players.

Positional variation is evident within match play, which likely reflects differences in the tactical role and may warrant a position-specific approach to training prescription to develop the physical, technical and tactical qualities required for match-play success [26]. Within the current study, Midfielders recorded the highest total distances, HSR and PL per training drill. Although interactions between playing position and drill type could not be assessed, it is likely that discrepancies in the outputs elicited during PS, SSG and TAC that is, [those drills in which players perform specific positional roles that are akin to match-play] largely explain such findings. Moreover, differences in physiological capabilities between positions may have contributed to greater distances for midfielders during other drills such as CON [1]. Four of the head coaches in the current study did not implement any PS during the study period, a finding that further highlights how coaching staff substantially influence the training practices of any given team [10]. Although potentially beneficial from a physical, technical or tactical perspective [26], the decision whether or not to include PS within a preparation program must be taken with reference to factors such as the time and resources for example, coaching expertise that are available as well as considering the training priorities in the context of the broader preparation program.

Substantially lower external physical outputs were recorded for goalkeepers compared with players in outfield positions, despite drills typically lasting longer for goalkeepers. This difference in physical output is similar to that observed during in match-play. Indeed, goalkeepers may cover ~50% of the match distances of their outfield counterparts [27,28] and their unique tactical role for example, [being the only team member permitted to handle the ball whilst the match is in play] means that much of a goalkeeper's training is conducted separately under the supervision of position-specific coaches [27,28]. Although the current study highlights the lowest physical outputs for goalkeepers, it must be considered whether the range of metrics typically used to quantify external training loads in outfield soccer players are also appropriate for use in relation to goalkeepers. Whereas locomotor demands may be the primary contributor to an outfield player's training and match-play loads, goalkeepers perform minimal running but are required to execute several explosive actions such as diving, saving and high-velocity kicking [28]. Practitioners should therefore contemplate accounting for such position-specific demands when seeking to quantify the loads of goalkeepers within their squad. Notably, eliciting desirable physical adaptations in this bespoke group of soccer players may require different types of training drills compared with the methods typically used for players in outfield positions. For example, although SSG is often implemented ~3–5 days prior to match-day as a means of providing a substantial stimulus for certain physical as well as technical/tactical developments in outfield players, SSG may be amongst the least demanding drills performed by goalkeepers [28]. Conversely, TEC or PS drills performed in the 24–48 h prior to match-play may be effective in allowing fatigue to dissipate amongst outfield players but appear to elicit goalkeeper-specific physical demands for example, [dives, jumps, explosive efforts, etc.] that substantially exceed the demands of match-play itself [28]. These discrepancies in physical outputs between goalkeepers and outfield players warrant consideration with regard to within-microcycle periodization to ensure appropriate recovery for all members of the match-day squad.

The current study has allowed practitioners to gain insight into three professional clubs training drills, providing comparisons across different training drill categories. Practitioners should account for the different prescribed training drills by the coaching staff at their club, while potentially using the information presented to compare to their own club. While novel in its findings considering training drills across multiple coaching staff and players, limitations within the current study should be considered such as, the use of only one team per standard and one playing position per player, irrelevant of a change in position within match play. However, the premise of this study was to provide practitioners insights into the physical outputs of different training drills administered by different head coaches. This is the first study, to the authors knowledge, that assesses the physical differences within training drill categories accounting for the different head coaches and their utilization of different training drill types. The methods provided in this study can be used by practitioners to analyze their own data and provide the insights required to account for the use of different training drill types and what the physical outputs are, allowing practitioners to account for training prescription for teams and individual players.

5. Conclusions

Soccer head coaches' effect both the physical output and the utility of different training drills. Understanding these differences can help support practitioners during transition periods when there are changes in a head coach, to help reduce the changes in external training loads players are required to perform.

Author Contributions: Conceptualization, S.B., M.C.V. and C.T.; methodology, S.B., M.R. (Matt Reeves), A.H. and C.T.; formal analysis, S.B., M.R. (Mark Russel) and S.P.H.; investigation, S.B., M.R. (Matt Reeves), A.H. and C.T.; writing—original draft preparation, S.B., M.C.V., S.P.H., M.R. (Mark Russel) and C.T.; writing—review and editing, S.B., M.C.V., S.P.H., M.R. (Mark Russel) and C.T.; All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding

Acknowledgments: The authors wish to thank all players and staff for their cooperation and participation in this research.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Mohr, M.; Krustrup, P.; Bangsbo, J. Match performance of high-standard soccer players with special reference to development of fatigue. *J. Sports Sci.* **2003**, *21*, 519–528.
2. Faude, O.; Koch, T.; Meyer, T. Straight Sprinting is the most frequent action in goal situations in professional football. *J. Sports Sci.* **2012**, *30*, 625–631.
3. Morgans, R.; Orme, P.; Anderson, L.; Drust, B. Principles and practices of training for soccer. *J. Sport Health Sci.* **2014**, *3*, 251–257.
4. Duhig, S.; Shield, A.J.; Opar, D.; Gabbett, T.J.; Ferguson, C.; Williams, M. Effect of high-speed running on hamstring strain injury risk. *Br. J. Sports Med.* **2016**, *50*, 1536–1540.
5. Malone, S.; Owen, A.; Newton, M.; Mendes, B.; Collins, K.D.; Gabbett, T.J. The acute: Chonic workload ratio in relation to injury risk in professional soccer. *J. Sci. Med. Sport* **2017**, *20*, 561–565.

6. Malone, S.; Roe, M.; Doran, D.A.; Gabbett, T.J.; Collins, K. High chronic training loads and exposure to bouts of maximal velocity running reduce injury risk in elite Gaelic football. *J. Sci. Med. Sport* **2017**, *20*, 250–254.
7. Akenhead, R.; Nassis, G.P. Training load and player monitoring in high-level football: Current practice and perceptions. *Int. J. Sports Physiol. Perform.* **2016**, *11*, 587–593.
8. Anderson, L.; Orme, P.; di Michele, R.; Close, G.L.; Morgans, R.; Drust, B.; Morton, J.P. Quantification of training load during one-, two-and three-game week schedules in professional soccer players from the English Premier League: Implications for carbohydrate periodisation. *J. Sports Sci.* **2016**, *34*, 1250–1259.
9. Malone, J.J.; di Michele, R.; Morgans, R.; Burgess, D.; Morton, J.P.; Drust, B. Seasonal training-load quantification in elite English Premier League soccer players. *Int. J. Sports Physiol. Perform.* **2015**, *10*, 489–497.
10. Weston, M. Training load monitoring in elite English soccer: A comparison of practices and perceptions between coaches and practitioners. *Sci. Med. Footb.* **2018**, *2*, 216–224.
11. Anderson, L.; Orme, P.; di Michele, R.; Close, G.L.; Milsom, J.; Morgans, R.; Drust, B.; Morton, J.P. Quantification of seasonal-long physical load in soccer players with different starting status from the English Premier League: Implications for maintaining squad physical fitness. *Int. J. Sports Physiol. Perform.* **2016**, *11*, 1038–1046.
12. Ade, J.D.; Harley, J.A.; Bradley, P.S. Physiological response, time–motion characteristics, and reproducibility of various speed-endurance drills in elite youth soccer players: Small-sided games versus generic running. *Int. J. Sports Physiol. Perform.* **2014**, *9*, 471–479.
13. Owen, A.L.; Wong, D.; Paul, D.; Dellal, A. Physical and technical comparisons between various-sided games within professional soccer. *Int. J. Sports Med.* **2014**, *35*, 286–292
14. Ekstrand, J.; Lundqvist, D.; Lagerbäck, L.; Vouillamoz, M.; Papadimitiou, N.; Karlsson, J. Is there a correlation between coaches' leadership styles and injuries in elite football teams? A study of 36 elite teams in 17 countries. *Br. J. Sports Med.* **2018**, *52*, 527–531.
15. Dönmez, G.; Kudaş, S.; Yörübulut, M.; Yildirim, M.; Babayeva, N.; Torgutalp, S.S. Evaluation of muscle injuries in professional football players: Does coach replacement affect the injury rate? *Clin. J. Sport. Med*. **2018**, *30*, 478–483.
16. Barrett, S.; Midgley, A.; Reeves, M.; Joel, T.; Franklin, E.; Heyworth, R.; Garrett, A.; Lovell, R. The within-match patterns of locomotor efficiency during professional soccer match play: Implications for injury risk? *J. Sci. Med. Sport* **2016**, *19*, 810–815.
17. Bradley, P.S.; Lago-Peñas, C.; Rey, E. Evaluation of the match performances of substitution players in elite soccer. *Int. J. Sports Physiol. Perform.* **2014**, *9*, 415–424.
18. Bradley, P.S.; Noakes, T.D. Match running performance fluctuations in elite soccer: Indicative of fatigue, pacing or situational influences? *J. Sports Sci.* **2013**, *31*, 1627–1638.
19. Varley, M.C.; Fairweather, I.H.; Aughey, R.J. Validity and reliability of GPS for measuring instantaneous velocity during acceleration, deceleration, and constant motion. *J. Sports Sci.* **2012**, *30*, 121–127.
20. Boyd, L.J.; Ball, K.; Aughey, R.J. The reliability of MinimaxX accelerometers for measuring physical activity in Australian football. *Int. J. Sports Physiol. Perform.* **2011**, *6*, 311–321.
21. Varley, M.C.; Jaspers, A.; Helsen, W.F.; Malone, J.J. Methodological considerations when quantifying high-intensity efforts in team sport using global positioning system technology. *Int. J. Sports Physiol. Perform.* **2017**, *12*, 1059–1068.
22. Hills, S.P.; Barrett, S.; Busby, M.; Kilduff, L.P.; Barwood, M.J.; Radcliffe, J.N.; Cooke, C.B.; Russell, M. Profiling the post-match top-up conditioning practices of professional soccer substitutes: An analysis of contextual influences. *J. Strength Cond. Res*. **2020**, *34*, 2805–2814.
23. Henderson, M.J.; Fransen, J.; McGrath, J.J.; Harries, S.K.; Poulos, N.; Coutts, A.J. Situational factors affecting rugby sevens match performance. *Sci. Med. Footb.* **2019**, *3*, 275–280.
24. Hopkins, W.; Marshall, S.; Batterham, A.; Hanin, J. Progressive statistics for studies in sports medicine and exercise science. *Med. Sci. Sports Exerc.* **2009**, *41*, 3–12.
25. Hills, S.P.; Radcliffe, J.N.; Barwood, M.J.; Arent, S.M.; Cooke, C.B.; Russell, M. Practitioner perceptions regarding the practices of soccer substitutes. *PLoS ONE* **2020**, *15*, e0228790.
26. Reilly, T.; Morris, T.; Whyte, G. The specificity of training prescription and physiological assessment: A review. *J. Sports Sci.* **2009**, *27*, 575–589.

27. White, A.; Hills, S.P.; Cooke, C.B.; Batten, T.; Kilduff, L.P.; Cook, C.J.; Roberts, C.; Russell, M. Match-play and performance test responses of soccer goalkeepers: A review of current literature. *Sports Med.* **2018**, *48*, 2497–2516.
28. White, A.; Hills, S.P.; Hobbs, M.; Cooke, C.B.; Kilduff, L.P.; Cook, C.; Roberts, C.; Russell, M. The movement demands of professional soccer goalkeepers in different training types and transiently throughout match-play. *J. Sports Sci.* **2020**, *38*, 848–854.