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SPORTS PERFORMANCE

How do soccer players sprint from a tactical context? Observations of an English Premier League soccer team

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ABSTRACT

The aim of this study was to quantify and tactically contextualise (i.e., phase of play and tactical outcome [TO]) sprints (≥7.0 m/s) of an English Premier League (EPL) soccer team during match-play. Videos of 901 sprints (10 matches) were evaluated using the Football Sprint Tactical-Context Classification System. Sprints occurred within a variety of phases of play (attacking/defensive organisation and transitions) and TOs, both out- and in-possession, with position-specific differences. Most sprints were completed out-possession (58%), with "closing down" the most observed TO (28%). In-possession, "run the channel" (25%) was the most observed TO. Centre backs predominantly performed "ball down the side" sprints (31%), whereas central midfielders mostly performed "covering" sprints (31%). Central forwards and wide midfielders mostly performed "closing down" (23% and 21%) and "run the channel" (23% and 16%) sprints when out- and in-possession, respectively. Full backs most frequently performed "recovery" and "overlap" runs (14% each). This study provides insights into the specific physical-tactical characteristics of sprints performed from an EPL soccer team. This information can be used to assist in the development of position-specific physical preparation programmes, and more ecologically valid and contextualised gamespeed and agility sprint drill construction to better reflect the demands of soccer.

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Football; contextual; speed; specificity

1. Introduction

High-velocity sprinting (≥7.0 m/s) is of specific interest in soccer (Sweeting et al., 2017), and linked to decisive moments and performance, such as goal scoring, goal assisting, and defensive scenarios during match-play (Faude et al., 2012; Martínez Hernández et al., 2022). In addition to its performance importance, high-velocity sprinting is also a common hamstring strain injury mechanism in soccer with negative implications (i.e., financial, rehabilitation periods, risk of reinjury) (Schuermans et al., 2017). Sprint distances have been reported to be increasing in EPL soccer (Barnes et al., 2014; Bush et al., 2015), and are projected to rise over the next 10 years (Nassis et al., 2020). Thus, the monitoring and physical preparation of soccer players to be able to tolerate the mechanical demands of sprinting is of high importance.

While monitoring sprint frequency and distances is indeed important in soccer (Barnes et al., 2014; Bush et al., 2015; Novak et al., 2021; Viera & Garrett, 2005), particularly from an exercise volume and load perspective (Kalkhoven et al., 2021), there is currently limited information regarding the situational and tactical-contextual sprinting demands of soccer. Additionally, there is a limited understanding regarding "why" the sprints occur during match-play (Ju et al., 2021; Ju, Doran, et al., 2022; Bradley et al., 2018). A greater understanding of sprint frequency with tactical contextualisation demands would provide a better representation of the physical demands of soccer match-play. This would therefore allow practitioners to be able to further increase the specificity of their practice, and allow the creation of more physical-tactical (i.e., physical activities with tactical purposes (Bradley et al., 2018)) and contextually specific sprint drills and gamespeed (i.e., the ability to exploit the qualities of speed and agility within the context of a sport (Jeffreys, 2010)) or agility training methods to improve physical performance (Jeffreys, 2010; Myszka, 2018).

Movement outcomes are a result of decisions made by the athlete in response to a given set of circumstances that they are presented with, constrained by the environment, task, and the athlete (Myszka, 2018; Seifert & Davids, 2017). These match contexts should provide the starting point for the development of any performance enhancement programme (Jeffreys et al., 2018). Only by truly understanding this context, can the perception–action relationship be trained (Dos'santos et al., 2022; Myszka, 2018; Seifert & Davids, 2017). Theoretically, the movements that present themselves during match-play may not necessarily be the most efficient for that physical-tactical context (Dos'Santos et al., 2022; Jeffreys, 2010), and it might be erroneous to mistake movement frequency with importance in sports specific contexts. Therefore, if a practitioner is aware of the physical-tactical context within which sprints occur, drill design can better reflect these physical demands using an integrative approach (i.e., contextualising physical performance

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with a combined approach in relation to technical and tactical contexts and key activities) (Ju et al., 2021; Ju, Doran, et al., 2022; Bradley et al., 2018). Consequently, this approach leads to exploratory learning by the athlete to ascertain the most effective movement strategy in a given context (Ade et al., 2016; Myszka, 2018). Additionally, any traditional physical metrics (i.e., sprint frequency, distance, high speed running, etc.) can be better understood by contextualising their tactical outcome within the match, which is particularly important in multidisciplinary environments (Bradley & Ade, 2018) which are common in soccer.

Perception-action coupling is a result of the interaction between an athlete and their environment (Dos'Santos et al., 2022; Myszka, 2018; Seifert et al., 2016). Only by understanding this interaction can an athlete be trained to achieve a successful task outcome by effectively employing their physical movement skill abilities in relation to the sports-specific environment (Dos'Santos et al., 2022). Thus, to improve agility and gamespeed performance, as part of a long-term periodised framework (Dos'Santos et al., 2022; McBurnie et al., 2022; Myszka, 2018; Spiteri et al., 2018), athletes must practice with drills and scenarios within an environment, which is specific and representative of the match and subsequent tactical scenario. Adopting such practice can facilitate "repetition without repetition", where learning is achieved through exploration and problem-solving (Myszka, 2018), and is conducive for developing agility and gamespeed performance (Dos'Santos et al., 2022; Jeffreys et al., 2018). Consequently, improving an athlete's ability to apply their physical abilities during a match (i.e., transfer of training; the underpinning goal of sports science and strength and conditioning) is central to improving soccer performance. However, only by truly understanding the key physical-tactical-contexts of soccer match-play, can training be designed accordingly which achieves greater specificity and potential transfer of training (Brearley & Bishop, 2019; Cleather, 2018; Bradley et al., 2018).

Recently, researchers have quantified the physical-tactical contexts within which high-intensity (≥5.5 m/s) running occurs during soccer (Ade et al., 2016; Ju et al., 2021; Ju, Doran, et al., 2022). Although not all actions were necessarily a sprint (≥7.0 m/s), these researchers provide a good insight into "why" running at faster velocities may occur during soccer match-play. For example, whilst in possession, there is variation across positions for the tactical-context of the running effort (Ade et al., 2016; Ju et al., 2021; Ju, Doran, et al., 2022): centre backs (CB) mostly attempt to "push up the pitch"; whereas, full backs (FB) and wide midfielders (WM) "run the channel". Central midfielders (CM) and forwards (CF) typically "drive through the middle" (Ade et al., 2016). Ju et al. has recently contextualised peak periods of high-intensity running (Ju et al., 2021) and contextualised high-intensity running by general and specialised tactical roles (Ju, Doran, et al., 2022), observing that central offensive players performed more distance "break into the box", "run-in-behind", "penetrating runs", and "pressing runs" compared to other positions. Additionally, wide offensive players covered more "run with ball" distance, while wide defensive players covered more "over/underlapping" distance. Finally, central and wide defensive players covered more "covering" distances compared to other positions, which overall provides more insight into physical-tactical high-intensity running demands of EPL soccer.

It is reasonable to assume that these position-specific differences exist when examining the physical-tactical aspects of sprint efforts, which potentially may have greater implications as sprinting by its nature being more decisive to match outcome (Faude et al., 2012; Martínez Hernández et al., 2022). Investigating such actions would then allow practitioners to design position-specific drills within a soccer-specific situational- and tactical-context to improve performance in these important moments of a match involving sprinting, and may assist in the development of return play standards for athletes rehabilitating from injury (Buckthorpe, 2021; Taberner et al., 2019). The aim of this study, therefore, was to quantify and contextualise sprinting actions of an EPL soccer team during match-play with respect to tactical (i.e., phase of play and tactical outcome) and situational scenarios, similar to previous high-intensity research (Ade et al., 2016; Ju et al., 2021; Ju, Doran, et al., 2022). This exploratory analysis will use a physical-tactical classification system titled the Football Sprint Tactical Context Classification System (STC) (Caldbeck, 2020), which was adapted from previous research (Ade et al., 2016; Mendez-Villanueva & Delgado-Bordonau, 2012) (Table 1 & 2). This system will provide specific detail regarding "why" sprints are performed during soccer match-play.

2. Materials and methods

2.1. Procedures and sample

Video match data of an EPL soccer team was evaluated for physical-tactical contextualisation using the STC. This was secondary data obtained from publicly available sources (3.2.6) (Premier League DVMS, ChyronHego). Data were treated confidentially, with ethical approval granted by the University institutional review board (ID: 45054), and written gatekeeper consent obtained from the club. Each of the analysed team's EPL games from the 2017–18 season were assigned a reference number in ascending order correlating with the chronological order of the matches. Five home and five away matches were then randomly chosen from these. These included matches against nine separate opposition and involved 21 different players. Results of the matches included 3 wins, 4 draws, and 3 defeats. The team's formation was classified as 4-5-1 on five occasions, 4-4-2 on three, and 5-3-2 on two. Whilst primary

Table 1. The detailed sub-category descriptions from the football sprint tactical-context classification system.

Main category	Sub-category	Description
Phase of play	Phase of play	The phase of play of the player's team within which the sprint occurs.
Tactical outcome	In possession	The player's team is in possession of the ball when the sprint effort occurs
	Out of possession	The player's team is not in possession of the ball when the sprint occurs

Table 2. Football sprint tactical-context classification system, detailing all categories and action descriptions.

Main category	Sub-category	Action	Description
Phase of play	Phase of play	Attacking transition	In possession: Transition to Attacking Organisation following the recovery of possession.
		Attacking organisation	In possession: Attacking build up aiming to create scoring opportunities by disorganising the opposition defence.
		Defensive transition	Out of possession: Transition to Defensive Organisation following the surrendering of possession.
		Defensive organisation	Out of possession: Assuming of defensive structure to prevent the creation of goal scoring opportunities.
Tactical outcome	In possession	Break into box	Player sprints into the opposition penalty box.
		Overlap	Player sprints from behind to in front of or parallel to the player on the ball.
		Push up pitch	Player sprints up the pitch to support the play (defensive and middle third of the pitch only).
		Run the channel	Player sprints with/without the ball down to one of the external areas of the pitch.
		Run-in behind	Player aims to beat the opposition offside trap to sprint through onto the opposition goal.
		Drive inside	Player sprints with/without the ball from the external flank into the central area.
		Drive through the middle	Player sprints with/without the ball through the middle of the pitch.
		Run with ball	Player moves with the ball either dribbling with small touches or sprinting with the ball with bigger touches.
		Other	All other in possession variables that could not be categorised.
	Out of possession	Closing down	Player sprints directly towards the opposition player on the ball.
		Interception	Player sprints to cut out a pass from an opposition player.
		Covering	Player sprints to cover space or a player on the pitch while remaining goal side.
		Recovery run	Player sprints back towards their own goal when out of position to be goal side.
		Ball over the top	Player sprints after an opposition pass over the defence through the centre.
		Ball down the side	Player sprints after an opposition pass in behind the defence down the side of the pitch.
		Track the runner	Player runs alongside opposition player with or without the ball.
		Other	All other out of possession variable that could not be categorised.

analysis was focused on all players, additional analysis was completed between playing positions (i.e., proportions). Positions were observed via two methods. Firstly, players were categorised as centre backs (CB), full backs (FB), central midfielders (CM), wide midfielders (WM), and central forwards (CF) (Ade et al., 2016). Additionally, to support pitch location information, groupings were created based upon the playing positions' location on the pitch: central (CB, CM, CF) and lateral (FB, WM). It should be noted that for the 5-3-2 formation, there were 3 CBs, 2 FBs, 3 CMs, and 2 CFs. For the 4-5-1 formation, there were 2 CBs, 2 FBs, 3 CMs, 2 WMs and 1 CF. Finally, for the 4-4-2 formation, there were 2 CBs, 2 FBs, 2 CMs, 2 WMs and 2 CFs.

From the 10 matches analysed, 901 total sprint efforts were recorded. A sprint was classified as the attainment of a velocity ≥7.0 m/s (Barnes et al., 2014). Whilst no official consensus exists, this is noted as the most widely employed velocity threshold in soccer analysis and would, therefore, be in line with previous research and practice (Sweeting et al., 2017). Raw video-based locomotor coordinates were obtained from official Premier League sources, Tracab (ChyronHego, USA). The raw data was then processed and filtered through a load management software to create velocity-time data (OpenField, Catapult Sports, Aus.). From this, time-stamps from the match clock were established for each effort classified as a sprint. These were then recorded for each player involved in the match. To classify these sprint efforts, official match video footage was obtained from the official Premier League DVMS online system (Premier League, UK); a portal database of all match footage powered by Hudl (Hudl, USA). Multiple camera angles were used for evaluation: tactical (high, wide-angle view from the centre of a lateral side of the pitch); 2) high behind (high angle, behind one of the goals); and broadcast (standard television broadcast view). Due to its ability to observe the most match-action, the tactical view was selected as the primary angle for analysis. If this view was obscured in any way, "high behind" and "broadcast" were, respectively, employed until the effort could be fully classified using the STC.

These matches averaged 12.8 ± 0.4 evaluated players per match. As no sprints were completed by goalkeepers over the match sample, each match involved 10 outfield players at one time. Sprint efforts of players who did not complete the full match were included and treated as a like-for-like replacement, alongside those of players that were substituted into the match. Thus, 100% of the match time was analysed for 10 outfield positions.

2.2. Sprint tactical-context movement classification

To classify the tactical context associated with sprinting for an EPL soccer team, a previously developed classification system was employed (Caldbeck, 2020). A comprehensive overview has been provided previously (Caldbeck, 2020), thus a brief overview is presented here. The STC (Table 1 & 2) has been shown to display high intra-rater and inter-rater reliability (Caldbeck, 2020). The system allows for match footage to be systematically and qualitatively analysed to comprehensively examine the tactical context of the sprint with respect to "phase of play" and "tactical outcome" (Table 1 & 2). Thus, each sprint effort consisted of two descriptive data points. The "phase of play" category described the soccer-specific moments of a game. A match can always be described as being in one of these four "moments" or "phases". Every action that occurs during a match exist in one of these phases and is suggested to consist of a tactical, technical, physical and psychological element (Delgado-Bordonau & Mendez-Villanueva, 2012). These phases are broadly "transition" (i.e., initial transition following recovery orsurrendering of possession) or "organisation" (i.e., attacking or defensive structure to create/prevent goal scoring opportunities) phases, from both attacking and defensive phases (Tables 1 & 2). Transition "phases of play" are

described as: "the recovery or the surrendering of possession and the consequent move into the organised phases". Organisation phases are described as the: "structured moments of attacking or defensive play". Tactical outcome described the "exact context of the sprint action, either in possession or out of possession" (Tables 1 & 2). Match sprint time-stamps for each player during each match were ascertained and these were then systematically analysed according to previously established protocols with respect to "phase of play" and "tactical outcome" (Tables 1 & 2) (Caldbeck, 2020) by the lead researcher who is an experienced sports scientist and strength and conditioning coach. Excellent intra-rater reliability (k = 0.97, 97 sprint evaluations) was observed for a single match for the STC, performed 7 days apart. Additionally, excellent inter-rater reliability (k = 0.97, 66 sprint evaluations) was demonstrated between the lead researcher and second rater who was an experienced sports scientist.

2.3. Statistical analysis

Data collected for each sprint was inputted into Microsoft Excel (Microsoft Corporation, Redmond, WA, USA). This data was then processed and formatted for analysis in a common statistical analysis software (SPSS, v26 Chicago, IL, USA). Processing included the establishing of means for each action category of each match, pooled across positions and by positional groups. Following the confirmation of normality utilising a Shapiro-Wilk's test, a one-way analysis of variance (ANOVA) was completed to determine any statistical differences in the mean frequency of each "phase of play" and "tactical outcome" within the categories for pooled sprint data. Tukey HSD post hoc was utilised for multiple pairwise comparisons. Significance was set at $p < 0.05$. All data, unless otherwise stated, were presented as mean and standard deviation. Following this, Cohen's d effect sizes (ES) were calculated to ascertain the magnitude of these differences. Magnitudes were classified as follows: trivial (<0.20), small (0.20–0.59), moderate (0.6–1.19), large (1.20–1.99), and very large (>2.0) (Hopkins, 2002). Finally, the proportion of sprints within the STC were calculated by positional groups and pooled across positions. Due to the small sample size for players across positions, positional group descriptive comparisons were made based on the proportion of sprints for "phase of play" and "tactical outcome".

3. Results

Results for sprint data in sections 3.1 and 3.2 are pooled across positions presented by the system's main categories of "phase of play" and "tactical outcomes", and representative of average movements per match. Section 3.3 presents the positional comparisons sprint data by proportions.

3.1. Phase of play

Most sprints in soccer occurred during "defensive organisation" (30 ± 12; 33%). This was followed by "attacking transition" (27 ± 9; 30%), "defensive transition" (24 ± 10; 27%), and "attacking organisation" (9 ± 5; 10%). All phases were significantly more frequent than "attacking organisation" (d = 2.0–2.6, $p < 0.01$). When pooling phases by attacking or defensive categories and transition or organisation categories, 60% and 57% of sprint efforts occurred during defensive phases and transition phases, respectively.

3.2. Tactical outcome

"Closing down" was the most frequent sprint tactical-context outcome across both in and out of possession categories, occurring on average 15 ± 4 times during a match. This was significantly more frequent than all other tactical outcomes except for the second most frequent, "covering" (10 ± 3) (d = 1.3–4.8, $p < 0.05$). "Covering" occurred significantly more often than all categories (excluding 'closing down'), "ball down the side", "track the runner", "run the channel" and "run in behind" (d = 0.4–4.0, $p < 0.05$). One category was never observed during analysis: out of possession; other. This was the least commonly observed of all categories (Figure 2). The least frequently occurring tactical outcome was "interception" (1 ± 1). 60% of efforts were completed whilst out of possession (Figure 2). Of these eight out of possession categories, five were commonly observed: "Closing down", "covering", "recovery run", "ball down the side", and "track the runner" (14–28% each; Figure 2). Conversely, "interception", "ball over the top" and "other" were observed less often (0–6% each; Figure 2).

Similarly, in-possession sprints were variable. Five of the categories occurred most often: "break into box", "push up pitch", "run the channel", "run in behind" and "run with ball" (11–25% each; Figure 2). The remaining four categories were observed less often (2–8% each; Figure 2). When out of possession, the category labelled "other" was never observed (Figure 2); however, in-possession this accounted for 6% of efforts (Figure 2). When in-possession, the most frequent sprint tactical outcome was "run the channel" (25%; Figure 2), whereas the least frequent was "drive inside" (2%; Figure 2).

3.3. Sprint tactical context positional comparisons

3.3.1. Positional phase of play comparisons

Differences were observed across positions for the "phase of play" within which sprints occurred (Figure 3). The greatest proportion of sprints for WM (37%) and CF (52%) occurred during attacking transitions, whereas FB (34%) and CB (54%) completed most of their sprints during the defensive organisation phase. CM completed most of their sprints during defensive transition (45%). CBs rarely completed their sprints in the attacking phases (1%). All positions, excluding CB, completed most of their sprints during the transition phases rather than organisation phases of play (Figure 3). When observing differences across position locations (Figure 3), both categories completed the majority of their sprint efforts within defensive organisation (Central: 39% and Lateral 33%). Both categories least common sprint "phase of play" was attacking organisation (7–12%). The second and third most common phases are both the transition phases, with lateral positions more likely to sprint in "attacking transition" (31%) and central positions in "defensive transition" (32%) (Figure 3).

3.3.2. Positional tactical outcome comparisons

Differences were also observed across positions for the "tactical outcomes" within which sprints occurred (Figure 4). CBs sprint predominantly during two "tactical outcomes" (61%): "ball down the side" and "covering" whilst out of possession. WMs, out of possession, complete most of their sprints "closing down" (21%), three-times as frequent as the next most common "covering"/"track the runner" (7% each). CFs, whilst out of possession, predominantly sprint "closing down" the opposition (23%); whilst all other categories occur very infrequently (<6%). CMs most common sprint action out of possession was "covering" (31%), while FBs generally performed most out of possession sprint actions with similar proportions (3–14%). In possession, CBs rarely sprint, with only one tactical outcome (Other) requiring them to sprint (3% of total efforts). Similarly, for CMs, only 19% of total sprints occurred whilst in possession. WMs and CFs were the positions most likely to sprint whilst in possession: 58% and 70% of their total sprint efforts, respectively. WMs predominantly sprinted to "run the channel" (16%) or "run with the ball" (11%); whereas CFs mostly sprinted to 'run the channel (23%), "run in behind" (18%) and "through the middle" (10%).

Two clear differences exist when comparing central and lateral positions and the tactical outcome of their out of possession sprints (Figure 5). Central players sprint twice as often for a "covering" sprint (20% vs. 9%). Another notable difference

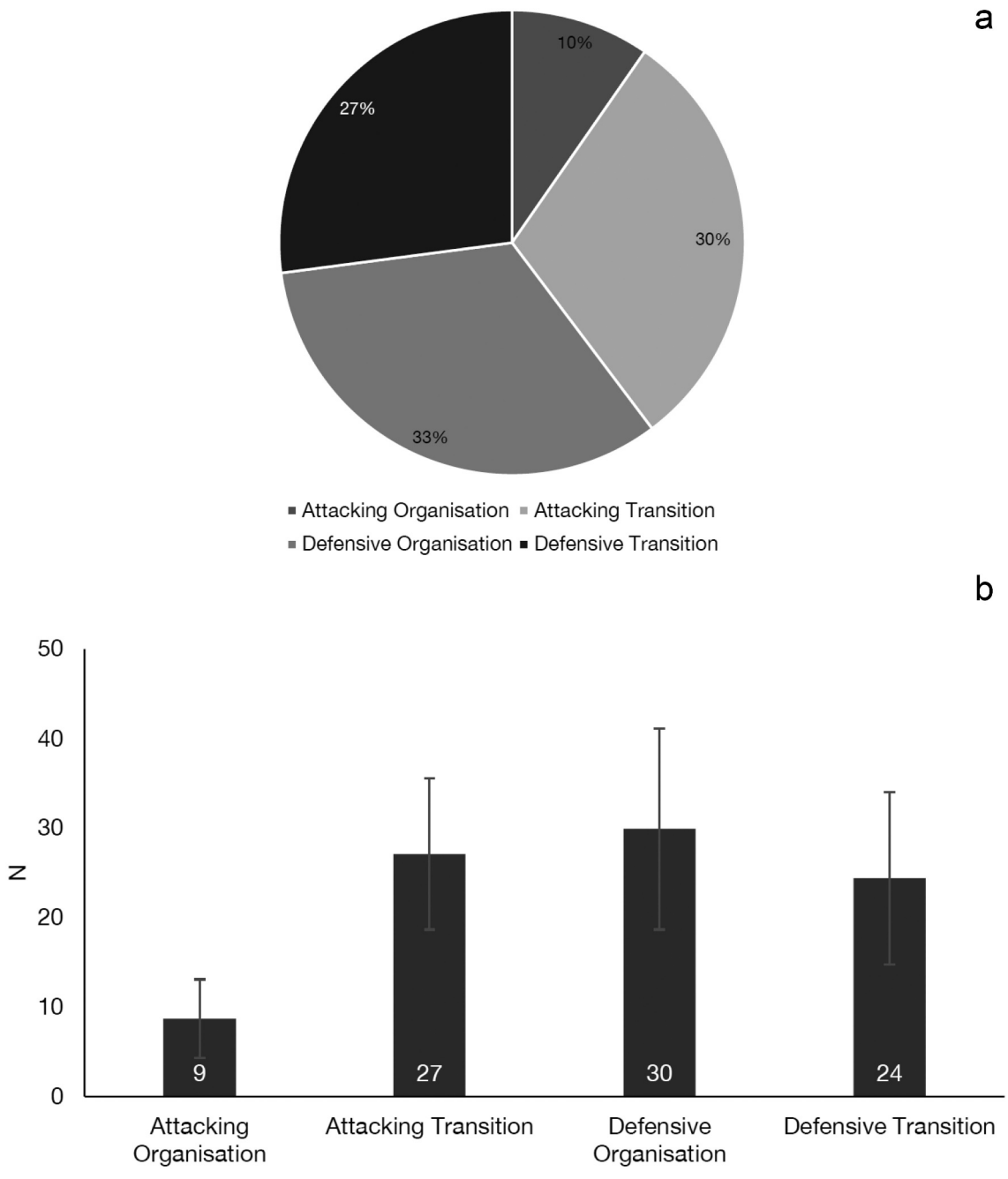

Figure 1. Phase of play sprint movements observed during soccer match play. Panel a Average percentage of phase of play sprints during match play; Panel b: Mean and standard deviation phase of play sprints completed during a match.

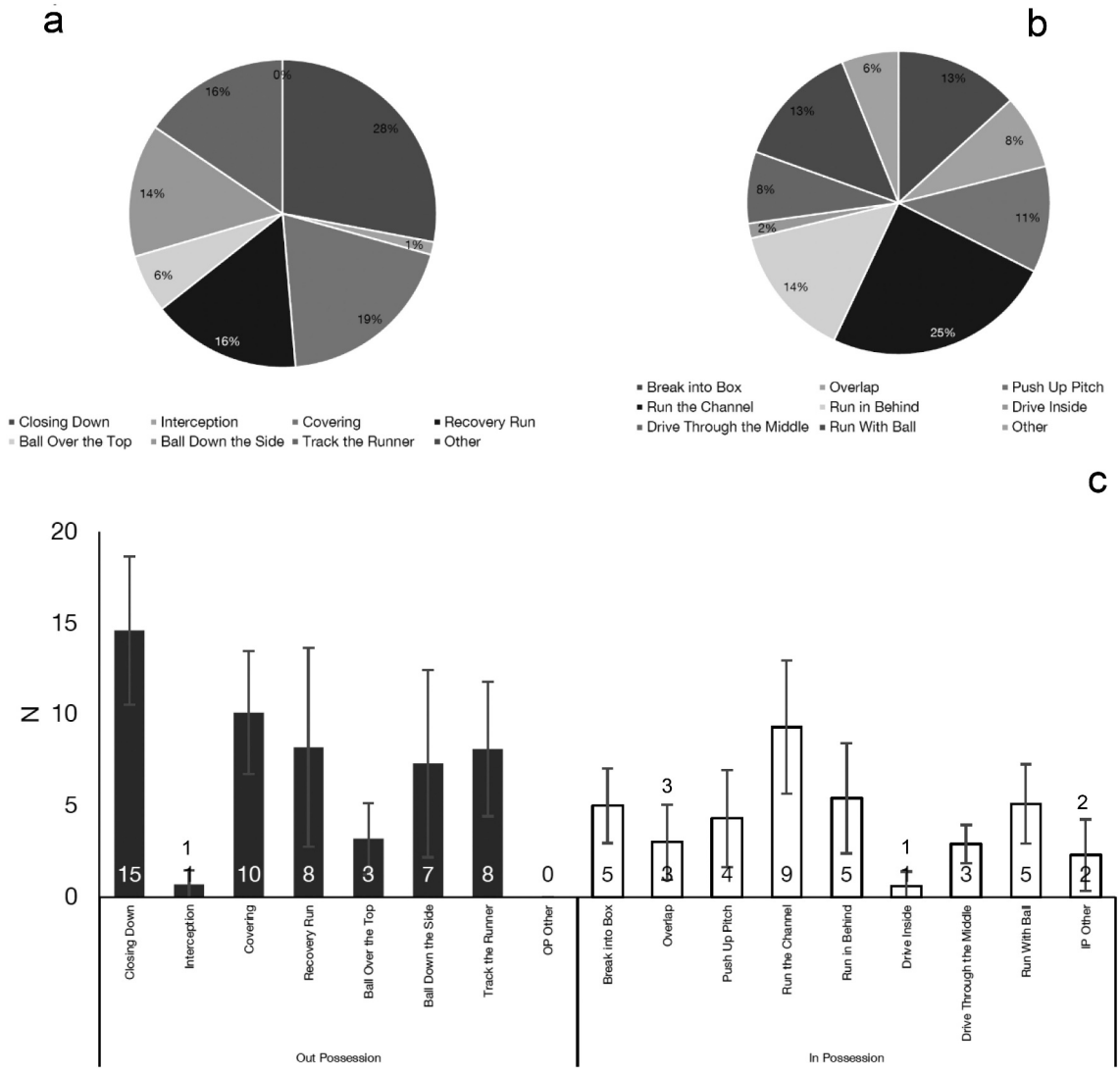

Figure 2. Tactical outcome movements observed during soccer match play. Panel a: Average percentage of tactical outcome actions during match play out of possession; Panel b: Average percentage of tactical outcome actions during match play in possession; Panel c: Mean and Standard Deviation of the number of sprints completed during a match according to tactical outcome in and out of possession.

is central players sprint more often as a result of a "ball down the side" (11% vs. 7%). Whilst in possession, central positions generally sprint less often compared to lateral positions (Figure 5). The most prominent categories where lateral positions perform more sprints than central positions are "overlap" (+8%), "run with ball" (+6%) and "run the channel" (+4%). Only two categories reveal central positions sprinting with greater proportions compared to lateral, "run in behind" (+3%) and "drive through the middle" (+3%).

3.4. Summary

Results were observed further by combining the sub-categories of phase of play and tactical outcome. 33% of efforts occur in defensive organisation, and the two most common tactical outcomes are "closing down" and "covering". These are tactical outcomes that are to be expected within this phase where a team reverts to a compact default shape and attempts to defend their goal. Similarly, "run the channel", "run in behind", "run with ball" and "break into box" are the most common in possession categories. These are all efforts that one can expect to be involved in the most common attacking phase of play: transition. These are contexts where a team can look to "break" on the opposition quickly.

4. Discussion

The aim of this study was to quantify and contextualise sprinting actions of an EPL soccer team during match-play with respect to tactical (i.e., phase of play and tactical outcome) and situational scenarios, similar to previous high-intensity research (Ade et al., 2016; Ju et al., 2021; Ju, Doran, et al., 2022), to better understand "why" sprints occur. The primary findings were that sprints occurred within a variety of phases of play and tactical outcomes, both in- and out of possession (Figures 1–2, Table 3), and across positional groups (Figures 3–5, Table 3), similar to the previously established observations of physical-tactical context of high-intensity running (Ade et al.,

2016; Ju et al., 2021; Ju, Doran, et al., 2022). Generally, most sprints were completed, while the team was out of possession (58%), with "closing down" the most commonly observed tactical outcome (28%) (Figure 2, Table 3). Conversely, in possession, "run the channel" (25%) was the most frequent tactical outcome displayed. Notably, there were clear position-specific differences within physical-tactical contexts of sprints, with CBs predominantly performing "ball down the side" sprints (31%), whereas CMs performed mostly "covering sprints" (31%) (Figure 4, Table 3). Moreover, CFs and WMs mostly perform "closing down" (23% and 21%) and "run the channel" (23% and 16%) sprints when out of and in-possession, respectively, while FBs generally perform "recovery" and "overlap" runs most frequently (14% each) (Figure 4, Table 3). Consequently, this study provides unique insights into the specific physical-tactical characteristics of sprints performed by an EPL soccer team during match-play, which can be used to assist in the development of position-specific physical preparation programmes, and more ecologically valid and contextualised gamespeed and agility sprint drill construction to better reflect the physical demands of match-play.

With respect to phases of play sprints, significant differences were observed during match-play (Figure 1). Attacking organisation was statistically the least common (~9) of these phases of play within which sprints occurred (Figure 1), ~3 times less common than all other categories (~24–30). Attacking organisation describes the phase of play whereby the in-possession team aims to create goal-scoring opportunities by disorganising the opposition's defensive structure. This phase is likely to involve the opposition being set-up in a strong organised defensive structure (Delgado-Bordonau & Mendez-Villanueva, 2012). During defensive organisation, the opposition will attempt to reduce the space available for the team in-possession (i.e., attacking organisation), and consequently, the likelihood of the necessary distance required to achieve the velocity for a sprint effort to be recorded may be limited, reducing the potential to attain high velocities for sprint classification in the context of this study (≥7.0 m/s) (Delgado-Bordonau & Mendez-Villanueva, 2012). Nevertheless, although not as frequent, those sprints that are performed during attacking phases are highly likely to be the most crucial due to their potential involvement in goal scoring opportunities: the main focus of the attacking organisation phase (Delgado-Bordonau & Mendez-Villanueva, 2012; Faude et al., 2012; Martínez Hernández et al., 2022).

Although sprinting is more common during transition phases, defensive organisation was the most common of the four phases overall (Figure 1). Thus, the majority of sprint efforts occurred when the team is settled into a defensive structure and individual players complete defensively minded, out of possession sprints (Delgado-Bordonau & Mendez-Villanueva, 2012; Jeffreys et al., 2018). Moreover, the majority of efforts (60%) occurred during defensive phases (i.e., organisation and transition), while "closing down" was the most commonly displayed tactical outcome for sprinting in the study (28%). This may be indicative of the importance of the defensive structure, importance of not conceding a goal, and forcing a turnover, which are common facets of the modern game. Whilst the results appear clear that defensively minded sprints are more common in soccer than attacking, caution must be noted due to generalisation of these findings as these observations are only reflective and representative of the current team, and influenced by additional factors, such as formation, style of play, skill level, and physical capacity.

Clear position-specific differences were observed regarding the physical-tactical context of sprints during EPL soccer match play (Figures 3–5). The two classically defensive positions, FBs (66%) and CBs (99%), unsurprisingly completed most sprints whilst in defensive scenarios; however, whilst CBs rarely sprinted during attacking phases, 34% of FB's sprints were for attacking purposes. This observation is corroborated by Ju et al. (Ju, Doran, et al., 2022), who demonstrated a similar trend for high-intensity running (≥5.5 m/s) in and out of possession for CBs and FBs. The large involvement in the attacking phases appears to be a modern tactical development of the FB from one solely focused on defending. Modern tactics dictate the involvement of FB in more attacking situations through more fluid formations and strategies, such as the WM being allowed the freedom to move into the centre of the pitch, and the rotation commonly observed between attacking players, freeing up space for the FB to progress further up the field (Barnes et al., 2014; Bush et al., 2015). Conversely, for CBs, 61% of all sprints were classified as "ball down the side" and "covering". CBs in this study played as a pair or trio, and typically have to deal with penetrating passes between the defensive lines, and perform covering runs of

Table 3. Summary of the most common sprints action within the football sprint tactical-context classification system.

	Sub-category	Most frequent action	Average percentage
Pooled	Phase of play	Defensive Organisation	33%
	Tactical outcome (OP)	Closing down	28%
	Tactical outcome (IP)	Run the channel	25%
Positional comparison phase of play	CF phase of play	Attacking transitions	52%
	WM phase of play	Attacking transitions	37%
	CM phase of play	Defensive transitions	45%
	FB phase of play	Defensive Organisation	54%
	CB phase of play	Defensive Organisation	34%
Positional comparison tactical outcome	CF tactical outcome	Closing down (OP)	23%
		Run the channel (IP)	23%
	WM tactical outcome	Closing down (OP)	21%
		Run the channel (IP)	16%
	CM tactical outcome	Covering (OP)	31%
		Run through the middle and break into the box (IP)	5%
	FB tactical outcome	Recovery run (OP)	14%
		Overlap (IP)	14%
	CB tactical outcome	Ball down the side (OP)	31%
		Other (IP)	3%

Key: OP: Out of possession; IP: In-possession; CB: centre backs; FB: full backs; CM: central midfielders; WM: wide midfielder; CF: central forwards.

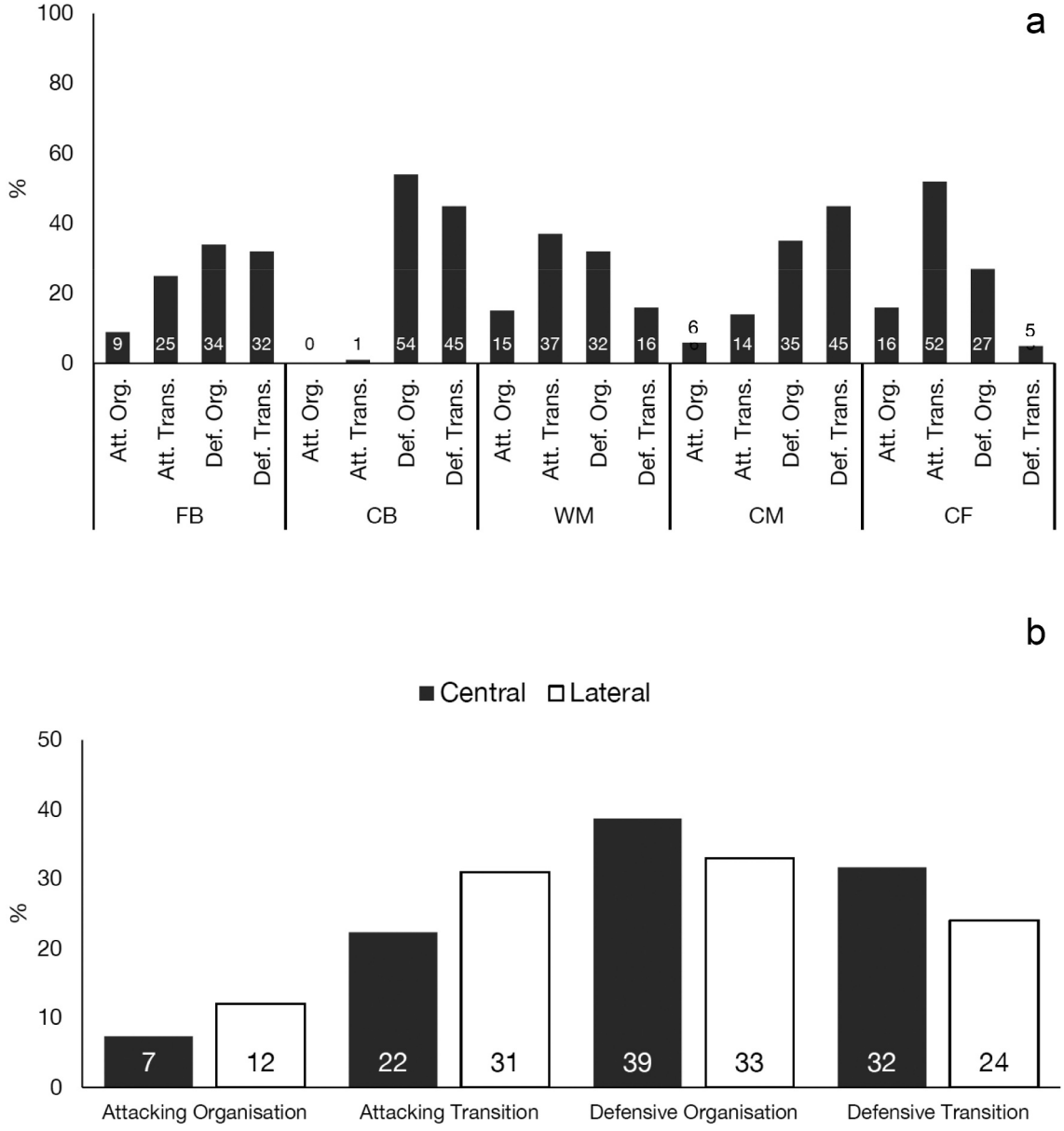

Figure 3. Phase of play sprint movements observed during soccer match play by positional group and locations. Panel a: Average percentage of phase of play sprints during match play by positional group; Panel b: Average percentage of phase of play sprints during match play by location. CB: centre backs; FB: full backs; CM: central midfielders; WM: wide midfielder; CF: central forwards.

fellow defenders. As such, our results suggest that FBs and CBs may require specific training programmes, due to the different sprint demands associated with their positions, and consequently, it could be erroneous to group and treat them collectively as "Defenders", due to their unique and different specialised roles (Ju, Doran, et al., 2022).

WMs and CFs presented similar sprint contextual characteristics, with most sprints occurring during attacking transitions, followed by defensive organisation (Figures 3–5). This observation is unsurprising, as these highly attacking positions seek to break quickly to catch the opposition's defence out of shape during attacking transitions; a potential area of weakness for the defensive team (Delgado-Bordonau & Mendez-Villanueva, 2012). But, surprisingly, a large proportion of efforts are completed during defensive organisation for these positions. It appears that once defensive organisation is achieved, these typically attacking-minded positions adjust their focus to defending. For example, these players commonly performed "closing down" sprints (21–23%) (Table 3), where a player sprints directly towards an opposition player to pressure them. High-intensity pressing from the front appears to be modern day requirements for soccer teams (Harper et al., 2021; McBurnie & Dos'Santos, 2022), with researchers previously highlighting "closing down" and "pressing" to be key features of high-intensity running of central offensive and forward players (Ade et al., 2016; Ju, Doran, et al., 2022). Collectively, these findings highlight the dual roles of the modern-day attacking players. It is worth noting that these

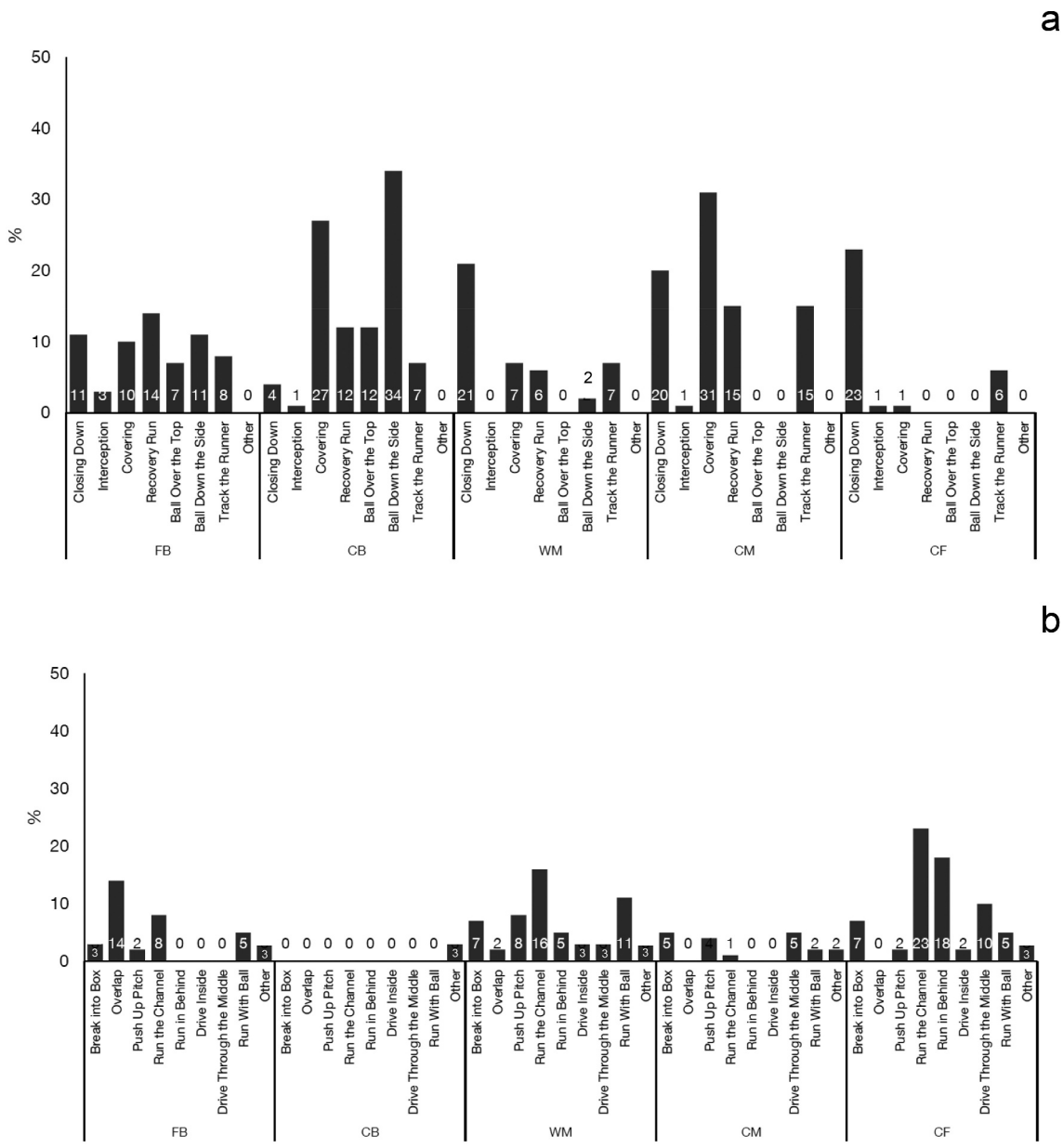

Figure 4. Tactical outcome sprint movements observed during soccer match play by positional group. Panel a: Average percentage of tactical outcome sprints during match play by positional group out of possession; Panel b: Average percentage of tactical outcome sprints during match play by positional group in possession; FB: full backs; CM: central midfielders; WM: wide midfielder; CF: central forwards.

observations are reflective of the current team's style of play and playing level, and are likely to differ between teams playing different strategies.

Whilst in-possession the most common sprint tactical outcome was "run the channel", followed by "run in behind" (Figure 2, Table 3). These types of sprint efforts are potentially very impactful on match outcomes (Faude et al., 2012; Martínez Hernández et al., 2022). When sprinting to run the channel, WMs and FBs may often be aiming to create separation from a defensive player and provide a cross into the opposition's penalty box and is, therefore, a strong position to assist a goal (Ade et al., 2016; Martínez Hernández et al., 2022). "Run in behind" would be performed by an attacking player to again achieve separation from a defensive marker and find space in-between the defence and their goal for a prime goal-scoring opportunity (Bradley et al., 2018). Although it is worth noting that most playing positions perform a variety of sprinting actions across a range of tactical contexts and outcomes (in and out of possession), soccer players would likely benefit from having the adaptability and sprint proficiency to meet the chaotic and unpredictable tactical demands of soccer match-play (Dos'Santos et al., 2022; McBurnie & Dos'Santos, 2022; McBurnie et al., 2022). Nonetheless, these tactical outcomes are key to any performance enhancement and could be "reverse-engineered" to design specific training interventions to improve a player's success during a match (Ju, Doran, et al., 2022; Bradley et al., 2018). For example, recreating these scenarios, tactical outcomes, and environments during training to allow a player to learn the key perceptual cues, knowledge of situation, visual scanning, and explore the most effective

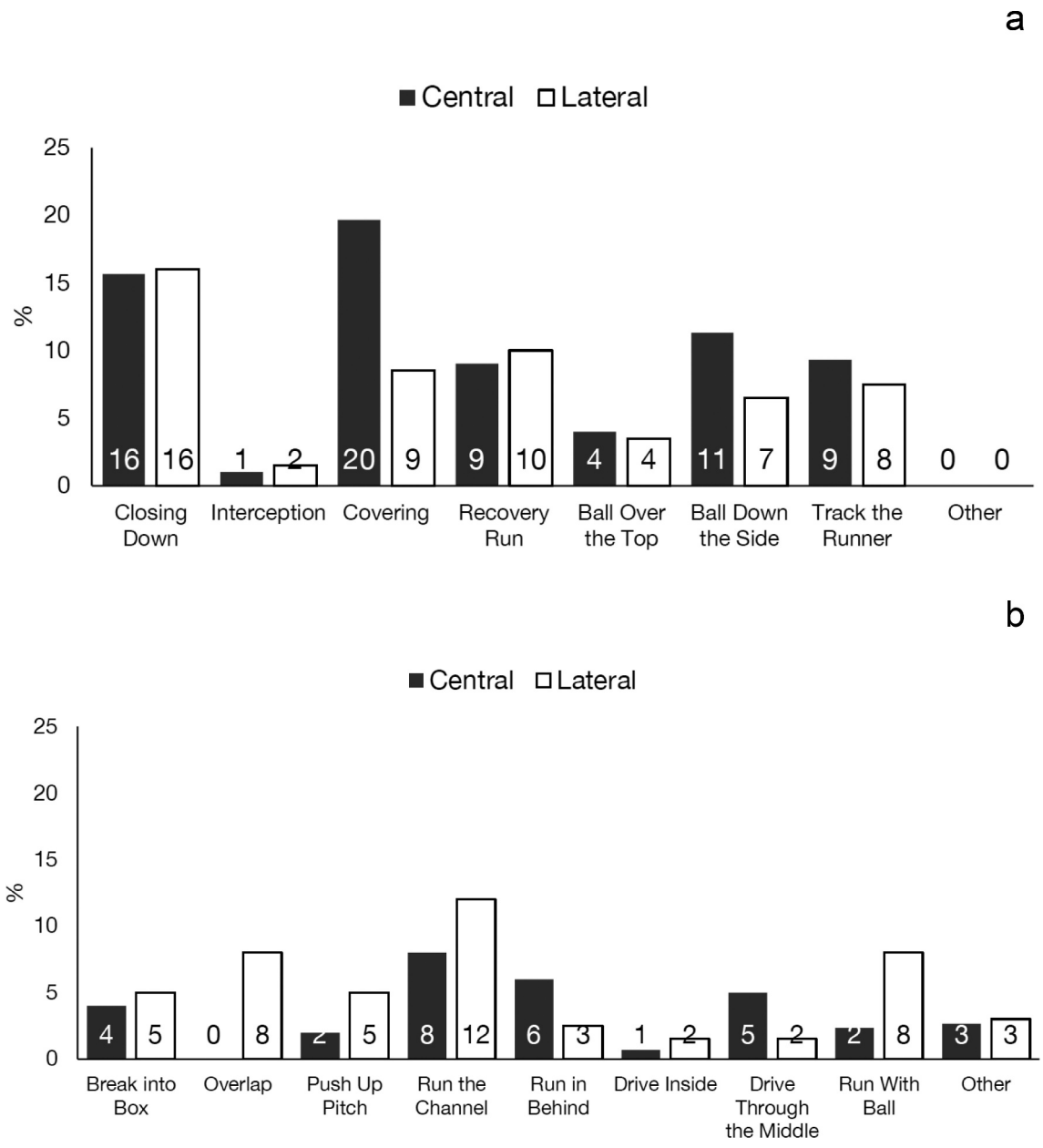

Figure 5. Tactical outcome sprint movements observed during soccer match play by location. Panel a: Average percentage of tactical outcome sprints during match play by positional group out of possession; Panel b: Average percentage of tactical outcome sprints during match play by positional group in possession.

movement strategy, could be an effective gamespeed and agility training method for transfer to match performance (Jeffreys et al., 2018; Myszka, 2018).

In addition to the performance enhancement possibilities, a deeper understanding of the contexts within which sprinting occurs allows practitioners to enhance the specificity of their rehabilitation programmes and evaluation of sprinting performance. A key factor for rehabilitating injured athletes to training, and eventual match-play, is to progressively expose the athlete to the stimuli and movement patterns they will likely encounter during day-to-day soccer practice and match-play, especially towards the latter stages of return to play (Buckthorpe, 2021; Taberner et al., 2019). As such, this study provides insight to the physical-tactical context of sprinting of EPL soccer; thus, a practitioner can recreate more specific scenarios that a player will typically encounter in training and match-play, using the control-to-chaos approach as suggested by Taberner et al. (2019) for drill construction. For example, athletes may initially be introduced to general, non-specific linear running drills, which are conservatively progressed in velocity, before increasing specificity and tactical context of high-velocity sprinting by simulating in and out possession scenarios with the ball, with soccer-specific movement patterns (i.e., transition, initiation, actualisation) (Jeffreys et al., 2018), and higher cognitive loads, ensuring the athlete is capable of tolerating the demands of training and match-play upon their return to performance (Taberner et al., 2019).

5. Limitations

It should be noted that the sprint data of the present study is representative of only one team from one EPL season. Due to

this, the ultimate, direct applicability of the results are limited to the team used as key factors, such as formation and team strategy and athlete physical capacity are likely to affect the eventual tactical outcomes presented (Aquino et al., 2017; Bradley et al., 2011). Whilst the results provide a good starting point for increasing the available knowledge in this area, caution must be taken when extrapolating these out to other teams, playing standards, ages, and sexes. Future research should therefore seek to replicate the current study using a controlled variety of teams, and potentially seek to draw comparisons across different formations, strategies, and playing levels. Additionally, as previously stated, the sprint classification system adopted within the study was limited to sprints ≥7.0 m/s, which is likely bias towards longer distance sprints and may omit intensive maximal effort accelerations and sprints over shorter distances, which may not attain this threshold, but could have important implications for match performance. Additionally, an arbitrary absolute threshold (≥7.0 m/s) was used to classify sprints, rather than a threshold, which was relative to the individual's maximum sprint velocity. This arbitrary threshold arguably could be too high or low for specific individual players and future research may consider exploring sprint classifications using a relative sprint threshold. It is also worth highlighting different formations were used and some actions could arguably span multiple classifications and thus affecting reliability (Ju, Lewis, et al., 2022), such as a player running with the ball in a wide area could be considered as "run with ball" or "run the channel" (Ju, Lewis, et al., 2022).

Recently, researchers have provided insights into high-intensity (≥5.5 m/s) running contextualised periods of play (Ju et al., 2021), whilst examining generalised and specialised tactical roles (Ju, Doran, et al., 2022) but did not isolate the high-intensity at different velocity thresholds. Thus, similar research is required to contextualise higher high-intensity running and sprinting actions with respect to general and specialised roles, while also contextualising other potentially important multidirectional speed movements including acceleration, decelerations, and changes of direction (McBurnie & Dos'Santos, 2022). Nevertheless, the current study clearly demonstrates the specific physical-tactical demands of sprinting in an EPL soccer team, which could have important implications for physical preparation programmes, position-specific gamespeed and agility training, sprint testing evaluation, and return-to-play design for the rehabilitation of injured players.

6. Conclusion

The primary findings were that sprints occur as a result of various different tactical outcomes and during all phases for an EPL soccer team during match-play (Figures 1–5, Table 3), with position-specific differences observed. The current study is the first attempt to contextualise the tactical-context that sprints occur within EPL match-play, whereby these novel results could have important implications for the future physical preparation of soccer players. Through a deeper understanding of the demands of soccer match-play, more specific programming and ecologically valid and contextualised gamespeed and sprint drills can be designed which are position-specific, to reflect the physical demands of match-play and potentially achieve better training specificity and transfer.

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Data availability statement

The data within this study are secondary data and available from publicly available sources (3.2.6) (Premier League DVMS, ChyronHego).

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