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Abstract

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Keywords

contextual, phase of play, match demands, soccer

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Article

Contextual analysis of physical-tactical match performance demands in elite U21 soccer players

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Abstract. Background: Soccer matches include physical and tactical factors, yet limited research has integrated physical-tactical variables involving U21 soccer players. This study examined how different phases of play influence physical intensity in elite U21 soccer players. Materials and Methods: Twelve professional development league matches involving 29 male U21 soccer players (106 observations) were analysed. Players wore 10 Hz GPS units to derive relative (m/min) physical metrics during six phases of play. Phases and positions were compared using repeated-measures ANOVA and one-way ANOVA. Results: Players covered significantly greater high-speed running per minute (HSR/min) during the final third compared to build-up (p = 0.015, ES: 0.5, small) and progression phases (p = < 0.001, ES: 0.6, moderate). Furthermore, players covered significantly greater HSR/min during the defensive low block phase compared to build-up (p = 0.001, ES: 0.7, moderate), progression (p = < 0.001, ES: 0.9, moderate), middle block (p = 0.011, ES: 0.7, moderate) and high press (p = 0.001, ES: 0.8, moderate) phases. Conclusions: Differing phases of play required specific physical qualities depending on the position and the tactical role within the team. This integrated approach provides contextualisation of important physical metrics relevant to tactical actions that may inform training design and rehabilitation sessions.

Keywords: phase of play, academy, soccer.

1. Introduction

Soccer matches involve a complex interchange of physical, tactical, technical and psychosocial factors, with previous research often adopting a traditional approach by evaluating physical demands in isolation without exploration for technical and tactical indicators [1]. Consequently, matches have been evaluated by reporting 'what' distances players have covered and have lacked any tactical-contextual description which may constrain understanding of match demands. Furthermore, previous research has mostly evaluated match demands in its entirety, without considering the influence of different phases of play on the physical demands of the match [2].

Physical match demands vary significantly depending on variables such as playing standard, opponent ranking, style of play, team formation, possession and location [3, 4]. Since playing position has also shown to affect match physical intensity [5], it is plausible that various phases of play within matches interact with the physical intensity of playing positions [6]. Thus, to extend the body of knowledge in this area, research should aim to investigate the 'why' of under-pinning high-intensity actions concerning tactical-contextual demands during phases of play [5].

Research on elite-level players found that match physical intensity differs in relation to the phase of play and the playing position, as greater physical demands were required for forwards during fast attacks and defenders during fast defence [2]. Studies have provided further contextualisation by analysing the association between ball possession and total distance covered, with its impact on physical intensity receiving less attention [7]. Solely quantifying physical data when in-possession (IP) and out-of-possession (OOP) may provide limited insights, as a direct style of play team with a defensive structure have similar high-intensity outputs as possession-based teams with offensive structures [1]. Analysing physical metrics with a focus on intensity may better differentiate the impact of possession of match physical demands [8]. Research has presented the tactical-contextual demands of high-intensity actions during matches and differences between positions [9]. For example, contextualised high-intensity actions of English Premier League players during matches have been found to differ between positions when regarding general and specialised roles [5].

Thus far, no other study has analysed the contextual match demands of academy soccer by integrating physical-tactical variables. Limited amount of research has investigated the tactical-contextual demands of key high-intensity actions such as accelerations (ACC) (> 3 m/s^2) and decelerations (DEC) (< -3 m/s^2) as these constitute a large proportion (5–16%) of high-intensity workloads during matches [10, 11]. Accelerations and DEC are critical in deciding match outcomes due to high metabolic demands and large mechanical loads [12]. Yet, studies have mostly overlooked ACC and DEC when researching physical-tactical variables during matches [11]. Instead, only high-speed running (HSR) or arbitrary sprinting thresholds of > 5.5 m/s [5] and > 7 m/s [9] were used to define and contextualise high-intensity actions. Although research has contextualised ACC and DEC actions within phases of play in elite-level first-team players [2], limited amount of research has completed this across academy players.

Tactical contextualisation alongside physical data may produce an alternative view of the physical demands of matches. Research suggests that full backs, centre midfielders and centre forwards cover comparable high-intensity distances (~600 m) during matches [13]. Therefore, the 'traditional' approach would claim that these performances are similar. However, due to differing tactical responsibilities, each position has a distinctive high-intensity profile and performs actions differently during each phase of play depending on various factors (e.g., style of play) [6, 14].

Recognising 'how' or 'why' players run may highlight how players execute their tactical responsibilities during matches [14]. The integrated model may help practitioners and coaches understand player performance and tactical structure within a team [1]. Each phase of play includes distinct tactical roles and movement demands relative to every position [15]. Breaking down the data into phases of play may produce greater insight into tactical actions [2, 5]. Yet, it is not currently known how match physical demands differ during phases of play and between positions when integrating physical-tactical variables in elite U21 Professional Development soccer players. Therefore, the study aimed to examine the physical match performance in elite U21 soccer players when IP and OOP. The study hypothesis was that physical match performance would vary depending on the phase of play and playing position.

2. Materials and Methods

2.1 Study Design

A retrospective longitudinal study was conducted analysing Professional Development League match data from the 2023-2024 season for a cohort of 29 males from an English football league club. Match data were collected via a commercially available computerised notational system and a Global Positioning System. In total, 12 competitive matches were analysed including 106 individual player observations. All analysed matches were played on grass pitches with pitch dimensions of 105 x 68 m. A non-probabilistic sampling protocol was employed to recruit the participants. During the 2023-2024 season, consistent player monitoring approaches were implemented without any interference from the researcher.

2.2 Participants

Professional players from a U21 squad (height: 1.8 m ± 0.07 m; body mass: 77 ± 7.7 kg) participated in the study. On average during a microcycle, players completed four pitch-based training sessions, two strength sessions and one competitive match. To include as many players as possible for analysis due to instances of the teams' pre-planned substitutes, players were included if at least 50 minutes of a 90-minute match were completed. Players were categorised as centre backs (CB; n = 25), full-backs (FB; n = 10), centre midfielders (CM; n = 36), wide midfielders (WM; n = 20) and centre forwards (CF; n = 15). Goalkeepers were excluded from the study due to the contrasting match-demands in comparison to outfield players [16].

Ethical approval was granted by Swansea University. The power of the sample size was calculated through G-Power [17]. Post-hoc analysis was conducted considering the study aims. The study was conducted according to the requirements of the Declaration of Helsinki and was approved by the local Ethics Committee of Swansea University and the club from which the participants volunteered [18]. To ensure confidentiality, data was anonymised prior to analysis.

2.3 Procedures

Each player was fitted with a 10Hz GPS unit (Vector S7, 53g, 81 x 43.5 mm; Catapult Innovations, Melbourne, Australia) situated in a size-specific vest between the shoulder blades during matches. The Catapult Vector S7 units have previously shown high validity and reliability for tracking distance covered and peak velocity during simulated team sports and linear sprinting [19, 20]. Following each match, data were downloaded using GPS software (Openfield version 3.11.0, Catapult Sports, Melbourne, Australia) on a secure laptop. Tactical match data was manually coded using SportsCode (SportsCode, Sportstec, Lower Hutt, New Zealand) through a computerised notational system. The phases of play when IP and OOP were coded using pre-established short-cut keys, with all matches coded by a single experienced analyst. The inter- and intra-observer reliability of analysts has been discovered to be strong when quantifying physical-tactical match performance [14]. Furthermore, the accuracy and reliability of SportsCode (SportsCode, Sportstec, Lower Hutt, New Zealand) have been previously established [21]. As shown in Figure 1, to align match kick-off with the velocity-time graph of physical data, annotations were imported into Focus SBG Sport Software (Focus version 7.6.0, Catapult Innovations, Melbourne, Australia) and then exported in the GPS software (Openfield version 3.11.0, Catapult Sports, Melbourne, Australia). This automatically synchronised and aligned the phases of play when IP and OOP to correspond with the physical match data. Raw data was extracted from Catapult Cloud Software (Catapult Sports, Melbourne, Australia) and exported into Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) for further analysis.

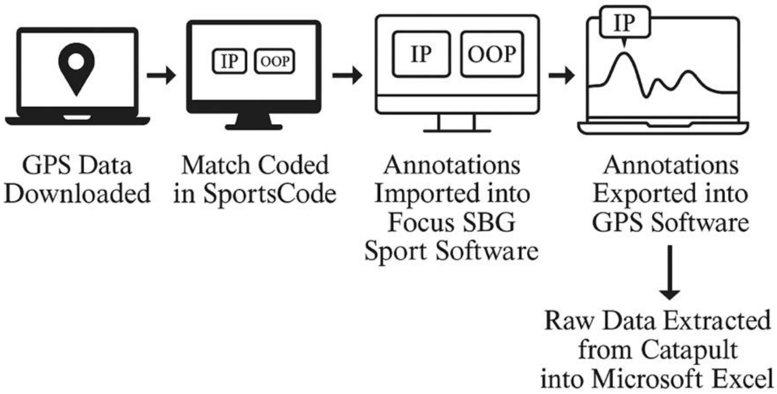

Figure 1. Timeline illustration of the data integration.

2.4 Phase of play classification

To classify the tactical context related to match-play, the coding of match phases of play were adopted from previous research [22] deriving from ball location. As defined in Table 1, IP phases were coded as build-up, progression and final third, while OOP phases were coded as low block, middle block and high press. The classification system was used concurrently as part of the clubs' analysis coding.

Table 1. Definitions and descriptions of each phase of play.

Phase of play	Definition and description
Build-up	Characterised by playing out from the back within a team's own half. Players aimed to progress the ball forward through the thirds by short passing. Often related to building up against an opposition looking to press high to gain the ball high up the pitch.
Progression	Characterised by vertical passing to play through opposition lines or by dribbling forward for ball progression. Players aimed to advance the ball into the final third phase.
Final Third	Ball possession in the attacking third of the pitch with the intention of finishing the attack by scoring a goal.
Low Block	Actions with an organised defensive structure in the team's defensive third. Characterised by team compactness and narrow shape with players positioned closely together to protect their goal and limit opposition's goal creation.
Middle Block	Organised defensive structure around the middle third of the pitch. Characterised by team compactness with players positioned closely together.

Phase of play	Definition and description
High Press	Pressing actions (often from opposition goal kicks), where multiple players exerted pressure during the opposition's build up phase. This occurred high up the pitch to gain possession in a favourable position and stop the opposition from moving up the pitch.

2.5 *Physical match performance metrics*

Physical match performance for each player when IP and OOP was evaluated relative to the duration of time within each phase to provide a measure of intensity. The following metrics were made relative (meter per minute (m/min)): total distance (TD) covered (m), high-speed running (HSR) (m; accumulated distance covered > 5.5 m/s), sprint distance (SD) (m; accumulated distance covered > 7 m/s). Furthermore, the number of ACC (> 3 m/s^2) and DEC (> 3 m/s^2) per minute were evaluated. The study used GPS units which captured velocity and acceleration data at 10Hz with a minimum effort duration set at 0.4 seconds to allow single acceleration bouts to be differentiated from multiple efforts [23].

2.6 Statistical Analysis

Descriptive statistics were reported as mean ± standard deviations (SD). All analyses were conducted using common statistical analysis software (SPSS, Chicago, IL, USA). The normality of data was verified by the Shapiro-Wilk test. A repeated analysis of variance (ANOVA) was used to compare differences between phases of play, and a one-way ANOVA was used to compare differences between each position with the Bonferroni host hoc test conducted to discover localised differences. The magnitude of effect size was as follows: trivial < 0.19; small 0.20 – 0.59; moderate 0.60 – 1.19; large 1.20 – 1.99; very large 2.0 – 3.99; extremely large > 4.0 [24]. Statistical significance was set as p = < 0.05.

3. Results

When IP, players across all positions averaged 25:26 ± 6:47 mins in build-up, 12:23 ± 4:23 mins in progression and 9:29 ± 2:03 mins in the final third phases. Conversely, when OOP, players averaged 15:46 ± 4:51 mins in low block, 11:25 ± 5:00 mins in middle block and 12:40 ± 3:25 mins in high press phases.

3.1 Contextualised physical intensity during differing phases of play.

Players covered significantly greater TD/min during the low block (p = < 0.001, ES: 0.7, moderate) and middle block (p = 0.001, ES: 0.6, moderate) phases in comparison to the build-up and progression phases, respectively. As shown in Figure 2, players covered significantly greater HSR/min during the final third phase in comparison to the build-up (p = 0.015, ES: 0.5, small) and progression phases (p = < 0.001, ES: 0.6, moderate). Furthermore, players covered significantly greater HSR/min during low block in comparison to the build-up (p = 0.001, ES: 0.7, moderate), progression (p = < 0.001, ES: 0.9, moderate), middle block (p = 0.011, ES: 0.7, moderate) and high press (p = 0.001, ES: 0.8, moderate) phases.

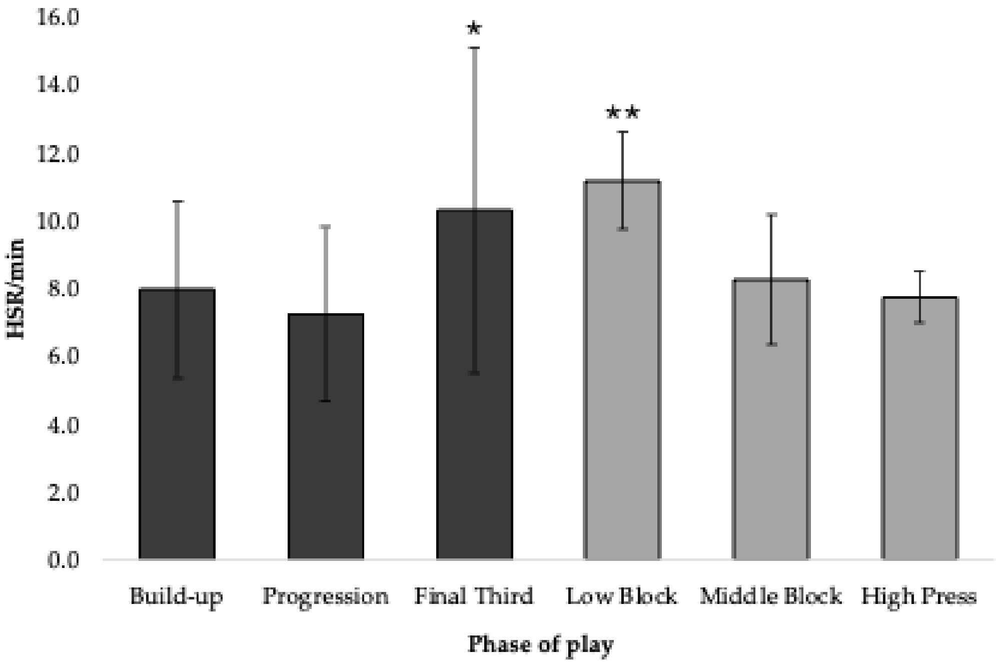

Figure 2. Contextualised high-speed running (HSR/min) covered at > 5.5 m/s per minute during phases of play. * Significantly greater than build-up (p = 0.015) and progression (p = < 0.001), ** Significantly greater than the build-up (p = 0.001), progression (p = < 0.001), middle block (p = 0.011) and high press (p = 0.001) phases.

Finally, players covered significantly greater SD/min during low block in comparison to the progression (p = < 0.001, ES: 0.9, moderate), middle block (p = 0.025, ES: 0.6, moderate) and high press (p = < 0.001, ES: 0.8, moderate) phases.

3.2 Positional differences in contextualised physical intensity during IP phases of play.

As per Table 2, build-up demonstrated significant differences between positions for HSR/min (p = < 0.001), SD/min (p = < 0.001), and ACC/min (p = < 0.001). The progression phase demonstrated significant differences in TD/min (p = 0.014), HSR/min (p = < 0.001), SD/min (p = < 0.001), and ACC/min (p = < 0.001). Finally, significant differences were discovered during the final third for TD/min, (p = 0.004), HSR/min (p = < 0.001), SD/min (p = 0.009) and ACC/min (p = 0.001).

Table 2. Descriptive statistics (mean ± standard deviation) for all metrics across positions during in-possession (IP) phases.

Metric	Position	Build-up	Progression	Final Third
TD/min	CB	125.7 ± 8.9	120.6 ± 5.3	115.3 ± 8.9
	FB	121.2 ± 9.9	123.4 ± 8.3	124.9 ± 14.1
	CM	128.4 ± 7.4	132.4 ± 4.9	132.5 ± 10.5
	WM	122.7 ± 2.8	127.4 ± 7.7	139.6 ± 16.0
	CF	124.7 ± 8.8	126.3 ± 9.0	135.4 ± 16.0
HSR/min	CB	5.0 ± 1.4	3.3 ± 1.3	3.8 ± 1.2
	FB	7.4 ± 1.3	7.5 ± 2.5	8.4 ± 4.1
	CM	6.2 ± 1.6	6.7 ± 1.6	9.2 ± 3.6

	WM	10.0 ± 2.5	10.2 ± 2.7	14.7 ± 6.8
	CF	11.2 ± 2.5	8.4 ± 2.3	15.3 ± 5.6
SD/min	CB	0.6 ± 0.3	0.3 ± 0.4	0.7 ± 0.5
	FB	3.1 ± 1.5	1.8 ± 1.4	3.6 ± 3.2
	CM	1.0 ± 0.5	1.0 ± 0.8	1.9 ± 1.6
	WM	3.1 ± 1.6	1.5 ± 0.9	5.5 ± 4.0
	CF	3.4 ± 2.2	2.8 ± 1.7	6.4 ± 6.2
ACC/min	CB	0.3 ± 0.1	0.2 ± 0.1	0.2 ± 0.1
	FB	0.3 ± 0.1	0.4 ± 0.2	0.3 ± 0.2
	CM	0.3 ± 0.1	0.4 ± 0.1	0.3 ± 0.1
	WM	0.5 ± 0.1	0.5 ± 0.2	0.5 ± 0.3
	CF	0.5 ± 0.1	0.5 ± 0.1	0.5 ± 0.3
DEC/min	CB	0.4 ± 0.1	0.3 ± 0.1	0.2 ± 0.1
	FB	0.5 ± 0.1	0.5 ± 0.1	0.4 ± 0.1
	CM	0.5 ± 0.1	0.6 ± 0.2	0.5 ± 0.1
	WM	0.6 ± 0.1	0.6 ± 0.1	0.8 ± 0.4
	CF	0.6 ± 0.1	0.7 ± 0.2	0.8 ± 0.3

Abbreviations: TD/min: total distance covered per minute, HSR/min: high-speed running (meters covered > 5.5 m/s) per minute, SD/min: sprint distance (meters covered > 7 m/s) per minute, ACC/min: number of accelerations (> 3 m/s^2 per minute), DEC/min: number of decelerations (> -3 m/s^2 per minute). CB: centre back, FB: full-back, CM: centre midfielder, WM: wide midfielder and CF: centre forward.

Significant differences:

- TD/min; CMs vs CBs during the progression phase (p = 0.009, ES: 2.2, very large). TD/min; WMs (p = 0.003, ES: 1.7, large) and CFs (p = 0.028, ES: 1.5, large) vs CBs during the final third. HSR/min; WMs (p = < 0.001, ES: 2.3, very large, p = 0.001, ES: 1.7, large) vs CBs and CMs during build-up.
- HSR/min; CFs (p = < 0.001 ES: 2.9, very large), p = 0.007, ES: 1.7, large, p = < 0.001, ES: 2.3, very large) vs CBs, FBs and CMs during build-up, respectively. HSR/min; FBs (p = 0.006, ES: 2.1, large), CMs (p = 0.014, ES: 2.2, very large), WMs (p = < 0.001, ES: 3.0, very large) and CFs (p = < 0.001, ES: 0.7, moderate) vs CBs during the progression phase, WMs vs CMs during the progression phase (p = 0.007, ES: 1.5, large). HSR/min; WMs (p = < 0.001, ES: 2.1, very large) and CFs (p = < 0.001, ES: 2.7, very large) vs CBs during the final third.
- SD/min; FBs (p = 0.017, ES: 2.4, large), WMs (p = 0.004, ES: 2.0, very large) and CFs (p = 0.001, ES: 1.7, large) vs CBs during build-up, WMs (p = 0.019, ES: 1.7, large) and CFs (p = 0.006, ES: 1.5, large) vs CMs during build-up. SD/min; CFs (p = < 0.001, ES: 1.9, large, p = 0.009, ES: 1.3, large) vs CBs and CMs during the progression phase. SD/min; CFs (p = 0.020, ES: 1.3, large) vs CBs during the final third.
- ACC/min; WMs (p = 0.005, ES: 0.7, large, p = 0.026, ES: 1.5, large, p = 0.030, ES: 1.3, large) and CFs (p = 0.004, ES: 1.8, large, p = 0.023, ES: 1.6, large, p = 0.026, ES: 1.3, large) vs CBs, FBs and CMs during the build-up. ACC/min; FBs (p = 0.024, ES: 0.3, small), WMs (p = < 0.001, ES: 0.7, large) and CFs (p = < 0.001, ES: 1.0, moderate) vs CBs during the progression phase. ACC/min; WMs (p = 0.003, ES: 1.7, large) and CFs (p = 0.005, ES: 1.8, large) vs CBs during the final third.

3.3 Positional differences in contextualised physical intensity during OOP phases of play.

During the middle block, significant differences were found between positions for HSR/min (p = < 0.001) and ACC/min (p = 0.001) (Table 3). Additionally, ACC/min during the high press showed significant differences between positions (p = 0.001).

Table 3. Descriptive statistic (mean ± standard deviation) of metrics across positions when out-of-possession (OOP).

Metric	Position	Low Block	Middle Block	High Press
TD/min	CB	133.0 ± 11.4	129.9 ± 13.0	127.4 ± 12.3
	FB	134.8 ± 15.2	124.2 ± 7.7	119.6 ± 6.5
	CM	135.9 ± 8.7	136.1 ± 5.4	132.4 ± 9.1
	WM	131.5 ± 10.7	131.0 ± 7.1	125.9 ± 7.7
	CF	129.9 ± 19.6	133.5 ± 12.8	129.9 ± 10.2
HSR/min	CB	11.4 ± 4.5	6.3 ± 2.3	7.5 ± 2.9
	FB	12.5 ± 4.3	8.5 ± 3.2	7.5 ± 3.0
	CM	8.8 ± 2.2	6.3 ± 1.7	6.7 ± 2.5
	WM	12.0 ± 4.4	9.7 ± 1.8	8.3 ± 2.0
	CF	11.1 ± 8.1	10.4 ± 2.6	8.6 ± 2.8
SD/min	CB	3.0 ± 2.1	1.2 ± 1.1	1.6 ± 1.1
	FB	4.6 ± 1.7	1.4 ± 1.2	1.7 ± 0.9
	CM	2.1 ± 1.7	0.7 ± 0.5	1.5 ± 1.4
	WM	3.0 ± 1.6	2.8 ± 3.3	2.0 ± 1.2
	CF	2.7 ± 1.4	2.6 ± 1.6	2.1 ± 1.1
ACC/min	CB	0.4 ± 0.1	0.3 ± 0.2	0.3 ± 0.1
	FB	0.4 ± 0.3	0.4 ± 0.1	0.5 ± 0.3
	CM	0.3 ± 0.1	0.3 ± 0.1	0.3 ± 0.1
	WM	0.4 ± 0.1	0.5 ± 0.2	0.5 ± 0.1
	CF	0.5 ± 0.2	0.6 ± 0.3	0.6 ± 0.2
DEC/min	CB	0.7 ± 0.2	0.6 ± 0.3	0.5 ± 0.2
	FB	0.6 ± 0.2	0.6 ± 0.1	0.5 ± 0.1
	CM	0.5 ± 0.1	0.5 ± 0.2	0.5 ± 0.2
	WM	0.6 ± 0.2	0.7 ± 0.2	0.6 ± 0.2
	CF	0.5 ± 0.1	0.6 ± 0.3	0.7 ± 0.1

Abbreviations: TD/min: total distance covered per minute, HSR/min: high-speed running (meters covered > 5.5 m/s) per minute, SD/min: sprint distance (meters covered > 7 m/s) per minute, ACC/min: number of accelerations (> 3 m/s^2 per minute), DEC/min: number of decelerations (> -3 m/s^2 per minute). CB: centre back, FB: full-back, CM: centre midfielder, WM: wide midfielder and CF: centre forward.

Significant differences:

- HSR/min; WMs (p = 0.024, ES: 1.6, large, p = 0.020, ES: 1.8, large) and CFs (p = 0.004, ES: 1.6, large, p = 0.004, ES: 1.8, large) vs CBs and CMs during middle block.
- ACC/min; CFs vs CMs during low block (p = 0.034, ES: 1.6, large). ACC/min; WMs (p = 0.39, ES: 1.4, large) and CFs (p = 0.004, ES: 1.4, large) vs CBs during middle block, CFs vs CMs during middle block (p = 0.014, ES: 1.4, large). ACC/min; CFs (p = 0.008, ES: 1.6, large, p = 0.003, ES: 1.9, large) vs CBs and CMs during high press.

4. Discussion

The aim of the present study was to examine the physical match performance in elite U21 soccer players when in-possession (IP) and out-of-possession (OOP). The main findings were that significant differences in physical match performance between phases of play and between positions during phases of play were evident. Specifically, positional demands had a distinctive interaction with the different phases of play, with the final third for WMs and CFs (HSR, WM; 14.7 ± 6.8 and CF; 15.3 ± 5.6) and low block for FBs and CBs (HSR, CB; 11.4 ± 4.5 and FB; 12.5 ± 4.3) requiring increased physical intensity.

Previous literature has evaluated physical metrics of U23, U18 and U16 academy matches in isolation [25], while the current study demonstrates the distinct positional physical-tactical characteristics linked with each players' tactical responsibility. These findings may provide deeper knowledge of physical match demands and the interaction of tactical roles on specific positions which will allow practitioners to translate metrics from matches into training.

The impact of phases of play on physical match intensity were often similar for the opposing IP and OOP phase. The results from the current study agree with previous findings, which suggests a symbiosis relationship between a playing position and phases of play (i.e. greater physical intensity was seen during the final third for attacking players and during the low block for defensive players) [2]. This observation supports the notion of inter-team synchronisation, in which players' movements are closely interrelated with opponents' movements [26]. In contrast to this finding, previous research has discovered that most sprints were completed when OOP during 'closing down' an opponent, as defensive organisation was reported as the most frequent phase of play in an English Premier League team [9].

The present study further demonstrates how and when WMs and CFs performed HSR actions, as significant differences were found for HSR/min when IP during the final third. The current study found that WMs and CFs covered significantly greater HSR/min during the final third in comparison to CBs (WMs; p = < 0.001, ES: 2.1, very large and CFs; p = < 0.001, ES: 2.7, very large). The final third phase involved significantly greater HSR demands for WMs (HSR/min: 14.7 m/min ± 6.8 m/min) and CFs (HSR/min: 15.3 m/min ± 5.6 m/min) due to making forward runs into the box to create goal-scoring opportunities by evading an opposition player and finding space for goal-scoring opportunities [1]. This suggests the attacking roles of WMs and CFs require 'running in behind' the opponent's defensive line. This finding is understandable, as attacking players aim to break rapidly to exploit any weaknesses in the opposition's defence during attacking transitions [9]. Although insignificant, FBs and CBs covered greater HSR/min and SD/min during the low block phase, which supports the concept of a symbiotic relationship. The findings suggest that FBs and CBs perform intense high-speed actions when 'covering' or dealing with defensive scenarios [5]. This finding is in-line with previous literature, which found that CBs primarily perform high-speed actions when dealing with 'ball down the side', whilst FBs perform most of their sprints during 'recovery' runs [9].

The findings in the current study suggest that CBs experience the lowest physical demands during different phases of play, which supports previous literature regarding whole and peak match demands [6]. Yet, CBs produced the highest quantity of DEC per minute during the low block (CB; 0.7 m/min ± 0.2 m/min) phase in comparison to other positions. These current findings are in line with previous literature that suggests CBs are involved in explosive DEC efforts when defending by squeezing space, covering and dealing with penetrating passes between defensive lines, thus requiring highly-intense actions through pressing [27]. Compared to speed-based actions, DEC efforts require greater mechanical and physical demand and are thus strongly associated with the match outcome [28]. Therefore, CBs are exposed to increased muscle damage and greater injury risk as a result of higher joint and muscular loading and eccentric contractions during the low block phase [12]. Position-specific CBs training sessions should focus on highly demanding mechanical activities such as intense DEC during defensive actions [6].

The current study discovered CMs to cover greater TD/min in comparison to other positions, particularly when OOP (low block; 135.9 m/min ± 8.7 m/min, middle block; 135.9 m/min ± 8.7 m/min). This emphasises the importance for CMs to develop aerobic fitness to cope with the high TD/min. Previous research has suggested that CMs cover the greatest TD during matches [29]. However, the current study contextualises how players cover that distance, thus providing specific detail on how CMs fulfil the tactical role according to the requirements of the team's style of play.

Despite the interesting findings, this study presented some limitations. The examined sample was derived from only one team within a specific context, country and league thus, interpretating and generalising the results must be conducted with caution. The samples of specific positions such as FBs and CFs were smaller in comparison to CBs, CMs and WMs which may have influenced positional trends in the current study. Additionally, the current study did not differentiate general and specialised positions as defensive and attacking-midfielders were classified as CMs, which may have affected results due to the differing tactical profile and style of play. Attacking-players perform greater high-intensity actions by moving to receive, supporting play and running in-behind when IP, with defensive midfielders producing the opposite [14]. Therefore, using general positions has been found to be less sensitive in providing an accurate contextualised description of the match demands [5].

A limitation of the present study was incorporating the 'integrated' approach into the manual coding process, which was a time-consuming method by synchronising the phase of the play when IP and OOP with the physical match data. This process restricts its application within the applied setting as numerous matches are often played within a congested micro-cycle. Thus, future research should aim to develop contextualised machine learning to create automated systems and algorithms to blend into the existing standardised coding process [1]. Future research should aim to reproduce the current study design with a range of teams to provide comparisons of different formations, playing levels and styles of play as physical demands differ between teams with contrasting styles of play such as an aggressive pressing style, possession-based and deeper block approach.

Knowledge of the contextual physical-tactical match demands may help players' preparation by providing benchmarking to inform workload monitoring, but also ensuring players are cumulatively exposed to contextual high-intensity and mechanically demanding actions during training. Although physical demands vary according to position and tactical context when IP and OOP, these tactical phases of play may be 'reverse-engineered' to design training sessions to improve player performance by using the physical data [5]. For example, specific drills may look to produce intensities seen during the low block and final third phases to allow players to practice the tailored tactical roles. Finally, fully understanding how high-intensity position-specific actions alongside the mechanical demands are performed may improve the specificity of rehabilitation programmes [30].

5. Conclusions

The current study is the first to provide a contextual analysis of physical-tactical match performance in elite U21 soccer players. Significant differences in physical match performance between phases of play were evident, confirming the impact of varying phases of play that require position-specific physical qualities based on the tactical role within the team. This 'integrated' approach provides contextualisation of important metrics relevant to tactical actions that may inform training design and rehabilitation sessions. Future research is required to examine the effect of team formations, competition standards and style of play to further understand the impact of tactical phases of play on physical match demands.

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