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Small-Sided Games in Elite Soccer: Does One Size Fit All?

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Purpose: To compare the peak intensity of typical small-sided games (SSGs) with those of official matches in terms of running demands and mechanical work (MechW) over different rolling average durations and playing positions. ***Methods:*** Data were collected in 21 players (25 [5] y, 181 [7] cm, and 77 [7] kg) belonging to an elite French football team. SSG data were collected over 2 seasons during typical training sessions (249 files, 12 [4] per player) and official matches (n = 12). Players' locomotor activity was recorded using 5-Hz Global Positioning System. Total distance (m), high-speed distance (HS, distance above 14.4 km·h^{-1}, m), and MechW (a.u.) were analyzed during different rolling average periods (1–15 min). The SSGs examined were 4v4+goalkeepers (GKs), 6v6+GKs, 8v8+GKs, and 10v10+GKs. ***Results:*** Peak total distance and HS during 4v4, 6v6, and 8v8 were likely-to-most likely lower than during matches (effect size: −0.59 [±0.38] to −7.36 [±1.20]). MechW during 4v4 was likely-to-most likely higher than during matches (1–4 min; 0.61 [±0.77] to 2.30 [±0.64]). Relative to their match demands, central defenders performed more HS than other positions (0.63 [±0.81] to 1.61 [±0.52]) during 6v6. Similarly, central midfielders performed less MechW than the other positions during 6v6 (0.68 [±0.72] to 1.34 [±0.99]) and 8v8 (0.73 [±0.50] to 1.39 [±0.32]). ***Conclusion:*** Peak locomotor intensity can be modulated during SSGs of various formats and durations to either overload or underload match demands, with 4v4 placing the greatest and the least emphasis on MechW and HS, respectively. Additionally, in relation to match demands central defenders and central midfielders tend to be the most and least overloaded during SSGs, respectively.

Keywords: peak intensity, match demands, periodization, football association

Although it is important for football players to have well-developed physical and physiological qualities,[1] match contextual factors[2] often prevent highly trained players to fully utilize their physical potential during matches. Indeed, it has been shown that in the case of an early player dismissal, the players remaining on the pitch could increase their running performance individually to maintain overall team running performance.[3] Additionally, elite young central midfielders (CM) and strikers have been reported to only reach ~85% to ~94% of their maximal sprinting speed during matches, respectively.[4] The current understanding is that elite football players are not necessarily required to be the fittest athletes, but fit enough to cope with the demands of the match and execute their tactical role efficiently.

As such, during recent years, soccer training concepts and methodologies have evolved toward more integrated types of physical training, that is, training with the ball under match-derived situations, which prioritizes both the quality and the density of players' specific actions and intercommunication over pure physical development. This systematic training approach is often referred to as "the tactical periodization model"[5]; its key principle is the overload, relative to match demands, of each of the 3 main fitness components (strength, endurance, and speed) within a football-specific manner during the week, rather than throughout a single session. Besides the specific tactical principles that every coach aims to implement during sessions, it has been shown that match-overload could be reached, and in turn, football-fitness developed using (at least partially) small-sided games (SSGs).[6] In fact, with appropriate formats (eg, number of players, area, rules), SSGs can be associated with high occurrences of player interactions (as a function of the decreased number of players and reduced space) and intense physical demands.[7] Training programs over several weeks, including SSGs, have reported improvements in various match winning-related factors, including technical proficiency, tactical awareness, speed, strength, and endurance performance.[6,8–10]

Nevertheless, the typical SSG formats that are most likely to target specific physiological attributes, as required within the tactical periodization model, are still unknown. Surprisingly also, how does the locomotor intensity of commonly used SSGs compare with that of matches is still unknown. This is somewhat surprising, as most exercises are organized in comparison with match demands to ensure an optimal work/recovery balance from 1 day to the following within the tactical periodization model.[5] One of the challenges to assess match demands is that the intensity and density of actions is likely time-independent, that is, the longer the period, the lower the average intensity. For that reason, it is difficult to compare the locomotor intensity of different SSG formats of various durations with the demands of a 90-minute game. To shed light upon this important question for practitioners, the match-related locomotor intensity versus time relationship during matches can now be modeled using a power relationship.[11] A recent study in professional soccer established the duration-specific profile of peak running periods from 1 to 90 minutes. As time approached 0, relative distance peaked between 170 and 200 m·min^{-1}, depending on positions. Although these results can provide coaching staff with clear information on peak match intensity over various time periods, comparing training drills, such as SSGs, has never been examined, so it remains difficult to translate this match-related information into actual training content.

To examine at which extent different SSG formats could be used to either underload or overload the running and/or mechanical demands of competitive matches, we first compared, using power law modeling, the peak locomotor intensity of different typical SSGs with those of official matches in terms of running demands and mechanical work (MechW) over different rolling average durations. A second objective of the present study was to examine the effect of playing positions on the magnitude of the differences

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in locomotor intensity responses between SSG and matches, which should help coaching staff to better individualize their training plans.

Methods

Participants

Data were collected in 21 players (25 [5] y, 181 [7] cm, and 77 [7] kg) belonging to an elite French football team (qualified for the last stage of the Champion's league competition) during 2 consecutive seasons (2014–2015 and 2015–2016). Players were grouped according to their playing position, as central defender (CD: n = 4), wide defender (WD: n = 6), CM (n = 6), and forwards (AM: n = 5). These data arose from the daily player monitoring in which player activities are routinely measured over the course of the season. Therefore, ethics committee clearance was not required.[12] The study nevertheless conformed to the recommendations of the Declaration of Helsinki.

Study Overview

All match data were collected during both preseason friendly (n = 7) and competitive (French League 1, n = 5) matches, with the team systematically playing in a 4-3-3 formation for a total of 64 player-match observations. Only data from players who completed the first half of the match were analyzed, in order to limit the effect of pacing strategies or possible performance decrement toward the end of the match.[2] All SSG data were collected in-season on a hybrid turf (DESSO GrassMaster; Tarkett, Nanterre, France) during typical training sessions. Players' activity was recorded using 5-Hz Global Positioning System (SPI-Pro, Team AMS R1 2016.8; GPSports, Canberra, Australia) and analyzed using Athletic Data Innovations analyzer (v5.4.1.514, Sydney, Australia)[13] to derive total distance (TD, m), high-speed distance (HS, distance above 14.4 $km \cdot h^{-1}$, m), and MechW (a.u.) during different rolling average periods (1, 2, 3, 4, 5, 6, 8, 10, 12, and 15 min). To limit interunit error, each player wore the same unit throughout the course of the 2 seasons.[14] MechW is an overall measure of velocity changes and is calculated using >2 $m \cdot s^{-2}$ accelerations, decelerations, and changes of direction events.[15] Its reliability and validity are in the same range of acceleration and deceleration variables using the same technology. To smooth the data and make sure the greatest high-intensity periods would be captured,[16] an overlapping between the successive windows (1- to 15-min duration) was applied. The duration of the overlapping was set either as 20% of the period length (for 1- to 5-min rolling average periods, ie, 12 s to 1-min overlapping) or as 1 minute (remaining longer durations windows). The peak value obtained for each SSG and match for each variable was recorded. Figure 1 shows, in a representative player, peak activities during the different SSGs compared with match demands (gray zone, as mean + SDs to mean − SDs) as a function of each rolling average period.

Small-Sided Games

Only the most standardized SSGs (3 touches max) over the 2 seasons were used for analysis: (1) 4v4+goalkeepers (GKs), n = 27 game observations, dimensions: 25 × 30 m, surface area per player: 71 (6) m^2, 6 repetitions, time on: 3 minutes, time off: 90 seconds; (2) 6v6+GKs, n = 46, 30 × 40 m, 87 (8) m^2, 4 repetitions, 4 minutes, 2 minutes; (3) 8v8+GKs, n = 50, 40 × 40 m, 106 (6) m^2, 2 repetitions, 10 minutes, 3 minutes; and (4) 10v10+GKs, n = 62, 102 × 67 m, 311 m^2, 1 repetition, 30 minutes, 0 minute. During SSGs, the ball was always available by prompt replacement when out.[6] SSGs were analyzed from the start of the first to the end of the last repetition, including resting periods.[17] As recovery periods are generally considered as a part of the overall exercise load,[18] we chose to analyze the complete exercise block as a whole (ie, 18- to 30-min sequences, including 1–6 repeated SSG drills).

Run-Based High-Intensity Training

To further contextualize the demands of the different SSGs and match play, we also provided, as a unique example, the locomotor demands a typical run-based high-intensity training (HIT) drill (6-min set with 15-s runs at 100% of maximal aerobic velocity interspersed with 15 s of passive recovery).

Locomotor Intensity Modeling

To model the relationship between locomotor intensity and moving average durations for each of the 3 variables, a power law relationship[19] was used using the formula: $i = cx^n$, where i is the running/mechanical load intensity, c the intercept, and n the slope of the relationship.[11]

Statistical Analyses

Data in text and figures are presented as means (SD) and 90% confidence limits/intervals. All data were first log-transformed to reduce bias arising from nonuniformity error. Differences in locomotor intensity between each SSG and match activity in the different variables, as well as between-SSG/position differences relative to match, were examined using standardized differences (effect size, *ES*), based on Cohen's effect size principle. Probabilities were used to make a qualitative probabilistic mechanistic inference about the true changes/differences in the changes, which were assessed in comparison with the smallest worthwhile change (0.2 × pooled SDs). The scale was as follows: 25% to 75%, possible; 75% to 95%, likely; 95% to 99%, very likely; and >99%, almost certain. Threshold values for standardized differences were >0.2 (small), >0.6 (moderate), >1.2 (large), and >2 (very large). For simplicity and greater impact of the present results in the field, only *ES* >0.6 with likely chances (>75%) that the differences were true were reported in Tables 1 and 2.

Results

Table 3 presents slopes, intercepts, and regression coefficients of the models (r = .94–1.00) that describe the associations between TD, HS, and MechW intensity and rolling average durations, for each SSG and position. Figure 2 presents the standardized differences in TD, HS, and MechW intensity between each SSG and match demands for all rolling average durations and positions.

Overall, TD and HS were likely-to-most likely lower during 4v4, 6v6, and 8v8 than during matches for all positions and rolling average durations. For CD and CM, TD was likely-to-most likely higher during 10v10 than during matches for almost all rolling average durations. Unclear or trivial differences were observed in HS between 10v10 and matches for all positions. MechW was likely-to-most likely higher during 4v4 than during matches for all positions and short-duration rolling averages (1–4 min). MechW was likely-to-most likely higher during 6v6 than during matches for CD (2–15 min), while only unclear-to-small differences were

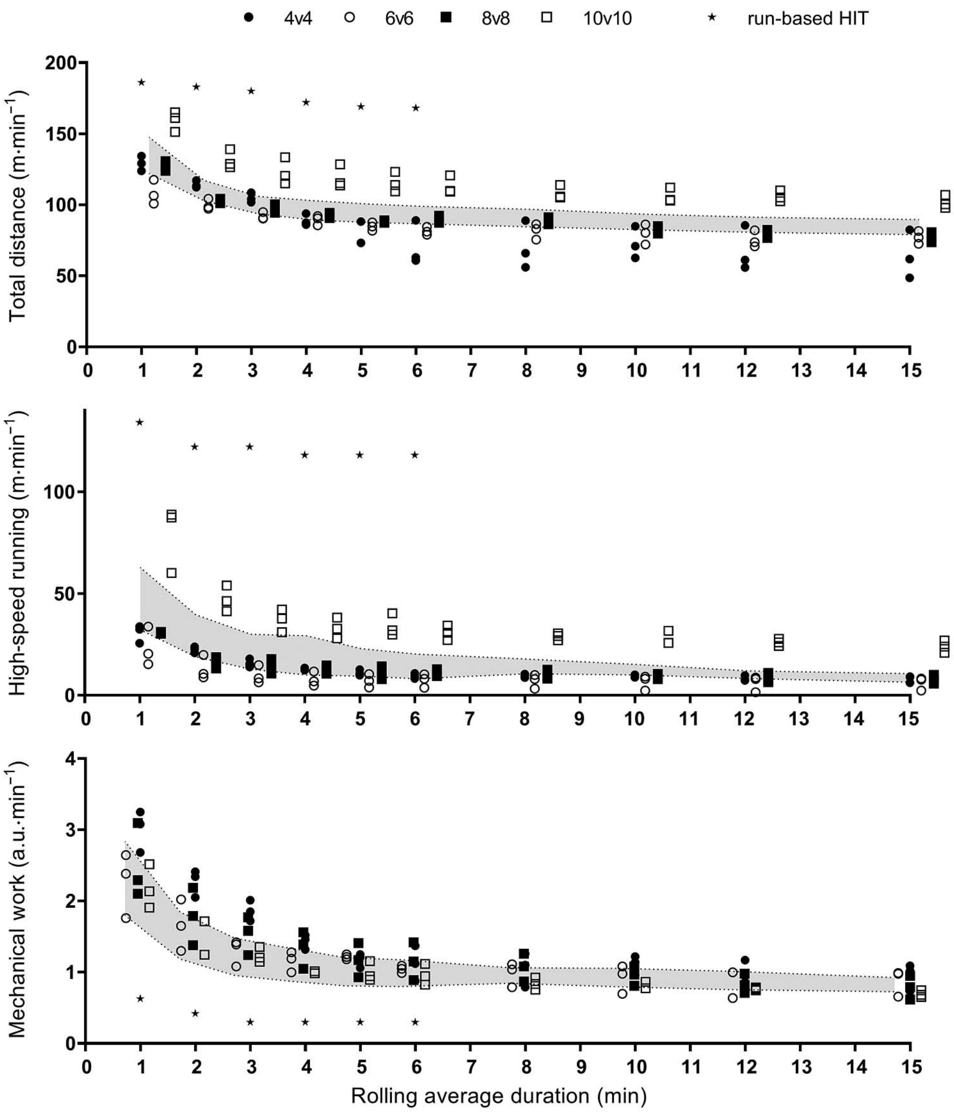

Figure 1 — Peak locomotor intensity during the different small-sided games compared with match demands as a function of each rolling average period in a representative professional soccer player (gray zones stand for match average [SDs]). HIT indicates high-intensity training.

Table 1 Between-SSGs Standardized Differences in High-Speed Running and MechW Intensity as a Function of Rolling Average Durations

	SSGs	4v4	6v6	8v8	10v10	
Distance > 14.4km · h^{-1} (m · min^{-1})	4v4	–	4v4 > 6v6 [1–3]	4v4 > 8v8 [1–4]	4v4 > 10v10 [1–4, 10]	MechW(a.u. · min^{-1})
	6v6	4v4 > 6v6 [1]	–	6v6 > 8v8 [10–15]	6v6 > 10v10 [2–15]	
	8v8	–	–	–	8v8 > 10v10 [6]	
	10v10	10v10 > 4v4 [1–15]	10v10 > 6v6 [1–15]	10v10 > 8v8 [1–15]	–	

Abbreviations: MechW, mechanical work; SSG, small-sided game. Note: Only effect sizes >0.6 with likely chances (>75%) that the differences are true are reported. Numerals within square brackets indicate rolling average duration.

Table 2 Between-Position Standardized Differences as a Function of Rolling Average Durations for High-Speed Running and MechW Intensity, for Each SSG

Distance > 14.4 km · h^{-1} (m · min^{-1})

Positions	CD	WD	CM	AM
CD	–	CD > WD for 4v4 [1–2] CD > WD for 10v10 [1–3]	CD > CM for 4v4 [3, 8–12] CD > CM for 6v6 [5–15] CD > CM for 8v8 [1–15]	AM > CD for 8v8 [12] AM > CD for 10v10 [2]
WD	WD > CD for 4v4 [8] CD > WD for 6v6 [1] CD > WD for 8v8 [1] CD > WD for 10v10 [1]	–	WD > CM for 8v8 [12–15]	AM > WD for 4v4 [1–2]
CM	CD > CM for 6v6 [1–15]	CM > WD for 8v8 [3–4] CM > WD for 10v10 [3–6]	–	AM > CM for 4v4 [1–2, 10–15] AM > CM for 6v6 [5–15] AM > CM for 8v8 [3–15]
AM	CD > AM for 6v6 [1–15] CD > AM for 8v8 [1–2, 8]	WD > AM for 4v4 [2, 5–15]	CM > AM for 4v4 [1] CM > AM for 8v8 [4–6] CM > AM for 10v10 [4–6]	–

MechW (a.u. · min^{-1})

Abbreviations: AM, forwards; CD, central defender; CM, central midfielder; MechW, mechanical work; SSG, small-sided game; WD, wide defender. Note: Only effect sizes >0.6 with likely chances (>75%) that the differences are true are reported. Numerals within square brackets indicate rolling average duration.

Table 3 Intercepts, Slopes, and Regression Coefficients of the Models for Estimating TD, HS, and MechW Intensity by Rolling Average Durations, for Each Small-Sided Game and Position

	TD, m·min^{-1}			HS, m·min^{-1}			MechW, a.u.·min^{-1}		
	Intercept	Slope	r	Intercept	Slope	r	Intercept	Slope	r
CD									
Match [20]	146.8	−0.16	.98	59.3	−0.46	.97	2.1	−0.37	.99
4v4 [5]	133.1	−0.34	.96	29.0	−0.62	.98	3.2	−0.49	.97
6v6 [10]	129.6	−0.16	.98	28.5	−0.38	.98	2.3	−0.31	.98
8v8 [12]	129.5	−0.16	.98	30.9	−0.49	.99	2.4	−0.38	.99
10v10 [12]	156.9	−0.15	.98	63.0	−0.43	.98	2.0	−0.38	.98
WD									
Match [15]	174.4	−0.16	.97	89.6	−0.43	.99	2.5	−0.34	.97
4v4 [10]	152.1	−0.28	.96	43.9	−0.52	.98	3.2	−0.42	.96
6v6 [13]	130.1	−0.15	.98	36.9	−0.45	.98	2.7	−0.33	.98
8v8 [17]	143.1	−0.16	.99	43.0	−0.48	.99	2.6	−0.32	.99
10v10 [20]	174.0	−0.15	.98	82.2	−0.39	.98	2.3	−0.32	.98
CM									
Match [16]	176.0	−0.13	.97	76.6	−0.39	.97	2.3	−0.33	.97
4v4 [8]	152.3	−0.31	.94	45.7	−0.61	.98	3.2	−0.47	.94
6v6 [12]	137.7	−0.17	.97	30.3	−0.38	.97	2.5	−0.35	.97
8v8 [11]	149.4	−0.15	.99	40.9	−0.44	1.00	2.3	−0.33	.99
10v10 [17]	181.8	−0.12	.99	79.8	−0.38	.98	2.3	−0.37	.99
AM									
Match [13]	171.1	−0.15	.97	81.1	−0.41	.98	2.7	−0.33	.99
4v4 [4]	147.1	−0.33	.98	40.4	−0.59	.99	3.8	−0.49	.96
6v6 [11]	128.2	−0.16	.98	33.2	−0.42	.97	2.8	−0.31	.98
8v8 [10]	133.2	−0.15	.99	37.6	−0.45	.99	2.7	−0.34	.99
10v10 [13]	173.4	−0.15	.96	80.6	−0.39	.97	2.6	−0.35	.99

Abbreviations: AM, forwards; CD, central defender; CM, central midfielder; HS, high-speed running; MechW, mechanical work; TD, total distance; WD, wide defender. Note: Numerals within square brackets indicate number of match or small-sided games observations.

observed for all other positions. Unclear-to-small differences in MechW were observed between 8v8 and matches for WD and AM.

Table 1 presents the between-SSGs standardized differences in HS and MechW intensity as a function of rolling average durations. Overall, HS increased with increases in player numbers. HS was most likely superior for 10v10 compared with 4v4, 6v6, and 8v8 for all rolling average durations (*ES*: 2.79 [±0.54] to 3.97 [±0.53]). Overall, MechW intensity decreased with increasing player numbers. MechW was very-to-most likely higher for 4v4 compared with 6v6 (1- to 3-min rolling average duration, *ES*: −1.14 [±0.52] to −1.25 [±0.38]), 8v8 (1–4 min; −0.69 [±0.39] to −1.61 [±0.32]), and 10v10 (1–4 min; −1.26 [±0.40] to −1.96 [±0.37]). MechW was very-to-most likely higher for 6v6 compared with 8v8 (10–15 min; −0.64 [±0.40] to −0.70 [±0.29]) and 10v10 (2–15 min; 0.65 [±0.32] to 1.02 [±0.26]). MechW was very likely higher for 8v8 compared with 10v10 over 8 minutes (0.69 [±0.35]).

Table 2 presents the between-position standardized differences as a function of rolling average durations for HS and MechW intensity for each SSG. Overall, CD covered likely-to-most likely more HS, relative to their match demands, compared with CM and AM during 6v6 for all rolling average durations (0.63 [±0.81] to 1.59 [±0.96]) as well as likely more than WD (1 min; −0.89 [±0.97]) and AM (1–2 and 8 min; −0.58 [±0.36] to −1.54 [±1.84]) during 8v8. CM covered likely more HS relative to the match than WD (3–4 min; 0.89 [±1.05] to 0.95 [±1.10]) and likely-to-most likely more than AM (4–6 min; 0.87 [±0.80] to 1.32 [±1.13]) during 8v8. Regarding MechW, CM worked less compared with their own matches than the other positions during 6v6. Similarly, CM performed likely-to-most likely less MechW than CD (5–15 min; 0.68 [±0.72] to 1.34 [±0.99]) and AM (4 and 6–15 min; 0.82 [±0.43] to 1.06 [±0.60]). CM performed likely-to-most likely less MechW than CD (1–15 min; 0.69 [±0.81] to 1.11 [±1.09]), WD (12–15 min; 0.79 [±0.77] to 1.39 [±0.32], respectively) and AM (3–15 min; 0.60 [±0.60] to 1.39 [±0.32]) during 8V8. All other between-group or between-SSGs differences in peak TD, HS, or MechW were small and/or unclear.

TD and HS intensity during a typical run-based HIT session was likely slightly higher (1-min TD: 180 [16] vs 186 [3] m; *ES*: 0.38 [±0.37]) to almost certainly very largely higher compare with the match (6-min TD: 128 [12] vs 168 [4] m; 2.72 [±0.35]; HS: 36 [8] m vs 118 [3] m; 5.13 [±0.37]). MechW was almost certainly very largely lower (*ES*: −10.5 [±0.37] to −7.58 [±0.37]) during HIT than the match.

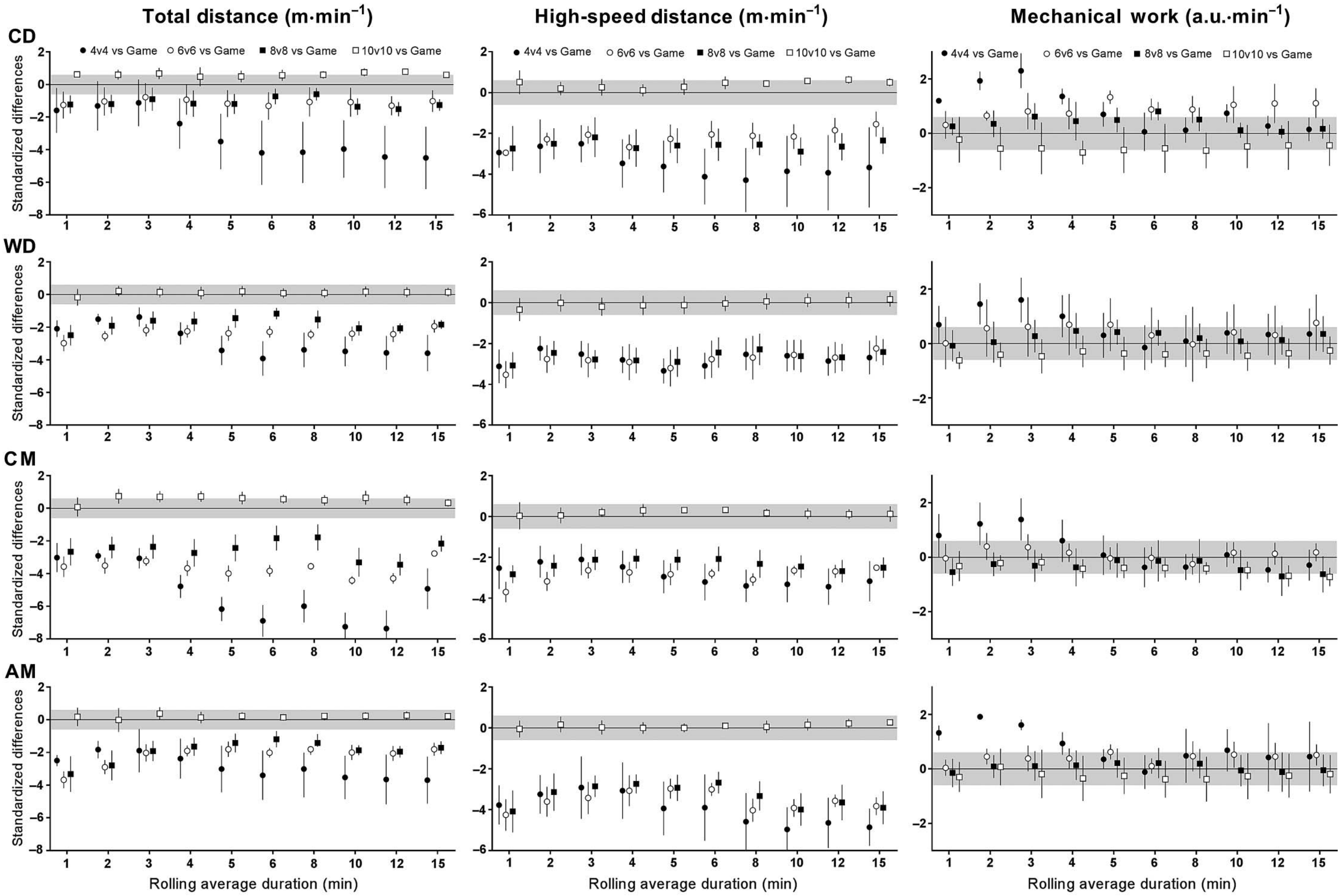

Figure 2 — Standardized differences in total distance, high-speed running, and mechanical work intensity between each small-sided game and match demands for all rolling average durations and position. Data are mean ± 90% confidence intervals. AM indicates forwards; CD, central defender; CM, central midfielder; WD, wide defender.

Discussion

To our knowledge, this study is the first to compare the locomotor intensity (ie, running activity and MechW) of typical SSGs with that of competitive matches in professional soccer players. The main findings of this study were: (1) Compared with matches, only 10v10 SSGs (102 × 67 m) allowed players to reach similar running intensities (TD and HS), whereas 4v4 (25 × 30 m; over 1–4 min) allowed the attainment of a moderately-to-largely greater MechW intensity; and (2) The magnitude of the differences in locomotor intensity between SSGs and matches was highly position- and SSG-dependent, irrespective of the rolling average durations.

In the present study, we used a power law model to examine the relationship between running and MechW intensity and time during official first league matches and a selection of typical SSGs. Interestingly, the peak running intensity reported in our study (intercept; 146.8–176 m·min^{-1} for CD and CM, respectively) was 10% to 15% lower than that reported in professional Australian A-League players,[11] despite the fact that the 2 teams played in a similar 4-3-3 formation. However, the actual playing style (possession vs direct- or fast-progression playing style[20]) and playing standard (1 team playing the European Champions' League vs 1 team playing in the Australian domestic championship) may influence match running demands at a greater extent than team formations. The high technical standard of the French team players and the high possession scores during matches (>65%) is, therefore, likely to explain the differences observed between the studies.

Differences Between SSGs and Match Demands and Implication for Tactical Periodization

In the present study, we found that the overall running intensity (TD and HS) during 4v4, 6v6, and 8v8 were likely-to-most likely and slightly-to-very largely lower than during matches for all positions (Figure 3). In contrast during 10v10, TD and HS were similar or even slightly-to-moderately higher than during matches (Figure 3). This latter result confirms previous work,[7,21,22] showing that increasing the number of players (and concomitantly pitch size) increases TD and HS during SSGs. In fact, an increase in relative playing area (from ~90 [4v4] to ~310 m^2/player [10v10]) allows for more space to be covered (high TD[23]) and in turn, higher speeds to be reached (HS[24]). In this study, the space available for players to run increased directly with player number, so that the greater number of players, the greater the distance per minute ran. Over the past years, soccer training concepts and methodologies have evolved and one of the most contemporary

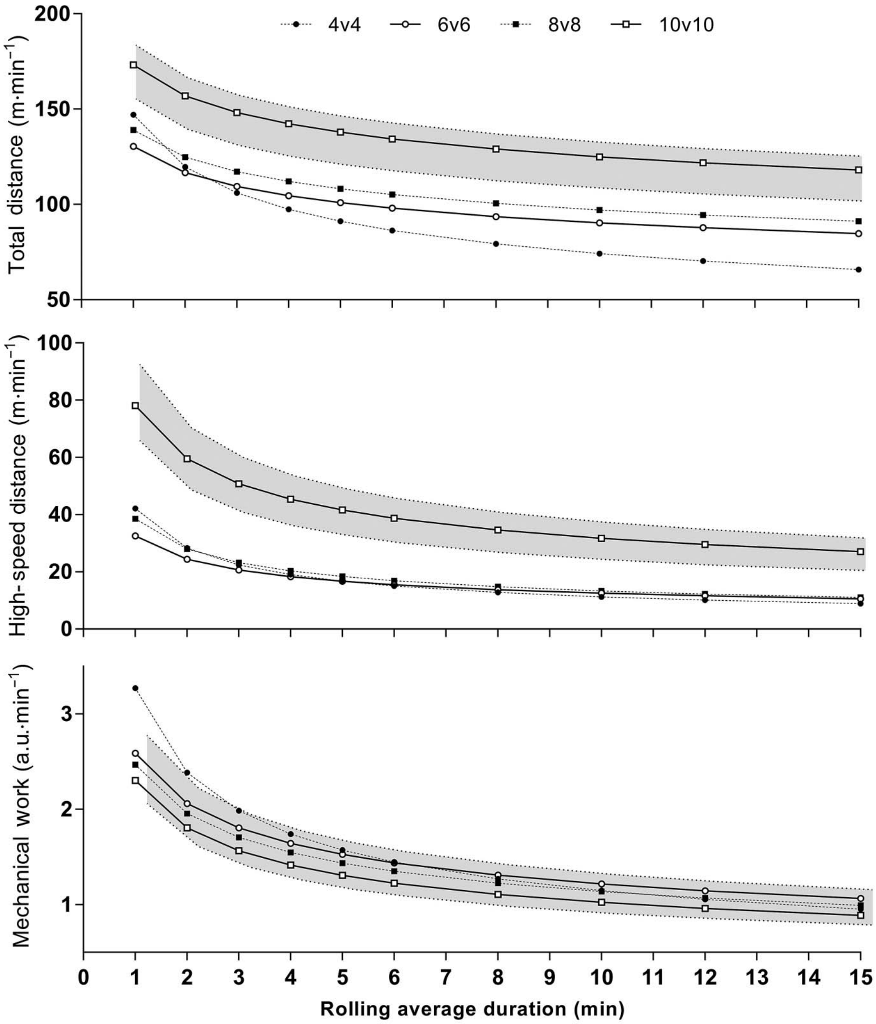

Figure 3 — Peak locomotor intensity during the different small-sided games compared with match demands as a function of each rolling average period for all players pooled together (gray zones stand for match average [SDs]). Confidence intervals for mean values are not provided for clarity.

training approaches in soccer is now called the "Tactical periodization."[5] With this approach, horizontal alternation of the training goals is achieved by prioritizing either strength, endurance, or speed focus between days rather than between exercises or microcycles. The aim of each "conditioned" session is then to overload the desired fitness component relative to the match demands. During an "endurance-targeted session," in parallel to a high metabolic load, coaches generally aim for a relatively high average running pace ($m \cdot min^{-1}$) and large activity volumes.[18] Therefore, from a pure locomotor standpoint, while the 4v4, 6v6—and to a lesser extent, the 8v8—might not allow overloading the running loads of endurance-oriented sessions, the 10v10 is likely the optimal format to program during submaximal endurance-oriented sessions. Notwithstanding, the magnitude of the difference between 10v10 and matches locomotor intensity was only trivial-to-small (182 vs 180 $m \cdot min^{-1}$ for 1 min to 121 vs 117 $m \cdot min^{-1}$ for 15 min for SSG and matches, respectively). As such, to substantially overload TD and HS intensity over longer periods of time, specific run-based HIT drills without the ball may sometimes still need to be incorporated into training sessions (ie, intermittent runs such as 15 s on–15 s off; Figure 1, 118 vs 36 $m \cdot min^{-1}$ at HS for 6 min, eg, very large effect). In practice, however, coaches may also use 6v6 or 8v8 SSGs within their endurance-oriented sessions, not for their locomotor demands, but because of the associated high but not maximal metabolic responses (high heart rate responses [see Hill-Haas et al[24]; Figure 2], which were not examined in the present study), which, when programmed over prolonged durations (eg, >8 min for 6v6 and >15 min for 8v8), may help to improve the ability to maintain high work rates over time (ie, endurance).

On the other hand, MechW intensity was likely-to-most likely higher during 4v4 than during matches for short-duration rolling averages (Figure 3). This result confirms previous work where a decrease in player numbers tended to increase player actions and changes in velocity (accelerations and decelerations),[21,22] which could, in turn, overload MechW intensity compared with match demands.[25] Interestingly, MechW was also higher than match demands during 6v6 for CD (but not the other positions, small and/or unclear differences, Table 2), suggesting that this format could also be used to overload MechW for this position. Since during a "strength-targeted session," coaches generally tend to overload players' neuromuscular system through increased occurrences of accelerations, decelerations, and changes of directions at high intensity, the present results confirm the interest of using 4v4 (and 6v6 for CD) over 3 to 5 minutes to overload this specific soccer-specific physical capacity. However, it is noteworthy that the overload in MechW intensity is likely substantial for short SSG bouts only (<5 min); as currently implemented in practice, it is, therefore, preferable to use short repetitions interspersed with long recovery durations (90–120 s) to promote peak MechW intensities. Finally, it is also worth noting that the metabolic responses to such SSGs are almost near-to-maximal (not measured here[18]), which shows, again, that during such football-specific drills, it is impossible to train physical capacities in complete isolation. These formats may, however, be better suited to develop maximal aerobic "power" than endurance per se, which explains why this SGG format fits better into locomotor "strength-" than "endurance-oriented" conditioned sessions.

The Magnitudes of Difference Between SSGs and Matches Are Position-Dependent

Another area of concern when planning training in overall, and especially SSGs, is the possible heterogeneity of physical responses between individuals, which can cause disparities in a player's weekly loading.[17] In this study, there were some substantial differences in relative locomotor intensity responses between positions (Table 2). For example, relative to their respective match demands, CD performed likely moderately greater HS than CM during 6v6, while these latter players performed moderately-to-largely more HS than WD and AM during 8v8 (Table 2). On the other hand, CM were moderately underloaded for MechW during 6v6 and 8v8 compared with other positions. With these results in mind, coaches may propose regulation rules or specific exercises to unload/overload individual player groups and, in turn, individualize the overall training intensity and load.[13] On one hand, when the aim is to decrease running load, players can be used as floaters or positioned off the pitch as wide players.[24] On the other hand, to specifically overload a group of players, player-to-player marking could be requested.[26] Reported elsewhere, it is also worth noting that game modulation can be achieved through creating "artificial" rule changes with players required to complete series of accelerations and decelerations before returning into the area of play,[24,27] increasing MechW intensity of the drill. However, although rule modifications in SSGs are widely used in professional football to unload or top-up specific players, their specific impact on locomotor and/or MechW intensity have not been clearly investigated and require further investigation. Finally, as these rule modifications may in fact lack specificity, it may be more appropriate to, at least, modify the exercise volumes for these latter specific player groups, for example, CD performing three-fourths of the game-specific part of the session and CM performing additional run-based drills at the end of the session. It is, however, worth mentioning that the present results may be exclusively representative of the team examined here; the team adopting different systems and types of play may show different match play demands,[28] which may affect, in turn, the comparisons with the SSGs examined here. It is also noteworthy that the relatively small sample size used in this study could potentially limit the confidence in the positional group comparison.

Practical Applications

- 10v10 (5–15 min) SSGs can be used to slightly-to-moderately overload the intensity of match locomotor demands (TD and HS) and may be well-suited for endurance-oriented sessions within a tactical periodization training paradigm.
- 4v4 (<5 min) and, to a lesser extent, 6v6 SSGs (2–15 min; CD), can be used to overload MechW intensity.
- SSGs are not a one-size-fits-all training weapon when it comes to player loading. Planning position-specific unloading strategies or top-up exercises are likely required to equilibrate player loading relative to game demands when using SSGs.
- A D+1 session for substitutes that aims to compensate for a ~60-minute match (TD: ~6000 m; HS: ~1200 m, MechW: ~50) could include the following: (1) 8v8, 2 sets of 10 minutes (1920 m with 260 m at HS, MechW: 11); (2) 4v4, 4 sets of 4 minutes (1660 m, 290 m at HS, MechW: 28); and (3) run-based HIT (15 s on; 15 s off), 1 set of 6 minutes (1020 m, 850 m at HS, MechW: 2), resulting in a total of ~60-minute training duration, ~4600 m covered with ~1400 at HS, and a MechW of 41.

Conclusion

The locomotor intensity (ie, running activity and mechanical load) of typical SSGs was compared for the first time with that of competitive matches in professional soccer players. We found that SSGs are not a one-size-fits-all training weapon when it comes to player loading: Peak locomotor intensity can be modulated during SSGs of various formats and durations to either overload or underload match demands. In comparison with matches, only 10v10 SSG (102 × 67 m) allowed players to reach similar running intensities (TD and HS), whereas, 4v4 SSGs placed the greatest and the least emphasis on MechW and HS, respectively. The present study also shows that positional roles likely modulate these SSG versus match demands relationships, with a tendency for CD and CM to be the most and least overloaded during SSGs, respectively. This novel information can be used for training programming to individualize player loading during SSGs and improve overall training load management in elite soccer players.

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