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Effects of pitch configuration on internal and external load during small-sided games with stop-ball rule in young soccer players

review paper
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ABSTRACT

Purpose. Small-sided games (SSGs) are currently one of the most common drills used and have been progressively growing in youth soccer. The aim of this study was to investigate the effects of different pitch sizes for SSGs-stop ball (SB) on external and internal load in young soccer players.

Methods. Ten young soccer players (13.8 ± 0.42 years; 168.8 ± 6.21 cm; 55 ± 7.07 kg) performed 4 vs 4 SSGs-SB (4 × 3 min, 2 min recovery) on 20 × 25 m and 30 × 38 m fields. Distance covered (DC) in jogging 3–8 km/h, distance covered at moderate-speed running 8–13 km/h, at high-speed running 13–18 km/h, at sprint running > 18 km/h, peak speed (PS), sprint number (SN), maximal acceleration (MA), maximal deceleration (MD), distance in acceleration > 2.5 m/s^2 (ACC) and deceleration < –2.5 m/s^2 (DEC), high metabolic load distance (HMLD, 35–50 W/kg; > 50 W/kg) and rate of perceived exertion (RPE) (CR-10) were measured.

Results. Large SSGs-SB produced higher values than smaller pitches for PS ($p < 0.001$, lines 14–19: *ES*: 1.62), SN ($p < 0.001$, *ES*: 1.64), MD ($p < 0.05$, *ES*: 1.24), DC at moderate-speed running 8–13 km/h ($p < 0.05$, *ES*: 0.95), high-speed running 13–18 km/h, ($p < 0.05$, *ES*: 1.10), sprint running > 1 8 km/h ($p < 0.05$, *ES*: 1.02), HMLD (35–50 W/kg, $p < 0.05$, *ES*: 0.92; > 50 W/kg, $p < 0.001$, *ES*: 1.40). Small SSGs-SB displayed higher values than larger pitches for MA ($p < 0.001$, *ES*: 1.52), DC in jogging 3–8 km/h ($p < 0.001$, *ES*: 2.01), both for distance in ACC and in DEC ($p < 0.001$, *ES*: 1.77; $p < 0.05$, *ES*: 1.30, respectively).

Conclusions. Large SSGs-SB elicited a significant increase in external and internal load, while lower dimensions affected MA, DC in jogging 3–8 km/h, in ACC and in DEC. Finally, practitioners should take this information into account in order to properly schedule training sessions.

Key words: technical drills, physical demands, high intensity, injury prevention

Introduction

Youth soccer is characterised by continuous changes in intensity during a wide range of activities, including walking, running and sprinting with frequent changes of direction, as well as jumping, often while engaging with the ball and/or opponents [1]. This variable intensity, as well as the duration of the official matches, involves > 80% of HRmax and approximately 75% of VO_2max in young soccer players, targeting considerably both aerobic and anaerobic energy production [1]. The use of drill-based games such as small-sided games (SSGs) has become popular for athletes of all ages and levels of play because they are useful in increasing their physical and technical performance [2, 3]. Indeed, SSGs are drills with task constraints that affect the tactical and physical behaviours of players [4]. The adjusted constraints consist of the training regimen [5], number of players [6], pitch size [7], rules [8] and scoring method [9]. The pitch configuration is one of the most commonly modified variables by head coaches, with such variations typically being adjustments to the relative area (area m^2/n° of players) [7, 10]. In this respect, the literature has investigated the area per soccer player to describe the effects on external load [11].

Manipulating the relative area is one of the interventions that practitioners implement to determine different demands in soccer players of all ages [12].

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The relationship between area per player and the load's effects should not be only analysed during traditional SSGs but also including stop-ball rules.

Indeed, previous studies have monitored external load during each possession type in SSGs [13], with small goals (SSG-SG) [14], with the presence of a goalkeeper [15], with and without side rules [16], defensive SSGs [17], and with internal [18] and external floaters [19]. However, to the best of our knowledge, only two studies are available in the literature aimed at monitoring external load variables during SSGs-SB in elite soccer players [9, 20]. When SSGs are played including the stop ball in a 1 m wide zone behind the end line (SSGs-SB), higher HR values were found than during SSGs-SG [21, 22].

Such differences have also been noted both in all pitch dimensions and in each play format [22].

This result emphasises that formats of play and specific rules applied during SSGs determine very different tactical behaviours and various physiological adaptations [23].

Implementing other scoring types has also become a significant factor in the development of young soccer players because they are able to resolve various play situations through problem-solving and decision-making processes.

However, beyond the small number of studies on SSGs-SB [9, 21, 22, 24], few external load variables have been investigated, leaving open a series of doubts about the benefits of this exercise. Even though mechanical variables (acceleration and deceleration) and locomotor demands have been analysed, previous studies have neglected metabolic power data. To date, this outcome tends to be indispensable for understanding energy expenditure during SSGs-SB [25]. Hence, monitoring of load during SSGs-SB is needed in order to understand how to schedule and implement them during weekly microcycles in Under-15 (U-15) sub-elite soccer players.

Therefore, to the best of our knowledge, further insights on SSGs-SB are needed with the aim of identifying the relative area suited to producing greater high-speed running and sprint values in youth soccer. Therefore, the aim of this study was to analyse the effects of two different pitch configurations during SSGs-SB on external and internal load in U-15 sub-elite soccer players.

We hypothesise that larger SSGs-SB are able to produce greater values on distance covered at high-speed running, at sprint running and sprint number, as was observed in other SSGs [26].

Material and methods

Participants

A power analysis (G*Power, version 3.1.9.2) indicated that ten participants would be an appropriate sample size (power = 0.80, effect size = 0.3, probability error = 0.05). The ten young sub-elite male soccer players tested (13.8 ± 0.42 years; 168.8 ± 6.21 cm; 55 ± 7.07 kg) were athletes of the same soccer academy competing in the Italian U-15 sub-elite championship. Participants were included if they were aged 13–14 years old and had been participating in soccer training and competition for at least 3 years.

Algorithm = 6.986547255416 + (0.115802846632 × chronological age) + (0.001450825199 × chronological age) + (0.004518400406 × body mass) – (0.000034086447 × body mass2) – (0.151951447289 × stature) + (0.000932836659 × stature2) – (0.000001656585 × stature3) + (0.032198263733 × leg length) – (0.000269025264 × leg length2) – (0.000760897942 × (stature × chronological age), utilised in the previous study [27] and defined as the maturity offset (MO), was applied to find the mean chronological age, height, weight and MO values of the sample. The MO algorithm produced a chronological age ranging between 13.2±0.2 and 14.1±0.3 years.

Participants were excluded if they had sustained a musculoskeletal/joint injury within the 3 months prior to commencing the experimental testing or had suffered any other injury that could have obstructed their performance at the assessment time.

The players regularly performed three sessions per week and an official match (Sunday). All the participants participated in all the SSGs-SB and the training drills during the usual training sessions with the team.

Study design

The participants were randomly assigned to two teams that played the SSGs-SB. The data were collected in the last week of October during the 2024–2025 soccer season. The randomisation process was carried out using opaque envelopes to avoid bias during group allocation. Inside each opaque was a sealed, randomly generated assignment card indicating the participant's group placement.

Both training sessions, conducted on two different days, were performed on the same artificial grass field and at the same time (16:30–18:00 pm) under similar weather conditions (temperature: 22 C°; humidity: 40%;

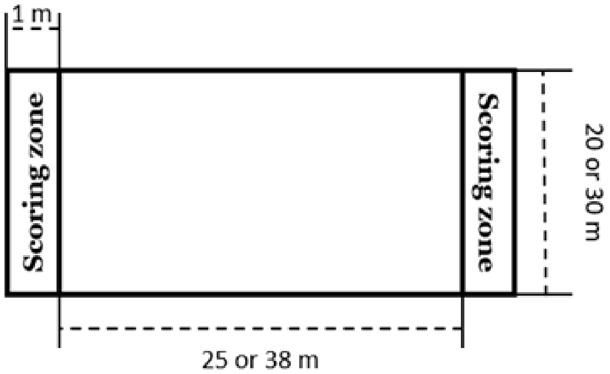


Figure 1. Schematic representation of SSGs-SB with two dimensions proposed (20 × 25 m, 30 × 38 m)

no wind). To analyse the effects of two different pitch sizes (20 × 25 m – 62.5 m^2 · player; 30 × 3830 × 38 m – 142.5 m^2 · player) on the parameters of external and internal load, a single 4 vs 4 game of SSGs-SB without a goalkeeper was performed, as shown in Figure 1.

In both exercises, the athletes played 4 × 3 min with 2 min of passive recovery. All participants were already familiarised with the experimental procedures as their coaches commonly use these drills.

During SSGs-SB, a point was scored when the player stopped the ball behind the bottom line of the playing field in a zone of 20 × 1 or 30 × 1 m [9]. Stopping the ball means finding a way of entering the 'goal zone' with the ball and stopping it under the sole of one foot [9].

Twenty balls were placed around the playing area with four coaches who could introduce them as needed, and they verbally encouraged the players to maintain a high work rate.

Before each SSGs-SB session, the players completed a standardised warm-up of 15 min, including performing low-intensity, dynamic stretching and technical exercises.

Measures

During the training sessions, the players were monitored using a global positioning system (GPS) at 18.18 Hz (GPEXE® SYSTEM, EXELIO srl, Udine, Italy) that had been recently validated [28]. The parameters detected were total distance covered (TD), peak speed (PS), sprint number (SN), maximum acceleration (MA), maximum deceleration (MD), and distance covered in acceleration > 2.5 m/s^2 (ACC) and in deceleration < –2.5 m/s^2 (DEC). The distance covered (DC) was also measured at different speed thresholds: standing 0–0.4 km/h, walking 0.4–3 km/h, jogging 3–8 km/h, moderate-speed running 8–13 km/h, high-speed running 13–18 km/h and sprint running > 18 km/h [29]. Besides this, the high metabolic load distance (HMLD, 35–50 W/kg; > 50 W/kg) was determined [30, 25]. For the internal load assessment, the soccer players were instructed to rate their exertion using Borg's CR-10 perceived exertion scale, which has been validated for its reliability in measuring effort intensity [31].

This rating was requested 5 min after the intervention's conclusion. This involved scoring their response to the question 'How intense was the session?' on the CR-10 Borg scale, which was administered individually to each player.

The reported scores were recorded and subsequently utilised for additional descriptive analysis.

Statistical analysis

Data are mainly presented in descriptive terms, using the mean and standard deviation (± *SD*), due to the nature of the study and small sample. The Kolmogorov–Smirnov test established the normal distribution of the data. Student's *t*-test for paired data was used to compare the results in relation to parameters of internal and external load between the SSGs-SB with two different pitch configurations. The significance level was set at $p < 0.05$. Cohen's effect size (*ES*) was calculated and interpreted as follow: < follows: < 0.20 = trivial, 0.20–0.59 = small, 0.60–1.19 = moderate, 1.20–1.99 = large; ≥ 2.00 = very large [32].

Relative reliability and within-session variability (absolute reliability) were expressed as intraclass correlation coefficient (ICC) and coefficient of variation (%CV), respectively. ICC values were interpreted as: low = < 0.10, moderate = 0.11–0.30, high = 0.31–0.50, very high = 0.51–0.70, nearly perfect = 0.70–0.90, and perfect = 0.91–1.0 [33].

All statistical analyses were performed using SPSS 28.0 for Windows (SPSS Inc, Chicago, USA).

Results

Both SSGs-SB produced the following mean coefficients of variation: TD (CV: 15.96%), PS (CV: 5.93%), MA (CV: 9.62%), MD (CV: 10.46%), SN (CV: 80.6%), DC in jogging 3–8 km/h (CV: 17.50%), moderate-speed running 8–13 km/h (CV: 20.87%), high-speed running 13–18 km/h (CV: 29.47%), sprint running > 18 km/h (CV: 73.07%), ACC > 2.5 m/s^2 (CV: 53.3%), DEC < –2.5 m/s^2 (CV: 42.30%), HMLD (CV, 35–50 W/kg: 32.22%; CV, > 50 W/kg: 84.35%). The coefficients of variation data from these drills are shown in Table 1.

Table 1. Coefficients of variation of SSGs-SB analysed

Parameters	%CV (95% CI)	
	SSGs-SB (38 × 30 m)	SSGs-SB (20 × 25 m)
TD (m)	7.27 (5.19 to 9.33)	24.65 (22.27 to 27.03)
PS (km/h)	9.61 (7.55 to 11.67)	2.25 (1.47 to 3.01)
MA (m/s^2)	9.54 (7.10 to 11.98)	9.71 (7.44 to 11.97)
MD (m/s^2)	11.35 (7.65 to 15.03)	9.58 (6.43 to 12.73)
SN (counts)	85.86 (59.77 to 111.94)	75.34 (42.46 to 108.21)
DC jogging 3–8 km/h (m)	8.79 (6.57 to 11)	26.22 (21.97 to 30.45)
DC moderate-speed running 8–13 km/h (m)	16.47 (12.40 to 20.54)	25.27 (17.73 to 32.79)
DC high-speed running 13–18 km/h (m)	24.73 (16.49 to 32.96)	34.21 (27.14 to 41.27)
DC sprint running > 18 km/h (m)	70.40 (44.07 to 96.73)	75.75 (49.39 to 102.10)
DC in ACC > 2.5 m/s^2 (m)	50.53 (31.95 to 69.12)	56.07 (43.73 to 68.40)
DC in DEC < –2.5 m/s^2 (m)	48.70 (33.57 to 63.82)	35.91 (29.38 to 42.42)
HMLD 35–50 W/kg (m)	36.69 (25.53 to 47.84)	27.75 (17.87 to 37.63)
HMLD > 50 W/kg (m)	81.38 (58.91 to 103.84)	87.32 (52.06 to 122.57)

SSGs-SB – small-sided games stop ball, AU – arbitrary units, DC – distance covered, TD – total distance, PS – peak speed, SN – sprint number, MD – maximal deceleration, MA – maximal acceleration, HMLD – high metabolic load distance, ACC – acceleration, DEC – deceleration, CV – coefficients of variation, 95% CI – confidence interval

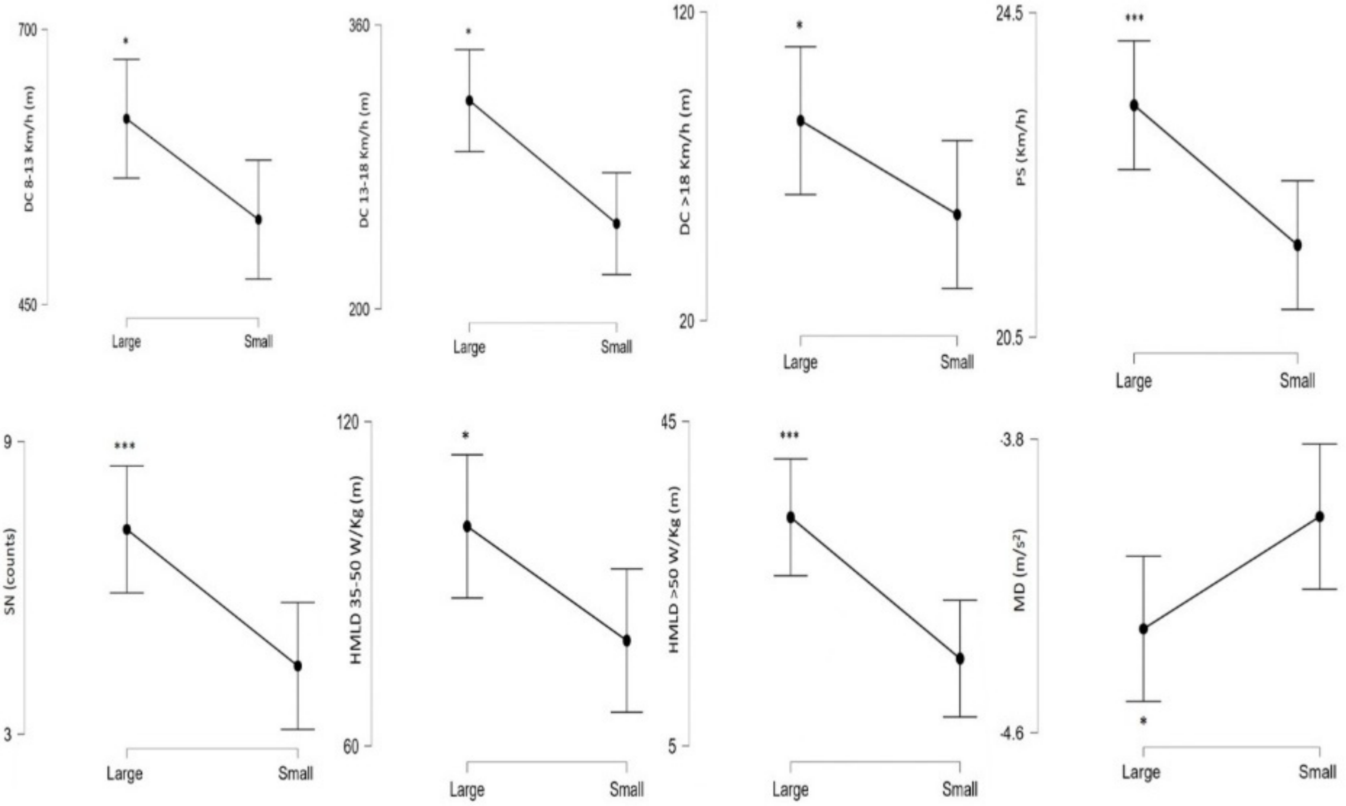
Table 2. ICC values of SSGs-SB analysed

Parameters	ICC (95% CI)	
	SSGs-SB (30 × 38 m)	SSGs-SB (20 × 25 m)
TD (m)	0.7 (0.41 to 0.90)	0.66 (0.37 to 0.88)
PS (km/h)	0.13 (–0.10 to 0.54)	0.19 (–0.07 to 0.59)
MA (m/s^2)	0.20 (–0.06 to 0.61)	0.13 (–0.11 to 0.53)
MD (m/s^2)	0.20 (–0.06 to 0.60)	0 (–0.18 to 0.40)
SN (counts)	0 (–0.18 to 0.39)	0.27 (–0.01 to 0.66)
DC jogging 3–8 km/h (m)	0.33 (0.03 to 0.70)	0.51 (0.19 to 0.81)
DC moderate-speed running 8–13 km/h (m)	0.54 (0.23 to 0.83)	0.65 (0.35 to 0.88)
DC high-speed running 13–18 km/h (m)	0.30 (0.01 to 0.68)	0.6 (0.29 to 0.85)
DC sprint running > 18 km/h	0.14 (–0.10 to 0.55)	0.27 (–0.01 to 0.66)
DC in ACC > 2.5 m/s^2	0.6 (0.29 to 0.85)	0.20 (–0.06 to 0.61)
DC in DEC < –2.5 m/s^2	0.1 (–0.12 to 0.51)	0.37 (0.06 to 0.73)
HMLD 35–50 W/kg (m)	0.25 (–0.02 to 0.65)	0.58 (0.27 to 0.85)
HMLD > 50 W/kg (m)	0.39 (0.07 to 0.74)	0.25 (–0.02 to 0.65)

SSGs-SB – small-sided games stop ball, AU – arbitrary units, DC – distance covered, TD – total distance, PS – peak speed, SN – sprint number, MD – maximal deceleration, MA – maximal acceleration, HMLD – high metabolic load distance, ACC – acceleration, DEC – deceleration, ICC – intraclass correlation coefficient, CI – confidence interval

Both SSGs-SB determined the following mean intraclass correlation coefficients: TD (ICC = 0.68), PS (ICC = 0.16), MA (ICC = 0.16), MD (ICC = 0.10), SN (ICC = 0.13), DC in jogging 3–8 km/h (ICC = 0.42), moderate-speed running 8–13 km/h (ICC = 0.59), high-speed running 13–18 km/h (ICC = 0.45), sprint running > 18 km/h (ICC = 0.20), ACC (ICC = 0.40), DEC (ICC = 0.23) and HMLD (35–50 W/kg, ICC = 0.41; > 50 W/kg, ICC = 0.32). The intraclass correlation coefficient data from these drills are shown in Table 2.

Large SSGs-SB (30 × 38 m) produced higher and statistically significant values than smaller pitch for PS ($p < 0.001$; *ES*: 1.62), SN ($p < 0.001$; *ES*: 1.64), MD ($p < 0.05$; *ES*: 1.24), DC at moderate-speed running 8–13 km/h ($p < 0.05$; *ES*: 0.95), highspeed running 13–18 km/h ($p < 0.05$; *ES*: 1.10) and sprint running >18 km/h ($p < 0.05$; *ES*: 1.02). HMLD outcomes were significantly greater than for smaller pitches (35–50 W/kg, $p < 0.05$, *ES*: 0.92; > 50 W/kg, $p < 0.001$, *ES*: 1.40). The results of these parameters are presented in Figure 2.



DC – distance covered, PS – peak of speed, SN – sprint number, HMLD – high metabolic load distance, MD – maximal deceleration
* $p < 0.05$, *** $p < 0.001$

Figure 2. The statistical significance detected for SSGs-SB (38 × 30 m)

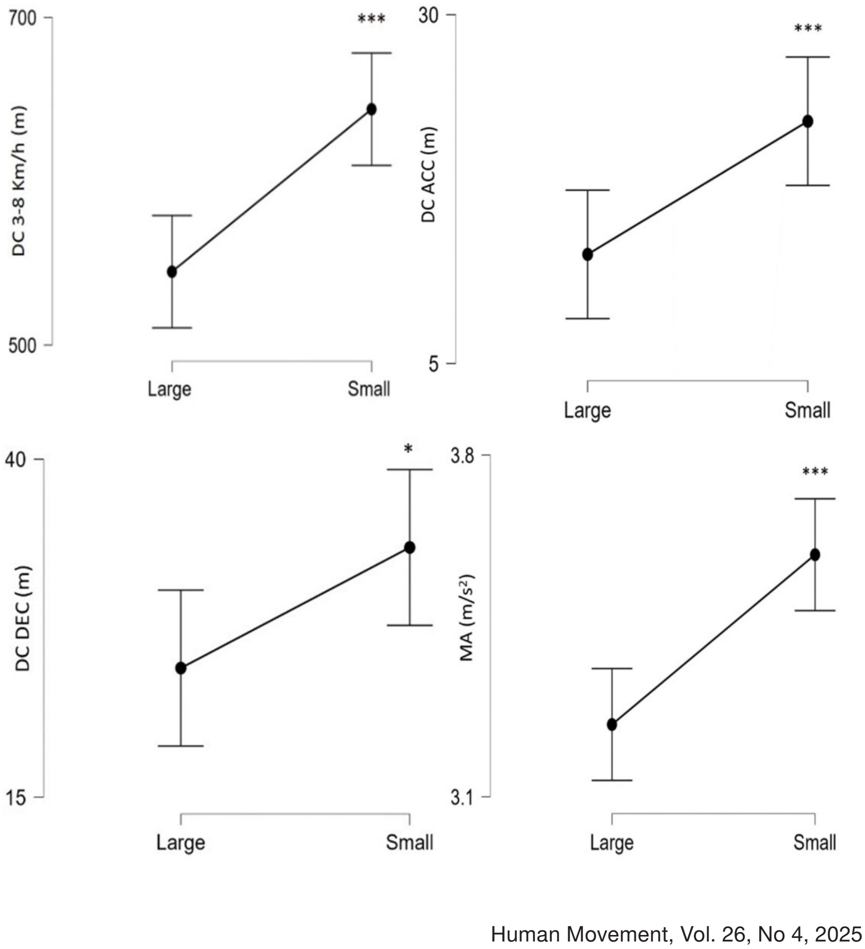
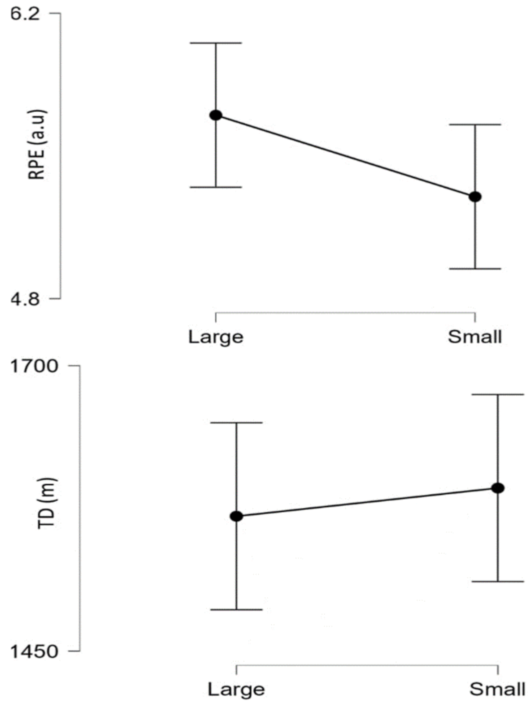


Figure 3. Statistical significance detected for SSGs-SB (20 × 25 m)

DC – distance covered
ACC – acceleration > 2.5 m/s^2
DEC – deceleration < –2.5 m/s^2
MA – maximal acceleration
* $p < 0.05$, *** $p < 0.001$

Small SSGs-SB (20 × 25 m) displayed higher and statistically significant values than larger pitch for MA ($p < 0.001$; ES: 1.52), DC in jogging 3–8 km/h ($p < 0.001$; *ES*: 2.01), for distance covered both in ACC and in DEC ($p < 0.001$, *ES*: 1.77; $p < 0.05$, *ES*: 1.30, respectively).



TD – total distance
RPE – rate of perceived exertion

Figure 4. No significant variables on comparison between SSGs-SB

The results of these parameters are presented in Figure 3. Table 3 reports all values collected, including the non-significant parameters (Figure 4).

Discussion

The aim of this study was to analyse the effects of different pitch configurations during SSGs-SB on external and internal load in U-15 sub-elite football players. High-speed running and sprint were statistically higher ($p < 0.05$) for the pitch of 142.5 m^2 · player by about 21.9%.

High-speed running and sprint running values obtained in U-15 sub-elite soccer players were similar to those collected with elite young soccer players during SSGs-SB [20], despite elite and sub-elite soccer players are characterised by different functional adaptations, technical abilities and knowledge of the game [34, 35].

The increase of these parameters is consistent with the scientific literature in relation to exercises characterised by larger areas per player [7], where large relative area during SSGs is recommended when the aim of the training is to target high-intensity activities.

Unlike in professional adult soccer players, where the relative area should be between 200, 325 and > 365 m^2 · player to generate important HSR and SR values [36], smaller relative areas also seem to be sufficient to improve these variables in U-15 sub-elite soccer players.

Table 3. Parameters of external and internal load collected during SSGs-SB

Parameters	Mean ± *SD*		*p*-value	*ES*
	SSGs-SB (30 × 38 m)	SSGs-SB (20 × 25 m)		
TD (m)	1568.14 ± 122.37	1592.81 ± 136.15	0.641	0.19
DC jogging 3–8 km/h (m)	544.78 ± 38.35	643.99 ± 60.00	< 0.001	2.01
DC moderate-speed running 8–13 km/h (m)	618.85 ± 74.58	527.28 ± 117.55	< 0.05	0.95
DC high-speed running 13–18 km/h (m)	317.41 ± 63.82	248.05 ± 61.56	< 0.05	1.10
DC sprint running > 18 km/h (m)	84.77 ± 30.28	54.37 ± 29.17	< 0.05	1.02
PS (km/h)	23.36 ± 0.93	21.64 ± 1.19	< 0.001	1.62
SN (counts)	7.20 ± 1.03	4.40 ± 2.37	< 0.001	1.64
MD (m/s^2)	–4.32 ± 0.46	–4.01 ± 0.31	< 0.05	1.24
MA (m/s^2)	3.25 ± 0.18	3.60 ± 0.28	< 0.001	1.52
HMLD 35–50 W/kg (m)	100.62 ± 22.81	79.50 ± 22.76	< 0.05	0.92
HMLD > 50 W/kg (m)	32.36 ± 14.82	15.76 ± 8.74	< 0.001	1.40
DC in ACC > 2.5 m/s^2 (m)	12.82 ± 3.17	22.36 ± 7.58	< 0.001	1.77
DC in DEC < –2.5 m/s^2 (m)	24.55 ± 6.77	33.47 ± 6.86	< 0.05	1.30
RPE (AU)	5.7 ± 0.95	5.3 ± 1.16	0.148	0.38

SSGs-SB – small sided games-stop ball, AU – arbitrary units, DC – distance covered, TD – total distance, PS – peak speed, SN – sprint number, MD – maximal deceleration, MA – maximal acceleration, HMLD – high metabolic load distance, ACC – acceleration, DEC – deceleration

In this regard, previous studies have confirmed that the present methodological principle is also efficient for young soccer players [37].

Indeed, a recent study found that U-15 and U-16 soccer players need a greater relative area than other youth categories in order to replicate the HSR, VHSR and sprint demanded in official matches [37].

However, if for youth elite categories appears to be approximately > 200 m^2 · player [37], the data in the present study showed that this variable can be limited to about 142.5 m^2 · player in U-15 sub-elite soccer players.

In addition, such effects were further shown by the significance determined for PS and SN, where the implementation of exercises on larger playing fields requires the occupation of major spaces at higher speeds in U-15 sub-elite soccer players.

Such analysis seems to be validated by the DC in jogging, where a smaller field elicited upper values: it is likely that U-15 sub-elite soccer players are able to cover such distances successfully without using high intensity.

Additionally, the DC in moderate-speed running outcome was statistically greater in larger SSGs-SB, revealing as. this variable is functional to achieve play positions during SSGs in U-15 sub-elite soccer players.

The present study also did not show a significant difference in TD between large and small pitch: likely, this scoring method leads U-15 sub-elite soccer players to cover a similar total distance, thus reducing the gap between two pitch sizes.

This result is not in line with previous studies, as larger pitches determined higher values and were more similar to official matches than smaller pitches [7, 38, 39].

Therefore, the data collected showed that U-15 sub-elite soccer players are able to cover the same TD using different running intensity.

Both DC in ACC and DEC were significantly greater during small SSGs-SB in U-15 sub-elite soccer players. These outcomes are in line with the literature, where the decrease of area of play entails an increase in technical actions and mechanical variables [7, 40].

Besides this, MD was significantly higher in the large SSGs-SB, while MA was significantly greater in the smaller pitch. This is likely because smaller dimensions determine more abrupt accelerations to retrieve the ball or to stop opponents in U-15 sub-elite soccer players.

HMLD values were also significantly higher in the large pitch, likely the high number of sprints and meaningful high-intensity values positively affect HMLDs in U-15 sub-elite soccer players.

However, no studies have been found that monitored these variables in detail in U-15 sub-elite soccer players.

Regarding the analysis of internal load, large SSGs-SB determined higher RPE levels than smaller areas, but without achieving statistical significance.

This result is not in line with that observed in the literature, where the gap in RPE levels is increasingly marked in the comparison among two different dimensions [7, 15]: likely because U-15 sub-elite soccer players have difficulty perceiving the different intensities between the two exercises.

Beyond that, the RPE values were lower than in previous studies due to the different bout duration [21, 22].

Therefore, SSGs-SB seem to constitute an interesting alternative for increasing physical demands in U-15 sub-elite soccer players.

Indeed, previous studies have shown that this scoring method results in higher intensities than SSGs with small goals [9].

The reasons can be linked to the behaviours of soccer players that cover larger spaces in both defensive and attacking phases for reasons of enjoyment and motivations [9, 41] that provide this constraint, as well as their less pronounced technical abilities [9, 42].

In addition, this type of scoring requires the player to perform high accelerations and decelerations to stop the ball.

Further studies will have to investigate the relationship between the relative area of SSGs-SB and official matches in youth leagues.

To date, to the best of our knowledge, only one study has addressed this analysis with professional soccer players [38].

The study has some limitations: a) the training age of the participants was not determined. This factor must be taken into account as it could have influenced their performance. In line with this observation, a previous study found that training age and the level of sport expertise can affect tactical behaviours and training load during various SSGs [35]; b) aerobic capacity was not assessed, and this factor could have explained individual differences. Indeed, the scientific literature points out the functional relationship between VO_2max and running performance both in youth [43] and in adult [44] soccer during SSGs.

Further scientific studies will be able to implement the results collected in the present study, finding heart rate values and relating them to the external load. It would also be interesting to compare SSGs-SB with other scoring types (possession games, transition games, with the presence of a goalkeeper, with small goals and/or mixed modality), analysing not only locomotor and mechanical variables but also burst and brake variables [45, 46].

Equally useful could be investigating the relationship between SSGs-SB load and the occurrence of acute fatigue on muscle groups (e.g. hamstring) to monitor with specific devices and recently introduced for training load [47].

Conclusions

SSGs are drills commonly used in the weekly microcycles to target high intensity and are considered better for increasing aerobic [1] fitness and neuromuscular variables [48] than high-intensity interval training. Previous works have suggested implementing high-intensity drills to reduce the risk of lower non-contact muscle injury [49, 50]. The results of the present study showed major intensity regarding DC in high-speed running, in sprint running, as well as SN, PS, MD and, finally, HMLD during large SSGs-SB. In contrast, small SSGs-SB determined greater DC in ACC and in DEC, as well as major DC in jogging. Such results can contribute to methodological advice for practitioners and fitness coaches who schedule the drills during soccer season.

Acknowledgments

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Ethical approval

The research related to human use has complied with all the relevant national regulations and institutional policies, has followed and was in accordance with the tenets of the Declaration of Helsinki, and has beenwas approved by the authors' institutional review board or equivalent committee of the University of Foggia (approval No.: 00149ss/2023).

Informed consent

Informed consent was obtained from all individuals included in this study.

Conflict of interest

The authors state no conflict of interest.

Disclosure statement

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