

Small-sided games activities with external wildcard soccer players

Abstract

Aim: The Small-Sided Games (SSG) is technical exercises presented as modified games by coaches and conditioning trainers according to the objective of the training session. The aim of the study is to evaluate and compare the external load of the professional player using GPS devices and to describe the speed run and power events in 6vs6 and 7vs7 SSG with external wildcard players.

Methods: 14 professional soccer players

Results: The study shows that values of average speed, average power and the power events number were statistically significant in 6vs6 versus 7vs7 ($p<0.05$); the low intensity ($p<0.05$) and moderate intensity travel volumes are higher in 6vs6, while the high intensity runs and the sprint number are clearly higher in 7vs7 ($p<0.001$).

Conclusion: The results showed that the two SSG formats determine very different external workload in professional soccer players. The 7vs7 format shows a greater sprint number while the 6vs6 imposes average running speeds up to medium intensity but does not require, if not to a very small extent, high speed and sprint performance.

Keywords: Small-sided games, external load, soccer players, soccer technical exercises, high intensity, wildcard players

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Abbreviations:

 SSG, small-sided games, HR, heart rate

Introduction

To develop and train aerobic and anaerobic skills in soccer often are used ball exercises on small fields, with reduced number of players, known as small-sided games (SSG). The SSG are technical exercises presented as modified games by coaches and / or athletic trainers according to the objective of the training session.^{1,2} These exercises can produce remarkable and multiple benefits^{3,4} as they allow to obtain simultaneously physical condition and technical-tactical aspects improvements, for adult and young soccer players.⁵⁻¹³ Recent studies highlight how SSGs are useful to simultaneously improve aerobic and anaerobic metabolism both in professional football players,¹⁴ in amateur football players,¹⁵ in young players,¹⁶ and in young elite players.¹⁷ Most of the literature studies evaluated the internal load on traditional fields^{13,18-30} or on a closed field with barriers instead of perimeter lines, the so-called “cage”³¹ other studies have identified the external load by means of “Global Position System” devices better known as GPS³²⁻³⁴ or have described and quantified both internal and external loading.³⁵⁻³⁹ All the studies cited have always monitored exercises that provide for the performance in terms of parity or numerical superiority / inferiority without the help of players placed outside on the field perimeter lines, defined “external wildcard players”. However, this type of exercises is widely used in soccer training and only very recently is attracting research attention to describe benefits and limitations, albeit with very small formats.³⁰ This study, therefore, describe the external load produced by two formats of SSG (6vs6, 7vs7) with the use of players called “wildcard players” in professional soccer players.

Materials and methods

The sample consists of 14 professional soccer players (25.1 ± 3.5

years, 79.2 ± 5.1 kg and 181.5 ± 5.8 cm) with no trauma or training suspension in previous 6 months. The players used in the study were aware of both the proposed exercises and usually monitor the workout through GPS device. All participants were informed about the study risks associated and were conducted in accordance with the Helsinki Declaration.

Materials

The study was conducted with GPS devices at 20 Hz (GPEXE® SYSTEM, EXELIO srl, Udine, Italy) and monitored the following parameters: average speed (Km/h), average power (W/Kg), number of power events (i.e. the number of events/actions in which the request is dependent on the anaerobic processes that may occur during a game, a training session or a specific exercise), maximum speed (peak in Km/h), maximum acceleration (m/sec²), maximum deceleration (m/sec²), number of acceleration and deceleration events, eccentric index (i.e. the ratio between active muscle power and mechanical power). With regard to the latter parameter, the device, with the aid of the dedicated software, calculates the index using the formula: active muscle power mechanical power¹. The index provides information on the impact of shutdown / braking actions (i.e. eccentric muscle contractions) in terms of both quantity and duration of decelerations). In addition to the parameters just mentioned, the distance traveled at different speeds has been calculated and analyzed: walking (speed <7.30 km/h), low intensity run (speed between 7.30 and 14.50 km/h), moderate intensity run (speed between 14.50 and 19.90 km/h), high-intensity run (speed between 19.90 and 25.20 km/h) and finally the sprints with speed >25.20 km/h.^{40,41}

Protocol

The SSG formats used (6vs6, 7vs7) were carried out on a natural grass field measuring 60x35 metres with two small goals (5x2

meters)+2 goalkeepers and 6 players defined as “*external wildcard players*” placed immediately outside the field perimeter: n=2 players next to each small goal and n=1 player on the side line (Figure 1) and n=26 soccer balls n° 5 placed outside the training area. The players were evaluated in the format of 6vs6 and 7vs7 according to the methods summarized (Table 1), in two different sessions performed at a distance of 48h, at the same time (3.00 PM) and with the same temperature (22° C). Before playing the SSG the players played the same warm up of about 15 minutes, in which they had ran at 60% HRmax, combined exercises with different variations of the run, gaits, joint mobility exercises and dynamic stretching exercises. The SSG were executed with goalkeeper, with free touches, with soccer rules in relation to fouls and free/penalty kicks. Offside rule has not been applied. During the execution of the SSG there was no encouragement from the coach, the technical staff and the conditioning trainer (Table 1)(Table 2).¹³

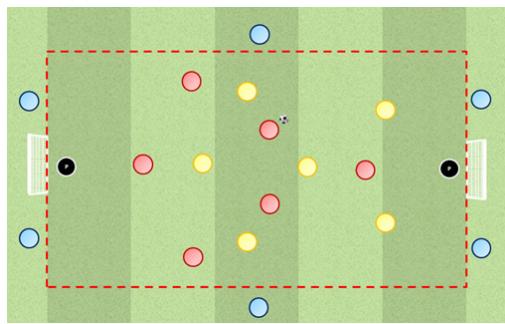


Figure 1 6vs6 with 2 goalkeepers and 6 external wildcard players.

Table 1 Organization methods and monitored load

	6vs6	7vs7
Ripetition number	6	6
Ripetition duration (min)	3	3
Recovery between repetition (min)	1	1
Field size (m x m)	60 x 35	60 x 35
Relative size per player (m ²)	0.163194444	0.145833333
Goalkeeper	SI	SI
Specific game rules	NO	NO
Staff encouragement	NO	NO

Table 2 Results

	6vs6 + 2 GK + external wildcard players	7vs7 + 2 GK + external wildcard players
Average speed (km/h)	4,6 ± 0,5 *	4,1 ± 0,3
Average power (W/kg)	5,6 ± 0,8 **	4,8 ± 0,6
Power events (n°)	33,2 ± 4,6 **	27,5 ± 5,9
Maximum speed (km/h)	23,1 ± 0,8	25,4 ± 2,1 ***
Maximum acceleration (m/s ²)	4,1 ± 0,3	3,9 ± 0,2
Maximum deceleration (m/s ²)	-4,4 ± 0,2 *	-4,1 ± 0,5
Acceleration (n°)	3,8 ± 2,4	3,5 ± 1,2
Deceleration (n°)	10,6 ± 4,3 *	7,1 ± 3,5

	6vs6 + 2 GK + external wildcard players	7vs7 + 2 GK + external wildcard players
Eccentric index	1,77 **	1,75
Walking distance (m)	817,3 ± 51,8	913,7 ± 52,3 *
Low intensity run distance(m)	735 ± 119,9 *	626,8 ± 105,2
Moderate intensity run distance (m)	225,3 ± 79,1	178,4 ± 79,9
High intensity run distance (m)	33,3 ± 22,1	43,1 ± 22,7
Sprint distance (m)	0 ± 0	13,3 ± 13,4 ***

Discussion of results

The study aimed to describe the different requests related to the external load imposed by the different small-sided games with the player’s movement and external wildcard players. The SSG executive conditions that involve the succession of movement players and wildcard players are a technical-tactical organizational modality widely used in football training.^{1,5,9,13,31} This is the first study that deals with the analysis of SSG larger formats with the use of external wildcard players: in literature there is only one research that describes what occurs with smaller formats and the use of external wildcard and internal ones on smaller sized fields.³⁰ To understand the nature of the requests of the two monitored exercises it is advisable to associate the analysis of some parameters, in this case the speed and power values with those of the running volumes performed at different intensities. The values of average speed, average power and the number of power events were statistically significant in 6vs6; the low intensity and moderate intensity travel volumes are higher in 6vs6, while the high intensity runs and the sprint number are clearly higher in 7vs7. These data suggest that the 6vs6 format imposes average running speeds up to medium intensity but does not require, if not to a very small extent, high speed and sprint performance: the data is in line with other studies that examined the differences between different formats of SSG.³² The 7vs7 format, in fact, consistently with what has been seen, allows to obtain peaks of maximum speed run speed statistically significant respect to the other format as well as high speed run and sprint number: this data is also in line with what has been described in other studies that they examined the differences between different formats of SSG.^{32,36} The presence of a greater number of players during this SSG format, with the same field size, seems to make the exercise more complex and seems to require a greater number of high and very high speed runs, to occupy more effectively and more quickly the small empty spaces. This trend was also observed by comparing formats with a reduced number of players, 3vs3 compared to 5vs5.³³ In 6vs6, however, changes in speed occur with intense accelerations and decelerations: the peak values, in fact, are consistent with the number of accelerations and decelerations recorded and in line with what was observed during the reduced format exercises.³⁶ In particular, the deceleration numbers appears statistically significant ($p < 0.05$) in 6vs6; it is in line with the eccentric index ($p < 0.01$) obtained in the same format.

Consequences for the training practice

The study allows understanding the different requests in relation to the external load determined by two soccer-specific exercises typology, often adopted in a similar way by the technical staff. Instead, it emerges that each of them imposes a different load on the player, both in terms of modality and intensity run. The results obtained allow

us to “*weight*” the soccer technical-tactical exercises and also allow us to foresee, perhaps with general contents, an integrative training to satisfy as many functional requests as those imposed by the model of football competition.^{1,32,42}

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Conflict of interest

No conflict of interest to be declared.

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