Chapter 4
Acute Effects of Different Formats of the Game

Abstract The number of players that participates in smaller versions of the game influences the training load. This variable has been well investigated in the specific literature about small-sided and conditioned games and for that reason, will be presented in first place. In this chapter will be analyzed the internal and external load imposed by different formats of the game and the specific effects in technical actions and tactical behavior of the players. The aim of this chapter is to summarize the most pertinent information about each format of the game (from one versus one to many versus many) and provide coaches the knowledge that can help them to choose the most adequate formats for their specific training goals.

Keywords Training load · Format of the game · Number of players · Small-sided and conditioned games · SSG · Drill-based exercises · Soccer · Football · Sports training

4.1 Introduction

The format of the game (number of players on each team) in a small-sided and conditioned game (SSCG) can be altered to regulate the intensity of the training mode (Hill-Haas et al. 2011). One of the main concerns that this condition implies during researches is to keep the same area per players (Clemente et al. 2014b). Increasing the format and keeping the same field will naturally reduce the area per player and another variable will emerge in the equation: the size of the field. Nevertheless, the aim of this chapter is only to focus on the physiological, physical, and technical/tactical changes that result from the change in the format.

   This chapter will summarize the studies conducted about this topic. The structure will try to summarize the scientific evidences per each format, thus providing to the reader the opportunity to easily identify the general effects of each format. Based on that we will have the opportunity to decide about the most adequate format for each type of period of week or of the training session.

4.2 1 Versus 1 Format

The 1 versus 1 format can be called by duel. This extreme SSCG leads to very high levels of effort and for that reason must be treated as a specific drill for anaerobic training (Clemente et al. 2014a; Little 2009). The research in this specific format is not so large as comparing with bigger formats. Nevertheless, the majority of the studies prescribed 1 to 3 min of exercise, with a ratio 1:1 of work-to-rest (Clemente et al. 2014a; Little 2009). Two to four bouts for a total volume of 16 min (maximum) is recommended for this kind of task (Clemente et al. 2014a) (Table 4.1).

The few studies that analyzed this format (see Table 4.2) revealed a blood lactate concentration of 9.4 (greater than lactate threshold) and intensities ∼86 % HRmax (Köklü et al. 2011; Owen et al. 2004; Williams and Owen 2007). No study analyzed the time–motion profile of players in this format. The unique technical analysis carried out on this format revealed a bigger tendency to do dribbles, turns, and headers in comparison with bigger formats (Owen et al. 2004).

Table 4.1 Acute physiological effects during 1 versus 1 format

Study	Participants	SF	Regimen	HR	BLa^{-1}
Owen et al. (2004)	13 (U17)	10 × 5	1 × 3/12 min rest	176 bpm	–
Owen et al. (2004)	13 (U17)	15 × 10	1 × 3/12 min rest	181 bpm	–
Owen et al. (2004)	13 (U17)	20 × 15	1 × 3/12 min rest	182 bpm	–
Williams and Owen (2007)	9 (U17)	20 × 15	–	183 bpm	–
Dellal et al. (2008)	10 (elite)	10 × 10	4 × 1 min, 30 s/1 min, 30 s rest	77.6 HRres	–
Köklü et al. (2011)	16 (U16)	6 × 18	6 × 1 min/2 min rest	168.6 bpm 86.1 % HRmax	9.4

SF Size of the field (m); *HR* Heart rate; *BLa^{-1}* Blood lactate concentration (mmol/L)

Table 4.2 Technical performance during 1 versus 1 format

Study	Participants	SF	Regimen	Dribble	Turn	Header
Owen et al. (2004)	13 (U17)	10 × 5 15 × 10 20 × 15	1 × 3/12 min rest	3 per player	4 per player	1 per player

4.3   2 Versus 2 Format

Similarly to duels, 2 versus 2 format is a highly demanding task. The studies that analyzed this drill (see Table 4.3) identified values between 3.4 and 8.1 of blood lactate concentrations, thus suggesting values in the lactate threshold (Aroso et al. 2004; Köklü et al. 2011). The intensity values vary between 80.1 and 93.3 % HRmax, thus confirming that glycolytic system highly participate during these games (Dellal et al. 2011b; Little and Williams 2007). Duration of the task may vary between 1 min and 30 s and the 3 min in 2–4 bouts with a work-to-rest ratio of 1:1 for a total volume of 16 min (Clemente et al. 2014a; Little 2009).

The time–motion analysis carried out in this format (see Table 4.4) revealed that players cover 100–144 m per min in the majority of time in walk or jogging mode (Hill-Haas et al. 2009; Dellal et al. 2011a, b). Only during ~ 3.5 % of the time can be observed sprints and very fast runs.

During 2 versus 2 format it was possible observe an accuracy between 62 and 66.4 % of the passes and a tendency to perform 12–13 duels per min, thus suggesting an interesting opportunity to develop the basic skills of soccer (Table 4.5).

4.4   3 Versus 3 Format

As possible to observe in Table 4.6, 3 versus 3 format keeps very high intensity (87–94 % HRmax) without a great blood lactate concentration (3–7.5 mmol/L). This format is one of the most studied in the field of SSCGs, maybe by their limited position between extreme SSCGs (1 vs. 1 or 2 vs. 2) and the small-sided games with greater number of players. In the majority of these studies the prescription was 3–6 min with 2–3 bouts and a work-to-rest ratio of 1:0.5 (Clemente et al. 2014a; Little 2009).

The studies that analyzed the time–motion profile during 3 versus 3 format (see Table 4.7) revealed that players cover 115–160 m per min (Dellal et al. 2011a, b; Aguiar et al. 2013). In the study conducted in elite players (Dellal et al. 2011a, b) it was found that 35 % of the distance covered is made in high intensity or sprint, thus a greater percentage than in 2 versus 2 format. This can be justified by the increase of opportunity to create lines of pass far away of the player with possession of the ball.

The studies (see Table 4.8) revealed that in 3 versus 3 format each player performs ~ 7 contacts in the ball per minute. Moreover, 5–12 passes are performed per each minute and there are ~ 9 duels per minute. There are fewer duels in 3 versus 3 that in comparison with 2 versus 2 format. For that reason, extreme SSCGs may be better to increase the individual participation and 3 versus 3 may be better to introduce some collective issues such as generate lines of pass or develop the tactical perception.

Table 4.3 Acute physiological effects during 2 versus 2 format

Study	Participants	SF	Regimen	HR	BLa^{-1}	RPE
Aroso et al. (2004)	14 (U16)	30 × 20	3 × 1 min, 30 s/1 min, 30 s rest	84.0 % HRmax	8.1	16.2 [0–20 scale]
Owen et al. (2004)	13 (U17)	15 × 10	1 × 3/12 min rest	172 bpm	–	–
Owen et al. (2004)	13 (U17)	20 × 15	1 × 3/12 min rest	179 bpm	–	–
Owen et al. (2004)	13 (U17)	25 × 20	1 × 3/12 min rest	180 bpm	–	–
Sampaio et al. (2007)[a]	8 (U15)	30 × 20	2 × 1 min, 30 s/1 min, 30 s rest	83.7 % HRmax	–	15.5 [0–20 scale]
Williams and Owen (2007)	9 (U17)	20 × 15	–	179 bpm	–	–
Williams and Owen (2007)	9 (U17)	25 × 20	–	180 bpm	–	–
Little and Williams (2007)	28 (elite)	30 × 20	4 × 2 min/2 min rest	88.8 % HRmax	–	16.2 [0–20 scale]
Dellal et al. (2008)	10 (elite)	20 × 20	6 × 2 min, 30 s/2 min, 30 s rest	80.1 % HRmax	–	–
Hill-Haas et al. (2009)	16 (U17)	28 × 21	24 min	89 % HRmax	6.7	13.1 [0–20 scale]
Köklü et al. (2011)	16 (U16)	12 × 24	6 × 2 min/2 min rest	172.3 bpm 88 % HRmax	8.0	–
Dellal et al. (2011a, b)[b]	20 (elite)	20 × 15	4 × 2 min/3 min rest	182 bpm 90 % HRmax	3.4	7.6 [0–10 scale]
Dellal et al. (2011a, b)	20 (elite) 20 (amateurs)	20 × 15	4 × 2 min/3 min rest	90.0 % HRmax (elite) 91.6 % HRmax (amateur)	3.5 (elite) 4.1 (amateurs)	7.7 [0–10 scale] (elite) 8.0 [0–10 scale] (amateurs)
Brandes et al. (2012)	17 (U15)	28 × 21	3 × 4 min	93.3 % HRmax	–	–
Aguiar et al. (2013)	10 (U18)	150 m² per player	3 × 6 min/1 min rest	87.46 % HRmax	–	–
Clemente et al. (2014b)[c]	10 (amateurs)	19 × 19	3 × 5 min/3 min rest	75.98 % HRres	–	–

SF Size of the field (m); HR Heart rate; BLa^{-1} Blood lactate concentration (mmol/L); RPE Rated of perceived exertion

[a] HR values in 2 versus 2 with verbal encouragement during task

[b] Values of free play

[c] 2 versus 2+2 floaters—values of task with one small goal

Table 4.4 Time–motion analysis during 2 versus 2 format

Study	Participants	SF	Regimen	TD	TD 0–6.9	TD 7.0–12.9	TD 13.0–17.9	TD > 18
Hill-Haas et al. (2009)	16 (U17)	28 × 21	24 min	2574	1176	933	411	44
Dellal et al. (2011a, b)[a]	20 (elite) 20 (amateurs)	20 × 15	4 × 2 min/3 min rest	1157.7 (elite) 1086.7 (amateurs)	–	–	245.5 (elite) 225.7 (amateurs)	177.6 (elite) 160.2 (amateurs)
Aguiar et al. (2013)	10 (U18)	150 m^2 per player	3 × 6 min/1 min rest	598.97	291.84	232.6	64.04	10.48
Clemente et al. (2014a)[b]	10 (amateurs)	19 × 19	3 × 5 min/3 min rest	240	–	–	–	–

TD Total distance (m); *TD* 0–6.9 Total distance at 0–6.9 km h^{-1}; *TD* 7.0–12.9 Total distance at 7.0–12.9 km h^{-1}; *TD* 13.0–17.9 Total distance at 13.0–17.9 km h^{-1}; *TD* > 18 Total distance at > 18 km h^{-1}

[a]Values of free play

[b]2 versus 2+2 floaters—values of task with one small goal

Table 4.5 Technical performance during 2 versus 2 format

Study	Participants	SF	Regimen	Indicator	Indicator	Indicator
Owen et al. (2004)	13 (U17)	15 × 10 20 × 15 25 × 20	1 × 3/12 min rest	11 passes per player	7 receives per player	3 dribbles per player
Dellal et al. (2011a, b)	20 (elite) 20 (amateurs)	20 × 15	4 × 2 min/3 min rest	49.9 possession per min (elite) 41.6 (amateurs	66.4 % successful passes (elite) 62.0 % (amateurs)	26.1 duels (elite) 25 (amateurs)
Clemente et al. (2014a)[a]	10 (amateurs)	19 × 19	3 × 5 min/3 min rest	17.50 volume of play	0.04 efficiency index	9.18 performance score

[a]2 versus 2+2 floaters—values of task with one small goal

Table 4.6 Acute physiological effects during 3 versus 3 format

Study	Participants	SF	Regimen	HR	BLa^{-1}	RPE
Aroso et al. (2004)	14 (U16)	30 × 20	3 × 4 min/1 min, 30 s rest	87 % HRmax	4.9	14.5 [0–20 scale]
Owen et al. (2004)	13 (U17)	15 × 20	1 × 3/12 min rest	167 bpm	–	–
Owen et al.(2004)	13 (U17)	20 × 25	1 × 3/12 min rest	167 bpm	–	–
Owen et al. (2004)	13 (U17)	25 × 30	1 × 3/12 min rest	173 bpm	–	–
Sampaio et al. (2007)[a]	8 (U15)	30 × 20	2 × 3 min/1 min, 30 s rest	162.2 bpm 80.8 % HRmax	–	15.8 [0–20 scale]
Williams and Owen (2007)	9 (U17)	20 × 15	–	164 bpm	–	–
Williams and Owen (2007)	9 (U17)	25 × 20	–	166 bpm	–	–
Williams and Owen (2007)	9 (U17)	30 × 25	–	171 bpm	–	–
Little and Williams (2007)	28 (elite)	43 × 25	4 × 3 min, 30 s/1 min, 30 s rest	91 % HRmax	–	15.5 [0–20 scale]
Rampinini et al. (2007)[b]	20 (Amateurs)	12 × 20	3 × 4 min/3 min rest	89.5 % HRmax	6.0	8.1 [0-10 scale]
Rampinini et al. (2007)[b]	20 (Amateurs)	15 × 25	3 × 4 min/3 min rest	90.5 % HRmax	6.3	8.4 [0-10 scale]
Rampinini et al. (2007)[b]	20 (Amateurs)	18 × 30	3 × 4 min/3 min rest	90.9 % HRmax	6.5	8.5 [0-10 scale]
Katis and Kellis (2009)	34 (U14)	15 × 25	10 × 4 min/3 min rest	87.6 % HRmax	–	–
Dellal et al. (2011a)[c]	20 (elite)	25 × 18	4 × 3 min/3 min rest	181 bpm 89.6 % HRmax	3.0	7.5 [0-10 scale]
Owen et al. (2011)	15 (elite)	30 × 25	3 × 5 min/4 min rest	90 % HRmax	–	–

(continued)

Table 4.6 (continued)

Study	Participants	SF	Regimen	HR	BLa^{-1}	RPE
Köklü et al. (2011)	16 (U16)	18 × 30	6 × 3 min/2 min rest	181.7 bpm 92.8 % HRmax	7.5	–
Da silva et al. (2011)	17 (U15)	30 × 30	3 × 4 min/3 min rest	89.8 % HRmax	–	–
Dellal et al. (2011b)[c]	20 (elite) 20 (amateurs)	25 × 18	4 × 3 min/3 min rest	89.6 % HRmax (elite) 89.5 % HRmax (amateurs)	3.1 (elite) 3.7 (amateurs)	7.5 [0–10 scale] (elite) 7.7 [0–10 scale] (amateurs)
Brandes et al. (2012)	17 (U15)	34 × 26	3 × 5 min	91.5 % HRmax	3.4	–
Aguiar et al. (2013)	10 (U18)	150 m^2 per player	3 × 6 min/1 min rest	89.56 % HRmax	–	–
Castellano et al. (2013)	14 (semi-professional)	43 × 30	3 × 3 min/5 min rest	93.8 % HRmax	–	–
Clemente et al. (2014a)[d]	10 (amateurs)	23 × 23	3 × 5 min/3 min rest	81.98 % HRres	–	–

SF Size of the field (m); *HR* Heart rate; *BLa*$^{-1}$ Blood lactate concentration (mmol/L); *RPE* Rated of perceived exertion
[a]HR values in 3 versus 3 with verbal encouragement during task
[b]HR values in 3 versus 3 with verbal encouragement during task
[c]Values of free play
[d]2 versus 2+2 floaters—values of task with one small goal

Table 4.7 Time–motion analysis during 3 versus 3 format

Study	Participants	SF	Regimen	TD	TD 0–6.9	TD 7.0–12.9	TD 13.0–17.9	TD > 18
Dellal et al. (2011a, b)[a]	20 (elite)	25 × 18	4 × 3 min/3 min rest	2013.9	–	–	422.4	315.6
Dellal et al. (2011a, b)[a]	20 (elite) 20 (amateurs)	25 × 18	4 × 3 min/3 min rest	2014.00 (elite) 1861 (amateurs)	–	–	422.5 (elite) 383.9 (amateurs)	315.16 (elite) 272.2 (amateurs)
Aguiar et al. (2013)	10 (U18)	150 m² per player	3 × 6 min/1 min rest	685.71	278.44	267.44	110.42	29.42
Castellano et al. (2013)	14 (semi-professional)	43 × 30	3 × 3 min/5 min rest	506.6	170.0	173.3	56.3	12.0
Clemente et al. (2014a)[b]	10 (amateurs)	23 × 23	3 × 5 min/3 min rest	240	–	–	–	–

TD Total distance (m); *TD* 0–6.9 Total distance at 0–6.9 km h⁻¹; *TD* 7.0–12.9 Total distance at 7.0–12.9 km h⁻¹; *TD* 13.0–17.9 Total distance at 13.0–17.9 km h⁻¹; *TD* > 18 Total distance at > 18 km h⁻¹
[a]Values of free play
[b]2 versus 2+2 floaters—values of task with one small goal

Table 4.8 Technical performance during 3 versus 3 format

Study	Participants	SF	Regimen	Indicator	Indicator	Indicator
Owen et al. (2004)[a]	13 (U17)	15 × 20 20 × 25 25 × 30	1 × 3/12 min rest	8 passes per player	5 receives per player	2 dribbles per player
Katis and Kellis (2009)	34 (U14)	15 × 25	10 × 4 min/3 min rest	48 short passes	7 long passes	8 dribbles
Dellal et al. (2011a, b)[a]	20 (elite)	25 × 18	4 × 3 min/3 min rest	26.8 number of duels	71 % successful passes	14.3 balls lost
Dellal et al. (2011a, b)[a]	20 (elite) 20 (amateurs)	25 × 18	4 × 3 min/3 min rest	26.8 duels (elite) 21.2 (amateurs)	71.7 % successful passes (elite) 70.0 % (amateurs)	41.7 possessions (elite) 37.4 (amateurs)
Owen et al. (2011)	15 (elite)	30 × 25	3 × 5 min/4 min rest	111 ball contacts per player	193 passes	185 receives
Da Silva et al. (2011)	17 (U15)	30 × 30	3 × 4 min/3 min rest	31 involvements with ball	19 passes	4 dribbles
Clemente et al. (2014a)[b]	10 (amateurs)	23 × 23	3 × 5 min/3 min rest	12.25 volume of play	0.30 efficiency index	6.42 performance score

[a]Values of free play
[b]2 versus 2+2 floaters—values of task with one small goal

4.5   4 Versus 4 Format

The 4 versus 4 format can be classified as a SSCG with aerobic and anaerobic characteristics. The values of intensity are between 70 and 90 % HRmax, nevertheless the majority of the studies are between 84 % and 89 % of HRmax (see Table 4.9). For that reason, this format can be appropriated to develop high-intensity aerobic training. The blood lactate concentrations are between 3 and 7 mmol/L, thus lightly above the lactate threshold. Duration of 4–6 min with 3–4 bouts and a work-to-rest ratio of 1:0.5 for a maximum volume of 30 min are the recommendations to prescribe this format during training sessions (Clemente et al. 2014a; Little 2009).

The majority of the studies that analyzed the time–motion profile during this format revealed that players cover ~115 m per min (see Table 4.10). The studies found that 12–19 % of the distance is covered in high-intensity running or in sprint, thus less than in 3 versus 3 format. Such evidence may justify the smaller acute effects in heart rate responses and blood lactate concentrations.

In Table 4.11 it can be found the studies that analyzed the technical performance during 4 versus 4 format. Studies revealed that ~13 passes per min are made

Table 4.9 Acute physiological effects during 4 versus 4 format

Study	Participants	SF	Regimen	HR	BLa^{-1}	RPE
Aroso et al. (2004)	14 (U16)	30 × 20	3 × 6 min/1 min, 30 s rest	70 % HRmax	2.6	13.3 [0–20 scale]
Owen et al. (2004)	13 (U17)	20 × 25	1 × 3/12 min rest	147 bpm	–	–
Owen et al. (2004)	13 (U17)	25 × 30	1 × 3/12 min rest	160 bpm	–	–
Owen et al. (2004)	13 (U17)	30 × 35	1 × 3/12 min rest	158 bpm	–	–
Williams and Owen (2007)	9 (U17)	25 × 20	–	152 bpm	–	–
Williams and Owen (2007)	9 (U17)	30 × 25	–	165 bpm	–	–
Little and Williams (2007)	28 (elite)	40 × 30	4 × 4 min/2 min rest	90.2 % HRmax	–	15.5 [0–20 scale]
Rampinini et al. (2007)[b]	20 (Amateurs)	16 × 24	3 × 4 min/3 min rest	88.7 % HRmax	5.3	7.6 [0–10 scale]
Rampinini et al. (2007)[a]	20 (Amateurs)	20 × 30	3 × 4 min/3 min rest	89.4 % HRmax	5.5	7.9 [0–10 scale]
Rampinini et al. (2007)[a]	20 (Amateurs)	24 × 36	3 × 4 min/3 min rest	89.7 % HRmax	6.0	8.1 [0–10 scale]

(continued)

Table 4.9 (continued)

Study	Participants	SF	Regimen	HR	BLa^{-1}	RPE
Jones and Drust (2007)	8 (elite)	30 × 25	10 min	175 bpm	–	–
Hill-Haas et al. (2009)	16 (U17)	400 × 30	24 min	85 % HRmax	4.7	12.2 [0-20 scale]
Da Silva et al. (2011)	17 (U15)	30 × 30	3 × 4 min/3 min rest	89.8 % HRmax	–	–
Köklü et al. (2011)	16 (U16)	24 × 36	6 × 4 min/2 min rest	179.3 bpm 91.5 % HRmax	7.2	–
Dellal et al. (2011a, b)[b]	20 (elite) 20 (amateurs)	30 × 20	4 × 4 min/3 min rest	84.7 % HRmax (elite) 85.1 % HRmax (amateurs)	2.8 (elite) 3.0 (amateurs)	7.3 [0–10 scale] (elite) 7.6 [0–10 scale] (amateurs)
Brandes et al. (2012)	17 (U15)	40 × 30	3 × 6 min	89.7 % HRmax	4.2	–
Aguiar et al. (2013)	10 (U18)	150 m^2 per player	3 × 6 min/1 min rest	85.91 % HRmax	–	–
Clemente et al. (2014a)[c]	10 (amateurs)	27 × 27	3 × 5 min/3 min rest	83.61 % HRres	–	–

SF Size of the field (m); *HR* Heart rate; *BLa^{-1}* Blood lactate concentration (mmol/L); *RPE* Rated of perceived exertion
[a]HR values in 4 versus 4 with verbal encouragement during task
[b]Values of free play
[c]2 versus 2+2 floaters—values of task with one small goal

during this format and the accuracy is greater than 73 %. Three to four individual ball contacts are performed per minute. Therefore, there is an increase of passes per minute in comparison with 3 versus 3 and a decrease in individual ball contacts.

4.6 5 Versus 5 Format

Based on the classification of Owen et al. (2014), 5 versus 5 format can be called by medium-sided game. The heart rate responses are between 85 and 93 % of HRmax in this format. Blood lactate concentration varies between 5 and 5.8 mmol/L. The internal load influenced by this format can be described as similar with 4 versus 4 format. For that reason, this can be used to high-intensity aerobic training. Repetitions of 4–6 min with 3–4 bouts and a work-to-rest ratio of 1:0.5 for a maximum volume of 30 min are recommended (Clemente et al. 2014a; Little 2009) (Table 4.12).

Table 4.10 Time–motion analysis during 4 versus 4 format

Study	Participants	SF	Regimen	TD	TD 0–6.9	TD 7.0–12.9	TD 13.0–17.9	TD > 18
Jones and Drust (2007)	8 (elite)	30 × 25	10 min	778	–	–	–	–
Hill-Haas et al. (2009)	16 (U17)	400 × 30	24 min	2650	1128	1041	436	65
Dellal et al. (2011a, b)[a]	20 (elite) 20 (amateurs)	30 × 20	4 × 4 min/3 min rest	2663.7 (elite) 2419.8 (amateurs)	–	–	482.7 (elite) 480.4 (amateurs)	381.8 (elite) 363.0 (amateurs)
Aguiar et al. (2013)	10 (U18)	150 m² per player	3 × 6 min/1 min rest	682.14	272.74	292.11	96.2	21.09
Owen et al. (2014)	10 (elite)	30 × 25	3 × 5 min/3 min rest	1709	534	963	200	9
Clemente et al. (2014a)[b]	10 (amateurs)	27 × 27	3 × 5 min/3 min rest	290	–	–	–	–

TD Total distance (m); *TD* 0–6.9 Total distance at 0–6.9 km h^{-1}; *TD* 7.0–12.9 Total distance at 7.0–12.9 km h^{-1}; *TD* 13.0–17.9 Total distance at 13.0–17.9 km h^{-1}; *TD* > 18 Total distance at > 18 km h^{-1}

[a]Values of free play

[b]2 versus 2+2 floaters—values of task with one small goal

Table 4.11 Technical performance during 4 versus 4 format

Study	Participants	SF	Regimen	Indicator	Indicator	Indicator	Indicator
Owen et al. (2004)	13 (U17)	20 × 25 25 × 30 30 × 35	1 × 3/12 min rest	7 passes per player	4 receives per player	1 dribble per player	
Jones and Drust (2007)	8 (elite)	30 × 25	10 min	36 individual ball contacts	–	–	
Da Silva et al. (2011)	17 (U15)	30 × 30	3 × 4 min/3 min rest	32 involvements with the ball	20 passes	2 dribbles	
Dellal et al. (2011a, b)[a]	20 (elite) 20 (amateurs)	30 × 20	4 × 4 min/3 min rest	25.1 duels (elite) 21.8 (amateurs)	73.5 % successful passes (elite) 70.7 % (amateurs)	31.5 possesssions (elite) 35.6 (amateurs)	
Owen et al. (2014)	10 (elite)	30 × 25	3 × 5 min/3 min rest	199 passes	166.5 receives	31 dribbles	
Clemente et al. (2014a)[b]	10 (amateurs)	27 × 27	3 × 5 min/3 min rest	7.70 volume of play	0.09 efficiency index	4.76 performance score	

[a]Values of free play

Table 4.12 Acute physiological effects during 5 versus 5 format

Study	Participants	SF	Regimen	HR	BLa^{-1}	RPE
Owen et al. (2004)	13 (U17)	25 × 30	1 × 3/12 min rest	154 bpm	–	–
Owen et al. (2004)	13 (U17)	30 × 35	1 × 3/12 min rest	163 bpm	–	–
Owen et al. (2004)	13 (U17)	35 × 40	1 × 3/12 min rest	164 bpm	–	–
Williams and Owen (2007)	9 (U17)	30 × 25	–	152 bpm	–	–
Rampinini et al. (2007)[a]	20 (Amateurs)	28 × 20	3 × 4 min/3 min rest	87.8 % HRmax	5.2	7.2 [0–10 scale]
Rampinini et al. (2007)[a]	20 (Amateurs)	35 × 25	3 × 4 min/3 min rest	88.8 % HRmax	5.0	7.6 [0–10 scale]
Rampinini et al. (2007)[a]	20 (Amateurs)	42 × 30	3 × 4 min/3 min rest	88.8 % HRmax	5.8	7.5 [0–10 scale]
Little and Williams (2007)	28 (elite)	45 × 30	4 × 6 min/1 min, 30 s rest	88.7 % HRmax	–	14.4 [0–20 scale]
Kelly and Drust (2009)	8 (elite)	30 × 20	4 × 4 min/2 min rest	91.0 % HRmax	–	–
Kelly and Drust (2009)	8 (elite)	40 × 30	4 × 4 min/2 min rest	90.0 % HRmax	–	–
Kelly and Drust (2009)	8 (elite)	50 × 40	4 × 4 min/2 min rest	89.0 % HRmax	–	–
Da Silva et al. (2011)	17 (U15)	30 × 30	3 × 4 min/3 min rest	86.9 % HRmax	–	–
Castellano et al. (2013)	14 (semi-professional)	55 × 38	3 × 5 min/5 min rest	92.7 % HRmax	–	–
Aguiar et al. (2013)	10 (U18)	150 m^2 per player	3 × 6 min/1 min rest	84.56 % HRmax	–	–

SF Size of the field (m); *HR* Heart rate; BLa^{-1} Blood lactate concentration (mmol/L); *RPE* Rated of perceived exertion
[a]HR values in 5 versus 5 with verbal encouragement during task

   The time–motion analysis carried out during 5 versus 5 format revealed that 100–110 m per min are covered per players (see Table 4.13). The high-intensity running or sprint represents 12–18 % of the distance covered. These values are very

Table 4.13 Time–motion analysis during 5 versus 5 format

Study	Participants	SF	Regimen	TD	TD 0–6.9	TD 7.0–12.9	TD 13.0–17.9	TD > 18
Castellano et al. (2013)	14 (semi-professional)	55 × 38	3 × 5 min/5 min rest	492.8	173	167	65	24
Aguiar et al. (2013)	10 (U18)	150 m² per player	3 × 6 min/1 min rest	659.98	285.30	260.19	92.49	21.99
Owen et al. (2014)	10 (elite)	46 × 40	3 × 5 min/3 min rest	1552	650	711	185	6

TD Total distance (m); *TD* 0–6.9 Total distance at 0–6.9 km h^{-1}; *TD* 7.0–12.9 Total distance at 7.0–12.9 km h^{-1}; *TD* 13.0–17.9 Total distance at 13.0–17.9 km h^{-1}; *TD* > 18 Total distance at > 18 km h^{-1}

Table 4.14 Technical performance during 5 versus 5 format

Study	Participants	SF	Regimen	Indicator	Indicator	Indicator
Owen et al. (2004)	13 (U17)	25 × 30 30 × 35 35 × 40	1 × 3/12 min rest	6 passes per player	4 receives per player	1 dribble per player
Kelly and Drust (2009)	8 (elite)	30 × 20 40 × 30 50 × 40	4 × 4 min/2 min rest	21 passes	42.25 receives	15 dribbles
Owen et al. (2014)	10 (elite)	30 × 25	3 × 5 min/3 min rest	170.5 passes	129 receives	23 dribbles

similar with the format 4 versus 4 but smaller than the 35 % verified during 3 versus 3 format.

Technical analysis carried out in 5 versus 5 format (Table 4.14) revealed that 5–11 passes per min are made during this format and 2–4 dribbles are made per minute, thus being smaller values than in 4 versus 4 format. The increase of complexity may turn the drill more tactical and with more time required to make the decision, thus being one reason for the small number of passes made.

4.7   6 Versus 6–10 Versus 10 Formats

This section compiled the analyses carried out in medium to large-sided games (see Table 4.15). These games are not so common and for that reason this structure makes easier to compare all of them. Intensities between 81 and 94 % of HRmax and blood lactate concentrations of 4.5–5.0 mmol/L were found during these games. The prescription may vary for each kind of format; nevertheless these larger formats may fit to develop long intensive endurance. For that reason, 3–4 bouts of 4–8 min with 1 min and 30 s–3 min of rest may be adequate to prescribe these games (Clemente et al. 2014a; Little 2009).

The study carried out by Owen et al. (2014) revealed that larger formats increases the distance covered by the players (see Table 4.16). This evidence was also found in the smaller formats. The intensity of running also increases in larger formats, maybe to perform longer distances in sprint to create longer lines of pass and exploit the length of the field.

Table 4.17 shows the technical performance during different large-sided games. A decrease in the number of passes, receives, and dribbles can be seen with the increase in the number of players per format. Moreover, it is hypothesized that the increase of players per format also decreases the number of individual skills performed by each player. For that reason, large-sided games are better to improve collective organization and not recommended for technical development or individual participation.

Table 4.15 Acute physiological effects during 6 versus 6 to 10 versus 10 formats

Study	Format	SF	Regimen	HR	BLa^{-1}	RPE
Rampinini et al. (2007)[a]	6 versus 6	24 × 32	3 × 4 min/3 min rest	86.4 % HRmax	4.5	6.8 [0–10 scale]
Rampinini et al. (2007)[a]	6 versus 6	30 × 40	3 × 4 min/3 min rest	87.0 % HRmax	5.0	7.3 [0–10 scale]
Rampinini et al. (2007)[a]	6 versus 6	36 × 48	3 × 4 min/3 min rest	86.9 % HRmax	4.8	7.2 [0–10 scale]
Little and Williams (2007)	6 versus 6	50 × 30	3 × 8 min/1 min, 30 s rest	87.6 % HRmax	–	13.7 [0–20 scale]
Katis and Kellis (2009)	6 versus 6	30 × 40	10 × 4 min/3 min rest	82.8 % HRmax	–	–
Castellano et al. (2013)	7 versus 7	64 × 46	3 × 7 min/3 min rest	94.3 % HRmax	–	–
Jones and Drust (2007)	8 versus 8	60 × 40	10 min	168 bpm	–	–
Little and Williams (2007)	8 versus 8	70 × 45	4 × 8 min/1 min, 30 s rest	88.4 % HRmax	–	14.0 [0–20 scale]
Owen et al. (2011)	9 versus 9	60 × 50	3 × 5 min/4 min rest	81 % HRmax	–	–

SF Size of the field (m); *HR* Heart rate; *BLa*$^{-1}$ Blood lactate concentration (mmol/L); *RPE* Rated of perceived exertion
[a]HR values in 6 versus 6 with verbal encouragement during task

4.8   Summarizing the Differences

This chapter aimed to show the acute responses that the formats of the game induce in soccer players. Greater intensities were generally found in smaller formats (extreme SSCGs—1 vs. 1–3 vs. 3). These games are recommended for anaerobic workout and for that reason duration of 1–3 min is recommended with work-to-rest ratio of 1:1. The intensities are progressively decreasing from 4 versus 4–6 versus 6 the intensities, thus being better formats to short intensive aerobic training, with short periods of time (3–5 min) and a work-to-rest ratio of 1:0.5. Finally, large-sided games (7 vs. 7–10 vs. 10) are recommended for long intensive aerobic training, thus longer periods (4–8 min) can be recommended with 1–3 min of rest between bouts. The following Table 4.18 represents the summary of the differences between formats for the studies that compared different formats. More symbols of (+) indicate greater intensities in heart rate responses.

The time–motion analysis carried out by different studies and showed during this chapter revealed that smaller formats lead to more intensity of running (high-intensity running and sprinting) but with fewer distance covered by players. For that reason, smaller formats are better to increase the intensity and also to workout acceleration and deceleration, thus being also possible to develop power of

Table 4.16 Time–motion analysis during 6 versus 6–10 versus 10 formats

Study	Format	SF	Regimen	TD	TD 0–6.9	TD 7.0–12.9	TD 13.0–17.9	TD > 18
Owen et al. (2014)	6 versus 6	50 × 44	3 × 5 min/3 min rest	1570	620	753	190	8
Owen et al. (2014)	7 versus 7	54 × 45	3 × 5 min/3 min rest	2054	738	1012	281	23
Castellano et al. (2013)	7 versus 7	64 × 46	3 × 7 min/3 min rest	499.1	165	208	89	37
Jones and Drust (2007)	8 versus 8	60 × 40	10 min	693	–	–	–	–
Owen et al. (2014)	8 versus 8	60 × 50	3 × 5 min/3 min rest	1606	618	805	168	16
Owen et al. (2014)	9 versus 9	70 × 56	3 × 5 min/3 min rest	1847	562	909	341	35
Owen et al. (2014)	10 versus 10	80 × 70	3 × 5 min/3 min rest	1750	599	836	254	61

TD Total distance (m); *TD* 0−6.9 Total distance at 0−6.9 km h^{-1}; *TD* 7.0−12.9 Total distance at 7.0−12.9 km h^{-1}; *TD* 13.0−17.9 Total distance at 13.0−17.9 km h^{-1}; *TD* > 18 Total distance at > 18 km h^{-1}

Table 4.17 Technical performance during 6 versus 6–10 versus 10 formats

Study	Participants	SF	Regimen	Indicator	Indicator	Indicator
Katis and Kellis (2009)	6 versus 6	30 × 40	10 × 4 min/3 min rest	35 short passes	11 long passes	5 dribbles
Owen et al. (2014)	6 versus 6	50 × 44	3 × 5 min/3 min rest	170 passes	138.5 receives	22.5 dribbles
Owen et al. (2014)	7 versus 7	54 × 45	3 × 5 min/3 min rest	146 passes	114.5 receives	10.5 dribbles
Owen et al. (2014)	8 versus 8	60 × 50	3 × 5 min/3 min rest	126.5 passes	98.5 receives	10.0 dribbles
Jones and Drust (2007)	8 versus 8	60 × 40	10 min	Individual 13 ball contacts	–	–
Owen et al. (2011)	9 versus 9	60 × 50	3 × 5 min/4 min rest	283 passes	267 receives	11 dribbles
Owen et al. (2014)	9 versus 9	70 × 56	3 × 5 min/3 min rest	115.5 passes	92.5 receives	13.0 dribbles
Owen et al. (2014)	10 versus 10	80 × 70	3 × 5 min/3 min rest	122.5 passes	95.5 receives	18.0 dribbles

Table 4.18 Summary table of the heart rate responses in studies that compare different formats

	1 versus 1	2 versus 2	3 versus 3	4 versus 4	5 versus 5	6 versus 6	7 versus 7	8 versus 8	9 versus 9	10 versus 10
Aroso et al. (2004)		++	+++	+						
Owen et al. (2004)	+++++	+++	++++	+	++					
Little and Williams (2007)		++	++++	+++	++	+		+		
Rampinini et al. (2007)			++++	+++	++	+				
Williams and Owen (2007)	+++++	++++	+++	++	+					
Sampaio et al. (2007)		++	+							
Katis and Kellis (2009)			++			+				
Hill-Haas et al. (2009)		+++	++	+						
Owen et al. (2011)			++						+	
Dellal et al. (2011a, b)		+++	++	+						
Köklü et al. (2011)		+	+++	++						
Da Silva et al. (2011)			++	++	+					
Brandes et al. (2012)		+++	++	+						
Castellano et al. (2013)			++		+		+++			
Aguiar et al. (2013)		+++	++++	++	+					
Clemente et al. (2014a)		++	+	+++						

Legend More symbols of (+) identify the greatest HR responses

lowers limbs during these tasks. On the other hand, larger formats are better to run longer distances and also to keep speed after a short acceleration.

In the case of technical analysis, studies suggest that smaller formats increase the individual actions per player. Moreover, smaller formats also increase the duels and the dribble, thus being recommended to develop both the skills. On other hand, larger formats are better to develop pass and large-sided games are also recommended to increase the longer passes that can be useful to adequate to some tactical principles of coaches. Nevertheless, in novices or youth players, smaller formats can be better to increase the individual participation. On the other hand, larger formats can be more adequate to develop the tactical behavior and the decision-making.

About the tactical topic, a study that used a 5 versus 5 format introduce two tactical metrics: (i) centroid; and (ii) surface area (Frencken et al. 2011). The centroid can be understood as the geometric mean point of all positions of a team. The surface area can be described as the area covered by a polygon constituted by all players. In 10 of 19 goals analyzed, the centroid of the attacking team overtakes the centroid of the defending team, thus unbalanced defenses can justify the majority of the goals scored during SSCGs (Frencken et al. 2011). Moreover, it was also found a synchronization tendency between centroids of teams. Following the use of centroid metric in SSCGs, a study compared 2 versus 2, 3 versus 3, 4 versus 4, and 5 versus 5 formats (Aguiar et al. 2015). In this study, it was found that the distance between centroids presented a small decrease from 2 versus 2–4 versus 4 format and a moderate to nearly perfect increase to 5 versus 5 format (Aguiar et al. 2015). The authors suggested that the absolute distance from the players to both their own team and the opponents' team centroid increased from 2 versus 2 to 5 versus 5 formats, the regularity has also increased across the formats, thus to increase the players' positional regularity it is more recommended larger formats (Aguiar et al. 2015).

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