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Floaters as coach's joker? Effects of the floaters positioning in 3vs3 small-sided games in futsal.

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ABSTRACT
The aim of this study was to analyse the effects of floater positioning within futsal Gk+3vs3+Gk SSGs on youth players' tactical and physical performance. An independent measure approach under four experimental conditions was carried out: Floaters Off (FO), Goal Line Floaters (GLF), Lateral Floaters own court sidelines (LFocsl) and Lateral Floaters full court sidelines (LFfcsl). Thirty male futsal players (U19 age category) participated in the study. Players' activity was assessed using WIMU PRO^{TM} and heart rate (HR) was recorded by HR monitors during the SSGs. Results showed significant differences in the physical variables ($\rho \leq 0.05$), not finding such differences in the tactical variables analysed. However, significant differences were observed in relation to the spatial occupation areas. GLF is related to higher distance and speed variables, being the most demanding SSG; in LFocsl, lower HR values were obtained, and FO is linked to the acceleration and deceleration variables, being an indicator of futsal performance. These findings should be considered for the design of futsal training tasks, according to the context (team, players . . .) and time of the week and the season, since they allow the development of the variables described by optimising training time with the ball.

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Team sports; task constraints; physical performance; tactical behaviour; occupation areas

1. Introduction

In team sports, such as futsal, performance should be viewed as a continuous process of co-adaptation (Araujo & Davids, 2016), in which players establish spatial–temporal interactions with the teammates, the opponents and the surrounding environment leading to the emergence of opportunities for action (Coutinho et al., 2018; Travassos, Araujo et al., 2012; Travassos, Duarte et al., 2012) and functional movement behaviours (Ric et al., 2016). Consequently, performance is based on how each individual exploits the environment information to support actions (Seifert et al., 2013; Travassos, Araujo et al.,

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2012). Accordingly, successful performances have been linked to the interpersonal relations developed by teams in order to achieve goal-directed behaviours (Araujo & Davids, 2016; Duarte et al., 2013; Gonçalves et al., 2017; Passos et al., 2016; Travassos, Araujo et al., 2012).

In line with that, the tactical complexity and the physical requirement that the players are subjected to in futsal assumes a fundamental issue for the design of training tasks due to the need to design representative tasks that allow to improve the individual and collective performance of the teams. Small-sided games (SSGs) have become a widely recognised training resource to develop the players' behaviour (Sampaio et al., 2014; Travassos, Gonçalves et al., 2014) and skill acquisition (Coutinho et al., 2018; Davids et al., 2013; Sgrò et al., 2018) since they allow representativeness of the futsal practice (Práxedes et al., 2019). Accordingly, the design of the SSGs is based on the manipulation of task constraints to induce different training responses according to the learning aim (Davids et al., 2013; Sampaio et al., 2014; Travassos, Araujo et al., 2012; Travassos, Gonçalves et al., 2014).

For this reason, previous studies attempted to provide a broader comprehension of the impact of altering SSGs characteristics (task constraints), such as the number of players per team (Clemente et al., 2014; Práxedes et al., 2018), the court size (Coutinho et al., 2018), number of targets (Travassos et al., 2018) and the presence of floaters (*jokers* in other studies) (Castellano et al., 2016; Clemente et al., 2016; Clemente, Wong, et al., 2015; Clemente, Martins et al., 2015; Hill-Haas et al., 2010; Padilha et al., 2017) on players' physical, tactical and technical responses.

For example, the manipulation of the SSGs with the integration of floaters promotes numerical superiority for a given team during SSGs (Sarmento et al., 2018), and consequently stimulates the emergence of new patterns of play related with the numerical or spatial advantage/disadvantage of attacking or defending team (Gonçalves et al., 2016; Vilar et al., 2014). Specifically, in futsal, Travassos (2020) highlighted that the use of floaters allows defenders to be more focused in the information that sustains their defensive behaviour and promoting a space occupation in line with a zonal defence, to avoid the creation of penetrative passing lines and shoots at goal. Also, the inclusion of a floater and the promotion of numerical advantage could decrease (Sampaio et al., 2014) or maintain (Praça et al., 2020) the physical demands of players compared to SSGs with numerical balance according to the position of the floater on the SSG.

Additionally, the presence of floaters seems to influence players' spatial occupation (Ric et al., 2016; Travassos, Gonçalves et al., 2014). Padilha et al. (2017) revealed that the use of floaters on the sidelines encourages players to keep ball possession during offensive organisation where they made more effective use of playing space (width and length) in the opponent's half, as well as promote the team's defensive stability by decreasing the spaces between teammates during the defensive organisation. Also, a reduction in physical demands was observed with the use of floaters on the sidelines in comparison with a numerical-balanced situation (Praça et al., 2015).

Ric et al. (2015) suggested that the use of on-court floaters increased players' tactical exploratory efficiency due to the distribution in breadth on the court. Moreover, on-court floaters might have afforded more opportunities for passing the ball, allowing the team to maintain ball possession (Castellano et al., 2016; Vilar et al., 2014). Praça et al. (2020) showed that players adjusted their individuals and collective tactical actions (higher support, defensive coverage, and width/length relationship), without differences in physical demands or physiological response, with the presence of two floaters on the court. In opposition, Hill–Haas (2010) points out that the inclusion of on-court floaters in SSGs (i.e. 4vs3) encourages the maintenance of HR, an increase in the values associated with RPE, total distance and distance covered at high intensity, as well as a decrease in the number of accelerations and decelerations in relation to situations of numerical equality (i.e. 3vs3).

These evidence highlight that different tactical and physical responses emerged as a consequence of the manipulation of the task constraints. In this sense, changing information during the training tasks, like adding or removing floaters, or even changing the position of floaters on the field promotes different tactical and physical behaviours of players and teams (Coutinho et al., 2018). In fact, the number of possibilities of manipulations of the floaters' positions on the SSGs increased with the possibility that it gives to coaches to highlights the exploration of different individual and collective tactical behaviours for attacking and defending teams. Travassos (2020) pointed that the use of floaters mainly enhances information related to the spatial occupation of attackers in the relation with defenders and opposing goal for creating/avoiding passing lines to progress on the field. However, as observed in previous studies, the use of on-court floaters or sideline floaters can promote changes on tactical and physical behaviours of players at individual and team level. Also, more than on-court or sideline floaters, coaches usually use defensive or attacker sideline floaters or even goal-line floaters. Thus, it is important that coaches understand the effects of such manipulations to design the appropriate learning environments that help the players to develop more adaptative tactical and physical behaviours according to changes in-game environment (Davids et al., 2013), specifically in futsal. This perspective justifies the interest of researchers and practitioners in this topic and the growing number of studies in the past few years (Gonçalves et al., 2017; Sarmento et al., 2018; Travassos, Gonçalves et al., 2014).

Summarising, there is contradictory information regarding the physical and tactical effect of the use of floaters on SSGs according to its position on the field. Also, until this moment there is no systematic study that evaluated the effects of the use of floaters in different locations out of the court. Taking into account that the use of floaters and its locations seems to induce different tactical and physical responses, further research is needed to better understand how these floaters regulate players' behaviour. Therefore, the aim of this study was to analyse the effects of floater positioning within futsal SSGs on youth players' tactical and physical performance.

2. Material and methods

2.1. Participants

The participants were 30 male futsal players from the under-19 (U19) category (age, M = 17.714 and SD = 0.713) of teams from four Spanish clubs. All the participants had an average skill level of sport expertise and participate in the first regional league. All teams had the same amount of training. Players perform two training sessions (60 min) per week with an official match played during the weekend.

The research project was fully approved by the Ethics Research Committee of a Spanish University. The participants and their parents were informed of the study and an informed written consent was obtained from the parents/guardians. Participants were treated in agreement with the ethical guidelines of the American Psychological Association with respect to participant assent, parent/guardian consent, confidentiality and anonymity.

2.2. Design and procedure

The study designed consisted of an independent measure approach under four experimental conditions in which were manipulated the floater positioning. The design was conducted in four testing sessions. Each testing day consisted of one of the four experimental conditions randomly selected. In this regard, the presence of floaters (and its positioning) was manipulated as key task constraints: a) "Floaters Off" (FO) (Gk + 3 vs. 3 + Gk); and "Floaters Lines" (Gk + 3 vs. 3 + Gk + 2 Floaters; one per team): b) "Goal Line Floaters" (GLF), c) "Lateral Floaters (own court sideline)" (LFocsl) and d) "Lateral Floater (full court sideline)" (LFfcsl) (see Figure 1).

Thirty players divided into five groups (G1, G2, G3, G4 and G5) of six players per group (without floaters and goalkeepers). Four different SSGs were developed on a court of 30 m long by 15 m wide. These measures try to respect the player–space ratio used by futsal players according to the maximum length and width dimensions (40 m x 20 m) of the competition format (for each player of a team, 10 m large and 5 m regular, without goalkeepers). The court was divided into 12 spatial occupation areas, resulting of the division in three hallways (hallway = vertical division of the court) and four zones (zone = horizontal divisions of the court) (see Figure 2).

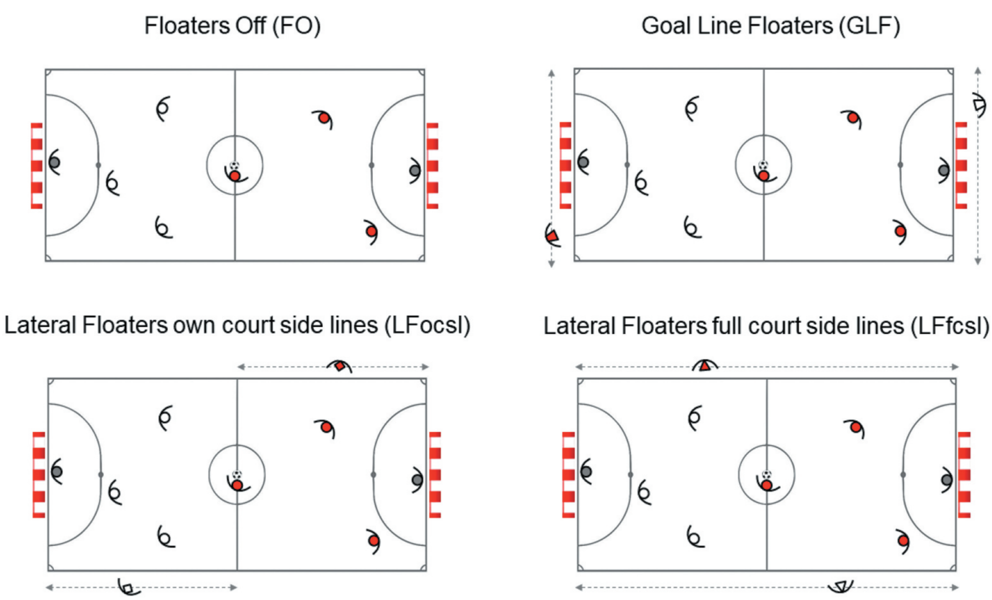


Figure 1. Four different SSGs in 30 × 15 delimited area.

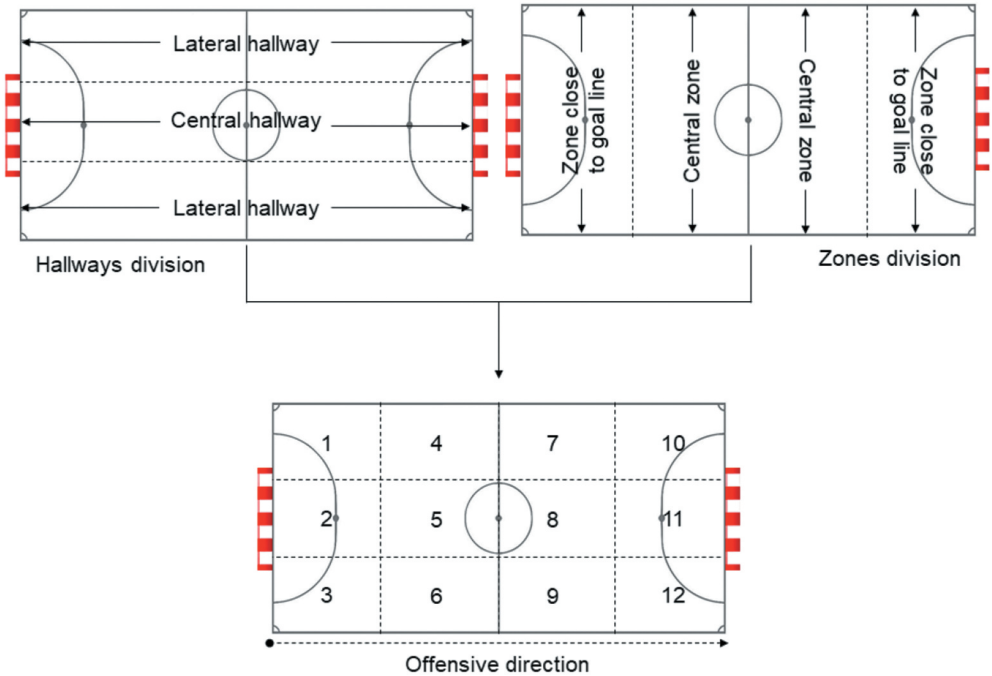


Figure 2. Court division in hallways and zones.

All participants played once to each situation but in a different order. Test was developed in 4 days (90´/day): warm-up (10´) +5 series of 11´: 3′-1′-3′-1′-3′ (3´ period = playing; 1´ period = rest) + periods of change GPS. During the rest intervals between bouts, players could drink water.

As for rules, floaters played with two touches, and their actions were limited to the space between two marks, parallel to each line (side or goal line) and could not to score a goal. In addition, goalkeepers could not get out of the finish line (see Figure 1). A throw-in was granted after the ball crosses the lines delimited by floaters' area. During the test, players were asked not to go inside floaters' area. The measures of goalkeepers and floaters were not assessed. Coaches and experimenters did not provide any verbal feedback during the SSG. Extra balls were placed around the court to allow a quick restart of the game in case the ball went out of bounds.

2.3. Data collection

From positional data, external and internal workload variables were considered (see Table 1). Also, tactical variables were identified (see Table 2), and the heat maps of spatial occupation through the field zones registered for comparison of field occupation according to the game scenarios. For comparison purposes, the direction of the attack of both teams was considered the same. That is, the positional data of one team in each game condition suffered a rotation in the field to overlap the position of player displacements. Specifically, external load variables were extracted based on the three main categories identified (Ribeiro et al., 2020): (a) kinematics and (b) mechanical.

Table 1. Physical dependent variables.

Load	Type	Variable	Sub-Variable	Unit	Description
External load	Kinematics	Relative distance covered	Total	m/min	Total distance covered inm per min
			Walking	(0–6 km/h) m/min	Total distance covered between 0–6 km/h/min
			Jogging	(6.1–15.4 km/h) m/min	Total distance covered between 6.1–15.4 km/h/min
			Running	(15.4–18.2 km/h) m/min	Total distance covered between 15.4–18.2 km/h/min
			Sprinting	(>18.3 km/h) m/min	Total distance covered between >18.3 km/h/min
	Mechanical	Accelerations	Low	ACC (0–3 m/s^2) n/min	Total positive speed changes between 0–3 m/s^2 per min
			High	ACC (>3 m/s^2) n/min	Total positive speed changes between 3–10 m/s^2 per min
		Decelerations	Low	DEC (0–3 m/s^2) n/min	Total negative speed changes between 0–3 m/s^2 per min
			High	DEC (>3 m/s^2) n/min	Total negative speed changes between 3–10 m/s^2 per min
		Speed	Maximal	Km/h	Maximal speed
			Average	Km/h	Average maximal speed
Internal load		Heart rate (BPM)	Total	HR_{MAX}	Total beats per min
		Avg HR (BPM)	Average	HR_{AVG}	Total average beats per min

Table 2. Tactical dependent variables.

Variable	Sub-Variable	Unit	Description
Distance between dyads	Between players	m	Distance between two players of one team
Distance between centroids	Between teams	m	Distance between teams' centroids
Surface area	Area of play	m^2	Area formed by all the players of both teams
Width	Between players of one team	m	Distance between player on the x axis
Length	Between players of one team	m	Distance between player on the y axis

Players' activity was assessed using IMUs with ultra-wideband (UWB) tracking system technology from WIMU PRO™ (Realtrack Systems, Almeria, Spain). The sampling frequency of WIMUs for the positioning system was 18 Hz. As previous studies, the devices were turned on about 10 to 15 min before the warm-up and placed on players with a specific custom neoprene vest located on the middle line between the scapulae at C7 level (Ribeiro et al., 2020). The system has six UWB antennas, placed outside the court and operates using triangulation between the antennas and the units to derive the X and Y coordinates of each unit. Data from SSGs, with the exclusion of rest and changing time were analysed using SPRO Software (Realtrack Systems SL, Almeria, Spain). WIMU inertial devices have been proven to be a valid and reliable system (Bastida-Castillo et al., 2019). Heart rate (HR), as internal load, was recorded at 1 Hz by HR monitors (Polar® FS1, Kempele, Finland) compatible with the GPS interface during the SSG. HR data from the recovery periods were excluded from analysis (Praça et al., 2020).

2.4. Statistical analysis

To characterise the variables, a Shapiro–Wilk test was used to assess the normal distribution of data. Some of the external and internal workload variables and heat maps of spatial occupation through the field zones considered presented non-normal distribution while tactical variables presented normal distribution. The non-parametric Repeated Measure ANOVA (Friedman) was used to compare the external and internal workload variables and heat maps spatial occupations according to the game scenarios. Pairwise comparisons were assessed based on the Durbin–Conover test. The one-way ANOVA was used to compare the tactical variables according to the game scenarios. Statistical significance was set at $p \leq .05$ and calculations were completed using the Jamovi Project (Computer Software Version 1.2, 2020).

3. Results

Friedman test and pairwise comparisons between the four SSGs are presented in Table 3. Friedman test revealed significant differences between the different SSGs in almost variables. Pairwise comparisons were then conducted for the four SSGs for each of the dependent variables.

Regarding the total and sprinting distance, results revealed significant differences between FO vs GLF, between GLF vs LFocsl and between GLF vs LFfcsl, with higher values for the GLF SSGs. These differences can also be found in the variable walking, were results revealed significant differences in favour of FO > GLF; GLF > LFocsl, and LFfcsl > GLF. For the jogging, results showed significant differences between FO vs GLF and between GLF vs LFocsl, again with higher values for the GLF SSGs. And finally, for the running, results showed significant differences between FO vs LFocsl, obtained higher values in FO; between GLF vs LFocsl, obtained higher values in GLF;, and between LFocsl vs LFfcsl, in favour of LFfcsl which obtained significantly higher values.

Regarding accelerations and decelerations, results revealed significant differences between FO vs GLF and between FO vs LFfcsl, with higher values for the FO SSGs for low accelerations and decelerations.

Regarding the maximal speed, results revealed significant differences between FO vs LFfcsl, in favour of FO; and between GLF vs LFocsl and GLF vs LFfcsl, with higher values in GLF for both situations. For average speed, results revealed significant differences between FO vs GLF, between GLF vs LFocsl and between GLF vs LFfcsl, with higher values in GLF for all situations.

Regarding the Max HR (BPM) and Avg HR (BPM), results revealed significant differences between FO vs LFocsl, between GLF vs LFocsl and between LFocsl vs LFfcsl, with lower values for the LFocsl SSGs.

With respect to the tactical variables, no significant differences were found for any of the variables (see Table 4). However, despite not finding significant differences in the analysed tactical variables, significant differences were observed in relation to the spatial occupation areas (see Table 5). Friedman test and pairwise comparisons between the four SSGs are presented in Table 5. Friedman test revealed significant differences between the different SSGs in some spatial occupation areas. Pairwise comparisons were then conducted for the four SSGs for each of the spatial occupation areas.

Regarding "5" area, results revealed significant differences between FO vs LFocsl and between GLF vs LFocsl, with higher values for the LFocsl SSGs. Regarding "8" area, results revealed significant differences between FO vs LFocsl and between LFfcsl vs LFocsl, with lower values for the LFocsl SSGs.

Table 3. Descriptive and inferential analysis for considered external and internal workload variables according to the different game formats.

Load	Type	Variable	Sub-variable	Unit	FO median	FO min	FO max	FO IQR	GLF median	GLF min	GLF max	GLF IQR	LFocsl median	LFocsl min	LFocsl max	LFocsl IQR	LFfcsl median	LFfcsl min	LFfcsl max	LFfcsl IQR	χ2	p-value	Pairwise Comparisons (Durbin-Conover)
External load	Kinematics	Relative distance covered	Total	m/min	88.1	61.1	108.0	12.7	92.6	65.4	110.0	12.6	86.0	60.6	112.0	15.6	87.4	62.6	116.0	12.3	12.9	**.005**	a | d | e
			Walking	(0–6 km/h)	40.7	28.5	51.1	6.0	39.5	29.7	47.7	3.8	39.4	28.6	52.4	6.1	40.2	30.9	51.3	6.2	9.2	**.027**	a | d | e
			Jogging	(6.1–15.4 km/h)	40.3	17.3	63.4	13.1	43.4	17.1	69.7	11.2	39.1	20.5	74.9	14.6	40.2	16.4	76.8	14.9	8.6	**.035**	a | d
			Running	(15.5–18.2 km/h)	3.5	0.0	10.7	3.9	4.3	0.0	14.0	3.6	2.6	0.0	11.6	4.1	3.3	0.0	13.5	3.2	16.8	**<.001**	b | d | f
			Sprinting	(>18.3 km/h)	1.4	0.0	14.4	4.4	2.4	0.0	12.3	5.0	1.3	0.0	14.2	3.7	1.5	0.0	13.4	3.2	11.8	**.008**	a | d | e
	Mechanical	Accelerations	Low	(0–3 m/s^2)	18.3	13.3	21.7	1.7	17.3	14.0	23.0	2.0	17.8	15.0	21.0	2.0	17.7	14.7	23.7	2.0	9.7	**.021**	a | c
			High	(>3.1 m/s^2)	0.3	0.0	2.3	0.3	0.7	0.0	2.0	0.6	0.3	0.0	1.7	0.7	0.5	0.0	2.0	1.0	1.2	.763	-
		Decelerations	Low	(0–3 m/s^2)	18.3	13.7	21.7	2.3	17.3	13.3	22.7	2.3	17.7	15.0	21.3	2.0	17.7	14.3	23.0	2.0	8.8	**.033**	a
			High	(>3.1 m/s^2)	0.5	0.0	2.3	0.7	0.7	0.0	2.0	0.9	0.7	0.0	1.7	1.0	0.3	0.0	2.0	0.3	1.9	.604	-
		Speed	Maximal	(km/h)	18.8	14.3	21.9	2.8	18.8	13.8	22.5	1.9	18.5	12.4	22.3	3.2	18.6	11.6	21.8	2.7	11.9	**.008**	c | d | e
			Average	(km/h)	5.5	4.1	6.7	0.7	5.7	4.1	6.9	0.6	5.4	4.2	6.7	1.0	5.5	4.3	7.0	0.7	11.4	**.010**	a | d | e
Internal load		Max HR	Maximum	(BPM)	184.0	143.0	207.0	21.5	183.0	134.0	205.0	19.5	180.0	135.0	208.0	18.5	181.0	121.0	208.0	18.0	22.2	**<.001**	b | d | f
		Avg HR	Average	(BPM)	170.0	125.0	196.0	27.3	169.0	111.0	194.0	19.0	165.0	112.0	195.0	17.8	167.0	116.0	197.0	21.0	25.0	**<.001**	b | d | f

Abbreviations: Pairwise Comparisons: a = FO vs GLF; b = FO vs LFocsl; c = FO vs LFfcsl; d = GLF vs LFocsl; e = GLF vs LFfcsl; f = LFocsl vs LFfcsl.

Table 4. Descriptive (mean±SD) and inferential analysis for considered tactical variables according to the different game formats.

Variables	FO	GLF	LFocsl	LFfcsl	F	p-value
Dist btw dyads (m)	7.5 ± 0.9	7.2 ± 0.8	7.3 ± 1	7.5 ± 0.9	2.3	0.077
Dist btw dyads (CV %)	45.4 ± 7.6	44.8 ± 5.9	44.9 ± 6.6	44.4 ± 7.2	0.3	0.846
Dist btw centroids (m)	3.1 ± 0.3	3.2 ± 0.3	3.2 ± 0.4	3.1 ± 0.4	0.4	0.777
Dist btw centroids (CV %)	54.9 ± 7.7	51.5 ± 3.9	53.7 ± 6.7	52.7 ± 5.8	0.9	0.439
Surface area (m^2)	18.2 ± 3.6	16.9 ± 3.1	18.3 ± 4.2	18.3 ± 3.5	1.3	0.293
Surface area (CV %)	75.8 ± 10.5	75.7 ± 9.3	79.6 ± 13.7	75.3 ± 12.4	0.7	0.560
Width (m)	6.3 ± 0.8	6.3 ± 0.6	6.3 ± 0.7	6.3 ± 0.6	0.1	0.945
Width (CV %)	39.8 ± 5.6	40 ± 5.3	40 ± 5	38.5 ± 3.8	0.8	0.480
Length (m)	7.2 ± 1.1	6.9 ± 1	7.2 ± 1.1	7.5 ± 1.1	1.3	0.290
Length (CV %)	52.6 ± 8.7	52.7 ± 5.1	51.7 ± 8.5	50.5 ± 8.2	0.6	0.645

Regarding "10" area, results revealed significant differences between FO vs LFocsl and FO vs LFfcsl, with higher values for the FO SSGs; and between GLF vs LFocsl and between GLF vs LFfcsl, with higher values for the GLF SSGs. Regarding "11" area, results revealed significant differences between FO vs LFocsl, between GLF vs LFocsl and between LFfcsl vs LFocsl, with lower values of LFocsl SSGs.

Summarising, through heatmaps analysis (see Figure 3), in FO and LFfcsl, the central zones revealed higher spatial occupation, than in other game scenario. On the other hand, the tendency of occupation shows the lower occupation of zones close to goal lines with LFfcsl. When floaters were in goal line (GLF SSG) a greater dispersion throughout the court was observed on players' spatial occupation. In contrast, in the LFocsl situation, the higher spatial occupation was observed in the central hallway (nearer to the defensive middle court).

4. Discussion

The aim of this study was to analyse the effects of adding floaters, in different positioning, during futsal small-sided games (SSGs) in youth players' tactical and physical performance. Overall, results revealed significant differences in the physical variables, both external and internal load, and in the heat maps of spatial occupation areas, not finding such differences in the tactical variables analysed.

In relation to physical differences, especially regarding to the total *distance/min*, our results showed significant differences, indicating that GLF promoted higher values of distance/min. This is the condition in which there is the higher distance between the position of the floater and the ball and in which it is easier to promote numerical superiority in the attack. Previous studies suggest that SSGs with numerical superiority in attack (i.e. including floaters) induces a decrease in variables such as percentage of total distance covered compared to numerical equality (G.M. Praça et al., 2018; Praça et al., 2020; Sampaio et al., 2014). In this line, previous findings seemed to indicate that the use of training tasks with a lower level of opposition may lead to less defensive pressure (Práxedes et al., 2019). Thus, the distance covered would be less as these studies indicated. Sampaio et al. (2014) also showed that numerical superiority led to a decrease in distance covered in higher intensities when an additional player was added permanently to one of the teams. However, these cannot take in consideration the position of the floater in the court. The positioning of the floater in the goal line may have induced

Table 5. Descriptive and inferential analysis for considered spatial occupation area variables according to the different game formats.

Variable	Sub-variable	FO median	FO min	FO max	FO IQR	GLF median	GLF min	GLF max	GLF IQR	LFocsl median	LFocsl min	LFocsl max	LFocsl IQR	LFfcsl median	LFfcsl min	LFfcsl max	LFfcsl IQR	χ2	p-value	Pairwise Comparisons (Durbin-Conover)
Spatial occupation area	1	1.6	0	5.7	2.9	1.2	0.0	4.7	1.5	1.6	0.1	4.2	2.2	2.1	0.1	3.8	2.7	0.8	.840	-
	2	7.7	1.0	13.9	4.9	9.5	7.1	12.7	1.9	10.1	1.9	14.3	6.1	7.3	2.2	11.6	4.4	6.6	.086	-
	3	1.8	0.0	6.3	2.7	1.4	0.1	4.1	2.1	1.1	0.0	5.5	1.8	0.8	0.0	3.9	2.4	2.2	.540	-
	4	6.4	0.7	15.2	7.7	4.3	0.3	15.3	5.9	6.8	2.3	13.1	4.5	6.1	1.6	12.0	4.6	3.5	.323	-
	5	32	24.7	40.6	4.2	31.5	28.4	39.4	5.8	40	30.4	49.7	8.6	34.6	28.5	44.2	4.1	9.7	**.021**	b | d | f
	6	5.2	1.0	15.6	6.6	7.1	0.5	16.5	11.1	5.5	1.8	13.0	4.0	6.4	0.6	14.0	9.0	1.6	.668	-
	7	6.0	1.7	13.2	4.2	6.8	0.0	11.9	8.1	5.0	2.8	10.3	2.6	6.1	0.9	10.9	7.1	0.6	.896	-
	8	24.2	14.8	32.5	7.0	21.8	17.0	32.7	7.7	20.3	13.3	27.8	3.8	25.1	16.3	32.3	8.5	7.3	**.049**	b | f
	9	4.3	0.4	15.6	3.2	5.3	1.1	10.0	4.5	4.0	1.2	6.9	3.7	4.8	1.4	8.5	4.4	4.1	.253	-
	10	1.7	0.4	3.5	1.8	1.5	0.8	3.5	1.2	0.9	0.3	2.2	0.9	0.5	0.1	1.9	0.8	10.2	**.017**	b | c | d | e
	11	3.8	1.4	6.7	2.7	3.8	2.0	5.4	1.3	2.7	0.6	5.9	1.7	3.3	1.0	5.4	2.0	13.1	**.004**	b | d | f
	12	1.2	0.5	3.5	1.4	1.6	0.1	2.9	0.6	1.0	0.1	2.5	1.2	2.2	0.0	4.0	1.7	4.4	.218	-

Abbreviations: Pairwise Comparisons: a = FO vs GLF; b = FO vs LFocsl; c = FO vs LFfcsl; d = GLF vs LFocsl; e = GLF vs LFfcsl; f = LFocsl vs LFfcsl.

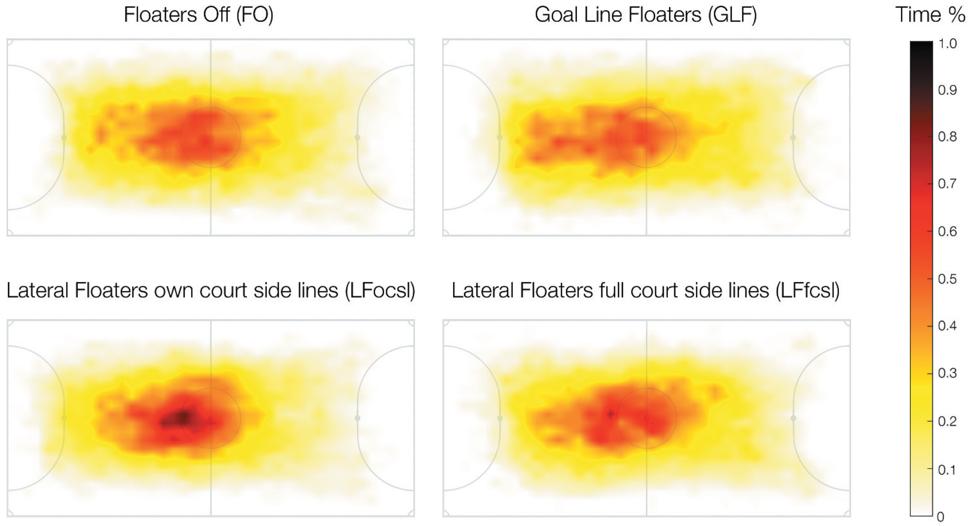


Figure 3. Heat maps for all four SSGs in 30 × 15 delimited area.

the attacking players to promote the numerical advantage through a pass with the floater and, therefore, the game changes to a more direct style of play (with shorter ball possessions and more passes to the floater that increases the length of the game) and consequently with more distances covered per minute. Finally, and regarding the distance covered at low intensity (walking) our results showed that FO SSG was the task with the highest values (FO > LFfcsl, GLF, LFocsl). Such results could be related to the difficulty of youth players to create space when in numerical equality relation. That is, the presence of floaters promotes numerical superiority for a given team and seems to highlight new possibilities for players' displacements at different intensities (Gonçalves et al., 2016; Vilar et al., 2014). That is, while defenders tend to maintain the space equilibrium to maintain equilibrium in the space occupation in numerical disadvantage, the attackers try to use the advantage to quick progress on the field (Travassos, 2020). Such behaviours require constant changes on players' intensity of displacements and justifies the decrease in the distance covered at low intensity when the floater was used.

However, the results obtained by Sampaio et al. (2014) and G.M. Praça et al. (2018) exposed the opposite. Numerical superiority (permanent addition of a player to one of the teams) promoted a decrease in the distance covered at high intensities (16.0–17.9 km/h) and in the total distance covered, and an increase in the distance covered at lower speeds (0–9.9 km/h). Further research is required to understand if the level of players can constraint such results.

Referring to *accelerations and decelerations*, there were significant differences in variables Acc and Dec 0–3 m/s^2 in FO, in comparison with GLF and LFfcsl SSGs. That means that tasks with numerical equality lead to a higher number of changes of directions and more demanding actions. The numerical equality between players requires more fakes (feints), changes of direction and changes in the rhythm of displacement to promote attacker-defender spatial-advantage on the court (G.M. Praça et al., 2018;

Travassos, 2020). In opposition, SSGs with offensive numerical superiority to one team requires more linear displacements on the court for the use of passing lines to progress on the field, but players have more time to make decisions and execute actions (Práxedes et al., 2018). According to that, attackers without the ball could receive a pass easier than in a numerical equality situation. Therefore, a greater number of passing actions will be made in relation to dribbling actions (Sánchez-Sánchez et al., 2017). This could be clarified because floaters might have afforded more opportunities for passing the ball, allowing the team to maintain ball possession with lower efforts (Castellano et al., 2016; Vilar et al., 2014). This advantage situation requires a minor engagement in actions without the ball and a lesser need to generate an imbalance in the opponents' defence through accelerations and decelerations (G.M. Praça et al., 2018).

In relation to *speed* variables, in FO and GLF SSGs, players achieved higher speed than the others. According to the average speed, results showed significantly higher values in GLF SSG in comparison with the other conditions (FO, LFfcsl and LFocsl SSGs). Therefore, players spent more time at higher speeds when the floater was in the goal line due the need to create the spatial advantage after the pass to the floater. As López (2017) points out, the 3–1 game system (system reflected in the GLF situation) allows developing a game based on breadth and depth, besides to being a more direct style of play in relation to other game systems (4–0 and 2–2) due to the presence of a reference player ("pivot"; in our SSG, a floater in goal line), to progress faster. More specifically, the internal logic of the GLF SSG allows the defending team to begin faster counterattacks when they recover the ball and, consequently, the defensive retreat of the attacking team that loses possession (Velasco & Lorente, 2007). This could be one of the causes for the production of higher speed levels. It is also interesting to note how the heat maps of GLF showed a great dispersion throughout the court in terms of spatial occupation.

In terms of *heart rate (HR)*, as in previous studies (G.M. Praça et al., 2018; Sánchez-Sánchez et al., 2017), the results showed a decrease in exercise intensity (Max HR and Avg HR) when an additional attacker player (floater) was included. However, Travassos (2020) argued that the addition of floaters did not change the HR values in futsal SSGs. Our results, revealed a trend of lower HR in LFocsl SSG and the highest values in FO SSG (without floaters). In FO, due to players have less time to make decisions and execute actions (Práxedes et al., 2018), the changes of direction and changes in the rhythm of displacement improved, possibly increasing the HR (G.M. Praça et al., 2018). However, there are also significant differences between the three floaters SSGs in our research (GLF, LFocsl and LFfcsl), obtaining the lowest HR values in the LFocsl SSG. Due to the positioning of the floater in the defensive midcourt, the LFocsl condition allows higher stability in defensive positioning, decreasing the intensity of displacements (Vilar et al., 2012). This greater defensive balance in their own court could promote a slowdown in the game, allowing the attacking team to pass the ball in order to maintain possession, reducing the HR of the players. In addition, floaters positioning may have also favoured a greater number of passes, in contrast to what happens in situations without floaters, where the number of dribbling (and therefore duels) (Sánchez-Sánchez et al., 2017) is greater, promoting increases in HR.

Summarising, regarding physical variables, the results revealed that using floaters promotes changes in SSGs demands. More than that it is important to understand the effect of the changes on the floater position on the field since this positioning clearly induces different responses in terms of physical demands in futsal SSGs.

With respect to the *tactical variables* no significant differences were found for any of the variables. The absent of differences on tactical variables could be related to the high levels of coefficient of variations observed due to the analysis of general values of teams not considering the positioning of attacker and defender teams. However, some significant differences were observed in relation to the heat maps spatial occupation areas. In this sense, these differences were observed in relation to the occupation of spaces and the dispersion of the positioning. Overall, in FO and LFfcsl SSGs, there is a greater concentration in the central zones, in GLF SSG there is a greater dispersion throughout the court and in LFocsl situation, the game is concentrated on the central hallway (nearer to defensive middle court) (see Figure 3). In this line of reasoning, previous studies showed tactical differences with different numerical relations between teams (Praça et al., 2020, 2016; Sampaio et al., 2014). Travassos, Vilar et al. (2014), Sampaio et al. (2014), Travassos et al. (2011), and Ric et al. (2016) observed that when teams were in defensive numerical inferiority, they get closer to each other and close the spaces trying to protect the goal, which demonstrates how the defenders prioritise protecting the goal against ball displacements more so than against movements of the attackers.

In opposition, previous studies found that SSGs with numerical superiority in attack (i.e. including a floater) induces an increase in centroid distance (defender-attacker players), especially when extra players are at the sides of the court (Praça et al., 2016; Sampaio et al., 2014; Travassos, Vilar et al., 2014). This possibly occurs because it allows more opportunities for players to perform behaviours aimed at increasing the use and effectiveness of playing space during the offensive phase of play, encouraging players to keep ball possession (Gonçalves et al., 2016; Ric et al., 2016) and an easy ball progression during the attack due to the frequently advanced position of a support player. Additionally, Praça et al. (2016) also demonstrated an increase in the *length* and *width* of teams in the 4vs3 configuration (on-court floater) compared with 3vs3 and 3vs3 + 2 sideline floaters situations, and a prevalence of player position in the width axis compared to the length axis in SSG with sideline floaters. At this point, we should differentiate the two SSGs that include lateral floaters in our study (LFocsl and LFfcsl), since spatial limitations may have induced unequal behaviours. In our case, the heat maps revealed spatial occupations similar to those in the study by Praça et al. (2016) in the LFfcsl SSG (similar conditions to those of the study in question), where there is a greater concentration in the central zones (similar spacial occupation to FO SSG), and lower occupation of zones close to goal lines, but different in the LFocsl, where the game is concentrated on the central hallway. This may be due to the fact that the positioning of the floater in the LFocsl and LFfcsl situations simulates game situations related to the 4–0 game system, a system characterised by having the players in line, which favours the conservation of the ball with various supports as well as a greater efficiency in the creation and occupation of free spaces, especially behind the defence in the finishing zone (López, 2017).

The current study had several strengths. One of them is the novelty, because to our best knowledge in futsal, previous investigations tried to understand the effects produced by the presence of floaters and its positioning but never comparing different lateral positions and, even, a position in the goal line. Additionally, it is relevant to highlight the double perspective provided from a physical and tactical point of view, trying to understand holistically what happened in the tasks. In this sense, coaches and scientists need to evaluate floaters inclusion and positioning from different dimensions (see Figure 4).

Despite the aforementioned strengths, the study results should be treated with some caution because the data presented includes attacking and defensive players, which limits a better understanding of what happened. In future studies, it would be interesting to divide the analyses into behaviours of the attacking team (inequality and superiority) and of the defending team (inequality and inferiority, respectively) based on the establishment of floaters (and their positioning). In addition, further research should be developed with players of different age categories and levels of expertise and also investigate what differences exist in technical-tactical actions in relation to manipulation of floaters positioning.

5. Conclusions and practical implications

This study provides practitioners with important insights on how to manipulate the floaters' positioning in futsal SSGs according to their purpose. Specifically, GLF SSG is related to higher distance and speed variables, being the most demanding of the four presented. It also seems to induce a greater dispersion all over the court and it is associated with a 3–1 game system. However, in LFocsl SSG, lower HR values were obtained. On the other hand, FO SSG is linked to the acceleration and deceleration variables, being an indicator of current futsal performance. Since a tactical point of

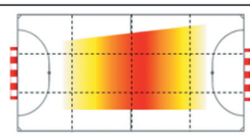
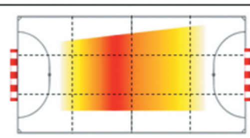
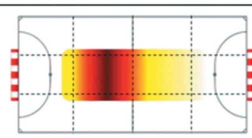
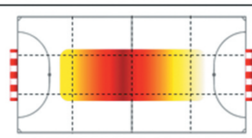
Floaters positioning	Physical	Tactical	Game system related	Occupation areas (→ offensive direction)
FO	Acc > Dec >	Greater occupation of central zones	-	
GLF	Dist min > Speed >	Greater dispersion all over the court	3-1	
LFocsl	HR <	Greater occupation of the central hallway	4-0	
LFfcsl	¿?	Greater occupation of central zones (lower occupations of zones close to goal lines)	4-0	

Figure 4. Principal effects of manipulation of floaters positioning highlighting significant differences obtained. Note. FO: floater off; GLF: goal-line floater; LFocsl: lateral floater (own court sideline); LFfcsl: lateral floaters (full court sideline); Acc: accelerations; Dec: decelerations; Dist min: distance per minute; HR: heart rate.

view, FO and LFfcsl SSGs promotes a greater occupation of central zones, where the difference between them is the lower occupations of zones close to goal lines of the second-mentioned. Instead, in LFocsl SSG, there is a greater occupation of the central hallway. Floater sideline SSGs seem to simulate 4–0 game system. These findings should be considered for the design of futsal training tasks, taking into account the context (team, players . . .) and time of the week and the season, since they allow the development of the variables described (physical and tactical) by optimising training time with the ball.

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