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The diagonal positioning of the goals modifies the external training load and the tactical behaviour of young football players

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ABSTRACT: The aim of this study was to identify how positioning the goals in diagonal configurations on the pitch modifies the external training load and the tactical behaviour of young football players during small-sided games. Four teams of five outfield players and a goalkeeper played six small-sided games of five minutes' duration in three different scenarios: 1) Control: goals placed one in front of the other; 2) Right diagonal goals: goals placed in the right-hand corner of the offensive half-pitch; and 3) Left diagonal goals: goals placed in the left-hand corner of the offensive half-pitch. The positioning-derived data from each player were collected with 10-Hz GPS units and were used to compute external load and tactical variables. Regarding the external load variables, differences were mainly focused on distance covered while walking in defence and game pace (variability), with higher values for the diagonal scenarios. Also, the length/width ratios in offence and defence were most likely lower in diagonal scenarios. In conclusion, the results showed that players' adaptations to the environmental constraints of positioning the goals diagonally were the enhancement of the width team variable and the variability of the length.

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INTRODUCTION

Creating meaningful and representative training tasks in team sports is one of the challenges of contemporary coaching. Training tasks should be designed considering the interaction and interdependence between organismic (such as the players and their characteristics: body composition, personality, physical condition or heart rate) and environmental constraints (e.g. the field, the characteristics of the goal, the light or the temperature) as well as the emergent relation between both, the task constraints [1, 2]. All constraints are nested in different levels and timescales, and the manipulation of the task has implications in all the system, and not only in the specific aims of the task proposed.

Small-sided games (SSGs) have been used to promote varied and unpredictable situations of interaction among teammates and opponents [3]. Training related to decision making is one of the aims of proposing SSGs [4]. SSGs are grounded in the use of task constraints as a strategy to limit or allow multiple behaviours while maintaining the basic characteristics of the real game. SSGs help players to discover and learn a large set of possible actions, performing task solutions by functionally adapting their behaviour to the actions of their teammates and opponents [5]. Therefore, SSGs are used as training tools so that developed skills can be better transferred to competition contexts.

Due to the nestedness of constraints, SSGs not only influence the processes of decision making, but they have also been used to train physical conditioning [6]. The external load is a variable that has been used to evaluate physical consequences of the use of SSGs [7, 8]. Task constraints related to the space, and especially to the position or size of the goals, have been used to train collective behaviour as well as individual physical conditioning. Several studies have described the changes in collective behaviour in SSGs with tasks that manipulated the scoring space by altering the presence/absence and size of goals [9, 10, 11, 12], the number of goals available for scoring [13, 14], and the proximity to the goals of 1 vs 1 football dyads [15]. The tactical performance seems to modify team variables such as time of ball possession, length and width, or penetration. Behaviours performed in SSGs also seem to suffer certain adaptations in the spatio-temporal relations between teams or players depending on the area of the field they are playing.

Physiological demands also seem to change as a function of alteration of the scoring modes in SSGs [16]. However, the external loads associated with the manipulation of spatial reference aspects, such as the goals' positioning related to the pitch dimensions, have been studied in basketball [17] but remain unknown in football.

Several studies have described the effects of SSG modifications by using nonlinear analysis techniques to measure predictability in football collective tactical behaviours [see 18 for a review]. The most common techniques applied have been the approximate entropy (ApEn), sample entropy (SampEn) and Shannon entropy (ShannonEn) [19]. Also, dynamic overlap has been used to quantify the diversity/unpredictability at different timescales [5]. In addition to these techniques, multiscale entropy (MSE) has also been used to describe the entropy at different timescales (or windows) across the series and has been recently used in sports sciences [20, 21]. The MSE has not been used with team positioning data, and it might allow to identify the emergence of certain behaviours at different timescales. Therefore, its use will make it possible to continue with the evaluation of the existing multilevel synergy between individual and collective behaviour [22, 23].

The use of SSGs in young players has also been widely studied [3]. Given that this period is a developmental stage, it is notable that most studies have focused on the analysis of the effects on physical and physiological variables or on technical demands, through different types of tasks [3]. Considering constraints related to goal positioning or scoring mode used in young players, the literature has focused on the physiological responses [24, 25, 26] and the game performance [27]. However, the physiological response and the team tactical behaviour in young football players related to the change of goals positioning remain unexplored. In the present study, the coach proposed this kind of constraint to determine whether the team performed as a block and how this kind of constraint affects the team external load.

We hypothesized that teams would seek a configuration in amplitude, especially to take advantage of the lateral spaces of the pitch where the goals are not placed, both for the start of the match (short or long start), and to finish the attack (frontal shot or lateral centre). We also hypothesized that, due to this search for free spaces, the internal load of the players might increase.

Therefore, the aim of this study was to evaluate how placing the goals in different positions on the pitch modifies the external load and the tactical behaviour of young football players during SSGs.

MATERIALS AND METHODS

Subjects

Twenty-four football male players U-12 (11.3 ± 0.8) participated in this study. The goalkeepers also participated in the different scenarios but were excluded from the data analysis. Participants were part of a high-level football school competing at the regional level. All of them had more than one year of experience in this school (3.13 ± 1.5). At the time that the study was conducted, there were

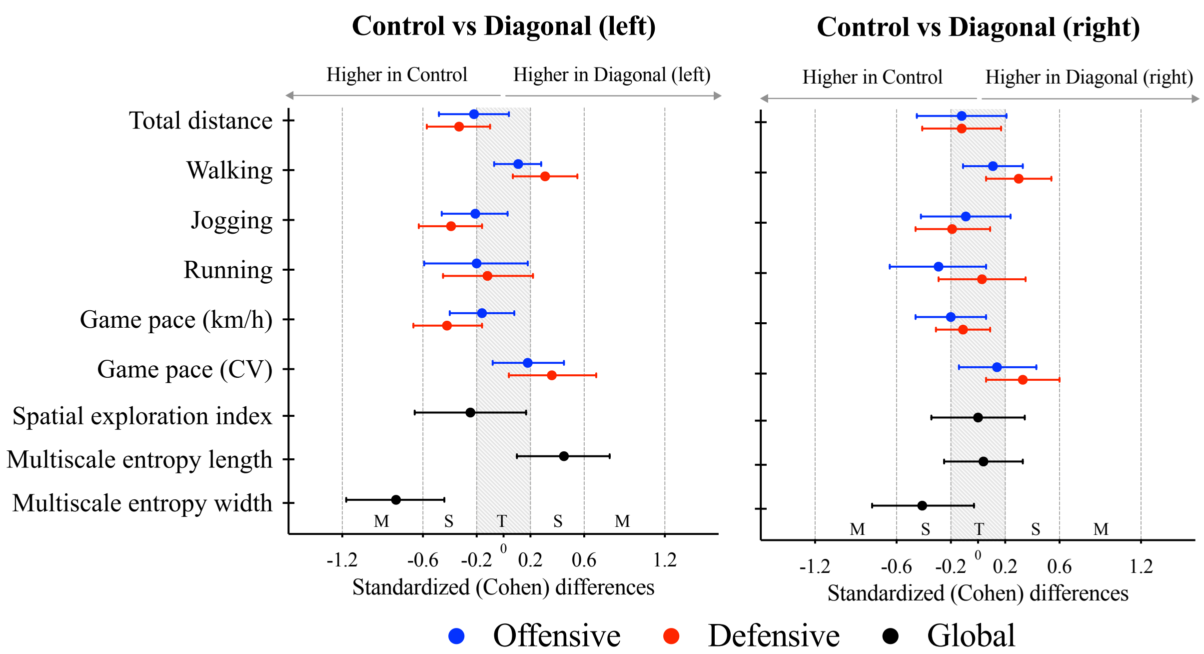

FIG. 1. Standardized (Cohen) differences in the individual performance variables according to game scenarios. Error bars indicate uncertainty in the true mean changes with 90% confidence intervals.

three football training sessions per week, with a 60-minute official game between teams belonging to the football school. All players were informed about the study's procedures, requirements, benefits and risks and informed consent was obtained before the start of the study from parents or a legal representative. The investigation was approved by the local Research Ethics Committee and conformed to the recommendations of the Declaration of Helsinki.

Procedure

Participants were divided into four balanced (in number of players and team level) teams (A, B, C and D) of 5 outfield players and a goalkeeper. All teams were established under the head coach's criteria to ensure that the teams' performance, roles, physical, technical and tactical levels were comparable [28]. Each team played six SSG of 5 minutes duration in three different scenarios that consisted of: 1) control, where seven-a-side football goals (6 meters wide by 2 meters high) were placed directly opposite each other (CTR); 2) right diagonal goals, where goals were placed in the right-hand corner of the offensive half-pitch (RGT); 3) left diagonal, where goals were placed in the left-hand corner of the offensive half-pitch (LFT) (see Figure 1), with the following format: A vs C/B vs D and A vs D/B vs C. In total, 24 games (six games for each of the four teams) of 5 minutes were performed in the same training session and analysed.

All SSGs were played on an artificial turf pitch measuring 31 × 37 metres, which was marked by using the side lines of an eleven-a-side football pitch and the side lines of the seven-a-side football pitch. The official rules of football were followed, with some exceptions to allow continuous spontaneous interactions between teammates and opponents [4, 29]. The first exception was: if the ball went outside the field limits or there was a fault, the game was restarted by the opposing goalkeeper. The second exception was: to increase the effective playing time, several balls were placed inside the goal to supply a ball whenever the game needed to be restarted. The third exception was that, in two of the three scenarios, the goals were not one in front of the other. In order to maintain the rhythm of play and avoid the influence of fatigue, each game involved 5-min periods of play separated by 3 min of passive rest. The coach never gave feedback or interceded, only acting as a referee if there was a very clear fault.

Data collection and analysis

The positioning-derived data of each player were collected using 10 Hz GPS units (WIMU PRO, RealTrack Systems, Almeria, Spain). The units were fixed in the back of the players by a vest top.

Moreover, a notational analysis by means of Lince software [30] was performed to determine the position of the ball. This software made it possible to determine the moment that a player took possession of the ball, passed it, received it, shot it or lost it. Knowing that, after mixing these data with the positional data of the players, we were able to determine the position of the ball, that is, which team had ball possession. To start the ball possession any player could pass the ball after receiving a goal, after a goal kick or a throw-in. The end of ball possession occurred when the ball went out of the field, a team scored a goal, a player of the opposing team regained the ball and could pass it efficiently or when a player committed a foul.

Data were processed using MATLAB dedicated routines (MathWorks, Inc., Massachusetts, USA) and used to compute the individual variables: external load expressed as total distance covered in both the offensive and defensive phases, distance covered in different speed zones, mean speed, speed coefficient of variation, spatial exploration index (SEI) [31], and the complexity index from the MSE [32] of width and length displacements; and tactical variables: duration of possession, team width, team length and their ratio (LPWR), in both the offensive and defensive phases, as well as their coefficient of variation.

The SEI was computed by calculating the distance from each positioning time series to the mean position and then computing the mean value from all the obtained distances. The SEI is considered a novel variable that explains the differences in players' pitch exploration according to the designed game scenarios, where higher values might be associated with players who are covering more space during the game situations [31].

To gain an insight into the integrated complexity associated with the different SSG scenarios, the complexity index was calculated from the MSE applied to the positional time series of the teams. MSE was used to quantify the level of regularity in the positional data across multiple timescales in each SSG. The MSE method integrates a coarse graining procedure to the SampEn algorithm to calculate entropy values at a range of different timescales, and was performed according to existing studies [33]. It provides an insight into the fluctuations in these block-to-block dynamics. The MSE algorithm runs 20 blocks of 3,000 data points per game (5 min × 25 Hz acquisition). SampEn was calculated in timescales from blocks of 15 seconds (timescale 20, 3,000 points/20 windows), to the entire 5 min (3,000 points) of the match. To obtain the overall complexity associated with the SSGs, the area under the MSE curves were calculated and presented as the complexity index [32].

Statistical analysis

A descriptive analysis was performed using mean and standard deviations for each variable. All data were assessed for outliers and assumptions of normality using the Shapiro-Wilk test. Based on the data normality, a repeated measures analysis of variance was used to compare the three scenarios. The statistical analysis was carried out in SPSS software and the significance level was set at 5%. Complementary, magnitude-based inferences and the effect size were applied [34]. Prior to the scenario comparisons (i.e. CTR vs LFT, CTR vs RGT), all processed variables were log-transformed to reduce the non-uniformity of error. A descriptive analysis was performed using mean and standard deviations for each variable. Differences in means for both pairs of scenarios were also expressed and graphically represented in percentage units with 90% confidence limits (CL). The

TABLE 1. Inferences for the individual performance variables. Data are presented as mean ± SD, the difference in means (% with ± 90% of confidence intervals) and uncertainty in the true differences.

Variables	Scenarios			F	p-value	Difference in means (%; ± 90%CL) Uncertainty in the true differences	
	Control (CTR)	Diagonal (left, LFT)	Diagonal (right, RGT)			CTR vs LFT	CTR vs RGT
Total distance covered							
offensive	230.6 ± 52.1	219.6 ± 50.4	224.4 ± 46.8	0.67	.52	-11.0; ± 13.2 possibly ↓	-6.1; ± 16.8 unclear
defensive	253.0 ± 76.9	229.9 ± 70.7	245.0 ± 53.8	2.19	.12	-23.1; ± 16.4 likely ↓	-8.1; ± 19.9 possibly ↓
Walking							
offensive	31.9 ± 11.9	33.4 ± 15.8	33.4 ± 12.8	0.46	.64	1.5; ± 2.5 likely trivial	1.5; ± 3.1 possibly ↑
defensive	27.6 ± 7.9	31.2 ± 12.9	31.1 ± 12.1	3.10	.04	3.6; ± 2.7* likely ↑	3.4; ± 2.8 likely ↑
Jogging							
offensive	184.5 ± 48.4	174.5 ± 40	180.5 ± 48.2	0.67	.52	-10.0; ± 11.3 possibly ↓	-4.0; ± 15.4 unclear
defensive	210.6 ± 71.7	185.5 ± 65.2	198.7 ± 48.3	3.21	.04	-25.1; ± 15* likely ↓	-11.9; ± 17.6 possibly ↓
Running							
offensive	14.2 ± 14.4	11.7 ± 12.1	10.5 ± 10.3	1.00	.38	-2.5; ± 4.9 possibly ↓	-3.7; ± 4.5 possibly ↓
defensive	14.8 ± 12.5	13.2 ± 13.5	15.1 ± 13.5	0.27	0.75	-1.6; ± 4.5 unclear	0.4; ± 4.3 unclear
Game pace (km/h)							
offensive	5.6 ± 0.8	5.5 ± 0.8	5.4 ± 0.9	0.98	.38	-0.1; ± 0.2 possibly ↓	-0.2; ± 0.2 possibly ↓
defensive	6.0 ± 0.9	5.6 ± 1.0	5.9 ± 1.0	4.78	.01	-0.4; ± 0.2* likely ↓	-0.1; ± 0.2 likely trivial
Game pace (CV)							
offensive	58.8 ± 9.3	60.3 ± 7.6	60.0 ± 7.1	0.68	.51	1.5; ± 2.2 possibly ↑	1.2; ± 2.3 possibly ↑
defensive	57.1 ± 7.4	59.8 ± 7.9	59.6 ± 7.1	2.68	.07	2.8; ± 2.4 likely ↑	2.5; ± 2.0 likely ↑
Spatial exploration index	6.9 ± 0.8	6.7 ± 1.0	6.9 ± 1.0	0.75	.48	-0.2; ± 0.4 possibly ↓	0.0; ± 0.3 unclear
Multiscale entropy length	1.9 ± 0.7	2.3 ± 1.0	1.9 ± 0.8	4.31	.02	0.4; ± 0.7* likely ↑	0; ± 0.3 unclear
Multiscale entropy width	3.2 ± 1.2	2.3 ± 1.0	2.7 ± 0.9	5.31	< .01	-0.8; ± -0.5* most likely ↓	-0.4; ± 0* likely ↓

Abbreviation: ↓ = decrease; ↑ = increase; m = meters; CV = coefficient of variation; *p < .05

effect was reported as unclear if the CL overlapped the thresholds for the smallest worthwhile changes, which were computed from the standardized units multiplied by 0.2. The magnitudes of clear effects were described probabilistically according to the following scale: 25–75%, possible; 75–95%, likely; 95–99%, very likely; > 99%, most likely [34]. The comparisons among game scenarios were assessed via standardized mean differences with 90% confidence intervals [34]. Thresholds for effect size statistics were 0.2, trivial; 0.6, small; 1.2, moderate; 2.0, large; and > 2.0, very large [34].

RESULTS

Table I and Figure 2 present the inferential results for the individual performance variables in the game scenario comparisons. Regarding the external workload, players ran a similar distance while in the offensive phase across scenarios since the differences between the results of total distance covered and distance covered in different speed zones were unclear/trivial. On the other hand, in the defensive phase players likely covered a shorter distance in the LFT scenario compared to CTR (mean difference ± 90% confidence intervals, -23.1% ± 16.4%, small effect).

When considering the different speed categories in the defensive phase, there was likely an increase in walking and a decrease in jogging, both with a small effect. Unclear results were obtained for running. Still in the defensive phase, while the absolute game pace likely decreased when playing with the LFT scenario, the corresponding CV likely increased (both with a small effect). The SEI results concerning all bouts played presented possibly lower values when CTR scenarios were compared to RGT scenarios (-0.2% ± 0.4%, with a trivial effect) and unclear values when CTR scenarios were compared to LFT scenarios (mean ± 90% confidence limits, 0.0% ± 0.3%, with a small effect). The MSE for players' movement in length direction showed a small increase while a moderate decrease was observed in width in the LFT game. In the RGT game there was a small decrease in width.

Figure 3 presents the MSE results for length and width across the time series of one of the teams in the 3 SSG situations. The MSE width results over the different timescales between situations are similar. On the other hand, the MSE length results are similar between both diagonal situations, but increased more when the goals were placed diagonally while increasing the timescale.

Error bars indicate uncertainty in the true mean changes with 90% confidence intervals.

Table II and Figure 4 present the inferential results for the collective performance variables in the comparisons of scenarios. The duration of ball possession was similar in all scenarios, with trivial differences. In the offensive phase, the teams showed slight differences in length (both absolute and CV results) when playing in the LFT compared to the CTR scenario. However, placing the goals on the right-hand side very likely decreased the team length (-3.1 ± 1.4 m, small effect). Both the LFT and RGT game scenarios most likely promoted increas-

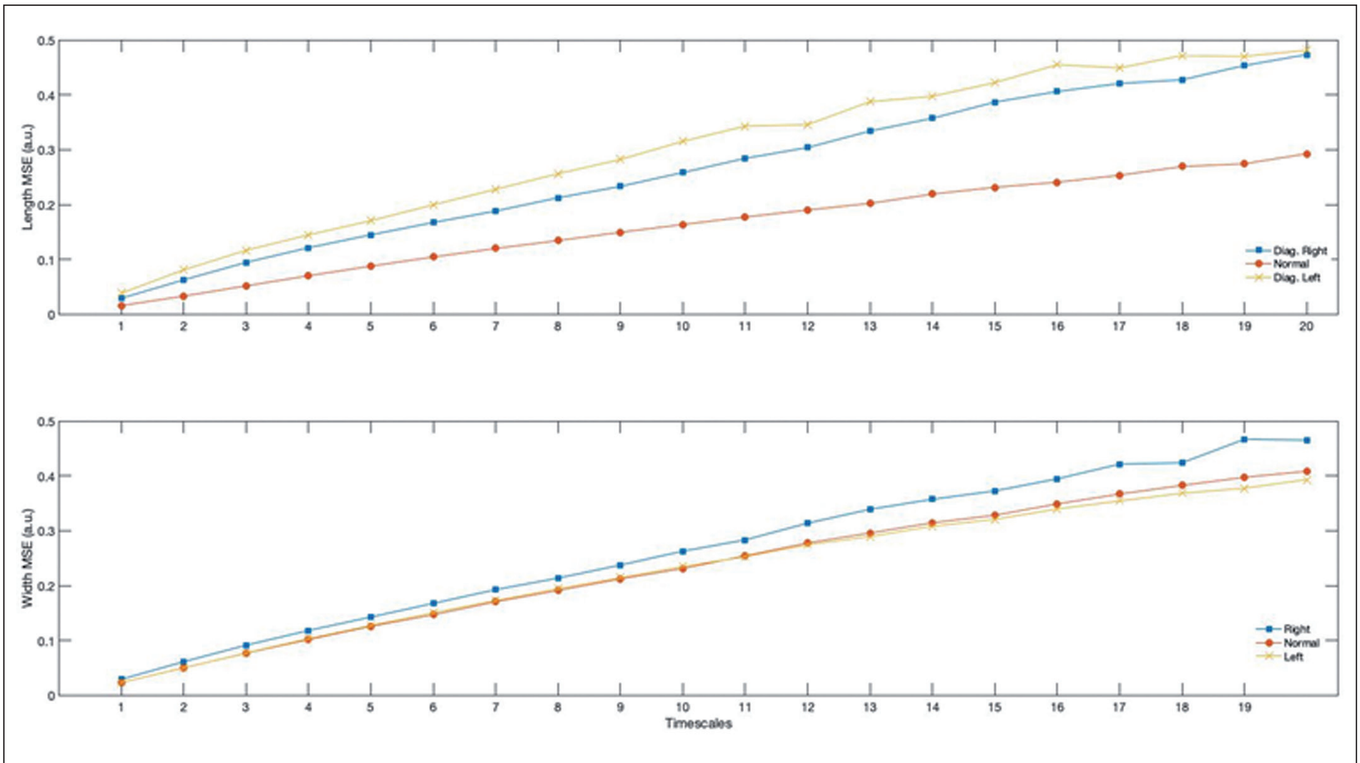

FIG. 2. Mean MSE for Length (upper panel) and Width (lower panel) across the time series of one team in the 3 SSG situations.

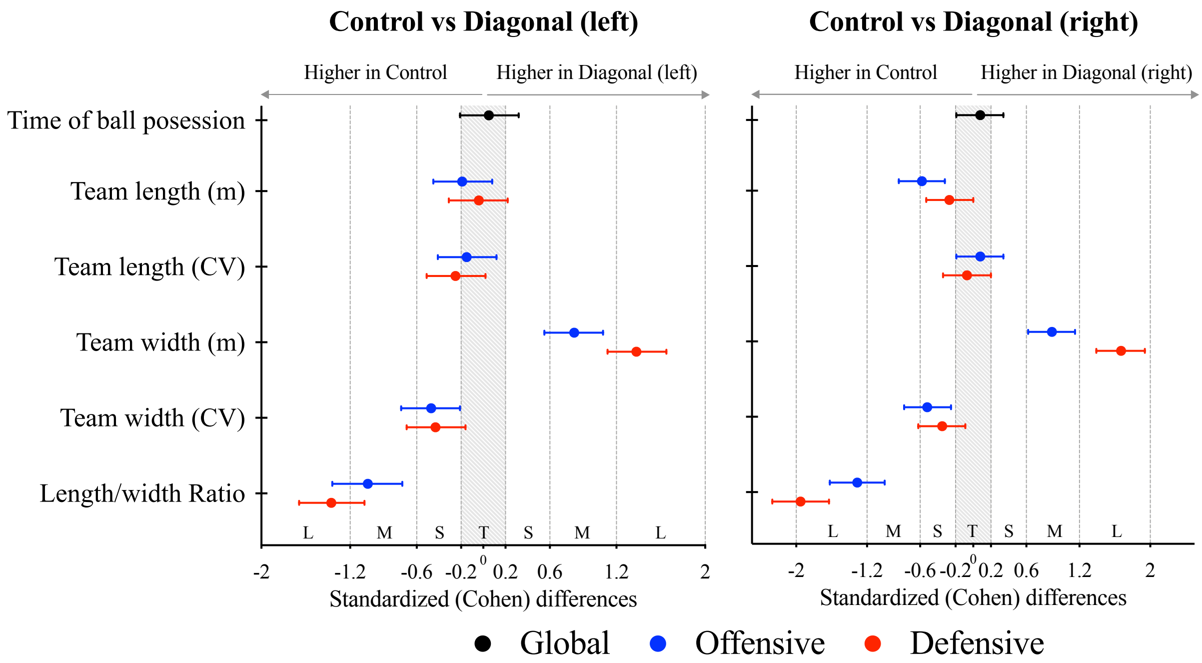

FIG. 3. Standardized (Cohen) differences in the collective performance variables according to game scenarios.

es in team width (from ~4 to ~6.5 m) during the offensive (moderate effects) and defensive phases (large effects). These increases were accomplished by a small decrease in team width CV (from ~-2.8 to ~-3.9%). Finally, there was most likely a decrease in the LPWR in both scenarios compared to the CTR one (with a moderate/large effect) resulting from an increase in the team width.

DISCUSSION

In general, the results showed that teams performed similarly in the three scenarios at an individual behaviour level, but differently in terms of collective behaviour. Specifically, the results showed that in a diagonal scenario teams were wider in the defensive phase than in the offensive one, and that the width in the defensive phase had large effects in both diagonal scenarios. Similarly, Castellano et al. [10] found that in SSGs without goalkeepers, using two small goals at each end of the goal lines the team width increased with the aim to protect both goals. In our case, this increase of the width in the defensive phase can be explained by the players' behaviour, that is, the forwards in front of the opposing goal to regain the ball possession and the defenders close to their own goal to protect it.

With the change of scenario from normal goal positioning (CTR) to diagonal left or right, coadaptation in offensive and defensive behaviour seems to lead to a new team pattern characterized by greater distances along the width axis. Travassos et al. [14] observed that using a six-scoring-target SSG seemed to promote higher security on the spatial proximity between teams (i.e. smaller space occupied by both teams on the pitch and smaller differences between teams). In the current study, the diagonal goals constraint seemed to promote lower security as reflected in the increase in width when a team lost possession of the ball. The reason for these differences could be the diagonal attack-defence pattern orientation of the team, which, as stated before, makes attackers be in front of the opposing goal to score a goal and regain the ball possession and the defenders in front of their own goal to protect it.

As a result of the particular placement of the goals and the width of the teams, the LPWR was also affected, showing an LPWR higher than those in all scenarios and in both the defensive and offensive phases. LPWR captures the shape of the team through the relation between its length and width (i.e. longer and thinner teams have higher LPWR values than shorter and wider teams) [35]. Our results show that the teams' LPWR was higher in the defensive phase than in the offensive phase, meaning that the distribution of the team tends to flatten when a team loses the ball, while remaining elongated. Although the trend in the LPWR behaviour in the three situations is the same, it is observed that the LPWR likely decreases from the CTR scenario to the diagonal ones. It means that when teams play in diagonal situations, they present more flattened and short shapes than in the CTR one.

Regarding the duration of ball possession, it was found that it was longer than that reported by Olthof, Frencken, and Lemmink [36] in similar size SSG conditions (i.e., SSG small pitch 40 × 30 m), and similar to that found in an SSG with a large pitch size (i.e.,

TABLE 2. Inferences for the collective performance variables. Data are presented as mean ± SD, the difference in means (% with ± 90% of confidence intervals) and uncertainty in the true differences.

Variables	Scenarios			F	p-value	Difference in means (%; ± 90%CL) Uncertainty in the true differences	
	Control (CTR)	Diagonal (left, LFT)	Diagonal (right, RGT)			CTR vs LFT	CTR vs RGT
Time of ball possession	15.1 ± 10.3	15.7 ± 10.9	15.9 ± 10.6	0.12	.89	0.6; ± 2.8 unclear	0.8; ± 2.8 possibly trivial
Team length (m)							
offensive	28.7 ± 5.4	27.7 ± 5.6	25.6 ± 5.2	8.82	< .001	-1.0; ± 1.5 possibly ↓	-3.1; ± 1.4* very likely ↓
defensive	29.9 ± 6.3	29.6 ± 6.2	28.2 ± 5.8	1.63	.20	-0.3; ± 1.7 unclear	-1.6; ± 1.6 possibly ↓
Team length (CV)							
offensive	9.5 ± 5.8	8.7 ± 5.0	10.0 ± 6.4	1.00	.37	-0.8; ± 1.4 possibly ↓	0.5; ± 1.6 possibly trivial
defensive	10.7 ± 7.2	9.0 ± 6.4	10.3 ± 5.8	1.32	.27	-1.7; ± 1.8 possibly ↓	-0.4; ± 1.7 possibly trivial
Team width (m)							
offensive	19.1 ± 5.1	23.0 ± 4.5	23.5 ± 4.7	18.42	< .001	4.0; ± 1.3* most likely ↑	4.4; ± 1.3* most likely ↑
defensive	15.5 ± 3.4	20.5 ± 3.9	21.9 ± 4.4	63.85	< .001	5.1; ± 1* most likely ↑	6.5; ± 1.1* most likely ↑
Team width (CV)							
offensive	15.1 ± 7.7	11.2 ± 8.7	11.2 ± 7.4	6.55	< .001	-3.9; ± 2.2 very likely ↓	-3.9; ± 2.0 very likely ↓
defensive	15.0 ± 8.0	11.5 ± 8.3	12.2 ± 7.9	4.12	.02	-3.5; ± 2.2* likely ↓	-2.8; ± 2.1 likely ↓
Length/width Ratio							
offensive	1.7 ± 0.6	1.3 ± 0.3	1.1 ± 0.3	24.30	< .001	-0.4; ± 0.1* most likely ↓	-0.5; ± 0.1* most likely ↓
defensive	2.1 ± 0.6	1.5 ± 0.3	1.3 ± 0.3	51.35	< .001	-0.6; ± 0.1* most likely ↓	-0.7; ± 0.1* most likely ↓

Abbreviation: ↓ = decrease; ↑ = increase; m = meters; CV = coefficient of variation; *p < .05

68 × 47 m) in U17 players. In contrast to Olthof et al.'s [36] study, constraining the goals in diagonal and in a similar sized field did not affect the duration of ball possession. According to our results and the literature, we think that the duration of ball possession depends more on the level of development and experience of the players [36, 37] than their age, given that maturational and developmental differences between players of the same age may exist. Related to this, it would be interesting to examine whether a longer duration of ball possession is more or less related to success and to the age, level or experience of players. Taking it into account, we could consider the scenarios proposed in this study without the duration of ball possession being affected.

Literature related to goal constraints has widely investigated the effects of a given constraint in SSGs on the physical variables and has concluded that the modification of constraints has effects on physical demands. It has been found that the intensity of the football SSG can be affected by many factors such as the presence or absence of goalkeepers and/or goals/mini-goals [9, 10]. In contrast to the results obtained by Gonçalves et al. [31], in the current study there were no differences in the total distance covered or in any speed range when constraining a task. We found that players did not expend any more or less effort from a motor or physical point of view. Thus, the task modification proposed in this study would not increase the high-intensity effort of the players.

The diagonal goal constraint did not show clear tendencies regarding the players' SEI. Previously it was found that restricting the players to specific areas of the pitch decreased the SEI [31]. In the present study, the diagonal positioning of the goals did not decrease the SEI in a clear way, showing that players covered approximately the same space in the diagonal scenarios and consequently explored the available space in a similar way.

The MSE results quantified the level of regularity of the teams' length and width positioning at different timescales. When compared across the different scenarios, the length MSE remained the same when comparing central with right diagonal positioning (CTR to RGT) and likely increased with the left diagonal (CTR to LFT). On the other hand, the width MSE likely decreased in the CTR scenario compared to the diagonal ones. As shown in Figure 3, both width and length display increasing MSE curves according to timescales. Interestingly, MSE in length in both diagonal situations increases at a higher rate than the CTR situation. It means that SSGs elicit different complex displacement across timescales in length. The unpredictability/diversity of the displacements in depth in shorter timescales showed similar low values of regularity; when increasing the timescales the irregularity increased greatly at longer timescales. In other words, the MSE shows the same evolution of irregularity in width displacements independently of goal positioning, but in the length it presents more differences while increasing the timescale. These results might be explained by the change in pressure and retreat of the players over the timescales of tens of second [37]. We hypothesize that the reason for this change in the behaviour of the team when the goals are placed diagonally is due to the location of certain players. In this certain situation, where the goals are at the corners and diagonally oriented, the forwards are in front of the opposing goal trying to score a goal or regain ball possession, and the defenders, who are in front of their own goal, try to start a new attack or to protect their own goal [38, 39]. Thus, it seems interesting to perform this kind of constraint, for example, to help players to start the game in a condition with fewer possibilities (one side of the field is "closed") and make team behaviours emerge to stabilize the restart of the game to one side or the other. Nevertheless, it has to be taken into account that several studies have shown that the probability of scoring a goal from the sides of the field is lower than from the centre [40, 41]. It would also be interesting to investigate the passing network in such constrained scenarios to determine which kind of progression follows the ball (if they exploit more lateral spaces to progress or to defend or not), the kind of finalization of the forwards and the place of the field from which they score a goal.

CONCLUSIONS

According to our results, it seems it would be possible to modify the collective behaviour of U12 teams by adjusting the location of the goals on the pitch in SSGs. As tactical behaviours emerge from the teams' adaptations to the environmental constraints imposed by the specific play context during training [3], this kind of constraint seems a good way to promote collective behaviour in which the width and the length of the team have increased relevance in different ways.

The results showed that players' adaptations to the environmental constraints of positioning the goals diagonally foster the emergence of pitch width-related explorations and the structure of variability over a range of time series in the team length.

In relation to the width, the main practical application that a task of this type would have, at a team behaviour level, would be the training of the team in amplitude. Therefore, it would be useful for the coach to work on aspects such as the expansion and contraction of the team after recovering or losing the ball, without negatively affecting the physical performance of the players. In terms of depth, we believe that the irregularity in this variable would allow coaches to train faster adaptation of teams when faced with an opponent with very variable behavioural patterns.

The main limitation of the study is that it was not possible to use the data provided by the local positioning system (LPS) signal because of the steel wire mesh that surrounded the field, which prevented the LPS signal from being well captured. We believe it would be interesting to replicate the same study in an 11 vs 11 with different age groups, similar to the study performed by Figueira et al. [42] and taking the variables proposed by Rico-González et al. [43], due to the similarity of football SSGs and futsal (that is, number of players and surface area) and the usefulness of the variables proposed in the aforementioned study (that is, geometrical centre and distance related variables).

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Conflict of interest declaration

The authors reported no conflict of interest.

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