REVISTA CORPOCONSCIÊNCIA

ENHANCING FUTSAL TRAINING AND LEARNING: INVESTIGATING THE IMPACT OF SMALL-SIDED GAMES ON SKILL DEVELOPMENT

APERFEIÇOANDO O TREINAMENTO E APRENDIZAGEM NO FUTSAL: INVESTIGAÇÃO SOBRE O IMPACTO DOS JOGOS REDUZIDOS NO DESENVOLVIMENTO DE HABILIDADES

MEJORANDO EL ENTRENAMIENTO Y EL APRENDIZAJE EN FUTSAL: INVESTIGANDO EL IMPACTO DE LOS JUEGOS REDUCIDOS EN EL DESARROLLO DE HABILIDADES

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Abstract
This study aims to examine whether the systematic practice SSGs combined with instruction effectively emphasizes the expected actions, leading to improvements (learning) in Formal Games (FGs) over time. We investigated SSGs widely used in Football/Futsal, with restrictions on the number of ball touches. We selected 18 young males, aged 15 to 19 years, who attended 17 practice sessions. The results indicated that the SSGs promoted a higher incidence of passes and unmarking movements compared to the FGs. The actions emphasized by the SSGs increased their frequencies and quality in the FGs. In contrast, other actions remained unaltered, indicating that the designed SSGs achieved their learning purposes. The manifestation in the FGs of the ball circulation pattern practiced in the SSGs

provides evidence that a playing style emerged throughout the intervention. Evidence from this study supports the thesis that the systematized practice of SSGs promote learning in FGs.
Keywords: Sport Pedagogy; Team Sports Games; Teaching Games; Tactics.

Resumo
Este estudo tem como objetivo examinar se a prática sistemática de jogos reduzidos (JRs), combinada com instrução, enfatiza as ações esperadas, levando a melhorias (aprendizado) nos Jogos Formais (JFs). Investigamos JRs com restrições no número de toques na bola. Selecionamos 18 jovens do sexo masculino, com idades entre 15 e 19 anos, que participaram de 17 sessões. Os resultados indicaram que os JRs promoveram uma incidência maior de passes e movimentos de desmarcação em comparação com os JFs. As ações enfatizadas pelos JRs aumentaram sua frequência e qualidade nos JFs. Em contraste, outras ações permaneceram inalteradas, indicando que os JRs projetados alcançaram seus propósitos. A manifestação nos JFs do padrão de circulação de bola praticado nos JRs fornece evidências de que um estilo de jogo emergiu ao longo da intervenção. As evidências deste estudo apoiam a tese de que a prática sistematizada de JRs promove aprendizagem nos JFs.
Palavras-chave: Pedagogia do Esporte; Jogos Esportivos Coletivos; Ensino de Jogos; Tática.

Resumen
Este estudio tiene como objetivo examinar si la práctica sistemática de juegos reducidos (JRs) enfatiza las acciones esperadas, llevando a mejoras (aprendizaje) en los Juegos Formales (JFs). Investigamos JRs con restricciones en el número de toques. Seleccionamos 18 jóvenes varones, de entre 15 y 19 años, que participaron en 17 sesiones. Los resultados indicaron que los JRs promovieron una mayor incidencia de pases y movimientos de desmarque en comparación con los JFs. Las acciones enfatizadas por los JRs aumentaron sus frecuencias y calidad en los JFs. En contraste, otras acciones permanecieron inalteradas, lo que indica que los JRs lograron sus propósitos. La manifestación en los JFs del patrón de circulación de balón practicado en los JRs proporciona evidencia de que un estilo de juego emergió durante la intervención. Las pruebas de este estudio respaldan la tesis de que la práctica de JRs promueve el aprendizaje en los JFs
Palabras clave: Pedagogía del Deporte; Juegos Deportivos Colectivos; Enseñanza de Juegos; Táctica.

INTRODUCTION

The teaching of Futsal and Team Sports (TS) in general is a subject of discussion in the context of Physical Education and Sports regarding the growing importance of these cultural manifestations worldwide. With the consolidation of the "systemic" or "tactical" approaches in the academic-scientific field (Garganta; Grehaigne, 1999), there is a prevailing position that learning should occur mainly in game situations, whether in its conventional form (formal game – FG) or modified versions (small-sided games – SSGs), as opposed to pedagogical practices that emphasize the repetition of movement techniques or collective offensive/defensive movements without opposition (Araújo, 2019; Bayer, 1986; Bunker and Thorpe, 1986; Chow; Komar; Seifert, 2021; Davids; Button; Bennetti, 2008; Graça *et al.*, 2019; Grehaigne *et al.*, 2005; Mahlo, 1974; Ometto *et al.*, 2018).

By manipulating task constraints, SSGs would provide an opportunity to emphasize specific aspects of the FG and/or adapt it to the participants' level (Rigon; Novaes; Tsukamoto, 2020). The advantage of these teaching activities lies in their capacity to maintain the tactical essence of Team Sport even when focusing on specific problems or actions (Araújo, 2019; Bayer, 1986; Bunker and Thorpe, 1986; Chow; Komar; Seifert, 2021; Davids; Button; Bennetti,

2008; Graça *et al.*, 2019; Grehaigne *et al.*, 2005; Mahlo, 1974; Ometto *et al.*, 2018). Thus, they would enable players to actively explore and develop, in a game context, individual and collective solutions that align with their unique characteristics, fostering the construction of a flexible and functional skill repertoire (Araújo *et al.*, 2019).

SSGs are typically accompanied by instructions that aim to direct attention toward relevant information to assist tactical problem-solving. Various forms of communication are utilized, including diagrams, drawings, videos, demonstrations, texts, and verbal instructions (Otte *et al.*, 2020).

Although SSGs are increasingly present in pedagogical interventions, caution must be exercised when using these teaching activities. It is common to come across their indiscriminate use, lacking a clear purpose, or poorly designed versions that would hardly meet the proposed learning objectives. Therefore, further exploration of their impacts on learning is still needed (Barba-Martín *et al.*, 2020; Graça; Mesquita, 2007; Kinnerk *et al.* 2018; Ometto *et al.* 2018).

For a suitable use, it is necessary, initially, to verify if they truly emphasize the resolution of the expected problems. Although there have been advancements in the academic-scientific literature in this respect, it is important to expand the researched categories or verify whether these already researched games are effective for different groups and purposes. Secondly, it would be necessary to analyse how the systematic practice of SSGs affects performance in the FG. In this regard, academic-scientific evidence is scarce, i.e., little has been investigated on the effectiveness of these teaching activities (Ometto *et al.* 2018).

In light of these considerations, this study aims to examine whether the systematic practice of a specific category of SSGs combined with instruction effectively emphasizes the expected problems and actions, leading to improvements (learning) in FG over time. To establish the parameters of the intervention, we adopted the Futsal game model proposed by Novaes *et al.* (2014) and identified certain problems and actions that were considered crucial for enhancing the participants' performance. Our focus was primarily on improving unmarking movements and passing. To accomplish this, we employed SSGs that imposed restrictions on the number of touches on the ball, limiting players to a maximum of two touches. This approach was selected due to widespread use of such SSGs by teachers and coaches in Futsal and Football. In terms of instruction, aside from explaining the rules and objectives of the SSG,

the teacher posed questions and guided potential approaches for students to explore and find solutions within game situations.

METHODOLOGICAL DESIGN

The current experiment utilizes a single-group design and enables comparisons between various practice conditions (i.e., independent variables) and multiple measures throughout the experimental period. The analysis specifically focused on the actions performed by the individuals when their team had the ball, encompassing passes, movements, dribbles, shots, etc. (i.e., dependent variables). These actions were examined in both SSGs and FGs conditions, allowing to identify which specific ones were emphasized during the SSGs and whether there were any notable changes or improvements in the execution of these emphasized ones during the FG condition over time.

Ethical Procedure

The research project underwent submission and approval by the Ethics Committee of the Federal Institute of Education, Science, and Technology of São Paulo (IFSP) (process number: 08775019.7.0000.5473). Before participation, all individuals involved in the study were provided with an informed consent form, which they carefully reviewed and signed. For underage participants, their legal guardians also granted their understanding and authorization through the informed consent process.

Participants

The study involved a sample of 18 male students, aged between 15 and 18 years (mean age 17.1 ± 1.1 years), who were enrolled in a federal public high school in São Paulo, and participated in an extracurricular Futsal activity led by the main researcher, who was also their Physical Education Teacher during regular classes. All participants had at least three years of regular practice experience in Futsal, with a minimum frequency of once a week. They did not have any apparent physical or cognitive disabilities, and none of them were involved in high-performance competitions affiliated with sports federations.

To ensure a balanced level of performance, the teams were carefully composed based on observations made by the researcher before the intervention period (4 days when participants played only FG during one hour and a half).

During the intervention period, the sessions that focused solely on FGs (assessments sessions), efforts were made to maintain same team compositions. In cases of participant absence, substitutes with similar characteristics were selected whenever possible.

Data from 12 participants out of the initial 18 who started the study were included in the analysis. The inclusion criterion was a minimum attendance rate of 75%, considering the 17 practice sessions over two and a half months.

Intervention Timeline

At the initial session, the participants were engaged in FGs to establish a baseline performance (A1). Subsequently, the intervention followed a consistent structure: three sessions of specific SSGs during the main part, followed by an assessment session in the FG situation. This sequence was repeated for each of the four different SSGs, resulting in five assessments conducted throughout the intervention. In total, encompassing both the teaching/training sessions and the assessment sessions, the intervention spanned approximately two and a half months, with sessions held twice a week on Mondays and Thursdays. Table 1 summarizes the details of the intervention timeline.

Table 1 – Interventions timeline with the activity type of intervention (SSG1 to 4 means the training sessions and A1 to 5 means de assessment sessions)

Interventions																
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
A 1	SSG 1	SSG 1	SSG 1	A 2	SSG 2	SSG 2	SSG 2	A 3	SSG 3	SSG 3	SSG 3	A 4	SSG 4	SSG 4	SSG 4	A 5

Source: original formulation.

Intervention Structure

The teaching/practicing sessions had the following structure:

(a) Warm-up:

Approximately ten minutes of jogging, running coordination exercises, and stretching.

(b) Main part (60 minutes):

During the main part of the training, the researcher provided the instructions, and each participant played SSGs for approximately 25 minutes.

(c) Final part (35 minutes):

The final part consisted of a FG, when each participant played for approximately 15 minutes.

The assessment sessions were as follows:

(a) Warm-up:

Approximately ten minutes of jogging, running coordination exercises, and stretching.

(b) Main part (60 minutes):

During the main part of assessment sessions, each participant played FGs for approximately 25 minutes.

During the teaching and assessments sessions, participants were oriented to adopt individual defence (i.e. mark individually) and execute high pressure (i.e. defence occupy the offensive field to reduce the opponent space-time). The zonal defence was not allowed.

Small-Sided Games

The SSGs used in the study were:

(1) SSG1 – 4 vs. 4 + 1 (four versus four plus one joker) with the objective of ball possession in half of the court (18×9m). Each player was limited to a maximum of two touches, and a joker player joined the team in possession of the ball. Teams earned points by completing seven consecutive passes, and there were no goals or goalkeepers.

(2) SSG2 – 4 vs. 4 + 1 (four versus four plus one joker) with a maximum of two touches per player. The joker player participated for the team in possession of the ball but was not allowed to score goals. This game was played on a full Futsal court (36×18m) with official goals and goalkeepers. The scoring system was the same as in the FG.

(3) SSG3 – 4 vs. 4 (four versus four) with a maximum of two touches per player, official goals, and goalkeepers. It was played on a full Futsal court (36×18m) without the wild card player. The scoring system remained the same as in the FG.

(4) SSG4 – 4 vs. 4 (four versus four) with a maximum of two touches per player, but after completing seven consecutive passes, the touch restrictions were lifted. If the ball went out of play or was recovered by the opponents, the team had to complete seven consecutive passes again to regain permission to play without touch restrictions. Shots on goal could be taken at any time without needing seven passes. This game took place on a full Futsal court (36×18m) with official goals and goalkeepers, following the same scoring system as the FG.

The selection of these SSGs considered the age range and experience of the players to ensure appropriate game conditions.

Instruction

In the teaching sessions, as instructional content, we used the heuristics proposed in the Futsal game model proposed by Novaes *et al.* (2014):

(1) Passing. Heuristics: Disguise the pass (do not show where and to whom you intend to pass) and prefer a ground pass.

(2) Unmarking movements. Heuristics: Seek passing lanes, run into an open space, try to receive the ball in a more favourable position, change direction, change pace, evade the marker's field of vision, infiltrate when there is no pressure on the ball, and approach when there is pressure on the ball carrier.

(3) Ball Control. Heuristics: Control the ball while progressing whenever possible and position the body for a second action after receiving the ball and use the body (arm, shoulder, hip, etc.) to protect the ball.

At the beginning of the main part of the teaching session, before the SSGs, reflective questions related to all the actions and heuristics mentioned above were posed to the group: "What can I do to help the ball carrier?", "How can I free myself from the marker?", "If my teammate with the ball is under pressure, how can I assist them?", "Is it better for me to control the ball while standing still or while progressing?", "How can I position myself before receiving the ball?", "In a two-touch situation, should I pass the ball high or low?", "How do I protect the ball?" and so on.

The students provided theoretical-conceptual answers guided by the teacher. Finally, the teacher presented the expected theoretical-conceptual answers to encompass all

the actions and respective heuristics mentioned above, even if the students had already presented them earlier.

Remark: no instructions were given during the games.

Main Researcher

This study main researcher was responsible for the intervention and analysis of the games actions. He holds a bachelor's degree and a teaching degree in Physical Education, with over 15 years of experience as a teacher and coach in Football/Futsal. Additionally, he has a master's degree and a doctorate in sports pedagogy. Furthermore, he has practised Football and Futsal for over 30 years.

Instrument and Data Collection

The players' performance was evaluated using an observation instrument developed and validated by Rigon *et al.* (2020). This instrument allows the assessment of various actions performed by players when their team had the ball, such as pass, dribble, shots and off ball movements. Ball control is evaluated along with other individual actions with the ball, as it is prerequisite for all of them.

All games were filmed using a camcorder to evaluate the actions taking place.

Each participant was observed for 12 minutes, timed in each situation (SSGs and FGs). As a general rule, participants played three games against different teams in the sessions throughout the intervention, whether in the SSG format or the FG during the assessment's sessions. These 12 timed minutes are the sum of the initial four minutes of each game played in a single session.

Performance Measure: Dependent Variables

Six specific variables were analysed: (1) a total of unmarking movements, (2) successful unmarking movements, (3) a total of passes, (4) successful passes, (5) dribbling, and (6) shooting. The evaluation of these variables involved different combinations of items from the observation tool, except successful passes, which was based on a simplified notation of the following item "player moves to an open space with a passing lane".

The total of unmarking movements corresponds to the sum of the following items of the observation instrument: "player moves but is marked and without a passing lane," "player moves to an open space but without a passing lane," "player moves with a passing lane but is marked," "player moves to an open space with a passing lane," and "player remains still, unmarked, with a passing lane." Successful unmarking movements correspond to the sum of the following items: "player moves to an open space with a passing lane" and "player remains still, unmarked, with a passing lane".

The total of passes corresponds to the sum of the following items: "player initially controls the ball but passes it to a marked teammate without a passing lane," "player initially controls the ball but passes it to a marked teammate with a passing lane," "player initially controls the ball but passes it to an unmarked teammate without a passing lane," and "player controls the ball and passes it to an unmarked teammate with a passing lane".

Dribbling corresponds to the following items: "player initially controls the ball but engages in a 1-on-1 duel with a defender outside their range of action," "player controls the ball and engages in a 1-on-1 duel with a defender close to their range of action," and "player controls the ball and moves into open space when no defenders are opposing them."

Finally, shooting corresponds to "the player initially controls the ball but shoots when the goal is blocked" and "the player controls the ball and shoots at the goal with a clear shooting lane".

Instrument Reliability: Intra-Observer Agreement

To verify the intra-observer agreement of the instrument, a global agreement test was performed (total agreement divided by the sum of agreements and disagreements) involving approximately 12% of the total actions analysed, that is, 2653 actions, in an interval greater than 6 weeks. The percentage of agreement observed was 82%.

Data Analysis

Two comparisons were conducted: a) among each format of SSGs and FGs to assess which actions the SSGs emphasized, and b) the performance evolution among FGs.

As this process can involve changes in performance resulting from learning, to assess which actions the SSGs emphasized, analyses were conducted in the first and last (third) session of each of the four proposed SSG game formats. The comparison with FGs was made

using the assessment session preceding and immediately succeeding each SSG format. In this regard, the analyses of variance were conducted in four blocks, each referring to the intervention period of one of the SSG formats:

(1) block 1 – A1, SSG1S1, SSG1S3, and A2;

(2) block 2 – A2, SSG2S1, SSG2S3, and A3;

(3) block 3 – A3, SSG3S1, SSG3S3, and A4;

(4) block 4 – A4, SSG4S1, SSG4S3, and A5.

The effects of the intervention were measured by analysing the performance in FGs during the assessments from one (A1) to five (A5).

Statistical Analysis

Kolmogorov-Smirnov test was utilized to assess data normality. Due to the non-normal distribution of most variables and the presence of missing data, the Skilling-Mack test was employed for the analysis of variance. We adopted a significance level of 10% for the statistical tests.

RESULTS

A total of 22,110 actions were analysed. The descriptive measures, including the mean (M) and standard deviation (SD) of the group, are presented below, followed by the analysis of variance.

Total of Unmarking Movements

The results indicate a higher quantity of unmarking actions in the SSGs compared to the FGs in all blocks. Furthermore, a significant increase was observed among Assessment 5 (A5) and the first two Assessments (A1 and A2) (Table 2 and Table 3).

Table 2 – Descriptive statistical measures for total of unmarking movements, whit the mean (M) and the standard deviation (SD) per activity, grouped in blocks

				Block 2						Block 4			
	A 1	SSG1 S1	SSG1 S3	A 2	SSG2 S1	SSG2 S3	A 3	SSG3 S1	SSG3 S3	A 4	SSG4 S1	SSG4 S3	A 5
M	78	150	149	74	113	106	90	101	101	83	105	113	94
SD	13	45,9	13,5	15	7,6	11,6	10	7,9	8,9	17	9,6	20,6	12
	Block 1						Block 3						

Source: original formulation.

Table 3 – Skilling-Mack results for total of unmarking movements per block and assessments, with p-values and differences among Small-sided games (SSGs) during teaching sessions and Formal games (FGs) during Assessments sessions (As)

Model	Skillings-Mack	p-value	Differences among
Block 1	24,40	< 0,001	except between A1 and A2 and between SSG1S1 and SSG1S3
Block 2	23,08	< 0,001	except between A2 and A3 and between SSG2S1 and SSG2S3
Block 3	12,56	0,006s	except between A3 and A4 and between SSG3S1 and SSG3S3
Block 4	20,30	< 0,001	except between A4 and A5 and between SSG4S1 and SSG4S3
Assess.	14,64	0,006	A5 > A1 | A5 > A2

Source: original formulation.

Successful Unmarking

The number of actions in this criterion was significantly higher in the SSGs compared to the FGs in all blocks. Additionally, there was a significant increase in the frequency of actions in this criterion throughout the assessments (Table 4 and Table 5).

Table 4 – Descriptive statistical measures for successful unmarking movements, whit the mean (M) and the standard deviation (SD) per activity, grouped in blocks

				Block 2						Block 4			
	A 1	SSG1 S1	SSG1 S3	A 2	SSG2 S1	SSG2 S3	A 3	SSG3 S1	SSG3 S3	A 4	SSG4 S1	SSG4 S3	A 5
M	56	110	103	51	99	90	70	88	86	71	91	100	77
SD	12	31	13	13	8	13	7,8	10	6,8	14	8,2	20	11
	Block 1						Block 3						

Source: original formulation.

Table 5 – Skilling-Mack results for successful unmarking movements per block and assessments, with p-values and differences among Small-sided games (SSGs) during teaching sessions and Formal games (FGs) during Assessments sessions (As)

Model	Skillings-Mack	p-value	Differences among
Block 1	24,53	< 0,001	except between A1 e A2 e between SSG1S1 e SSG1S3
Block 2	23,50	< 0,001	except between A2 e A3 e between SSG2S1 e SSG2S3
Block 3	15,42	0,001	except between A3 e A4 e between SSG3S1 e SSG3S3
Block 4	19,16	< 0,001	except between A4 e A5 e between SSG4S1 e SSG4S3
Assess.	29,37	< 0,001	A4 > A1 | A5 > A1 | A3 > A2 | A4 > A2 | A5 > A2 | A5 > A3

Source: original formulation.

Total of Passes

Overall, the SSGs exhibited significantly higher values of passes compared to the FGs in all blocks. Furthermore, when comparing the assessments, there was a significant increase in the number of passes in the FGs over time (Table 6 and Table 7).

Table 6 – Descriptive statistical measures for total passes, whit the mean (M) and the standard deviation (SD) per activity, grouped in blocks

				Block 2						Block 4			
	A 1	SSG1 S1	SSG1 S3	A 2	SSG2 S1	SSG2 S3	A 3	SSG3 S1	SSG3 S3	A 4	SSG4 S1	SSG4 S3	A 5
M	23,6	45,5	45,3	19	32	28,1	27,6	31	35	25	33	36,2	28
SD	6,4	13,6	8,5	10	7	4,8	4,6	6,8	5,2	8,4	5,1	10,7	6
	Block 1						Block 3						

Source: original formulation.

Table 7 – Skilling-Mack results for total passes per block and assessments, with p-values and differences among Small-sided games (SSGs) during teaching sessions and Formal games (FGs) during Assessments sessions (As)

Model	Skillings-Mack	p-value	Differences among
Block 1	24,60	< 0,001	except between A1 and A2 and between SSG1S1 and SSG1S3
Block 2	10,32	0,016	only between SSG2S1 and Assessments
Block 3	8,02	0,046	SSG3S3 > A4
Block 4	7,08	0,069	SSG4S3 > A4 | SSG4S3 > A5
Assess.	12,17	0,016	A5 > A1 | A3 > A2 | A5 > A2

Source: original formulation.

Successful Passes

In general, a significantly higher number of successful passes was observed in the SSGs compared to the FGs. Furthermore, when comparing the assessments, there was a significant increase in successful passes over time (Table 8 and Table 9).

Table 8 – Descriptive statistical measures for successful passes, whit the mean (M) and the standard deviation (SD) per activity, grouped in blocks

				Block 2						Block 4			
	A1	**SSG1 S1**	**SSG1 S3**	**A2**	**SSG2 S1**	**SSG2 S3**	**A3**	**SSG3 S1**	**SSG3 S3**	**A4**	**SSG4 S1**	**SSG4 S3**	**A5**
M	20	42	42	20	31	27,5	26	29	32	24	32	35	27
SD	5	13	8,6	7,4	6,3	5,1	5	6,9	5,5	8,5	5,1	11	6
	Block 1						Block 3						

Source: original formulation.

Table 9 – Skilling-Mack results for successful passes per block and assessments, with p-values and differences among Small-sided games (SSGs) during teaching sessions and Formal games (FGs) during Assessments sessions (As)

Model	**Skillings-Mack**	**p-value**	**Differences among**
Block 1	21,83	0,000	A1 < SSG1S1 | A1 < SSG1S3 | SSG1S1 > A2 | SSG1S3 > A2
Block 2	11,00	0,012	A2 < SSG2S1
Block 3	7,73	0,052	SSG3S3 > A4
Block 4	5,72	0,126	
Assess.	17,20	0,002	A1 < A3 | A1 < A5 | A2 < A3 | A2 < A5

Source: original formulation.

Dribbling

FGs exhibited significantly higher number of actions in this criterion. These results were expected, as the two-touch limit in the SSGs makes it more challenging for dribbling and ball control actions to occur. There was no significant difference observed between the assessments (Table 10 and Table 11).

Table 10 – Descriptive statistical measures for dribbling, whit the mean (M) and the standard deviation (SD) per activity, grouped in blocks

				Block 2						Block 4			
	A 1	SSG1 S1	SSG1 S3	A 2	SSG2 S1	SSG2 S3	A 3	SSG3 S1	SSG3 S3	A 4	SSG4 S1	SSG4 S3	A 5
M	6,2	0	0	5,9	0	0	9,8	0	0	4,3	0	0	4,9
SD	3,9	0	0	5	0	0	5,8	0	0	3,4	0	0	4,2
	Block 1						Block 3						

Source: original formulation.

Table 11 – Skilling-Mack results for dribbling per block and assessments, with p-values and differences among Small-sided games (SSGs) during teaching sessions and Formal games (FGs) during Assessments sessions (As)

Model	Skillings-Mack	p-value	Differences among
Block 1	22,92	< 0,001	except between A1 and A2 and between SSG1S1 e SSG1S3
Block 2	19,50	< 0,001	except between A2 and A3 and between SSG2S1 e SSG2S3
Block 3	16,95	< 0,001	except between A3 and A4 and between SSG3S1 e SSG3S3
Block 4	17,30	< 0,001	except between A4 and A5 and between SSG4S1 e SSG4S3
Assess.	4,16	0,385	

Source: original formulation.

Shooting

A significant difference was observed only in Block 1 between the SSGs and the FGs, which was expected as this particular version of the SSGs did not involve shooting actions (Table 12 and 13).

Table 12 – Descriptive statistical measures for shooting, whit the mean (M) and the standard deviation (SD) per activity, grouped in blocks

				Block 2						Block 4			
	A 1	SSG1S 1	SSG1 S3	A 2	SSG2 S1	SSG2 S3	A 3	SSG3 S1	SSG3 S3	A 4	SSG4 S1	SSG4 S3	A 5
M	2,6	0	0	3,3	2,5	2,1	2,4	2,8	2,8	3,5	2,7	3,4	2,7
SD	1,9	0	0	2,4	1,9	1,4	0,9	1	1,3	1,9	1,7	3,4	1,3
	Block 1						Block 3						

Source: original formulation.

Table 13 – Skilling-Mack results for shooting per block and assessments, with p-values and differences among Small-sided games (SSGs) during teaching sessions and Formal games (FGs) during Assessments sessions (As)

Model	Skillings-Mack	p-value	Differences among
Block 1	18,74	< 0,001	except between A1 and A2 and between SSG1S1 e SSG1S3
Block 2	1,80	0,616	
Block 3	4,74	0,192	
Block 4	1,99	0,575	
Assess.	3,64	0,457	

Source: original formulation.

DISCUSSION

The current study aimed to examine whether the systematic practice of a specific category of SSGs combined with instruction effectively emphasizes the expected problems and actions, resulting in improvements (learning) in FG over time.

Our results revealed that the SSGs fulfilled their expected role. All versions with touch restrictions promoted a higher incidence of passes and unmarking movements compared to FGs. Over time, these actions emphasized in the SSGs showed an increased frequency and quality in FGs, while actions that were not emphasized remained constant, indicating an intervention effect.

It is interesting to observe how the pattern of ball circulation practised in SSGs appeared in FGs. Notably, there are several ways of playing (i.e., playing styles) (Rigon *et al.*, 2022), meaning various ways to solve game problems and improve performance to achieve team goals could emerge from practice (Araujo *et al.*, 2019). In the case of two-touch games, the exercised pattern was a "possession-based" style, i.e., a "less direct" way of playing that favours ball circulation through passing.

This manifestation in the FG situation of the ball circulation pattern practised in the SSGs provides evidence that an individual and collective playing style emerged throughout the intervention (Araújo *et al.*, 2019). We can even discuss whether it is the most effective way to win the game, considering numerous cases in Football/Futsal where a team with more ball possession is defeated. However, the impact of SSGs on individual and collective playing style seems it happened.

Regarding these results, games with touch restrictions can be an interesting tool for practising passing and unmarking movements to develop a more "possession-based" playing style. Nevertheless, it is necessary to use this category of games, or any other, critically, aligning it with the formative purposes of the group.

One possible critique of the excessive use of "two-touch" games is that they may create less incisive patterns of individual and collective action, relying less on dribbling and ball control, as these actions are significantly limited by the rules. Although we observed that the incidence of dribbling remained constant over time, we speculate that an insistence on "two-touch" games alone may lead to a reduction in these actions if not alternated with other SSGs that allow and value them.

Another potential critique is that these SSGs might pose excessive challenges for certain groups or individuals. For example, in a study conducted by Almeida *et al.* (2012) with boys up to 13 years old, there appeared to be difficulty in maintaining ball possession in the "two-touch games," which may be attributed to the lack of experience of the group. Hence, it is imperative to introduce these activities cautiously, ensuring they align with the group's and players' characteristics.

To the best of our knowledge, this is one of the first studies to follow a category of SSGs over time, observing whether they effectively promote the practice of expected problems and analysing the impacts of their systematic practice on performance in FGs. In our view, replicating this study and conducting further studies with different experimental designs, categories of SSGs, practice contexts, etc., would be interesting to investigate to what extent these teaching activities are fulfilling their role. These studies need not be limited to the academic sphere but should be part of the pedagogical or training routine, with some simplifications.

If learning in SSGs is consolidated through the repetition of solutions to specific problems resulting from the manipulation of task constraints, it is crucial to investigate whether these problems are practised with the necessary representativeness (Araújo *et al.*, 2019). We understand that analysing the actions promoted by SSGs alone, as most of the studies did, is insufficient, as they may emerge in a manner not suited to the demands of SSGs or the needs of the group, resulting in limited effects on performance/learning. Therefore, to "assess" this representativeness, there is no other out of observing the effects of the systematic practice of SSGs on performance in formal games.

CONCLUSION

The concept of representative learning design underscores the importance of structuring SSGs to mirror the perceptual and decision-making demands of the FG. By carefully aligning the design of SSGs, teachers/coaches can optimize teaching interventions to enhance skill transferability (learning) and performance outcomes in Futsal and other team sports.

The findings of our study demonstrated that these SSGs effectively fulfilled their intended role by effectively emphasizing and improving in FG the specific actions they were designed to address. While the results support the hypothesis that engaging in SSGs can be an effective approach to enhancing performance in FG settings, there is still much to explore

regarding the effects of these teaching activities. Future research should encompass a range of experimental designs and explore different categories of SSGs, practice contexts, age groups, experience levels, instructional methods, and teaching styles to develop a more comprehensive understanding of their impact.

Remarks and Limitations of the Study

The study has certain remarks and limitations that should be acknowledged and addressed in future research to ensure a more comprehensive understanding of the effects of SSGs. Firstly, it would be beneficial to explore different categories of SSGs that emphasize various problems, actions, and playing styles within the same or different groups. It would provide a more nuanced understanding of the impact of these teaching activities on performance and learning outcomes.

Another limitation to consider is the challenge of controlling participants' practice time in Futsal/Football beyond the study's teaching sessions. While it is a valid concern, it is not easy to control this variable fully, particularly in non-elite Football/Futsal contexts.

Additionally, attendance and dropout rates among participants pose challenges and potentially affect the study's findings. By acknowledging and addressing these limitations in future studies, we can better understand the effects of SSGs as teaching tools in sports education. It will contribute to the refinement of pedagogical practices and enhance the overall effectiveness of these interventions.

REFERENCES

ALMEIDA, Carlos Humberto; FERREIRA, Antonio Paulo; VOLOSSOVITCH, Ana. Manipulating task constraints in small-sided soccer games: Performance analysis and practical implications. **The open sports science journal**, v. 5, n. 1, p. 174-180, 2012.

ARAÚJO, Duarte *et al*. Ecological cognition: expert decision-making behaviour in sport. **International review of sport and exercise psychology**, v. 12, n. 1, p. 1-25, 2019.

BARBA-MARTÍN, Raúl A. *et al*. The application of the teaching games for understanding in physical education. Systematic review of the last six years. **International journal of environmental research and public health**, v. 17, n. 9, p. 1-16, 2020.

BAYER, Claude. **La enseñanza de los juegos deportivos colectivos baloncesto, fútbol, balonmano, hockey sobre hierba y sobre hielo, rugby, balonvolea, waterpolo**. Barcelona, España: Editorial Hispano Europea, S.A, 1986.

BUNKER, David; THORPE, Rod. The curriculum model. In: THORPE, Rod; BUNKER, David; ALMOND, Len (Eds.). **Rethinking games teaching**. Loughborough, England, 1986.

CHOW, Jia Yi; KOMAR, João; SEIFERT, Ludovic. The role of nonlinear pedagogy in supporting the design of modified games in junior sports. **Frontiers in psychology**, v. 12, p. 1-10, 2021.

DAVIDS, Keith; BUTTON, Chris; BENNETT, Simon. **Dynamics of skill acquisition**: a constraints-led approach. Champaign, USA: Human Kinetics, 2008.

GARGANTA, Julio; GREHAIGNE, Jean Francis. Abordagem sistêmica do jogo: moda ou necessidade. **Movimento**, v. 10, n. 5, p. 40-50, 1999.

GRAÇA, Amândio *et al.* O modelo de competência nos jogos de invasão: proposta metodológica para o ensino e aprendizagem dos jogos deportivos. In: IBAÑES, Sérgio José; FEU, Sebastian; RUBIO, Javier Garcia. **Los procesos de formación y rendimiento en baloncesto**: progresos científicos para su mejora, Sevilla, España: Wanceulen, 2019.

GRAÇA, Amândio; MESQUITA, Isabel. A investigação sobre os models de ensino dos jogos desportivos. **Revista portuguesa de ciência do desporto**, v. 7, n. 3, p. 401-422, 2007.

GRÉHAIGNE, Jean-Francis; WALLIAN, Nathalie; GODBOUT, Paul. Tactical-decision learning model and students' practices. **Physical education and sport pedagogy**, v. 10, n. 3, p. 255-269, 2005.

KINNERK, Paul *et al*. A review of the game-based approaches to coaching literature in competitive team sport settings. **Quest**, v. 70, n. 4, p. 401-418, 2018.

MAHLO, Freidrich. **O acto tático no jogo**. Lisboa, Portugal: Compendium, 1974.

NOVAES, Rafael Batista; RIGON, Thiago André; DANTAS, Luiz Eduardo Pinto Bastos Tourinho. Modelo do jogo de futsal: subsídios para o ensino. **Movimento**, v. 20, n. 3, p. 1039-1060, 2014.

OMETTO, Lucas *et al*. How manipulating task constraints in small-sided and conditioned games shapes emergence of individual and collective tactical behaviours in football: a systematic review. **International journal of sports science & coaching**, v. 13, n. 6, p. 1200-1214, 2018.

OTTE, Fabian W. *et al*. When and how to provide feedback and instructions to athletes? How sport psychology and pedagogy insights can improve coaching interventions to enhance self-regulation in training. **Frontiers in psychology**, v. 11, p. 1-14, 2020.

RIGON, Thiago André *et al*. A elaboração de uma matriz de referência para o ensino de jogos esportivos coletivos. **Corpoconsciência**, v. 24, p. 172-186, 2020.

RIGON, Thiago André *et al*. Modelo de jogo, estratégia de jogo, estilo de jogo e tática de jogo: concepções úteis para compreender o contexto do jogo esportivo. **Corpoconsciência**, v. 26, p. 216-235, 2022.

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