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COACHES' PERSPECTIVES OF THE USE OF SMALL-SIDED GAMES IN THE PROFESSIONAL SOCCER TRAINING ENVIRONMENT

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Authors' contribution:

A. Study design/planning
B. Data collection/entry
C. Data analysis/statistics
D. Data interpretation
E. Preparation of manuscript
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G. Funds collection

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Abstract:

Objective: The utilization and variation of small-sided games (SSGs) in team sports have garnered increased attention in recent years. This study aimed to explore the application of SSGs in high-performance soccer using qualitative methods.

Methods: Five high-performance soccer coaches participated in semi-structured interviews. A reflexive thematic analysis was conducted, revealing six key themes: 1) the relevance of SSGs, 2) variations in SSGs, 3) the role of SSGs in planning and periodization, 4) the diverse functions and meanings of SSGs within a high-performance team, 5) decision-making and creativity in SSGs, and 6) the emphasis on tactical development through SSGs.

Results: The findings highlighted the integral role of SSGs in the coaches' training routines, particularly on microcycle days -4 and -3, and for both substitute and starting players. Coaches identified the number of players and pitch dimensions as primary constraints to manipulate. The leadership of SSGs was typically delegated to assistant coaches to enhance the physical and enjoyment aspects. SSGs were predominantly used to develop positional play, with specific playing positions constrained in various pitch areas to elicit targeted behaviors. Furthermore, SSGs were employed to enhance players' decision-making and creativity by providing game-like scenarios that encourage spontaneous problem-solving.

Conclusion: This study underscores the critical importance of SSGs in high-performance soccer training, offering practical insights for coaches and theoretical implications for researchers. Coaches can leverage SSGs to replicate match demands, foster tactical understanding, and enhance player engagement.

Introduction

A wide range of research have emerged over the last two decades emphasizing the use of game-based situations as a coaching method to enhance players' performance [1]. It has been argued that the use of game-based situations would help the players to develop and refine their motor skills in accordance with the environmental information [2], such as the teammate and opponents positioning [3,4], the ball location, and in relation to the game rules, through an ecological approach [5].

Small-sided games (SSGs), also known as skill-based conditioning games, game-based training, or small-sided and conditioned games, are modified training formats played in adjusted areas, with adapted rules and/or involving a reduced number of players in relation to the competition [6]. Such formats are typically employed on the premise that it allows to concomitantly develop players' physical, technical, and tactical behaviours [7]. One advantage is that coaches can plan and emphasize the players' running demands, motor skills, and space exploration as result of modifying different task constraints [2].

These practices tend to be representative of the match scenarios because they expose players to dynamic and unpredictable situations through teammates' cooperative behaviours and opponents' competitive interactions under specific game rules [8]. Consequently, the interest in the use of SSGs has been growing, leading to the emergence of a wide scope of original investigation and reviews exploring the effects of different rules, playing area dimensions, number of players, goals, or touches, among others, on the physical, technical, and tactical behaviours of soccer players [5,9,10].

A few studies have attempted to explore the coach's perceptions on the use of SSG in the team preparation through semi-structured interviews [11–13]. Coaches consider SSGs to be important in the process of preparing their team for competition [12] and to allow concurrent development of tactical and physical skills [11]. Particularly, coaches reported that SSGs are essential in their training methodology to establish direct association with specific game moments and the competition [11]. As such, SSGs are adopted in the daily training routines and throughout the season [13].

While the effects of SSGs on various aspects of team sports (such as physical fitness, technical skills, tactical understanding, and psychological components) are well-documented, there remains a significant gap in understanding how professional soccer coaches perceive and implement these tasks within their training routines. Coaches' perspectives are crucial as their experiences, beliefs, and strategic decisions directly influence the practical application of SSGs, impacting their effectiveness. As well, despite the relevant scientific insights with a practical implication, previous research has mainly been conducted at the academy level or semi-professional environments through quantitative methods. It remains unclear how high-performance soccer coaches perceive and manipulate the use of SSGs in their practise. Therefore, using a qualitative approach can provide valuable insights about how coaches envision their own practices and their rationale for decision making [14]. Such line of inquiry may help coach education programs, sport organizations and high-performance coaches reflect on the influence of experiential, social, and cultural factors on planning and periodisation, which subsequently may provide solid grounds for more effective reflexive practices and better learning opportunities for players.

Said that, this study aims to explore coaches' insights to uncover the rationale behind their use of SSGs, the specific methods and variations they employ, the challenges they encounter, and the perceived benefits and limitations of SSGs from a coaching perspective. Addressing this gap is essential to bridging the divide between theoretical benefits established in research and the practical realities faced by professional soccer coaches, thereby informing best practices, and contributing to the development of more effective coaching education programs. Specifically, the study seeks to understand how coaches define SSGs and the perceived benefits these games offer in training sessions [11]. It aims to investigate the timing and frequency of SSG implementation throughout the training calendar and how coaches adapt these games to develop specific fitness components and tactical aspects of play [13]. Additionally, the study intends to examine the constraints and rules coaches manipulate within SSGs to achieve desired training outcomes and the role of SSGs in fostering decision-making and creativity among players [12]. By addressing these questions, the study aspires to fill existing gaps in the literature and provide a comprehensive understanding of the practical applications and theoretical underpinnings of SSGs in high-performance soccer coaching.

Materials and Methods

Researchers' Positioning

Considering the purpose of the present study, the research team adopted a relativist ontology and constructionist epistemology, highlighting the importance of perceived experiences and the pivotal role played by social interactions. This is a co-constructed process, engages researchers and participants, involves events, and captures how individu-

als perceive knowledge and how these perceptions are grounded on social interactions [15]. Therefore, the present study results from a reflexive and collaborative process between researchers and coaches, all with their unique identities, beliefs, experiences, and critical awareness [14].

To help readers critically reflect on the present study, it is important to stress that all authors of this research have a Higher Education degree. Particularly, authors 1, 2, 3, and 4 completed a PhD in Sports Science, while author 5 has a MSc. From a coaching experience, authors 1, 2, 3 and 5 completed UEFA soccer courses and have been engaged in the coaching process, including planning, and delivering sessions, and performance analysis. Author 4 is an innovative soccer researcher, attending conferences worldwide. Specifically, author 5 works as Head of Fitness in a high-performance club that regularly participates in the Asian Champions League, with previous experience in different worldwide clubs and leagues/tournaments, including FIFA Club World Cup and UEFA Champions League. Authors 1, 2, 3, and 4 are university lecturers, teaching modules to BSc and MSc university students, and delivering workshops and continuous professional development courses to different soccer associations.

Participants

Five male soccer coaches participated in this investigation (Table 1). The number of participants was determined based on theoretical saturation [16]. All coaches possessed the UEFA Pro Football (Soccer) Coaching qualification and have numerous years of experience in high-performance soccer across different environments. At the time of data collection, all individuals were employed as Head Coaches in Professional Soccer (adult male contexts) or at the Professional Development Phase (Under-23 and Under-19) across different countries. The participants' diverse experiences, beliefs, values, and cultures facilitated a completer understanding about SSGs through a multitude of lenses and ontologies [16,17]. After ethics approval by the local Institutional Research Ethics Committee, written and informed consent was provided by the coaches before the beginning of data collection. All participants were notified that they could withdraw from the study at any time. To ensure anonymity, participants were given a number (e.g., Coach 1).

Table 1. Professional soccer coaches' characterisation.

Coach 1	Ex-professional soccer player with international playing experience in different countries. Represented a South American Soccer Confederation (CONMEBOL) National Team as player. Soccer Head Coach in different divisions and countries, with experience managing in international competitions. National Team Head Coach in a Union of European Football Associations (UEFA) country. 16 years playing experience. 17 years coaching experience.
Coach 2	Ex-professional soccer player in the United Kingdom. Previous experience as Head of Academy and 1st Team Head Coach in the United Kingdom. Head Coach in the Scottish Premiership. Soccer coach educator. 17 years playing experience. 10 years coaching experience.
Coach 3	BSc in Sports Science and Physical Education. Career started as Academy Coach and Assistant Head Coach. Head Coach, with experience in different countries and continents. Previous Asian Football Confederation (AFC) champion. 25 years coaching experience.
Coach 4	Ex-professional soccer player in the United Kingdom, but never played in the highest league. Early career finisher. Previous experience as a younger Academy Manager, 1st Team Assistant Manager and Head of Academy. Currently Under-23 Head Coach in an English Premier League soccer club. 5 years playing experience. 9 years coaching experience.
Coach 5	Ex-professional soccer player in the United Kingdom. Under-19 Head Coach in an English Championship soccer club. National Team Head Coach in a Confederation of North, Central America and Caribbean Association Football (CONCACAF) country, with also experience representing it as soccer player. 13 years playing experience. 7 years coaching experience.

Procedures

Data was collected using an individual semi-structured interview guide with 27 questions (Table 2). Questions were shared with a group of soccer coaches and researchers, and the final amended interview guide was attained after suggestions for minor corrections (e.g., how do you manipulate SSGs in accordance with the microcycle day?) and additions (e.g., what constraints do you usually manipulate to develop your topics? Can you provide any examples?). Due to the geographical distance between the interviewer and the participants, an online interview through video-conference with synchronous communication was conducted [17]. As per the number of questions proposed, each interview lasted for approximately 45 minutes. All interviews were recorded using a Dictaphone and later transcribed to Microsoft Word, and then sent to each coach for their approval through a member-checking technique [11–13]. Every meeting with the different coaches followed the guidelines proposed by [17] for procedures before, during, and after an interview. Interviews were conducted for two months in the off-season period.

Table 2. Applied individual semi-structured interview questions.

1.	How do you define SSGs?
2.	Do you use SSGs in your daily routine? How often?
3.	In your opinion, what are the benefits of using SSGs?
4.	Is there any specific time of the year/calendar where you more often use SSGs?
5.	Do you use SSGs to develop any specific moment or principle of the game?
6.	How do you use SSGs to develop specific fitness components?
7.	What considerations do you take when planning SSGs for training sessions?
8.	In what part of the session do you usually include SSGs?
9.	Do you believe it is possible to build up a game model using SSGs?
10.	What constraints do you usually manipulate to develop your topics? Can you provide any examples?
11.	How do you manipulate SSGs in accordance with the microcycle day?
12.	How do you manage the use of SSGs, MSGs and LSGs within you microcycle?
13.	Number of players and size of playing area are the most common constraints manipulated by coaches. How do you control these specific variables to achieve your intended goals?
14.	Do you use coach encouragement during SSGs practice, or are you quiet analysing the task? How does your adopted behaviour influence your players' performance?
15.	Do you believe the inclusion of small goals or the use of GK during SSGs influence your players' performance? In which way?
16.	Is there any specific constraint you are likely, or you preferably use, when planning and delivering SSGs?
17.	What kind of rules do you adopt in your SSGs tasks to achieve certain goals?
18.	Do you look to develop decision making within your planned SSGs? If so, what type of constraints do you use to achieve your intended behaviours?
19.	How do you look to develop creativity of players using SSGs?
20.	Are you likely to plan and deliver SSGs tasks in accordance with the next opponent?
21.	Do you take the lead of planning and delivering SSGs in your sessions? Or do you delegate this to your staff?
22.	How do you measure the effectiveness of the use of SSGs on players' performance?
23.	How can you live analyse SSGs in a training session? And how do you usually review them after session?
24.	How do you think players react to the use of SSGs?
25.	Are SSGs an important part on players individual development?
26.	Is there any age group or level of specialisation where you consider the use of SSGs more relevant or beneficial for players and teams?
27.	What advise can you give to coaches when thinking of using SSGs in their training sessions?

SSGs – Small-Sided Games; MSGs – Medium-Sided Games; LSGs – Large-Sided Games; GK - Goalkeeper

Data Analysis

A Reflexive Thematic Analysis (RTA; [14] was conducted to identify patterns across the qualitative dataset and describe and interpret latent meanings [16]. A deductive-inductive approach was used to develop new meanings from data as well as to apply a theory-driven framework guided by ecological lenses. The analysis was produced through the intersection of the theoretical assumptions, disciplinary knowledge, research skills and experience, and the content of data themselves [16]. The analysis involved diverse fluid steps: data familiarization; coding (i.e., development of codes and topics); theme development; theme refinement; naming; and writing the final report [14].

First, the research team read and re-read the transcripts (i.e., four pages per coach and 20 single-spaced pages in total) with the aim of understanding data and developing initial codes. Throughout the analysis, researchers read the transcripts again to revisit meaning and contextual information. This process was pivotal in informing the latent semantical components of the analysis. Codes were developed into topics which represented more complex understandings about the data, but still superficial, unrefined, and unpolished (i.e., semantical component of the analysis).

Then, topics were developed into themes and subthemes were provided for rich and in-depth representations of the dataset (i.e., latent component of the analysis). Subsequently, themes were refined to best align with the participants' perceptions and the purpose of the study. The final stages of the analysis included writing the results section to provide a coherent storyline. The themes that resulted from this process were: 1) the relevance of SSGs, 2) SSGs variations, 3) SSGs in the planning and periodisation processes, 4) the diverse roles and meanings of SSGs within a high-performance team, 5) decision making and creativity implicit into SSGs, and 6) highlighting tactical development in SSGs (Table 3). As per guidelines provided by [18] which have implications across fields and aligned with the current ontological and epistemological positioning, the quality of the analysis was increased through a co-constructed process of data analysis that actively involved the participants (i.e., through diverse discussions). Further, the first author who led the analysis engaged in discussions with the co-authors that, through their diverse expertise and experiences, provided alternative insights and explanations throughout the analysis. More than reaching consensus, this was a process of open discussions and critique to create a complex and complete storyline.

Table 3. Thematic Analysis categories and interview statements.

Categories	Interview statements
The relevance of SSGs	SSGs recreate game situations with a smaller number of players in reduced areas. It is important to improve fitness with ball as it allows to develop specific soccer components in intensity (Coach 1).
	SSGs are a reduction of the formal game, with lower number of players, in a small playing area, with high contact and higher repetitions. SSGs recreates a lot of match demands and with a lot of competition and freedom, promoting motivation to the players and the team (Coach 2).
	I always thought the training process in an ecological approach, so it is of upmost importance to bring the match demands to our training session. The training process can be divided, but not disintegrated. And that is why SSGs can be a powerful tool used by coaches to improve team and players' performance (Coach 3).
	SSGs are realistic training tasks, that aim to look like the 11v11 game. They are important to use, especially with younger ages, as coaches don't have enough number of players to train the 11v11 (Coach 4).
	It allows to provide a big technical component under pressure, with a competitive scenario, in 1v1 and 2v2 situations, being aggressive and using different sectors of the pitch against each other (e.g., attackers vs defenders). It also allows to develop physical components alongside the soccer side. And the social and psychological aspects of the game, so important at this stage: emotion, frustration, overcoming difficulties, manipulation of game scenarios (e.g., wrong referee decision) (Coach 5).
SSGs variations	We will be looking at the space we need and even support players or number of touches. It is important to have a set of rules and I think it is important to let the players know the reason of the SSGs (Coach 1).
	Playing areas and number of players are the main considerations we take when planning SSGs. Large playing area with lower number will be used to develop anaerobic endurance, while a small playing area with higher number to stimulate the aerobic system. The use of finishing scenarios, such as GKs, mini goals or end zones are also constraints we adopt to develop certain parts of the game (Coach 2).
	Number (including unbalanced scenarios), playing area, number of touches, finishing type (GK, mini goals, finishing zones). For example, we tend to increase the playing area to develop acceleration, deacceleration and dribbling. But we also tend to increase the number of players, as also as numerical superiority, to develop the ability to keep ball possession and passing circulation (Coach 3).
	We use extra players, overloads, specific position where certain players need to receive, certain zones to miss out or play through, players locked in, rules for scoring and specific players (e.g., if you score you keep the ball to encourage players possession). We always have direction or finishing situations in SSGs, but not always needing of a GK. Target or mini goals provide realism and an outcome to the task. We also tend to incorporate set-pieces, such as throw-ins (Coach 5).
SSGs in the planning and periodisation processes	From the second week of the pre-season, we tend to introduce SSGs, to improve fitness components and prepare players to competition. During season, in a regular week, we use 100% SSGs on the day -4. In a week with a game in the middle, we tend to use SSGs more often for players without match time to offset the intensity of the match. We work from SSGs, to MSG and to LSG, particularly on day -4 and -3. In these days, we normally include SSGs at the middle of the training session, after a specific warm up and ball drills. We don't like to use it at the end as it increases the risk of injury due to players' fatigue (Coach 1).

SSGs in the planning and periodisation processes	During pre-season we tend to work from the 11v11 to the use of SSGs, so we can increase intensity. From a microcycle perspective, on day -4 we use small playing areas with lower number of players, to increase transitions, and on day -3 we have higher playing areas and small number of players. In international breaks or calendar stoppages, we will use them a lot as well to keep the players ready for competition (Coach 2).
	SSGs are usually played at the end of the training session, for maximal actions, but lower repetitions. When looking for a more strategic and tactical approach, we tend to use before the last global component. In a microcycle with a match per week, it is always used on the -4 day, alongside with power. When there are more matches a week, we use SSGs specially for the players that did not play. The incidence decreases over the season. We use more SSGs during preseason, and we decrease its use as the seasons is coming to an end (Coach 3).
	We may use them more at the end of the calendar to have players engaged as they feel tired by then. However, for instance and during pre-season, we can also get more in from the SSGs in between friendlies. Before, coaches used to have SSGs only at the end, and now it become much more embed in training due to their ecology. At the end of the session is always constructive to use them as they are positive, providing a good social side and players want to come back later. But also, at the beginning will allow players to be engaged to the rest of the session. Even in a match day or day before, allowing the players to be ready to compete (Coach 4).
	We mostly use at the end, to also work with GKs and develop team principles under pressure, and mental and physical fatigue (Coach 5).
The diverse roles and meanings of SSGs within a high-performance team	If the SSG is about physical and enjoyment, I let my assistants to work more on them. If it is having a strong tactical component, it will be led by me from the first moment (Coach 1).
	When delivering, I like to be away from that to have a better picture and not have confrontation with players. I don't want to confront a player that had a bad decision in certain moment of the SSG. In that situation, players are not likely to think properly (Coach 2).
	It is important to control external and internal loads, by using global position systems or heart rate, so we are aware of the exercise intensity. Normally, I tend to be more away during SSGs. But my coaching staff behaves like me, so they need to strengthen the task with encouragement and feedback, which can be positive or negative, depending on the needs and player's individualities (Coach 3).
	Sometimes, I like to see them without encouragement, specially to see the tactical outcome and observe what players understood from the planned task. But sometimes, if we need a more physical outcome, we speak to them in between sets to give them specifically feedback (Coach 4).
Decision making and creativity implicit into SSGs	We need to make the players developing certain actions, as much as possible, to promote a habit thinking, to make a constant decision and the knowledge of how to act. In SSGs, the decision will be natural due the number of repetitions. With reduced space and time, players need to be quicker and think fast, sometimes without even thinking. (Coach 1).
	We need to allow freedom for the players, to involve a lot of 1v1 and constraint defenders to stay in certain areas to promote those situations. We like players to be free during the tasks, not structured, not overcoaching them, understand what the players want, and let them have mistaken (Coach 2).
	If we want to develop decision making, we tend to increase the playing area to work without pressing. When our players understood that specific game idea, we then can decrease the playing area to work under pressure, and so on to develop the cognitive components. If we reduce the number of touches on the ball, players won't be able to develop this creativity as they will be forced to use more of passing rather than dribbling (Coach 3).
	Decision making is difficult to coach and develop, because you can't touch it, you can't lively say decision making is improving, and I think SSGs is a vital tool to make quicker decisions in small playing areas. By using SSGs we can increase the degree of freedom and we encourage players to show their individual brilliance (Coach 4).
	For example, the constant flow of balls coming in will help the process of decision making. Sometimes we have bounce games, with one team in the outside at 1 touch to develop specifically technical aspects, so they need to learn how to use their body to have success. We look to match up the players. We need to make sure players have success, so sometimes we need to combine players if a defender is stronger, as such 2v1, or a 1v1 with a lower-level defender. Keep it competitive, not restricting the number of touches, but look at tempo and not restrictive movements, so we tend to look at the quick touch, according to opponent and surrounding area (Coach 5).

Highlighting tactical development in SSGs	We like to use SSGs to develop positional play, to work on body angles and movements off the opposition. Particularly from a defensive perspective, it allows to create a guided discovery where players are looking to understand the space available or when to press (Coach 1).
	We tend to use game areas for certain players to allow the creation of positional game and relationship between sectors, as also as certain aspects of the game model, such as progressive progression (Coach 2).
	We can use a SSGs in a specific part of the pitch; in the wing channel, we can manipulate the game to force the players to build up the game from the back and progress through the halfway line. As an example, when working on progressive progression, we can work on a 5v3 in the channel and then progress to a full width 10v7 in ¾ pitch. (Coach 3).
	We look to develop overloads, 3v2 and 2v1, manipulating the areas with attacking combinations in underlapping and overlapping running, including 1 or 2 touches to allow quick offensive transitions. So, we try to use SSGs to develop the team aspects, but also able to work towards the needs of the movement, for the moment, in accordance with opponent, teammate, ball and goal. As well, touches restriction to develop team combinations and relationship between players. Look at the game, look at the stats and its analysis, and breakdown to a SSG. For example, finishing with 1 touch, and if players take more, they have straight pressure. And this is what we see in the game (Coach 5).

SSGs – Small-Sided Games; MSGs – Medium-Sided Games; LSGs – Large-Sided Games; GK - Goalkeeper; GPS – Global Position System; HR – Heart Rate

Results and Discussion

The objective of this study was to understand the use of SSGs by soccer coaches in the high-performance context. Data was collected through semi-structure interviews from coaches in the Professional Development Phase or at Senior Elite Level. A total of six themes were developed from the Reflexive Thematic Analysis of the twenty-seven questions presented to the five different coaches: 1) the relevance of SSGs, 2) SSGs variations, 3) SSGs in the planning and periodisation processes, 4) the diverse roles and meanings of SSGs within a high-performance team, 5) decision making and creativity implicit into SSGs, and 6) highlighting tactical development in SSGs. Data is presented through quotes from coaches and followed up by references (in brackets) to indicate similarities with existing literature. As expected, coaches tend to use SSGs as part of their periodised week, with a higher incidence on Matchday (MD) -4 and -3. Coaches also referred the predominant use of SSGs to develop fitness levels, and to work on positional play, constraining specific playing positions on their zones of action on the pitch. All coaches agreed that SSGs motivate players to perform, due to the integration of all soccer components at the same time, being usually the players' favourite part of the session.

The relevance of SSGs

Coaches considered SSGs as training tasks played with lower number of players performed in a reduced area, with the aim to replicate the match demands, and allowing more repetitions with a certain amount of freedom. Coach 1 reinforced the relevance of using SSGs across high-performance contexts "to improve fitness with the ball as it allows to develop specific soccer components in intensity" with in an "interval intermittent training regime" (added by Coach 3), while Coach 4 considered it important to use "different sectors of the pitch against each other". Coach 5 also referred that "agility, coordination, reaction and ability to read the game are very important when using SSGs, rather than only isolated practises". Those comments align with previous research that identified the benefits of using SSGs to improve physical parameters (Owen et al., 2014). Therefore, rather than providing isolated physical stimuli to players in a decontextualised environment, coaches can manipulate SSGs to replicate match-like demands, and concomitantly develop all soccer components at the same time, in exact zones of the pitch with specific playing positions [19,20].

Remarkably, Coach 3 believed the training process should be considered from an ecological approach: divided, but not disintegrated [8,21]. This coach mentioned: "And that is why SSGs can be a powerful tool to be used by coaches to improve team and players' performance… as they are more real". It was well accepted by every coach that these tasks promote "motivation to the players and the team" (Coach 2), and if players could choose, they would want SSGs in every session (Coach 1). These two last coaches also recalled their time as soccer players and remembered the SSGs as their favourite part of the session and were always looking forward for the weekly session on these tasks. Finally, Coach 3 mentioned "players love SSGs, they love competition… when we are training at high

intensity, having competition with ball will always be a differential factor of extra motivation… we also want to incite this winning mentality, to develop a winning culture in the club".

The insights gathered from the coaches' perspectives underscore the multifaceted benefits of incorporating SSGs into soccer training sessions. Coaches unanimously recognised SSGs as valuable tools for replicating match demands, fostering player motivation, and promoting holistic player development. Moreover, the ecological approach advocated by Coach 3 highlights the importance of integrating SSGs seamlessly into training regimens, ensuring that the training process remains cohesive and contextually relevant. The coaches' testimonials also emphasise the intrinsic appeal of SSGs to players, with many recalling their own positive experiences and highlighting the motivational impact of the competitive match. Importantly, the emphasis on fostering a winning mentality and developing a culture of success underscores the broader implications of SSGs beyond physical and technical development. Overall, the collective insights underscore the pivotal role of SSGs in enhancing team performance, player engagement, and cultivating a culture of excellence within soccer clubs.

SSGs variations

There was consensus amongst the coaches that playing area and number of players are the main constraints to consider when planning SSGs, in line with previous studies [6,7]. Coach 2 referred that "a large playing area with lower number of players will be used to develop anaerobic endurance, while a small playing area with higher number of players to stimulate the aerobic system", and Coach 3 mentioned that he "tends to increase the playing area to develop dribbling … and increase the number of players, and the numerical superiority, to develop the ability to keep ball possession and passing circulation". These coaching perceptions come in line with studies from [3,4], that referred the use of large playing areas and numerical superiority affords the development of tactical individual actions in ball possession, without the constraint of pressing.

In regards other task constraints manipulation, the "number of touches, finishing type (e.g., GK, mini goals, finishing zones)" (Coach 3) and "extra player, overloads, specific position, … rules for scoring" (Coach 4) were used to manipulate SSGs for planned behaviours according with the intended game model for the team, but also to incorporate set-piece development (Coach 5). Particularly at the academy level, Coaches 4 and 5 considered the number of available players for each session to be important for U19s and U23s as this often fluctuated to serve the needs of the first team. Planning needed to be daily adjusted, and the use of SSGs seemed to be an important strategy for mixing different age groups. SSGs were viewed as a pedagogical resource for planning and periodisation that automatically generated learning through a guided discovery paired with feedback and appropriate support [1]. However, aligned with past research, players' understandings about the usefulness of these tasks seemed to be critical for meaningful learning [22], as referred by Coach 1: "it is important to let the players know the reason of the SSGs", so they are aware of the outcomes expected.

Coaches' perspectives underscored the significance of carefully manipulating constraints, such as playing area and number of players, when planning SSGs in soccer training sessions. Their insights align with previous research, emphasising the role of these constraints in shaping tactical and technical development. Furthermore, the coaches highlighted the importance of adapting SSGs to suit the developmental needs of different age groups within academy settings, necessitating flexible planning and daily adjustments. The pedagogical value of SSGs as a tool for guided discovery and learning was also underscored, particularly when paired with clear communication and feedback to players. However, the coaches emphasised the crucial role of players' understanding and buy-in, highlighting the need for transparent communication regarding the objectives of SSGs to maximise their effectiveness in promoting meaningful learning experiences. Overall, their insights offer valuable guidance for coaches seeking to optimise the use of SSGs in soccer training, emphasising the importance of strategic constraint manipulation and effective communication with players.

SSGs in the planning and periodisation processes

During the macrocycle, every coach acknowledged the importance of using SSGs from pre-season through the end of the season. To illustrate, Coach 1 tended to introduce SSGs from the second week of pre-season, while Coach 2 started pre-season "to work from 11v11 to the use of SSGs". This coach aims to start working on the main principles of play, at the same time as players return to training with low intensity stimulus, to gradually develop sub-principles of play under fatigue, by using SSGs to increase intensity of the task and promote specific demands for their own individualities.

Coach 4 also emphasised the role of using SSGs "more at the end of the season to keep players engaged as they feel tired by then". However, Coach 3 mentioned the use "of SSG decreases over the season, as towards the end of

the competitive calendar their training aims were more strategic". Coach 4 works at the Professional Development Phase and is aware of a natural lower match intensity compared to senior level [19]. However, young players can be called to the first team and would therefore benefit from SSGs played at a higher intensity to reduce the risks of suffering from overuse injuries [20].

From a microcycle perspective, all coaches agreed the predominant use of SSGs on MD -4 and MD -3. For example, Coach 2 mentioned "on MD-4, we use small playing areas with lower number of players to increase transitions, and on MD-3 we have greater playing areas and small number of players", while Coach 3 said "a SSG is always used on MD-4, alongside with power". Interestingly, Coach 1 and 3 mentioned the exclusive use of SSGs for starting or substitute players through the microcyle, and Coach 2 tended to include the use of more regular SSGs in international stoppages "to keep players ready for the competition". Coaches seem to promote specific workload for players by using SSGs, periodising the physical capacities alongside the manipulation of constraints to achieve intended outcomes [7].

From a session planning perspective, Coach 4 mentioned "coaches used to have SSGs only at the end, and now it become much more embedded in training". There were some considerable contrary opinions amongst the coaches on the timing of the SSGs. Coach 1 included "SSGs at the middle of the training session... as at the end it increases the risk of injury due to players fatigue", which is opposite to Coach 3 who mentioned that "SSGs are usually played at the end of the training session for maximal actions, but lower repetitions" and Coach 5 planned SSGs "mostly at the end, to also work with GKs and develop team principles under pressure with mental and physical fatigue".

Coaches provided valuable insights into the strategic use of SSGs across the macrocycle and microcycle of soccer training. Their approaches varied, with some coaches favouring the early introduction of SSGs during pre-season to gradually increase intensity and develop specific demands, while others emphasised their use towards the end of the season to maintain player engagement and strategic training aims. Interestingly, there was consensus among coaches regarding the predominant use of SSGs on specific days within the microcycle, with MD -4 and MD -3 being highlighted as key periods for SSG implementation. Moreover, coaches recognised the importance of tailoring SSGs to suit the developmental needs of players at different levels, from academy to senior teams, and adapting session planning to optimise workload and minimise injury risks. Despite some discrepancies in opinion regarding the timing of SSGs within training sessions, the coaches' perspectives collectively underscored the versatility and effectiveness of SSGs as a pedagogical tool for promoting tactical, technical, and physical development in soccer players throughout the training season.

The diverse roles and meanings of SSGs within a high-performance team

All interviewed coaches tasked their assistants on leading the SSGs to further strengthen the link between the physical component and enjoyment of SSGs. Coach 2 refrains from any tactical involvement, because he does "not want to confront a player that had a bad decision in the SSG", as players may spontaneously react due to task involvement/ excitement. As well, Coach 4 preferred most of the time "to see players' performance in SSGs without encouragement, specially to observe the tactical outcome and what players understood from the planned task". However, this coach mentioned they would step in the task with encouragement if players "need a more physical outcome" or any specific feedback necessary to achieve success in the task. This would only occur in between sets and not in the middle of the task. Coach 1 observes the communication amongst players and believes that "if they keep talking to each other, they are looking to find new solutions for the problem". These coaches' ideas align with principles of promoting guided discovery [5]. On the other hand, [23] mentioned there is some impact of active coaching on the physical performance on players. Interviewed coaches choose to not actively coach, but that might compromise on the physical component of the SSG.

All coaches also referred to the importance of monitoring intensity "to control external and internal loads by using global position systems or heart rate" (Coach 3). Therefore, coaches worked in collaboration with Sports Science and Performance Analysis departments and planned specific constraints to achieve intended goals, monitored the SSG live (e.g., emphasise recovery between sets and encouragement to achieve the SSG target), and analysed and interpreted outcomes. Despite this, all coaches stressed they used their "own judgment to understand and adapt SSG tasks" (Coach 2) as "the immediate analysis on the moment will always be coach perception" (Coach 3). Interestingly, Coach 3 also mentioned they "want to have the players' perception of exercise, so we keep asking them during session and during the different tasks" to adapt any momentary constraint and to keep a record for future practises.

Coaches' perspectives shed light on the multifaceted role of coaches in guiding SSGs within soccer training sessions. While all coaches delegated the leadership of SSGs to their assistants, they maintained a keen focus on monitoring player communication and task engagement, recognising the potential for spontaneous player reactions

and the importance of promoting guided discovery. However, the coaches' reluctance to actively coach during SSGs, aimed at preserving the enjoyment and tactical exploration of players, raised concerns about potentially compromising the physical component of these tasks. Nonetheless, coaches emphasised the importance of monitoring intensity and collaborating with sports science and performance analysis departments to ensure the effective implementation of SSGs. Their reliance on personal judgment and player feedback highlights the dynamic and adaptive nature of SSG planning and underscores the ongoing need for coaches to balance tactical objectives with physical development in SSG-based training sessions.

Decision making and creativity implicit into SSGs

The benefits of SSGs are illustrated by several coaches: "the decision will be natural due the number of repetitions" (Coach 1), and "using SSGs we can increase the degree of freedom and we encourage players to show their individual brilliance" (Coach 2). It was acknowledged that small playing areas in SSGs are a feasible manipulation for coaches: "a vital tool to make quicker decisions in small playing areas" (Coach 4), "with reduced space and time, players need to be quicker and think fast, sometimes without even thinking, … on an instinctive way and in reaction" (Coach 1), and "the repetition of certain aspects will allow players to make better decisions in the game" (Coach 2). As an example, Coach 3 "tend to increase the playing area to work without pressing, … then decrease the playing area to work under pressure, and so on to develop the cognitive components". Coach 5 also mentioned the importance of having placed balls around the playing area, so players will keep high tempo in the match and potentially fail, so "they will learn from there and not repeat the movements".

Coach 1 defined SSGs as "very closed to understanding the game and to make right decisions" which they found important for the promotion of creativity. Coach 2 considered the "need to allow freedom for the players, to involve a lot of 1v1, … not structured, not overcoaching them, … let them have mistaken". This coach considered SSGs as like street football, where players return to the basics of soccer and they "are exploring and enjoying themselves", while Coach 3 believed "SSGs allow to develop creativity by itself, it is almost as the players were playing in the streets as before and need to find solutions for their problems".

Another worthwhile strategy used by Coach 5 is to match up the players by combining stronger individuals in numerical inferiority to increase the difficulty of the task for some individuals, but making sure the success can be achieved. Number of touches on the ball was also discussed, and it was considered a restriction that would influence creativity. For instance, Coach 3 mentioned "if we reduce the number of touches on the ball, players will not be able to develop this creativity as they will be forced to use more of passing rather than dribbling", and Coach 5 would like to "keep it competitive, not restricting the number of touches, but look at tempo and not restrictive movements, so we tend to look at the quick touch, according to opponent and surrounding area" This last coach finished stating, "too many restrictions make them get lost… it is important to force some behaviours, in a balanced way".

Coaches' perspectives underscored the diverse benefits of SSGs in soccer training, ranging from the promotion of decision-making and cognitive components to the fostering of creativity and individual brilliance. The consensus among coaches emphasised the importance of manipulating playing areas and task constraints to create environments that challenge players and encourage spontaneous, instinctive reactions [2]. Coaches highlighted the role of SSGs in replicating the conditions of street football, where players are free to explore and enjoy the game without excessive structure or overcoaching [24]. Moreover, strategies such as matching up players and manipulating the number of touches on the ball were discussed as means to enhance creativity and maintain a competitive yet balanced environment. Ultimately, coaches recognised the delicate balance between imposing constraints to shape behaviours and allowing freedom for players to express themselves, emphasising the need for thoughtful planning and moderation in SSG design.

Highlighting tactical development for SSGs

From a tactical perspective, coaches tended to use SSGs to develop positional play: "to work on body angles and movements off the opposition" (Coach 1). They aimed to develop "relationship between sectors, as also as certain aspects of the game model, such as progressive progression" (Coach 2). In this regard, Coach 3 mentioned the "use of specific parts of the pitch" to "manipulate the game to force players" in match-specific scenarios (e.g., full-back vs winger). This last coach mentioned "the principles of play should be developed in the different sectors… before we can work in its totality… so, by using SSGs to work on specific moments it allows then to transfer this acquired knowledge to full team's game model".

And "particularly from a defensive perspective, it allows to create a guided discovery where players are looking to understand the space available or when to press, … increasing players' motivation to recover possession" (Coach

1), and "to develop pressing triggers and area awareness" (Coach 4). So, coaches "use SSGs to develop the team aspects, but also able to work towards the needs of the movement, for the moment, in accordance with opponent, teammate, ball and goal" (Coach 5). It was also mentioned that SSGs are planned according with the own team needs, and not considering opponent's analysis. As per Coach 5, "look at the game, look at the stats and its analysis, and breakdown to an SSG".

Coaches emphasised the tactical significance of SSGs as a means to develop specific aspects of positional play and game model principles [9]. Their use of SSGs aimed to facilitate a guided discovery process, wherein players could understand spatial relationships, pressing triggers, and defensive responsibilities within the context of match-specific scenarios [24]. Coaches strategically manipulated playing areas and task constraints to replicate game-like situations and promote engagement and motivation among players. Importantly, SSGs were tailored to address the specific needs of the team, focusing on areas of improvement identified through game analysis and statistical data. By integrating SSGs into their training sessions, coaches sought to instil a deeper understanding of tactical concepts and foster a cohesive team dynamic that could be translated onto the pitch during competitive matches.

Limitations and Future Research Directions

Despite the several insights presented in this research in the professional soccer environment, it is necessary to acknowledge some limitations. Firstly, each coach only completed the interview once, which can be seen as an individual source of data [17]. The interview process could have happened a second time so participants might present more/different information as well as added insights. Further, interviews could have been paired with observations or other data collection methods for a more comprehensive understanding about the use of SSGs. As well, it was missing the inclusion of some questions in the interview that could develop knowledge in regard to: 1) playing positions during SSGs, as some players with tactical freedom can influence demands of the task; 2) coaching position during SSGs, as if the coach is more focused in a specific group, this can influence outcome of the task; 3) how coaching staff adjust intensity for players that did not achieved intended internal and external workloads; and 4) what type of feedback is provided by coaches during SSGs, as by the end of the task, players are likely to be fatigued.

Based on the results of this study, several areas for future research in the domain of SSGs have been emphasised by coaches but remain underexplored in scientific literature. Firstly, the cognitive and psychological impacts of SSGs, particularly on players' decision-making processes and creativity under various constraints, warrant further investigation. Coaches highlighted the importance of fostering cognitive development through SSGs, yet empirical data on the optimal conditions and game modifications that best support these outcomes are limited. Secondly, the long-term effects of SSGs on player development across different age groups and skill levels need to be examined. While coaches frequently use SSGs to develop technical and tactical skills, the longitudinal benefits, and potential drawbacks of these games over a player's career are not well documented. Thirdly, the integration of advanced monitoring technologies, such as GPS and heart rate monitors, within SSGs requires additional exploration. Coaches noted the utility of these technologies in managing training loads and ensuring optimal intensity during sessions; however, more research is needed to establish standardised protocols and determine their effective utilisation. Lastly, the social and emotional dimensions of SSGs, such as their role in building team cohesion, handling competitive scenarios, and managing emotional responses, should be investigated. Future studies should delve into how SSGs can be designed to maximize these social and emotional benefits, providing insights into their contribution to the holistic development of players. Addressing these gaps can lead to a more comprehensive understanding of SSGs' multifaceted roles in soccer training, informing coaching practices and enhancing player development.

Conclusion

This study provides valuable insights into the perspectives and practices of professional soccer coaches regarding the use SSGs in training sessions. The thematic analysis of interviews revealed several key findings. Firstly, coaches emphasised the importance of SSGs in replicating match demands, fostering technical and tactical development, and promoting player motivation and engagement. Secondly, variations in SSGs, including adjustments in playing area, number of players, and constraints, were identified as essential for targeting specific fitness and skill components. Thirdly, coaches outlined their strategic incorporation of SSGs within the planning and periodisation processes, highlighting their utilisation for different training objectives across the pre-season, regular season, and international breaks. Fourthly, diverse roles and meanings of SSGs within high-performance teams were elucidated, including their contributions to physical fitness, tactical understanding, decision-making, and team cohesion. Lastly, coaches underscored the need for future research to explore areas such as the cognitive and psychological impacts of SSGs,

the long-term effects on player development, the integration of advanced monitoring technologies, and the social and emotional dimensions of SSG participation.

By synthesising these findings, this study contributes to the growing body of knowledge on SSGs in soccer coaching, providing practical implications for coaches and guiding future research endeavours in this field. Those current insights have multiple implications for coaching education programs and practitioners who may need to be prompted to reflect on how SSGs could be framed within a nonlinear pedagogy that prevents the use of SSGs in a prescriptive and rigid manner. We invite researchers across contexts to further explore this line of inquiry and position qualitative methods as a valid resource to examine how previous research and existent theoretical lenses are indeed permeating coaching practises (e.g., planning, periodisation, programming, instruction).

Institutional Review Board Statement: The experimental protocol and study design were approved by the local Institutional Research Ethics Committee and conducted in compliance with the Helsinki Declaration.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on reasonable request from the corresponding author.

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