

## Tactical and Technical Performance in Basketball Small-Sided Games: A Systematic Review

### Rendimiento táctico y técnico en juegos reducidos de baloncesto: una revisión sistemática

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**Abstract .** The ability to design Small-sided games (SSGs) by manipulating the game allows coaches to align the games with players' specific needs, thereby fostering adaptations in their behavior as they engage with the challenges presented in the drills. Given the increasing volume of original research on SSGs in basketball, this systematic review aims to synthesize acute technical and tactical responses observed in players of both genders, irrespective of their competitive level. A systematic review was performed based on PRISMA recommendations in the PubMed, ScienceDirect, Scopus, and Web of Science database. The eligibility criteria included basketball players who had participated in SSGs, without the necessity for a comparator group. Outcomes focused on observed and recorded technical actions (such as passes and shots) and/or tactical behaviors (individual or collective). Data synthesis comprised compiling the observed technical and tactical outcomes, along with the main findings of the studies. An initial database search returned 1,758 studies. After the study selection process, 41 studies were included in the qualitative synthesis, comprising 922 participants of both sexes that ranged from beginners to professional players. The analyzed SSGs ranged from 1 vs. 1 to 5 vs. 5 game formats. Findings suggested that SSGs with fewer players demonstrated positive effects on technical performance and increased action frequency, while also fostering tactical behavior and decision-making. Moreover, research indicated that SSGs incorporating restrictions on dribbling actions led to a higher occurrence of passing actions.

**Keywords:** basketball training; sports pedagogy; conditioned games; small-sided games; technical performance; tactical behavior.

**Resumen.** La capacidad de diseñar juegos reducidos (SSGs) mediante la manipulación del juego permite a los entrenadores adaptar los juegos a las necesidades específicas de los jugadores, fomentando así adaptaciones en su comportamiento a medida que se enfrentan a los desafíos presentados en los ejercicios. Dado el creciente volumen de investigaciones originales sobre los SSGs en el baloncesto, esta revisión sistemática tiene como objetivo consolidar las agudas respuestas técnicas y tácticas observadas tanto en jugadores masculinos como femeninos, independientemente de su nivel competitivo. Se realizó una revisión sistemática basada en las recomendaciones PRISMA en las bases de datos PubMed, ScienceDirect, Scopus y Web of Science. Los criterios de elegibilidad abarcaron jugadores de baloncesto que habían estado expuestos a SSGs, sin el requisito de un grupo de comparación. Los resultados se centraron en acciones técnicas observadas y registradas (por ejemplo, pases, tiros) y/o comportamientos tácticos (individuales o colectivos). La síntesis de datos implicó recopilar los resultados técnicos y tácticos observados, así como los principales hallazgos de los estudios. Una búsqueda inicial en las bases de datos arrojó 1758 estudios. Luego del proceso de selección de estudios, se incluyeron 41 estudios en la síntesis cualitativa, comprendiendo 922 participantes de ambos sexos que iban desde principiantes hasta jugadores profesionales. Los SSG analizados variaron desde formatos de juego de 1 contra 1 a 5 contra 5. Los hallazgos sugirieron que los SSGs con menos jugadores mostraron impactos positivos en el desempeño técnico y aumentaron la frecuencia de las acciones, además de favorecer el desarrollo del comportamiento táctico y la toma de decisiones. Los resultados de la investigación indican que los SSGs que incorporan restricciones a las acciones de drible dan como resultado una mayor ocurrencia de acciones de pase.

**Palabras clave:** entrenamiento de baloncesto; pedagogía deportiva; juegos condicionados; juegos reducidos; rendimiento técnico; comportamiento táctico.

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## Introduction

Ecological game-based task-handling approaches allow teachers and coaches to explore diverse factors of sports development (Nitsch, 2009), as performance arises from the simultaneous interaction between task constraints (frequently manipulated by the coach), environmental constraints, and biological constraints. By acknowledging the interplay between these constraints, the coach can adjust task constraints to effectively elicit changes in players' performance (Davids et al., 2013). This becomes particularly intriguing in ecological tasks, such as the widely popularized small-sided games (SSGs) (Clemente et al., 2021a). These

games, effectively constrained or conditioned, deviate from the typical rules of the official game format to enhance players' perception of specific actions and behaviors (Castro et al., 2022; Davids et al., 2013). Therefore, even in a 5v5 setup, the basketball game can be constrained, albeit using the standard number of players.

Coaches can manipulate various task constraints when designing SSGs. These include the format of play (such as the numerical relationship between players), court configuration (such as the width-to-length ratio, area per player, and court shape), task objectives (such as scoring on a specific basket or maintaining possession of the ball), and adjustments to interpersonal and intrapersonal dynamics (like

restricting certain technical actions or behaviors) (Clemente et al., 2021a). The impact of these concurrent task constraints varies depending on specific manipulations, yet they undeniably shape how players perceive the game and subsequently act, influencing tactical performance, technical actions, and, ultimately, locomotor demands and physiological responses (Arslan et al., 2022; Bredt et al., 2022; Clemente et al., 2017). Despite their effect on a myriad of variables, research often prioritizes locomotor and physiological responses, neglecting or under-researching their impact on technical and tactical dimensions (Klusemann et al., 2012).

From a tactical-technical perspective, several studies (Clemente et al., 2021a; Conte et al., 2015; Diniz et al., 2022; Ferioli et al., 2020; Sansone et al., 2020) have demonstrated that Small-Sided Games (SSGs) influence both the frequency and quality of technical and tactical actions in various team sports (Clemente et al., 2021a). In basketball, SSGs can be manipulated in several ways, including numerically unbalanced setups (Diniz et al., 2022), limitations on tactical/technical actions, rule changes (Ferioli et al., 2020; Conte et al., 2015), and alterations in the size of the playing space (Klusemann et al., 2012). For example, Sansone et al. (2020) showed that short-term SSGs promoted a greater volume of offensive play, in addition to diverse tactical behaviors, and more individual and collective actions. Conte et al. (2015) compared SSGs with and without dribbling in a 4 vs. 4 format on a full court and showed a higher frequency of technical actions and more defensive pressure in a non-dribbling match. These results suggest that restricting dribbling actions can be an effective strategy to develop passing skills. Therefore, SSGs emerge as a valuable resource for technical and tactical training in team sports (Fernández-Espíndola et al., 2020).

Reducing the number of players in SSGs is another strategy that affects tactical-technical performance, as it implies a greater demand for individual and collective actions (Clemente et al., 2021a). Furthermore, SSGs formats with fewer players promote greater ball possession and effective player participation (Martínez-Fernández et al., 2015). Similarly, Ferioli et al. (2020) demonstrated that the reduced number of players favors a greater frequency of technical actions, and games with dribbling limitations promoted more passing actions. Another manipulation involving the number of players is the use of numerically unbalanced SSGs, which promote more shooting situations due to the superiority in the offensive phase (Diniz et al., 2022).

Despite the growing body of original studies focused on SSGs in basketball, specifically concerning technical and tactical dimensions, the existing research has not offered a comprehensive summary of evidence at this level. Current systematic reviews on SSGs in basketball primarily focus on physiological and physical aspects, as demonstrated by recent publications (Clemente, 2016; O'Grady et al., 2020). Conducting a systematic review in this manner would deepen our understanding of how various task constraints impact technical and tactical aspects. This would aid

coaches in assessing the effects of task manipulations and assist researchers in identifying gaps and trends. Notably, systematic reviews on technical and tactical dimensions of Small-Sided Games (SSGs) have been limited to soccer (Clemente et al., 2020a; Clemente & Sarmiento, 2020). Therefore, there's an opportunity to extend such reviews to basketball, given its widespread popularity and distinct characteristics.

Given the scarcity of updates on SSGs in basketball (Clemente et al., 2021a), certain questions arise: What are the effects of SSGs with manipulations of different task restrictions (such as playing area, number of players, rules, and scoring systems) on technical-tactical performance? In this context, a systematic review allows us to highlight studies on this topic and provide an overview for future research. Therefore, this systematic review aims to summarize the acute technical and tactical responses observed in both male and female players, regardless of their sex or competitive level.

## Methods

### *Preliminary settings*

This study was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page et al., 2020). The research question was defined using the PICO model. Population: Basketball players. Intervention: SSGs. Comparators: manipulations of different task restrictions (playing area, number of players, rules, and scoring systems). Outcomes: Tactical-technical and performance parameters.

### *Search methods for identification of studies*

This search was conducted on July 21, 2023, in the following databases: PubMed, ScienceDirect, Scopus, and Web of Science. The following Medical Subject Headings (MeSH terms) and text words (free descriptors) of interest were combined using Boolean operators: (basketball OR basketballs) AND (“conditioned game” OR “conditioned games” OR “drill-based game” OR “drill-based games” OR “play format” OR “play formats” OR “reduced game” OR “reduced games” OR “sided-game” OR “sided-games” OR “small-sided and conditioned game” OR “small-sided and conditioned games” OR “small-sided game” OR “small-sided games” OR “ssg” OR “ssgs”). No restrictions regarding the year of publication were applied and no search filters were used. Also, manual research was conducted on the bibliographies of all included studies in full-text screening.

### *Eligibility criteria*

The following inclusion criteria were set: (1) participants should be basketball players from any sex, age group (children/adolescents, adults, and older adults), skill, or

competitive level (educational, recreational, and high performance/athlete); (2) intervention should be SSGs, defined as drill-based exercises that simplifies the dynamic of real team sport game while keeping the main properties of the game (Clemente et al., 2021b); (3) parameters screened consisted of tactical and technical actions; and (4) only original and full-text studies written in English, Portuguese, and Spanish were included. The following exclusion criteria were established: (1) studies with 3x3 basketball, as it is a specific sport modality; and (2) studies lacking criteria described in the inclusion criteria.

### Study selection

Studies were inserted in the Rayyan web application (<http://rayyan.qcri.org>) and duplicates were removed. Two researchers (WJFS and PESC) independently screened articles for inclusion, by reviewing titles and abstracts. In the second stage, researchers reviewed the full texts of the remaining manuscripts for exclusion. All cases of disagreement were resolved by a third researcher (HOC), in both stages.

### Data extraction

Two researchers independently extracted the data using a standardized spreadsheet in Microsoft Excel 2016 software (version 16.0.13901.20148 for Windows). The following information was included in Table 1: study title, objective, sample, competitive level, game design, instrument, variables, and main findings. This extraction was checked by a third author.

### Results

A total of 124, 128, 160, and 1,346 manuscripts were identified in Pubmed, Web of Science, Science Direct, and Scopus, respectively. Rayyan identified 265 duplicates that were confirmed and removed by one researcher (KNOG). The flowchart showing the study selection process is presented in Figure 1.

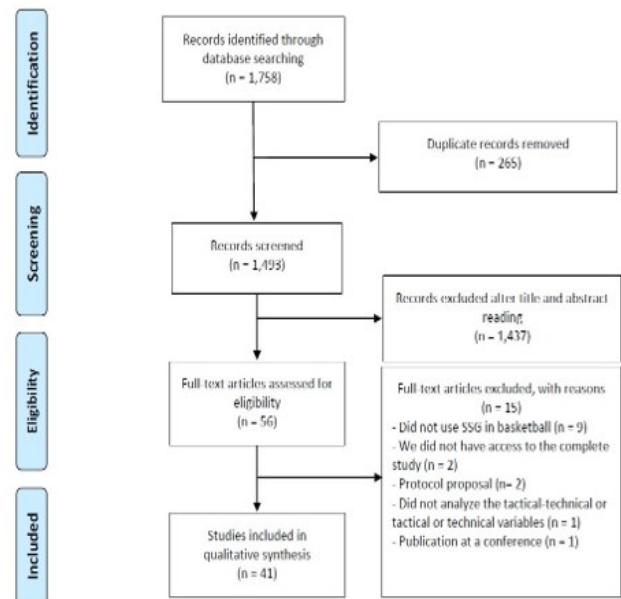


Figure 1. PRISMA. Flowchart

### Characteristics of the included studies

The studies comprised 922 participants of both sexes (190 female, 554 male, and 178 not specified in the study). Participants ranged from 8-year-old beginners (Martínez-Fernández et al., 2015) to senior players at the professional level (Boros et al., 2020; Brini et al., 2021). The game format manipulations ranged from 1 vs. 1 (Clemente et al., 2021b; Clemente et al., 2019; Clemente et al., 2020b; González-Espinosa et al., 2021) to 5 vs. 5 (Clemente et al., 2021b; Clemente et al., 2017; Clemente et al., 2019; Clemente et al., 2020b; Ferioli et al., 2020; Figueira et al., 2022; Köklu et al., 2017; Mateus et al., 2019; McCornick et al., 2012; Piñar et al., 2009; Práxedes et al., 2021; Tallir et al., 2012). The characteristics of the studies included in this review, along with specific instruments and results related to the tactical and technical variables, are available in Table 1.

Table 1.  
Characteristics of the included studies (n = 41)

Study	Objective	Sample	Competitive level	Game design manipulating	Instrument	Variables	Main findings
Arslan et al. (2022)	To investigate the effects of a six-week SSGs versus HIIT training programs on the psychophysiological responses, performance, and technical skills of young basketball players.	32 male players (age: 14.5 ± 0.5 years)	Regional	2 vs. 2 / full court	Defensive and offensive agility, and technical skills	Technical	SSGs can promote the development of technical skills while improving enjoyment in young basketball players.
Atli et al. (2013)	To compare HR responses on various technical actions between half-court and full-court 3-a-side games in high school basketball players.	12 female players (age: 15.5 ± 0.5 years)	School	3 vs. 3 / half court / full court	Action frequency	Technical	Half-court 3-a-side games result in more technical actions compared to full-court 3-a-side games.
Boros et al. (2022)	To compare the two types of basketball in terms of shot selection, shot efficiency, ball possession,	3 vs. 3 data was collected from 20 teams in 48 World Cup	Professional	3 vs. 3 half court / 5 vs. 5 full court	Game Statistics Performance Indicator	Tactical / Technical	Changes in game conditions and rules affect player's thinking, behavior, and decision-making on the court during the game.

	offensive rating, and relative offensive rating.	games while data was collected from 32 teams in 92 5 vs. 5 (World Cup)					In comparison, a significant difference in terms of overall shots was found between 5 vs. 5 and 3 vs. 3 shot selection, specifically in ratio and long-range efficiency.
Bredt et al. (2018)	To compare the dynamics of space creation and attack types during three different 3 vs. 3 small-field basketball games played in the half court, with man-to-man defense in the half playing area, man-to-man defense in the middle of the playing area, and with reduced shooting time.	12 male athletes (age: 17.01 ± 0.24 years)	National/regional	3 vs. 3 / half court / full court / rules	Space Creation Dynamics	Tactical / Technical	The investigated SSGs lead to different frequencies of tactical solutions compared to the formal 5 vs. 5 game.
Bredt et al. (2022)	To compare the physical, physiological, and tactical-technical responses during 3 vs. 3 basketball games, played on full court and half court: numerical equality (3 vs. 3), numerical superiority (4 vs. 3), and with a non-scorer (3 vs. 3 + 1).	45 male U14 and U15 players (age: not informed)	National/regional	3 vs. 3 / 3 vs. 3 + 1 / 4 vs. 3 / half court/full court	Space Creation Dynamics	Tactical/ Technical	Additional players increase the group's tactical actions in 3 vs. 3 small-sided basketball games. Furthermore, the results showed a higher frequency of creating space actions without the ball and average passes per attack in 4 vs. 3 and 3 vs. 3 + 1 formats.
Bredt et al. (2023)	To compare the offensive and defensive technical-technical actions, physical and physiological responses between four basketball reduced games played in half court: with regular rules (3 vs. 3), with defensive pressure (3 vs. 3), with accurate shot rule (3 vs. 3) and with offensive numerical superiority (4 vs. 3).	51 male U14 and U15 players (age: not informed)	National/regional	3 vs. 3 regular / 3 vs. 3 with defensive pressure / 3 vs. 3 with accurate shooting / 4 vs. 3 offensive numerical superiority.	Space Creation Dynamics	Tactical/ Technical	The SSGs investigated stimulated different offensive and defensive actions and can be used to develop the performance of basketball athletes.
Brini et al. (2021)	To evaluate the effects of an additional training program with reduced games during RIF on technical performance, changes in body composition, sleep habits, and RPE.	24 male players (age: INT 25.32 ± 2.56 years; CON 24.85 ± 1.55 years)	Professional	3 vs. 3 / half court / rules	Notational analysis	Technical	Individual and team technical performance was negatively affected during the fourth week of RIF to INT.
Camacho et al. (2021)	To explore the impact of different task constraints on mental load and its consequences on individual and collective performance in small-sided basketball games.	24 university students (22 men, and 2 women, age: 20.81 ± 1.76 years)	University	3 vs. 3 / full court / rules	Action frequency	Technical	The team performance and not the individuals' is associated with the perception of subjective load in collective tasks.
Clemente et al. (2021b)	To compare the athletes' RPE and the number of technical-tactical actions in SSGs played within the same relative area with adjusted durations in (a) varied game formats, and (b) two successive games of different formats.	10 female U16 players (age: 14.3 ± 1.3 years)	National	1 vs. 1 / 2 vs. 2 / 3 vs. 3 / 4 vs. 4 / 5 vs. 5	TSAP	Tactical/ Technical	More technical-tactical actions per player per minute were found in smaller SSGs formats
Clemente et al. (2016)	To identify the effects of game format and task conditioning on heart rate responses and technical/tactical performance measured by mathematical methods.	10 male players (age: 14.75 ± 0.46 years)	Regional	2 vs. 2 / 3 vs. 3 / 4 vs. 4 / task restrictions / rules	TSAP	Tactical/ Technical	Smaller formats significantly increased tactical/technical performance.
Clemente et al.	To analyze the effects of SCGs with different tactical	10 male U14 and 10 male U16	National	3 vs. 3 / 5 vs. 5 / rules	TSAP	Tactical/ Technical	The smaller format significantly increased play volume,

(2017)	contents on heart rate responses, technical performance, and collective organization measured by network analysis in young basketball players.	players (age: U14 $13.7 \pm 0.8$ years; U16 $15.3 \pm 1.1$ years)					efficiency index, and performance score. Furthermore, the attack task condition also increased the efficiency index and performance score.
Clemente et al. (2019)	To analyze the relationship between anthropometry, physical fitness status, countermovement jump performance, and perceived effort of U14 and U16 male basketball players and their technical actions during SSGs from 1 vs. 1 to 5 vs. 5 formats.	10 male U14 and 10 male U16 players (age: U14 $12.0 \pm 0.8$ years; U16 $14.3 \pm 0.5$ years)	National	1 vs. 1 / 2 vs. 2 / 3 vs. 3 / 4 vs. 4 / 5 vs. 5	TSAP	Tactical/ Technical	The level of physical conditioning is positively associated with received balls, attacking balls, and shots, while anthropometric characteristics were positively associated with rebounding and negatively associated with the frequency of lost balls.
Clemente et al. (2020b)	To compare the rate of subjective perception of effort and the frequencies of technical actions per minute in different SSGs among U14 and U16 age groups. And to compare the frequency of technical actions per minute between the 1 vs. 1, 2 vs. 2, 3 vs. 3, 4 vs. 4, and 5 vs. 5 formats.	10 male U14 and 10 male U16 players (age: U14 $12.0 \pm 0.8$ years; U16 $14.3 \pm 0.5$ years)	National	1 vs. 1 / 2 vs. 2 / 3 vs. 3 / 4 vs. 4 / 5 vs. 5. (relatively similar game area)	TSAP	Tactical/ Technical/ Physical	Main findings include trivial to small differences in technical actions between formats. However, moderate decreases in balls won were reported for the U14 and U16 age groups in the 1 vs. 1, 2 vs. 2, and 5 vs. 5 formats.
Conte et al. (2015)	To evaluate the physiological and technical demands of non-dribbling exercise compared to regular exercise.	23 male U15 and U17 players (age: $15.5 \pm 0.9$ years)	Regional	4 vs. 4 / full court / rules	Notational analysis	Technical	SSGs without dribbling promoted higher number of passes compared to dribbling SSGs in young basketball players.
Conte et al. (2016)	To analyze the effects of number of players and training regimes on the physiological and technical demands of players in basketball training.	21 male U15 and U17 players (age: $15.4 \pm 0.9$ years)	Regional	2 vs. 2 / 4 vs. 4 / full court / training regimen	Notational analysis	Technical	The reduction in the number of players promoted greater technical demands. The ball exercise was played intermittently and resulted in more dribbling actions.
Conte et al. (2017)	To evaluate the workload of basketball training by analyzing: (i) the effect of varying the number of players involved on physiological and technical demands; (ii) temporal changes in players' responses during disputes; and (iii) the relationship between players' workload and their state of maturation and training age.	12 male U15 players (age: $13.9 \pm 0.7$ years)	Regional	2 vs. 2 / 4 vs. 4	Notational analysis	Tactical/ Technical	The number of players affected the tactical demands on SSGs. Furthermore, no variations in general technical actions were observed.
Coutinho et al. (2016)	To examine the effects of manipulating the number of players and targets on technical, tactical, and physiological indicators in basketball, handball, and indoor football.	9 school students eighth year (age: $13.3 \pm 0.7$ years)	School	3 vs. 3 / 4 vs. 4 / rules	Notational analysis	Technical	The 3 vs. 3 format promoted similar technical-tactical indicators compared to the 4 vs. 4 format.
Delextrat & Martinez (2014)	To compare the effects of two training interventions based on SSGs and high-intensity interval training on the physical and technical performance of junior male basketball players.	18 male U17 players 24 male players (age: HIIT $16.0 \pm 0.6$ years SSG $16.03 \pm 0.8$ years)	Regional	2 vs. 2 / full court	Skills Tests	Technical	SSGs resulted in greater improvements in defensive agility and shooting skills.
Diniz et al. (2022)	To compare the tactical behavior and effectiveness of young novice basketball players' skills during small-	45 students 26 girls and 19 boys (age: $11.55 \pm 0.49$ years)	School	3 vs. 2 / 3 vs. 3 / 3 vs. 3 + 1 / half court/rules	GPAI	Tactical/ Technical	Unbalanced SSGs were considered less complex than numerical equality SSGs, since technical-tactical performance

	sided games in situations of numerical equality, numerical superiority, and floating without scoring.						was greater in unbalanced SSGs.
Ferioli et al. (2020)	To examine the physiological, physical, and technical demands of regular dribbling and no-dribbling game-based exercises involving a different number of players.	10 male U20 players (age: 18.3 ± 1.0 years)	Regional	3 vs. 3 / 4 vs. 4 / 5 vs. 5 / full court / rules	Notational analysis	Technical	The number of players is the main variable that affects perceptual responses in SSGs regardless of rule modifications. On the other hand, the number of players and rule modification (i.e., dribbling vs no-dribbling) affect the SSGs activity demands.
Figueira et al. (2022)	To examine the physiological responses of young players and differences in technical-tactical performance when playing simulated 3 vs. 3 and 5 vs. 5 basketball games.	15 male U17 players (age: 16.6 ± 0.2 years)	National	3 vs. 3 / 5 vs. 5	Notational analysis	Tactical/ Technical	Comparative analysis revealed a greater influence of the game format on technical-tactical-related variables.
González-Espinosa et al. (2021)	To analyze and compare the learning acquired by the students after the implementation of a basketball program based on the DI methodology or a program based on the TGA methodology, analyzing game performance before and after the implementation of the intervention programs.	40 students ranging from 11 to 12 years old with no previous experience.	School	1 vs. 1 / 2 vs. 2 / 3 vs. 3 / 2 vs. 1 / 3 vs. 2	BALPAI	Tactical / Technical	Tactical games presented better results in technique and decision-making compared to the direct instruction method.
Hassan et al. (2023)	To identify the impact of small-sided games using FITLIGHT on some of the harmonic skills and some of the basic skills of basketball players.	24 male basketball players (age: 10.92 ± 0.79 years)	Regional		Skills tests	Technical	The result shows that there is progress in harmonic skills and basic skills with the use of reduced games, using FITLIGHT. FITLIGHT provided young people with fun and excitement through motor interaction with new technology and small-sided games.
Klusemann et al. (2012)	To quantify the magnitudes of difference in physical, physiological, and technical demands in various types of small-sided basketball games to assess the influence of the number of players, block size, and work-rest ratio.	16 basketball players (8 male 18.2 ± 0.3 and 8 female 17.4 ± 0.7 years)	National	2 vs. 2 / 4 vs. 4 / half court / full court / training regimen	Notational analysis	Technical	The number of players had the greatest influence on technical demands. Specifically, 2 vs. 2 games promoted 60% more technical executions than 4 vs. 4 games.
Köklü et al., (2017)	To compare physiological responses and frequencies of technical actions in different full-court game formats in young basketball players.	12 male players (age: 15.8 ± 0.9 years)	School	2 vs. 2 / 3 vs. 3 / 4 vs. 4 / 5 vs. 5 / full court	Notational analysis	Technical	Full-court 2 vs. 2 and 3 vs. 3 games promoted higher frequencies of technical actions compared to full-court 4 vs. 4 and 5 vs. 5 games.
López-Herrero & Arias-Estero (2019)	To investigate whether the 3 vs. 3 or 5 vs. 5 game format favors technical actions occurrence in a school basketball setting.	42 children aged between 9 and 11 years old (age: 9.89 ± 0.83)	School	3 vs. 3 / 5 vs. 5 / half court	Notational analysis	Tactical/ Technical	The 3 vs. 3 format promoted greater participation and contact with the ball compared to the 5 vs. 5 format.
Martínez-Fernández et al. (2015)	To compare the 3 vs. 3 and 4 vs. 4 game formats to investigate how the number of players influences the Mini Basketball game.	29 male players, all members of a regional basketball team (age: 9.56 ± 0.44 years)	Regional	3 vs. 3 / 4vs.4	Descriptive and Inferential analysis	Tactical/ Technical	The 3 vs. 3 SSGs presented more ball-possession and 1 vs. 1 situations. Furthermore, the effectiveness of the possessions was greater. On the other hand, in the 4 vs. 4 game, more successful passes per possession were completed and more players participated in each possession.

Mateus et al. (2019)	To identify how two additional baskets influence the technical, physiological, physical, and positional performance of the players in the basketball game.	14 male U16 players (age: 14.0 ± 0.9 years)	Regional	5 vs. 5 / with the addition of two more baskets	Notational analysis	Tactical/ Technical	Informational scoring restrictions are fundamental in influencing players' technical performance. The greater number of baskets allowed for more scoring opportunities, which subsequently increased field points and dribbles per player.
McCormick et al. (2012)	To compare 3 vs. 3 small-sided basketball games and 5 vs. 5 two-sided basketball games in terms of ball contacts and physical activity.	12 male players from a high school freshman basketball team (15 years old)	School	3 vs. 3 / 5 vs. 5 / half court / full court	TSAP	Tactical/ Technical	Offensive ball-play was higher in 3 vs. 3 compared to 5 vs. 5 basketball games.
Mengi et al. (2023)	To examine the acute effects of three different feedback conditions (positive feedback, negative feedback, and no feedback) on heart rate, lactic acid, rate of perceived exertion responses, and technical action frequencies in basketball players during full-court 3 vs. 3 games.	12 male U17 high school basketball players (age: 16.5 ± 1.5 years)	School	3 vs. 3 / full court	Notational analysis	Technical	No significant differences were found in the number of technical action scores in the different feedback conditions. Providing or not positive or negative verbal feedback in full-court 3 vs. 3 games does not significantly affect the frequencies of technical actions.
Ortega-Toro et al. (2020)	To evaluate the effects of adapting the height of the basket on the execution and decision-making involved in technical-tactical skills, self-efficacy, cooperation, and perception of students in a basketball unit.	56 male and female students, aged 13 to 14 (age: 13.4 ± 0.8 years)	School	3 vs. 3 / basket height manipulation	Scale for tactical/technical actions	Tactical/ Technical	For both groups, participating in the basketball unit reduced the use of passing in 3 vs. 3 situations and increased specific collective efficacy. The use of an adapted basket height resulted in an improvement in shooting ability.
Piñar et al. (2009)	To determine the effect of changes in space, time, and number of players on player participation in offensive phases.	47 boys and girls aged 9 to 11 (age: not informed)	Regional	3 vs. 3 / 5 vs. 5	Notational analysis	Tactical/ technical	The 3 vs. 3 game format showed a higher frequency of actions.
Pouregbali et al. (2020)	To analyze the acute effects of SSGs based on differential learning, on the physical, technical, and positioning performance of young basketball players.	8 male U13 basketball players (age: 12.1 ± 0.4 years)	Regional	2 vs. 4 / 2 vs. 3 / 2 vs. 1 / 3 vs. 4 / 3 vs. 1 / 4 vs. 1	Notational analysis	Tactical/ Technical	Players obtained a dynamic performance profile throughout the training with the differential learning approach to the technical performance.
Práxedes et al. (2021)	To analyze the effect of a basketball unit (structured practice) based on the TGfU model (developed in Physical Education classes) combined with a program based on unstructured practice (developed in the school playground), compared to the only application of the unit, in decision-making and execution of actions in Physical Education students.	31 students (12.39 ± 0.57 years)	School	4 vs. 3 / 3 vs. 2 / 2 vs. 1 / 5 vs. 5 / 4 vs. 4 / 3 vs. 3	GPET	Tactical	The experimental group showed a significant difference in decision-making compared to the control group.
Sánchez et al. (2018)	To analyze the effects of a two-week SSGs program on the decision-making and perceived exertion of teen scholars.	44 teen girls (15.36 ± 0.49 years)	School	3 vs. 3	GPAI	Tactical/ Technical	Results indicated the development of decision-making and the performance of the basketball game.
Sánchez-Sánchez et al. (2018)	To describe the physiological and technical responses during a 3 vs. 3 basketball SSG with and without verbal encouragement from the	6 female basketball players (age: 14.3 ± 0.5 years)	Regional	3 vs. 3 / half court / task restrictions	Observational analysis	Technical	Task restrictions promoted a greater number of passes when dribbling was restricted.

	coach and dribbling restriction in young female recreational basketball players.						
Sansone et al. (2020)	To compare technical-tactical, perceptual, and mental demands, and fun responses in small-sided 3 vs. 3 basketball games designed with different tactical tasks and training regimes.	12 male basketball semi-professionals (age: $21 \pm 2.0$ years)	Semi-professional	3 vs. 3 / half court / training regimen	Notational analysis	Tactical/ Technical	The number of ball possessions and technical actions was greater in the short-intermittent regimes compared to the long-intermittent regimes.
Souabni et al. (2023)	To examine the Effect of a 40-minute Nap Opportunity on Cognitive Outcomes and Technical Performance During SSGs in Professional Basketball Players	10 male professional basketball players (age: $27.6 \pm 4.7$ years)	Professional	Not informed	TSAP	Tactical/ Technical	Naps did not improve observational variables analysis.
Tallir et al. (2012)	To investigate whether manipulating task constraints (number of players) results in a differential number and type of learning opportunities.	30 players (23 boys, 7 girls) (age: $11.08 \pm 0.55$ years)	Regional	3 vs. 3 / 5 vs. 5	Coding Instrument	Tactical	Players experienced more learning opportunities during the 3 vs. 3 game compared to the 5 vs. 5 game.
Tannoubi et al. (2023)	To examine the effects of video modeling during a four-week basketball training program for young novice players, with the specific objectives of evaluating the effects on individual technical skills while evaluating the impact on collective play.	20 young players. (Control group n = 10 age: $12 \pm 0.7$ years. Video modeling experimental group n = 10 age: $12.5 \pm 0.5$ years)	Regional	3 vs. 3 / half court	TSAP	Tactical/ Technical/	The intervention group reported a significant improvement over the control group in the passing test. Despite this, the dribbling and defensive movement test showed lower values after the intervention, indicating a potentially negative effect on these skills.
Zeng et al. (2021)	To compare the effects of four-week SSGs and training programs on physical performance and specific technical skills in women's college basketball players.	24 female basketball players (age: $19.8 \pm 1.1$ years)	University	2 vs. 2	Notational analysis	Technical	The SSG were effective in improving basketball-specific movements after a 4-week intervention.

Note: SSG = Small Sided-Games; HIIT = High-intensity interval training; HR = Heart rate; RIF = Ramadan intermittent fasting; RPE = Ratings of perceived exertion; INT = Group intervention; CON = control group; TSAP = Team sports assessment procedure; GPAL = Game assessment instrument; TGA = Tactical Game Approach; DI = Direct instruction; BALPAI = Basketball learning and performance assessment instrument; FITLIGHT = Light stimulus; TGfU = Teaching games for understanding; GPET = Observation instrument game performance assessment tool.

### Synthesis methods

No meta-analysis was planned for this study. A narrative synthesis of the results was provided.

### Discussion

This systematic review aimed to present scientific evidence on the effects of basketball SSGs manipulations on basketball players' tactical and technical behaviors. The results obtained indicate that studies that investigated SSGs in basketball generally analyzed tactical-technical skills across various SSG formats and populations. These formats included manipulations of the number of players, court size, task restrictions, rules, and training regimes, encompassing diverse populations such as inexperienced youth, school-children, novices in the sport, individuals at local/regional/national competitive levels, as well as semi-professional and professional players. Additionally, some studies analyzed physical, physiological, and psychological variables

alongside tactical-technical behavior. However, this study will solely discuss results pertaining to tactical and technical behaviors.

### Tactical-technical behavior

Various SSGs manipulations have shown effects on technical aspects across different age groups and experience levels. For instance, Clemente et al. (2019) found that manipulating the number of players resulted in higher average conquered balls in the 1 vs. 1 format. Conversely, the 2 vs. 2 format exhibited greater passing efficiency compared to larger SSG formats in the under-14 and under-16 categories (Clemente et al., 2019). Similarly, Clemente et al. (2021b) demonstrated that formats with fewer players led to increased frequencies of tactical-technical actions per minute compared to larger formats. Conversely, larger formats such as 5 vs. 5 and 4 vs. 4 exhibited higher rates of ball loss compared to the 2 vs. 2 format (Clemente et al., 2021b).

Regarding technical skills, Conte et al.'s (2016) study



indicated that 2 vs. 2 game formats showed a higher frequency of dribbling, rebounds, passes, and shots (missed and successful) compared to the 4 vs. 4 in under-15 and under-17 players. Similar findings were reported by Conte et al. (2017), who found increased dribbling, rebounding, and shooting frequencies in the 2 vs. 2 compared to 4 vs. 4 SSGs formats. In the study by Ferioli et al. (2020) with under-20 players competing at the regional level, results also indicate that the frequency of technical actions is increased when the number of players is reduced. Additionally, 3 vs. 3 SSGs on the full court resulted in higher frequencies of rebounds, assists, passes, losses, and steals when compared to the 5 vs. 5 format (Ferioli et al., 2020). In terms of shots scored, 3 vs. 3 showed higher frequencies compared to 4 vs. 4 and 5 vs. 5 formats (Ferioli et al., 2020). These findings suggest that reducing the number of players in SSGs increases the frequency of technical actions. Consequently, smaller formats offer the potential for the development of tactical-technical skills in young players by enabling greater frequencies and varied actions within a game context.

Klusemann et al. (2012) compared 2 vs. 2 and 4 vs. 4 SSGs formats in different scenarios (half court, full court, and work-rest ratio), and found 60% more technical actions in the 2 vs. 2 compared to 4 vs. 4 formats. Similarly, Köklü et al. (2017) analyzed different formats of full-court SSGs with a sample of young high school basketball players and found that the 2 vs. 2 format presented higher average numbers of assists, rebounds, and passes compared to the 4 vs. 4 and 5 vs. 5 formats. In another study, Martínez-Fernández et al. (2015), found that 3 vs. 3 SSGs promoted higher ball possession efficiency rates compared to 4 vs. 4 format, in a sample of mini basketball players. Additionally, some studies compared the formal structure (5 vs. 5) with SSG formats. McCormick et al. (2012) compared 3 vs. 3 and 5 vs. 5 formats in different playing areas within the under-15 category and discovered that 3 vs. 3 SSGs in half court demonstrated a greater volume of offensive play compared to 5 vs. 5 in full court. Similar findings were reported by Figueira et al. (2020), who compared 5 vs. 5 and 3 vs. 3 formats among under-17 players, indicating that the 3 vs. 3 format allowed for better offensive spacing. Additionally, Piñar et al. (2009) analyzed the differences in 3 vs. 3 and 5 vs. 5 game formats among young players (aged 9 to 11 years) and found that the 3 vs. 3 format promoted more counterattack situations. Overall, these results suggest that SSGs with fewer players encourage greater athlete participation in the game context.

Regarding the 3 vs. 3 formats, Atli et al. (2013) compared full court and half court 3 vs. 3 SSGs in a sample of young players, and found more passing and shooting actions in half-court games. Additionally, a greater frequency of rebounds and turnovers was observed in the reduced court (Atli et al., 2013). Sansone et al. (2020) analyzed 3 vs. 3 SSGs under conditions of short and long duration games and offensive and defensive situations (where one team only attacked and the other only defended throughout the game). Short duration games allowed for more ball possession and

technical actions compared to long duration games, along with more frequent collective and individual tactical actions. López-Herrero & Arias-Estero (2019) compared 3 vs. 3 and 5 vs. 5 SSG formats among young schoolchildren (aged 9 to 11 years) and found that 3 vs. 3 promoted more passes and ball possession. In a sample of professional athletes, Boros et al. (2022) analyzed the statistics of the 5 vs. 5 basketball world cups and 3 vs. 3 SSGs, revealing that the 3 vs. 3 games showed more shooting actions, while the 5 vs. 5 format exhibited more successful long-distance shots.

By manipulating the number of players in numerically unbalanced SSGs, Bredt et al. (2023) found that the 4 vs. 3 format allowed more passing actions compared to the 3 vs. 3 (defensive pressure required during SSGs). Using the imbalance in the number of players, Bredt et al. (2022) compared the tactical-technical responses of unbalanced and balanced SSGs formats and found that the 4 vs. 3 format with the additional player scoring promoted greater space creation without the ball when compared to the numerical equality 3 vs. 3 format. Similarly, Diniz et al. (2022) reported that 3 vs. 2 SSGs demonstrated fewer passing errors compared to 3 vs. 3 and 3 vs. 3 + 1 (additional player not scoring) formats with young inexperienced students. However, the format with numerical equality (3 vs. 3) presented more support for the player with the ball compared to numerically unbalanced SSGs (3 vs. 2) and with the additional player not scoring (3 vs. 3 + 1). Regarding the marking of the player with the ball, numerically unbalanced SSGs presented significantly higher values when compared to formats with numerical equality (Diniz et al., 2022). Thus, it is evident that SSGs with a numerical imbalance of players may be utilized to promote tactical development (Poureghbali et al., 2020).

Other manipulations also demonstrated effects on tactical-technical behavior. By adapting game rules, Conte et al. (2015) and Sánchez-Sánchez et al. (2018) demonstrated that SSGs without dribbling increase the number of passes. In another study involving rules adaptation, Mateus et al. (2019) found that adding two targets (hoops) in a 5 vs. 5 SSG format increased opportunities for dribbling and shooting. Similarly, Coutinho et al. (2016) compared half-court 3 vs. 3 and 4 vs. 4 SSGs with two or one target (hoops) in a sample of schoolchildren. The authors reported that the 4 vs. 4 games with one hoop showed longer durations of the unsuccessful offensive phase compared to the 4 vs. 4 games with two hoops and the 3 vs. 3 games with one hoop. Regarding the manipulation of target height, Ortega-Toro et al. (2020) evaluated the influence of basket height on the tactical-technical performance of Physical Education students aged between 13 and 14 years old in 3 vs. 3 SSGs. Results indicated that adjusting the basket height to 2.60 m in 3 vs. 3 SSGs favored improvements in decision-making and shot execution, while SSGs with standard basket height (3.05 m) promoted more one-on-one situations (Ortega-Toro et al., 2020).

SSGs were also compared with other interventions to assess technical performance. In the study by Arslan et al.

(2022), the effects of a six-week intervention between SSG and high-intensity interval training (HIIT) on young players (aged 14) were compared. Results indicated that the SSGs group outperformed the HIIT group in technical skills, with significant differences observed in dribbling and shooting control. Similarly, Delextrat & Martínez (2014), who compared the effects of SSGs and HIIT interventions on the technical performance of young under-17 players, reported similar findings, showing improvement in defensive agility and shooting for the SSGs group. Furthermore, Zeng et al. (2022) investigated the effects of four-week SSGs and HIIT interventions on technical performance and found a significant improvement in throwing skills among female college players in the SSGs group. These findings highlight that SSG activities can effectively replicate real game scenarios while imposing physical demands comparable to other forms of training.

Brini et al. (2021) analyzed the effect of SSGs during the Ramadan period (intermittent fasting) and observed a reduction in individual technical performance. Furthermore, a study analyzed the increase in technological elements (FITLIGHT) combined with SSGs, revealing improvements in passing, shooting, and dribbling skills among young players following a 10-week intervention (Hassan et al., 2023). The study by Souabni et al. (2023), on the other hand, analyzed the influence of “napping” before playing SSGs and found improvements in the efficiency index and attack with the ball.

Concerning verbal stimulation, Mengi et al. (2023) investigated the effects of positive, negative, and neutral feedback on technical performance during 3 vs. 3 SSGs on a full court. They reported that verbal incentives did not affect technical performance in 3 vs. 3 SSGs among under-17 students. Conversely, Sánchez-Sánchez et al. (2018) demonstrated an increase in the number of shots converted when coaches provided verbal encouragement to young female basketball players during 3 vs. 3 half-court SSG. Moreover, games that allowed dribbling also showed an increase in the number of shots converted compared to those that did not allow dribbling (Sánchez-Sánchez et al., 2018). Regarding time manipulation, Bredt et al. (2018) evaluated different SSG formats and found that half-court 3 vs. 3 SSGs with reduced time for the attack action resulted in greater ball possession compared to full-court 3 vs. 3 SSGs.

Regarding decision-making, Sánchez et al. (2018) carried out an eight-week 3 vs. 3 SSGs intervention with school girls and observed an improvement in decision-making. Similarly, in the school setting, Práxedes et al. (2021) demonstrated enhanced decision-making among Physical Education students following a four-week SSG intervention. In another study, Tallir et al. (2012), compared the 5 vs. 5 and 3 vs. 3 SSGs formats and found that the 3 vs. 3 improved decision-making and action execution efficiency compared to the 5 vs. 5 format. On the other hand, Camacho et al. (2021) indicated that time constraints in SSGs hindered the decision-making process during offensive actions. Therefore, game-based activities can be an

important tool in teaching collective sports such as basketball.

Overall, various manipulations, including alterations in rules, the number of players, and court size, significantly influence tactical-technical aspects in SSGs. However, research in this area remains limited, especially from a tactical standpoint. Future studies are encouraged to address this gap and should take into account participants' experience and training levels to enhance understanding in this field.

### **Study limitations, future research, and practical applications**

The present study has several limitations. Firstly, teaching-learning-training models were not included in the search criteria, which may have restricted the scope of the findings. Additionally, the majority of studies were conducted with male participants, indicating a need for future research to investigate the effects of manipulations on technical-tactical performance in female basketball players, as literature on this demographic remains limited. Moreover, there is a call for additional research to better understand the effects of rule changes and playing-area manipulations in numerically unbalanced SSGs, particularly in comparing scenarios where the additional player scores versus not scoring. The findings presented in this study contribute to both scientific understanding and practical application of SSGs in basketball. Most analyzed studies indicate that SSG formats with fewer players increase the frequency of tactical-technical actions, suggesting the integration of smaller formats into basketball teaching-learning-training processes. Therefore, SSGs emerge as effective pedagogical tools for coaches and educators involved in basketball training, promoting the development of tactical-technical aspects across all skill levels, from beginners to high-performance athletes.

### **Conclusion**

Overall, the results of the present review indicate that specific SSGs manipulations produce different effects on basketball tactical-technical behaviors. Regarding alterations in the number of players, SSGs with fewer participants demonstrate positive impacts on technical performance and increase action frequency, serving as effective pedagogical tools in basketball training sessions. From a tactical standpoint, SSGs with fewer players promote the development of tactical behavior and decision-making. Manipulating rules in SSGs also emerges as a viable approach for skill development. For instance, restrictions on dribbling actions lead to increased passing occurrences. Therefore, future studies should explore the effects of SSGs across different competitive levels and correlate them with psychological, physical, and physiological variables. Moreover, given the predominance of male participants in the reviewed studies, there is a pressing need for research on women's basketball across various levels and contexts. Ultimately, the findings

of this study offer valuable insights for teachers and coaches seeking to integrate SSGs into their training routines to enhance tactical-technical performance.

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