



## Bibliometric analysis of scientific production in small-sided games

review paper

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### ABSTRACT

**Purpose.** The present study constitutes a comprehensive bibliometric analysis aimed at evaluating both the quantity and quality of scientific output pertaining to small-sided games (SSGs). This analysis employs science mapping techniques to explore networks and clusters within publications, authors, and keywords associated with the SSG field.

**Methods.** The process of identifying relevant studies involved a rigorous search across reputable databases, including PubMed, Scopus, and Web of Science (Core Collection). Inclusion criteria stipulated that studies must primarily focus on SSGs, with explicit references to SSGs or synonymous terms in the title or abstract.

**Results.** Out of 3,125 initially retrieved titles, 1,084 met these criteria and were included. When considering five-year intervals, the average number of annual publications from 2019 to 2023 stood at 122.2. It is noteworthy that, in the last five years (2019–2023), a total of 34 reviews were published. Additionally, there is an increasing prevalence of keywords related to soccer, athletic performance, global positioning systems and their associated metrics, as well as terms associated with tactical behaviour, validity, and reliability.

**Conclusions.** The bibliometric analysis revealed that the majority of studies in this field have predominantly focused on training load monitoring, particularly concerning acute effects and with a strong emphasis on soccer. Future research directions should aim to address existing imbalances, including the incorporation of more experimental randomised controlled studies, a broader range of sports, and the inclusion of female participants. Additionally, mixed-methodological approaches should be encouraged to enhance the depth and breadth of the field.

**Key words:** bibliometrics, sports, sports training, conditioned games, drill-based games

### Introduction

Small-sided games (SSGs) represent modified versions of the formal games played by team sports athletes [1]. In SSGs, coaches tweak the rules and task objectives to elicit specific behaviours from the players [2]. To achieve this, coaches often employ task constraints that interact to shape player behaviour and, consequently, performance across various dimensions, including physical, psychophysiological, technical, and tactical aspects [3–5]. These acute effects during training sessions can potentially lead to chronic adaptations [6, 7], depending on the extent of exposure and the alignment of these games with the goals set for the players.

Due to their adaptability and capacity to expose players to high-demand scenarios while preserving the dynamics of the game (albeit in modified or simplified forms), SSGs have gained significant attention as a research topic [8, 9]. This is particularly evident in team sports, such as soccer [10], basketball [11], handball [12], rugby [13], and volleyball [14], where the value of these games for targeting multiple objectives simultaneously is recognised [15]. As the market offers an increasing array of tools and instruments for monitoring, it has become easier to assess acute responses, initially focusing on physiological parameters such as heart rate (HR) and blood lactate (BL), and later expanding to physical measures such as distance covered at different speed thresholds [16, 17]. Additionally, there

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is a growing trend in analysing the technical and tactical aspects of these games, although this often requires a more diverse set of instruments and outcomes [8].

This progression, characterised by descriptive studies and a slower emergence of experimental research, has paved the way for systematic reviews and, eventually, meta-analyses [6, 7, 18, 19]. These review approaches aim to consolidate the primary acute effects of SSGs on player performance, summarising their impact on athletic, technical, and tactical aspects in comparison to other experimental conditions [20, 21].

As the body of literature on this subject has expanded over time, it has led to an increasing diversity in approaches for investigating SSGs [22, 23]. This diversification poses a formidable challenge for researchers seeking to establish coherent and well-defined research trajectories supported by robust empirical evidence. In contrast to systematic reviews, which aim to condense and amalgamate existing research findings within a given domain, or meta-analyses, which synthesise empirical evidence pertaining to relationships between variables, including those unexplored in extant studies, bibliometric analysis offers a distinctive avenue for distilling extensive bibliometric data to provide a comprehensive overview of the intellectual landscape and emergent trends within a particular research domain [24]. This approach proves particularly valuable when the subject matter of examination encompasses a broad spectrum of research.

Hence, bibliometric analysis excels in the task of summarising both the bibliometric and intellectual structure of a field through an examination of the social and structural interconnections among various constituents of research, such as authors, countries, institutions, and thematic areas [24]. The application of bibliometric analysis facilitates several essential components, including performance analysis, which assesses the contributions of these research constituents to the field [25]. Furthermore, it enables the examination of science mapping, elucidating the intricate relationships between these research constituents [26]. Additionally, it empowers the analysis with network analysis, offering insights into the relative significance of these research constituents [27].

With the increasing number of publications on SSGs and the extensive body of research dedicated to this topic, it is surprising that, to date, no comprehensive bibliometric analysis exists to offer insights into publication trends related to SSGs. Conducting a bibliometric analysis can provide valuable insights into how SSGs have been studied. It allows for a closer examination of different research approaches, such as the focus on

acute effects versus chronic effects, or the emphasis on different populations, such as soccer versus other sports, youth versus adults. Therefore, this analysis is instrumental in mapping the evolutionary trends in research on SSGs and offers the scientific community a roadmap for future endeavours. By providing insights from this bibliometric analysis, we aim to inspire future research directions and contribute to the growth of knowledge in this field.

Therefore, the primary aim of this study is to perform a thorough bibliometric analysis that encompasses both the quantity and quality of scientific production pertaining to SSGs. This analysis will include elements of science mapping and exploration of networks and clusters within the realm of SSG publications. Additionally, it will involve characterising the publication profile over the years. Ultimately, this bibliometric analysis seeks to provide an overview of the current state of research publications in the field of SSGs, with the potential to identify emerging trends and directions for future research.

### Material and methods

#### Protocol and registration

The bibliometric review protocol underwent an initial submission process and was subsequently disseminated on the Open Science Framework with the designated registration number DOI: 10.17605/OSF.IO/YFW87, on the 5<sup>th</sup> of September, 2023. Interested parties may access the protocol via the registration number, [osf.io/yfw87](https://osf.io/yfw87).

#### Eligibility criteria

The inclusion criteria comprehensively encompassed all types of studies published in peer-reviewed journals, such as original research and review articles. This also extended to studies designated as ‘in press’ or ‘ahead-of-print’. No other categories of studies were taken into consideration for inclusion (e.g., editorials, proceedings, books, newspapers, letters). Furthermore, studies conducted in any language were deemed eligible for inclusion, without imposing any temporal constraints [28]. As part of the inclusion criteria, only studies with a primary focus on SSGs were incorporated into the bibliometric analysis. To meet this criterion, it was imperative that references to SSGs (and any synonymous terms) were explicitly featured in the title or abstract of the study.

Information sources

The quest for pertinent studies entailed an exhaustive exploration of the group of leading reputable databases, specifically PubMed, Scopus, and Web of Science (Core Collection). This bibliometric analysis was initiated on the 5<sup>th</sup> of September, 2023, following the formalisation of the protocol registration.

Search strategy

The search methodology employed the Boolean operators AND/OR, with a conscious decision to refrain from applying any filters or constraints based on date, language, or study design. This deliberate approach was adopted to enhance the probability of uncovering pertinent studies. The search strategy, which serves as the principal means of identifying relevant research, is elucidated as follows:

[Title/Abstract] “small-sided game\*” OR “small sided game\*” OR “sided game\*” OR “sided-game\*” OR “drill-based game\*” OR “constrained game\*” OR “small-sided and conditioned game\*” OR “conditioned game\*”

The full search strategy can be observed in the following Table 1.

Selection Process

The retrieved records, including titles and abstracts, underwent a screening process conducted by the first author. Each article in the dataset was meticulously

examined to ensure that those mentioning ‘small-sided games’ in their title or abstract were genuinely focused on this subject. Any articles that did not meet this criterion were systematically excluded from the analysis. To effectively manage records and eliminate duplicates, a combination of manual and automated procedures was employed, utilising the EndNote™ 20.5 software from Clarivate™.

Procedures for refining data

Refining the collected data is a crucial step aimed at improving the precision of information retrieval. Initially, our process involved extracting nouns from each research paper, followed by a meticulous refinement process. During this refinement, we identified nouns that shared identical words, exhibited similarities, or fell into exceptional cases. If an adjective had been nominalised or if similar words were combined into a single word, we designated them as synonyms in our thesaurus.

For instance, terms such as ‘small-sided games’, ‘conditioned games’, and ‘sided-games’ were consolidated and pre-registered under the unified term ‘small-sided games’ in our thesaurus. Furthermore, we unified terms like ‘behavior’ and ‘behaviour’ to ‘player’ due to their semantic similarity, and these were also included in our synonym list. A similar approach was applied to author names. For example, ‘Clemente, F’ and similar variations like ‘Clemente, FM’ and ‘Clemente Filipe Manuel’ were treated as ‘Clemente, F’ to ensure consistency.

Table 1. Full search strategy for each database

Database	Specificities of the databases	Search Strategy	Titles retrieved (n)
PubMed	None to report	(((((((“small-sided game*”[Title/Abstract]) OR (“small sided game*”[Title/Abstract])) OR (“sided game*”[Title/Abstract])) OR (“sided-game*”[Title/Abstract])) OR (“drill-based game*”[Title/Abstract])) OR (“constrained game*”[Title/Abstract])) OR (“small-sided and conditioned game*”[Title/Abstract])) OR (“conditioned game*”[Title/Abstract]))	613
Scopus	Search for title and abstract also includes keywords	TITLE-ABS-KEY (“small-sided game*” OR “small sided game*” OR “sided game*” OR “sided-game*” OR “drill-based game*” OR “constrained game*” OR “small-sided and conditioned game*” OR “conditioned game”)	1,206
Web of Science	Search for title and abstract also includes keywords and its designated “topic”	TS=(“small-sided game”) OR TS=(“small sided game”) OR TS=(“sided game”) OR TS=(“sided-game”) OR TS=(“drill-based game”) OR TS=(“constrained game”) OR TS=(“small-sided and conditioned game”) OR TS=(“conditioned game”)	1,306

Bibliometric analysis

The bibliometric analysis in this study encompassed performance analysis, science mapping, and network visualisation. The performance analysis involved examining various metrics, including total publications, the number of active publication years, annual publication trends, the top-ten journals with the highest number of articles related to the topic, and the top-ten authors in the field.

Science mapping was employed to identify the most influential publications, focusing on the top-ten most cited articles per database. Additionally, it involved periodical bibliographic coupling, co-word analysis (with a specific focus on frequently occurring keywords), and co-authorship analysis, which explores the social interactions among authors in the field.

Moreover, network visualisation techniques were applied to enrich the bibliometric analysis by revealing author and keyword clustering patterns across publications over the years. This led to a more comprehensive understanding of the bibliometric landscape.

The bibliometric analysis was conducted using the VOSviewer software, developed by Nees Jan van Eck and Ludo Waltman (version 1.6.19, University Leiden, The Netherlands). VOSviewer is specifically designed for statistical analysis and visualising co-occurrence and co-authorship relationships in bibliometric studies.

**Ethical approval**

The conducted research is not related to either human or animal use.

**Results**

Study identification and selection

The initial search yielded a total of 3,125 titles (Figure 1). The data were imported into the EndNote™ reference manager software (version 20.2, Clarivate Analytics, Philadelphia, PA, USA). Duplicates (1,258 titles) were subsequently removed, either automatically or manually. The remaining 1,867 titles were screened for their relevance based on their titles and abstracts. Of those, 783 titles were removed. In total, 1084 articles were included in the final scoping review.

Publication trends

Figure 2 illustrates the evolution of publications related to SSGs in the dataset. Between 2004 and September 05, 2023, a total of 1,084 articles were identified in relation to SSGs, showcasing a consistent increase in the number of records over time. Notably, this growth pattern can be divided into two distinct periods. From 2011 to 2016, there was an average annual growth rate of 43.2%, while from 2018 to 2022, the average annual growth rate was 20%. However, in 2017, there was a decline of 14.3% compared to the previous year (2016).

Examining five-year periods, the average number of publications per year from 2019 to 2023 was 122.2. In the period from 2014 to 2018, it averaged 71.4 publications per year, and from 2009 to 2013, the average was 21.4 publications annually. Lastly, from 2004 to 2008, the average was 1.8 publications per year.

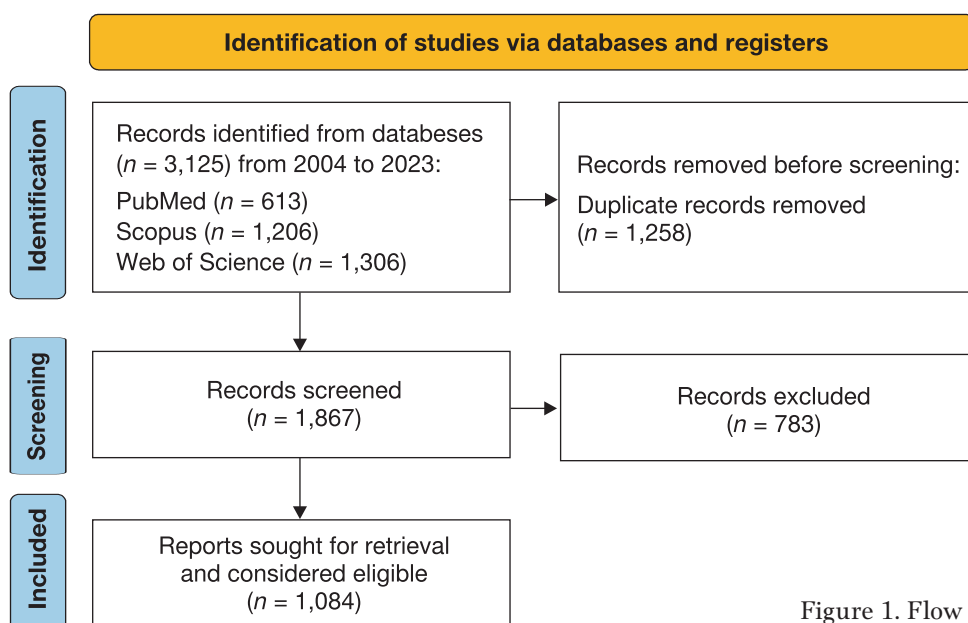


Figure 1. Flow diagram



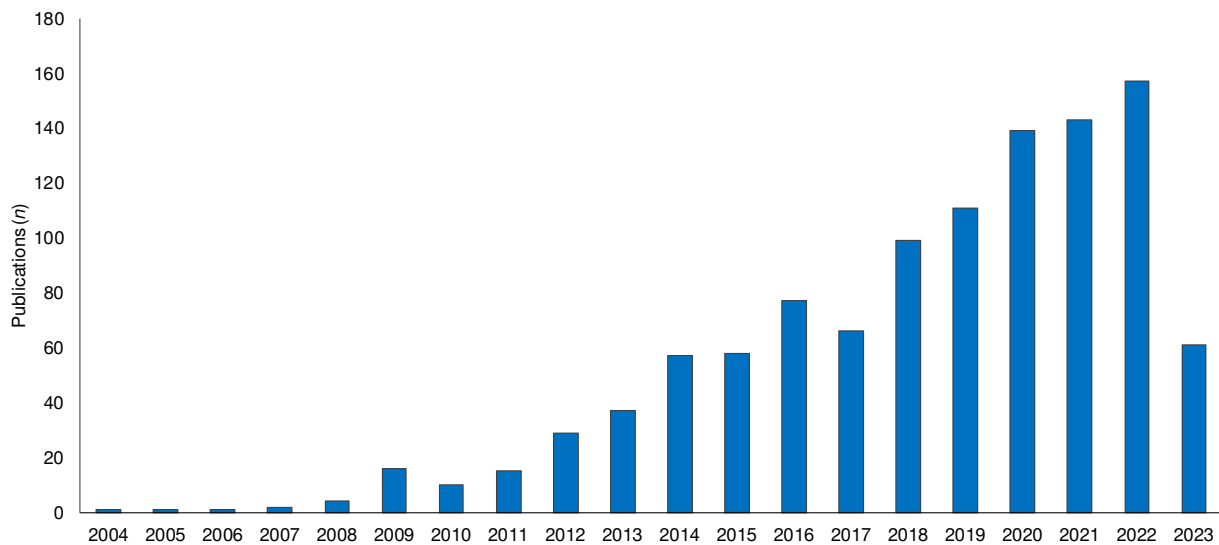


Figure 2. Publication frequency regarding small-sided games from 2004 to September 5, 2023

### Most cited articles

Table 2 (see end of paper) displays a compilation of the most cited articles related to SSGs. Notably, among the top ten most cited articles in the Web of Science database, five are original research articles, while in the Scopus list, six of the top ten are original articles. Interestingly, in both the Web of Science and Scopus databases, the most highly cited articles are primarily review articles.

### List of reviews exclusively dedicated to the topic of SSGs

Table 3 (see end of paper) provides a comprehensive list of reviews ( $n = 41$ ) exclusively dedicated to the topic of SSGs. It is noteworthy that, within the last five years (2019–2023), a total of 34 reviews were published. This constitutes a significant portion, accounting for 83% of the total number of publications since the first one in 2011 [29]. Furthermore, during the period from 2018 to 2022 (spanning five completed years), the average annual growth rate of review publications was an impressive 44.6% per year.

The reviews frequently reflect the expanding number of original articles, signifying a wealth of evidence available for a comprehensive synthesis of results. Among the reviews published, 19 (46%) take the form of systematic reviews, and 12 (29%) adopt the systematic review with meta-analysis format, while 9 (22%) adopt the narrative or scoping review formats. Additionally, an umbrella review of systematic reviews concerning SSGs was also published in 2021 [30].

In terms of the sports to which the reviews are dedicated, soccer takes the majority share with 29 (71%)

reviews, followed by the generic topic of ‘team sports’ with 7 (17%) reviews. Basketball is the focus of 2 reviews, while handball, rugby, and volleyball each have one review dedicated to them.

Out of the published reviews, 20 (49%) were exclusively dedicated to acute responses (e.g., physiological, physical, technical, and tactical), and 10 (24%) were solely focused on chronic adaptations (e.g., physical fitness and technical aspects). When considering the primary outcomes presented in these reviews, 24 (59%) covered physiological outcomes (e.g., HR, rate of perceived exertion, BL), 28 (68%) delved into physical outcomes, including locomotor responses (e.g., distances covered at different speed thresholds) and physical fitness (e.g., muscular strength, cardiovascular endurance). Additionally, 19 (46%) reviews focused on technical actions and skills (e.g., passes executed, development of technical proficiency), while 17 (41.5%) reviews explored tactical behaviours.

### Co-occurrence of keywords

The keyword analysis was conducted with a predefined threshold, requiring each keyword to appear at least ten times in the dataset (Figure 3). In total, 174 unique keywords were identified, leading to the formation of 4 distinct clusters, encompassing 6,355 connections and a cumulative link strength of 39,272. An examination of the temporal trends in keyword usage reveals notable shifts. In recent years, closer to 2023, there has been a discernible increase in the prevalence of keywords related to soccer, athletic performance, global positioning systems and their associated metrics, as well as terms related to tactical behaviour, validity, and reliability. Conversely, in the earlier years of





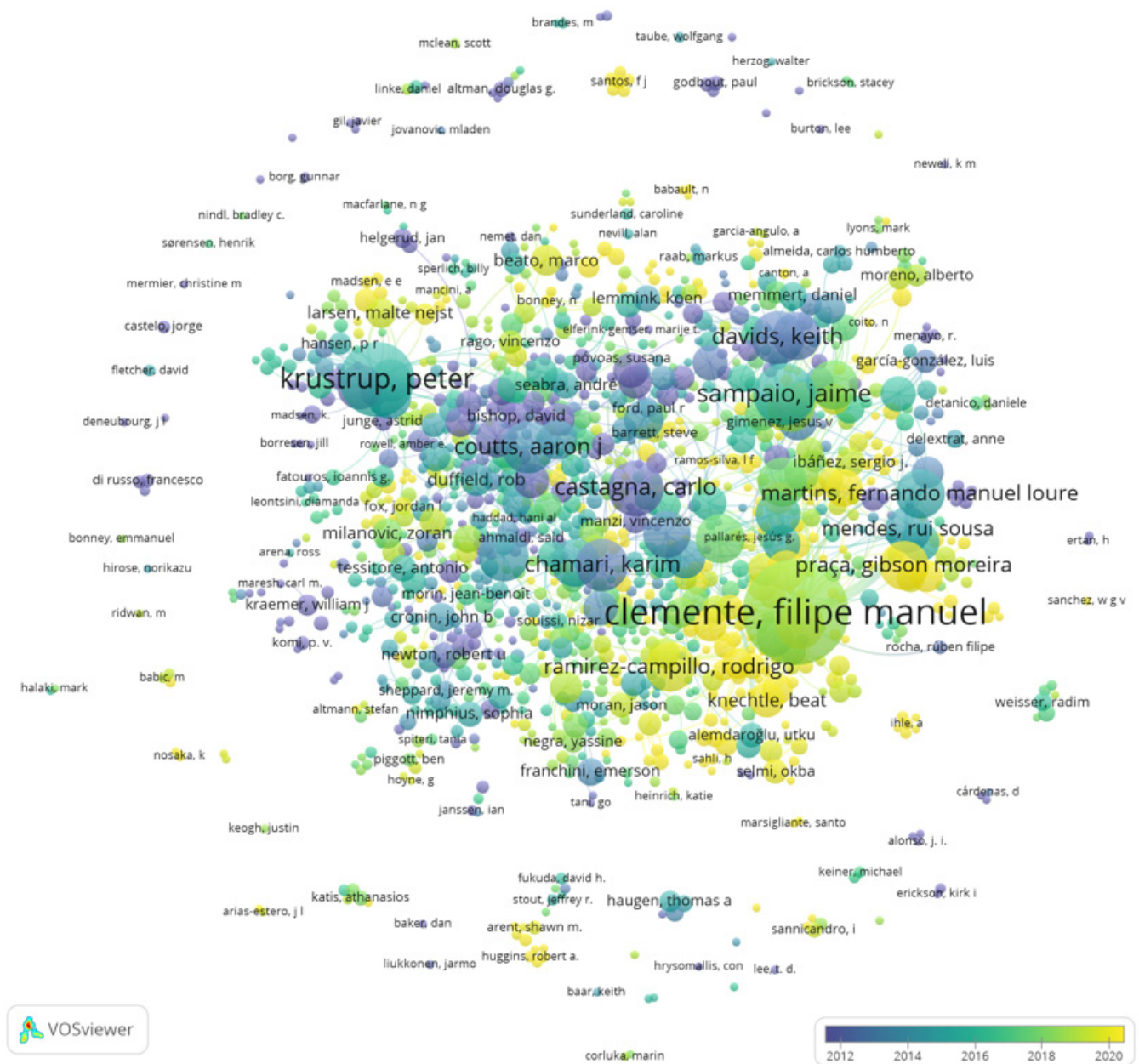


Figure 4. Overlay visualisation of the authorship of articles published regarding small-sided games, while considering the period of publication

Moreover, there is growing interest in researching the reproducibility of players' acute responses [39–41], reflected in the prevalence of terms like 'reliability' and 'validity'. This underscores sports scientists' keenness to assess the impact of playing dynamics on their ability to consistently elicit specific stimuli in players. It also highlights the significance of ensuring stable results and employing certain games for monitoring athletes' readiness [42, 43].

Nonetheless, a prominent trend towards observational studies is evident, which is also reflected in the most cited articles. For instance, only one of the top ten most cited articles on SSGs had an experimental focus

[44], particularly a randomised controlled design. This observation highlights a potential gap in the evidence, as the limited number of experimental studies hinders the provision of robust insights into the chronic adaptations induced by these games. While various reviews have been published on this topic, most concentrate on physical fitness adaptations, with only two reviews focusing on technical adaptations [4, 19] and none on tactical adaptations. To further advance the understanding of SSGs, there is a need for more experimental research, broader focus areas in chronic adaptations, and a more comprehensive exploration of technical and tactical aspects in future studies.

Several issues have surfaced in the realm of research on acute responses in SSGs (i.e., observational studies). These concerns primarily revolve around the use of small sample sizes, the frequent absence of a priori sample size calculations, and the repetition of analyses on a single game. These practices can introduce biases and limit the ability to generalise findings [45]. Furthermore, given the inherent variability of SSGs, it becomes challenging to ascertain whether a specific outcome variation is a consistent trend or merely a product of the unique context in which it was observed [39, 46].

The co-occurrence network analysis clearly illustrates that the term 'soccer' holds a prominent position as one of the most frequently used terms. This observation is corroborated by an analysis of the most cited articles and reviews on SSGs. Notably, in the list of the top-ten most cited articles in Web of Science, seven are specific to soccer, and in the top-ten most cited articles in Scopus, eight are related to soccer. Moreover, in the list of all-time published reviews exclusively dedicated to SSGs, 71% were focused solely on soccer. These findings indicate that research on SSGs has predominantly centred around soccer, while other team sports such as basketball, futsal, handball, rugby, and volleyball have seen fewer dedicated reviews. This discrepancy is largely attributed to the smaller number of original studies conducted in these sports. Therefore, it is imperative to make a concerted effort in the coming years to balance the evidence base across various team sports, particularly considering that the unique rules and constraints of each sport warrant specialised research rather than relying on generalisations from soccer.

Another notable imbalance identified in the co-occurrence network analysis was the intermittent prominence of the keyword 'men' during certain periods. Furthermore, when reviewing the list of reviews exclusively dedicated to SSGs, it becomes evident that only two were focused on women's sports [47, 48]. It is worth noting that one of these reviews, despite being systematic, included only 13 original articles as of 2018 [48]. Given the physiological and contextual differences between men and women in sports, there is a pressing need to increase research dedicated to women in this field. This effort should not only address the gender gap but also ensure proper contextualisation, such as considering competitive levels, utilising a common terminology such as the participant classification framework [49], accounting for the influence of the menstrual cycle [50], and clearly defining eligibility criteria.

Analysing the authorship, we found that only 7.3% of the authors have contributed to three or more papers related to SSGs. This observation suggests that a sig-

nificant portion of the authors may be engaging with this topic on an occasional basis rather than establishing a long-term research career focused on SSGs. Furthermore, it is worth noting that authors with more than three articles in this field contributed to a total of 98 distinct clusters. This finding suggests that there is not an exclusive trend in SSG research. Instead, researchers seem to be dispersed across smaller groups that collaborate within the broader research topic.

To gain a deeper understanding of authorship dynamics, future research should explore centralities and connection elements within author networks. Additionally, investigating citations and co-citations can shed light on how information flows within and between research groups. In summary, further investigation is warranted to unravel the intricacies of authorship, collaboration, and knowledge dissemination in the field of SSG research.

The present bibliometric analysis comes with certain limitations that should be acknowledged. Firstly, the scope of the study was confined to specific databases, which means that some relevant research might not have been included. Furthermore, the analysis focused exclusively on research articles, omitting potential contributions from conference proceedings, books, and grey literature. Consequently, it is possible that a broader spectrum of research on this topic exists beyond the confines of this analysis. Therefore, any interpretations drawn from this bibliometric study should be cautiously framed within the context of the methodological boundaries set for this investigation.

From both the theoretical and practical perspectives, this bibliometric analysis reveals that historical research in this field predominantly centred on acute effects, with a particular focus on physiological and physical aspects, predominantly among male soccer players. However, current research trends indicate a shift towards a more holistic approach. Recent studies are increasingly incorporating a wider array of outcomes, including technical and tactical aspects, and are paying closer attention to methodological considerations related to variability and the reproducibility of stimuli.

These evolving trends represent a positive step towards more comprehensive investigations, where different outcome measures are integrated. This approach provides a better understanding of how tactical, technical, physiological, and physical demands interact and are influenced by task constraints in SSG designs. Nevertheless, there are still significant gaps in the literature, including a lack of diversity in the team sports studied, an underrepresentation of female populations, and a shortage of randomised controlled studies.



Addressing these gaps in the coming years is crucial to complete the puzzle. It will help elucidate how acute effects translate into chronic adaptations and enable sports scientists and coaches from various disciplines to contextualise this valuable information for their respective practices.

The growing body of literature on SSGs highlights the need to challenge researchers and the practical community. Key considerations include a demand for more experimental randomised controlled studies to enhance the robustness of findings. Furthermore, there is a call for diversification in research settings, encompassing multiple centres and contexts, to improve the generalisability of outcomes. In both experimental and observational studies, adherence to established reporting guidelines, such as CONSORT (for experimental studies) or STROBE (for observational studies), is crucial. Particular emphasis should be placed on ensuring a priori sample size calculations to meet stringent statistical standards. Notably, the predominant quantitative nature of SSGs publications, as evidenced by the most cited articles and reviews, while valuable for replicability, falls short in addressing all methodological nuances. Therefore, the integration of more mixed-method approaches, leveraging the strengths of both quantitative and qualitative methods, should become a more frequent practice in future SSGs research endeavours.

## Conclusions

The field of SSG research has witnessed a rapid escalation in publication trends within sports sciences, particularly since its initial documented appearance in 2004. Demonstrating an impressive average annual growth rate of 43.2% over the last five years, this research trajectory indicates its enduring popularity, especially within the context of sports training. It is apparent from the identified research landscape that the most highly cited articles encompass both original studies and reviews. It is worth noting that only one of the top ten most cited articles is an experimental study; instead, they predominantly fall under the observational category, with a specific focus on analysing the impact of manipulating task constraints on the physiological and physical demands of these games.

Furthermore, the substantial increase in the number of reviews published in the last five years underscores the growing prevalence of research centred around soccer and physiological/physical outcomes. Co-occurrence analysis within the networks reflects a discernible shift from physiological-based analyses towards locomotor-based investigations. Key topics, such as the

exploration of tactical responses and variability analysis, have gained prominence in recent years.

In retrospect, the predominant focus of research into SSGs has been centred on soccer, particularly with regard to acute effects while analysing training load. However, there is currently a transition occurring, marked by an increasing number of studies investigating technical and tactical outcomes, with a particular interest in within-player variability. This bibliometric analysis highlights the necessity of diversifying research efforts beyond soccer to encompass a broader spectrum of sports, including basketball, futsal, handball, rugby, and volleyball. Moreover, it underscores the importance of inclusivity, emphasising the participation of female athletes, and a heightened dedication to experimental studies.

Furthermore, within the realm of observational studies, there is a pressing need for elevated standards, encompassing larger sample sizes that can yield greater generalisability through adequately powered analyses. Additionally, enriching the quality of these studies can be achieved by incorporating repeated measures of assessments and broadening the diversity of participants analysed. It is paramount that these critical gaps become a primary focus in future research endeavours within this dynamic field in the forthcoming years.

Consequently, the future landscape of studies in SSGs may involve a combination of various methodological approaches, including the integration of mixed-methodologies. This multifaceted approach should encompass physiological, physical, technical, tactical, psychological, and sociological parameters. It should also ensure an adequate number of participants to provide robustness for generalisation while striving to establish cause-and-effect relationships between the applied task constraints and the potential acute and chronic adaptations observed.

## Disclosure statement

No author has any financial interest or received any financial benefit from this research.

## Conflict of interest

The authors state no conflict of interest.

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Table 2. List of most cited articles related to small-sided games based on information retrieved from Web of Science and Scopus

Web of Science	Citations	Publication year	Type
High-intensity interval training, solutions to the programming puzzle, part I: Cardiopulmonary emphasis [51]	773	2013	Review
Physiology of small-sided games training in football. A systematic review [29]	515	2011	Review
Physiological and performance effects of generic versus specific aerobic training in soccer players [44]	453	2006	Original
Factors influencing physiological responses to small-sided soccer games [31]	444	2007	Original
Is recreational soccer effective for improving VO <sub>2</sub> max? A systematic review and meta-analysis [52]	383	2015	Review
Time-motion, heart rate, perceptual and motor behaviour demands in small-sides soccer games. Effects of pitch size [32]	309	2010	Original
How small-sided and conditioned games enhance acquisition of movement and decision-making skills [2]	246	2013	Review
Heart rate and blood lactate correlates of perceived exertion during small-sided soccer games [53]	242	2009	Original
A review on the effects of soccer small-sided games [54]	212	2012	Review
The effect of pitch dimensions on heart rate responses and technical demands of small-sided soccer games in elite players [33]	209	2009	Original
Scopus	Citations	Publication year	Type
Physiology of small-sided games training in football. A systematic review [29]	574	2011	Review
Factors influencing physiological responses to small-sided soccer games [31]	486	2007	Original
Physiological and performance effects of generic versus specific aerobic training in soccer players [44]	478	2006	Original
Time-motion, heart rate, perceptual and motor behaviour demands in small-sides soccer games. Effects of pitch size [32]	345	2010	Original
How small-sided and conditioned games enhance acquisition of movement and decision-making skills [2]	284	2013	Review
Heart rate and blood lactate correlates of perceived exertion during small-sided soccer games [53]	271	2009	Original
A review on the effects of soccer small-sided games [54]	232	2012	Review
The effect of pitch dimensions on heart rate responses and technical demands of small-sided soccer games in elite players [33]	229	2009	Original
Physiological responses and time-motion characteristics of various small-sided soccer games in youth players [55]	224	2009	Original
Small-sided games in team sports training. A brief review	222	2014	Review



Table 3. Comprehensive list of reviews (n = 41) exclusively dedicated to the topic of SSGs

Article	Type	Year	Sport	Effects	Physio-logical outcomes	Physical outcomes	Technical Outcomes	Tactical outcomes	Others	Original articles included	Journal	Percentile in JCR – JIF for the year of publication	Percentile in Scopus (CiteScore) for the year of publication
Hill-Haas et al. [29]	Systematic	2011	Soccer	Acute & Chronic	Yes	Yes				NA	Sports Medicine	99th (sport sciences)	99th (physical therapy, sports therapy and rehabilitation)
Aguilar et al. [54]	Narrative	2012	Soccer	Acute	Yes					NA	Journal of Human Kinetics	16th (sport sciences)	41st (physical therapy, sports therapy and rehabilitation)
Halouni et al. [15]	Narrative	2014	Team sports	Acute & Chronic	Yes	Yes				NA	Journal of Strength & Conditioning Research	72nd (sport sciences)	87th (physical therapy, sports therapy and rehabilitation)
Clemente [11]	Narrative	2016	Basketball	Acute & Chronic	Yes		Yes			NA	Strength and Conditioning Journal	10th (sport sciences)	32nd (physical therapy, sports therapy and rehabilitation)
Hammami et al. [56]	Meta-analysis	2018	Team sports	Chronic	Yes	Yes				15	Journal of Sports Medicine and Physical Fitness	21st (sport sciences)	58th (physical therapy, sports therapy and rehabilitation)
Dios-Álvarez et al. [48]	Systematic	2018	Soccer	Acute	Yes	Yes				13	Journal of Sports Medicine and Physical Fitness	21st (sport sciences)	58th (physical therapy, sports therapy and rehabilitation)
Pill and Agnew [57]	Scoping	2018	Team sports	Acute	Yes	Yes	Yes	Yes		56	International Sports Studies	None	6th (education)
Bujalance-Moreno et al. [9]	Systematic	2019	Soccer	Acute & Chronic	Yes	Yes	Yes	Yes		53	Journal of Sports Sciences	69th (sport sciences)	90th (physical therapy, sports therapy and rehabilitation)
Kunz et al. [20]	Meta-analysis	2019	Soccer	Chronic		Yes				9	Sports Medicine Open	None	77th (physical therapy, sports therapy and rehabilitation)
Moran et al. [6]	Meta-analysis	2019	Soccer	Chronic	Yes	Yes				7	Sports Medicine	98th (sport sciences)	99th (physical therapy, sports therapy and rehabilitation)
Sannicandro [58]	Narrative	2019	Soccer	Acute		Yes				3	Journal of Physical Education and Sport	None	60th (physical therapy, sports therapy and rehabilitation)
Clemente et al. [5]	Systematic	2020	Soccer	Acute			Yes	Yes		34	Chaos, Solitons and Fractals	97th (mathematics, interdisciplinary applications)	98th (general mathematics)
Clemente et al. [4]	Systematic	2020	Soccer	Acute & Chronic			Yes			37	Human Movement	None	44th (physical therapy, sports therapy and rehabilitation)
Fernández-Espínola et al. [59]	Systematic	2020	Team sports	Acute & Chronic		Yes	Yes	Yes		47	International Journal of Environmental Research and Public Health	67th (public, environmental & occupational health)	66th (public health, environmental and occupational health)
O'Grady et al. [60]	Systematic	2020	Basketball	Acute	Yes	Yes				17	International Journal of Sports Physiology and Performance	73rd (sport sciences)	94th (physical therapy, sports therapy and rehabilitation)

Ometto et al. [61]	Systematic	2020	Soccer	Acute	Yes	Yes	24	International Journal of Sports Science and Coaching	16th (hospitality, leisure, sport & tourism)	82nd (sport sciences)	74th (social sciences, miscellaneous)
Clemente et al. [62]	Systematic	2021	Soccer	Acute & Chronic	Yes	Yes	5	Biology of Sport		87th (physical therapy, sports therapy and rehabilitation)	
Clemente et al. [7]	Meta-analysis	2021	Soccer	Chronic	Yes	Yes	6	Frontiers in Physiology	76th (physiology)	74th (physiology, medical)	
Clemente et al. [63]	Meta-analysis	2021	Soccer	Acute	Yes	Yes	6	Frontiers in Psychology	77th (psychology, multidisciplinary)	73rd (general psychology)	
Clemente et al. [19]	Meta-analysis	2021	Team sports	Chronic	Yes	Yes	6	Frontiers in Psychology	77th (psychology, multidisciplinary)	73rd (general psychology)	
Clemente et al. [64]	Meta-analysis	2021	Soccer	Chronic	Yes	Yes	5	Healthcare	55th (healthcare sciences & services)	None	
Clemente et al. [65]	Meta-analysis	2021	Soccer	Chronic	Yes	Yes	9	Healthcare	55th (healthcare sciences & services)	None	
Clemente et al. [66]	Meta-analysis	2021	Soccer	Chronic	Yes	Yes	4	International Journal of Environmental Research and Public Health	66th (public, environmental & occupational health)	75th (public health, environmental and occupational health)	
Clemente et al. [30]	Umbrella	2021	Team sports	Acute & Chronic	Yes	Yes	12	PLoS One	61st (multidisciplinary sciences)	87th (multidisciplinary)	
Sannicandro [47]	Narrative	2021	Soccer	Acute	Yes	Yes	NA	Journal of Human Sport and Exercise	None	52nd (physical therapy, sports therapy and rehabilitation)	
Sarmiento et al. [67]	Systematic	2021	Soccer	Acute	Yes	Yes	77	International Journal of Performance Analysis in Sport	37th (sport sciences)	74th (physical therapy, sports therapy and rehabilitation)	
Zanin et al. [68]	Systematic	2021	Rugby	Acute & Chronic	Yes	Yes	20	Journal of Sports Sciences	71st (sport sciences)	90th (physical therapy, sports therapy and rehabilitation)	
Clemente et al. [39]	Systematic	2022	Soccer	Acute	Yes	Yes	24	Biology of Sport	93rd (sport sciences)	93rd (physical therapy, sports therapy and rehabilitation)	
Clemente et al. [69]	Meta-analysis	2022	Soccer	Acute	Yes	Yes	41	Biology of Sport	93rd (sport sciences)	93rd (physical therapy, sports therapy and rehabilitation)	
Coito et al. [36]	Systematic	2022	Soccer	Acute	Yes	Yes	21	Research Quarterly for Exercise and Sport	25th (hospitality, leisure, sport & tourism)	75th (physical therapy, sports therapy and rehabilitation)	
Castro et al. [70]	Systematic	2022	Volleyball	Acute & Chronic	Yes	Yes	22	Biology of Sport	93rd (sport sciences)	93rd (physical therapy, sports therapy and rehabilitation)	
Oliveira et al. [71]	Narrative	2022	Soccer	Chronic	Yes	Yes	8	Motriz. Revista de Educacao Fisica	None	26th (health, social science)	

Borge et al. [72]	Narrative	2022	Soccer	Acute	Yes	Yes	NA	Retos	None	64th (education)
Ferreira-Ruiz et al. [73]	Systematic	2022	Soccer	Acute	Yes	Yes	47	Apunts, Educacion Fisica y Deportes	None	93rd (cultural studies)
Klingner et al. [74]	Scoping	2022	Soccer	Acute	Yes	Yes	23	International Journal of Sports Science and Coaching	16th (hospitality, leisure, sport & tourism)	79th (social sciences, miscellaneous)
Praça et al. [75]	Meta-analysis	2022	Soccer	Acute	Yes	Yes	11	Journal of Human Kinetics	44th (sport sciences)	76th (physical therapy, sports therapy and rehabilitation)
Rico-González et al. [76]	Systematic	2022	Soccer	Acute	Yes	Yes	24	Perceptual and Motor Skills	16th (psychology, experimental)	39th (experimental and cognitive psychology)
Zhang et al. [77]	Meta-analysis	2022	Team sports	Chronic	Yes	Yes	7	Strength and Conditioning Journal	53rd (sport sciences)	78th (physical therapy, sports therapy and rehabilitation)
Dechchi et al. [78]	Systematic	2023	Handball	Acute & Chronic	Yes	Yes	20	Human Movement	None	51st (physical therapy, sports therapy and rehabilitation)* result from the 2022 list
Dello Iacono et al. [46]	Systematic	2023	Soccer	Acute	Yes	Yes	111	Sports Medicine	97th (sport sciences)	99th (physical therapy, sports therapy and rehabilitation)* result from the 2022 list
Junior et al. [79]	Systematic	2023	Soccer	Acute	Yes	Yes	12	Retos	None	64th (education)* result from the 2022 list

JCR – journal citation reports covering the ‘Science Citation Index Expanded’ (SCIE) and the ‘Social Sciences Citation Index’ (SSCI)  
 JIF – journal impact factor