

Goal-scoring in futsal: A scoping review of trends and knowledge gaps to advance performance analysis in research and practice

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ABSTRACT

Although goal scoring is widely conceived as a key performance indicator in futsal, a comprehensive understanding of how this phenomenon has been conceptualized and investigated in the scientific literature remains limited. This study aimed to systematically map, synthesize, and critically examine research on goal scoring in futsal, identifying thematic and methodological patterns, conceptual orientations, and knowledge gaps to clarify the current state of the field and support the advancement of performance analysis research and practice. A scoping review was conducted in accordance with PRISMA-ScR guidelines. Five databases (Scopus, EBSCO, SciELO, Web of Science, and Google Scholar) were searched for peer-reviewed publications in Portuguese, Spanish, and English in which goal scoring was treated as a dependent or independent variable. From 3,786 records, 98 studies met the inclusion criteria. Descriptive and bibliometric analyses were conducted to characterize publication trends and methodological features. Results indicate that research on goal scoring in futsal emerged in 2008 and is largely produced in Brazil and Spain, focusing on elite adult male players. The predominance of observational and descriptive designs limits explanatory insights into goal-scoring processes. This review outlines conceptual and analytical directions to support more integrative and process-oriented approaches in research and applied performance analysis.

Keywords: Match analysis, Tactics, Key performance indicators, Sport analytics, Invasion games, Game performance.

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INTRODUCTION

Futsal is a high-intensity team invasion sport characterized by reduced playing space, continuous interactions, and rapid decision-making demands, which shape its distinct performance dynamics. The sport represents a variant of football played on a smaller court with five players per team (one goalkeeper and four outfield players) and governed by specific rules (FIFA, 2020). Beyond its competitive structure, futsal has been described as a “*donor sport*” to football, contributing to players’ technical and tactical development, particularly during early stages of training (Travassos, Araújo, & Davids, 2017).

Since the 2000s, FIFA has consolidated its role as the main regulatory body for international futsal competitions, promoting greater standardization and global visibility (Fahey, 2022). This process of institutionalization has expanded participation across age groups, genders, nationalities, and performance levels. Parallel to this expansion, scientific production on futsal has increased substantially, encompassing physiological, biomechanical, sociocultural, and tactical perspectives (Berdejo-Del-Fresno, 2014; Moore et al., 2014). Within this growing body of literature, strategic and tactical dynamics have emerged as particularly prominent due to their direct relevance to performance and their pedagogical implications for player development.

One specific phenomenon, goal-scoring, arguably the ultimate determinant of match outcomes, has been examined through analyses of distinct contextual variables (Medina, San José, & Lorente, 2019). Indeed, goal-scoring has been widely regarded as a key indicator of offensive performance, informing tactical strategies and shaping game models (Nogueira et al., 2022). In applied contexts, coaching staff routinely has prioritized goal-related indicators given their decisive influence on competitive outcomes. Within the specialized literature, offensive goal patterns have been extensively described and linked them to team effectiveness through variables such as opposition dismissals (Gómez et al., 2018), shot location (Kunze, Schlosser, & Brancher, 2016), and possession characteristics, including the number of passes preceding a goal (Gómez, Moral, & Lago-Peñas, 2015).

Despite the importance and advancements on the field, it remains unclear to what extent futsal research has adopted such process-oriented perspectives or continues to rely on more event-centred conceptualizations of goal-scoring (Torres-Ronda et al., 2022). Accordingly, the present study aims to systematically map, synthesize, and critically examine research on goal-scoring in futsal, identifying thematic and methodological patterns, conceptual orientations, and knowledge gaps to clarify the current state of the field and support the advancement of performance analysis research and practice.

For that, this study adopts a critical perspective on the analytical paradigm underpinning goal-scoring research in futsal by examining how this phenomenon has been conceptualized, operationalized, and interpreted across studies. Three research questions guided the study: (1) how goal-scoring has been conceptually and methodologically investigated in futsal research?, (2) which analytical paradigms, variables, and contextual dimensions have predominated in the literature?, and (3) to what extent current approaches capture goal-scoring as a dynamic and process-based phenomenon?. Within this context, this review does not aim solely to catalogue research trends and gaps. Rather, it adopts a framework-oriented perspective to examine how goal-scoring has been understood within futsal research and to identify theoretical directions capable of supporting more integrative and process-based approaches to performance analysis.

METHODS

Study design

This study employed a scoping review design based on the methodological framework proposed by Arksey and O'Malley (2005), subsequently refined by Levac, Colquhoun and O'Brien (2010), and operationalized according to the Joanna Briggs Institute guidelines (Peters et al., 2015). The review was conducted and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR; Tricco et al., 2018), ensuring methodological rigor, transparency, and reproducibility. A bibliometric analysis was integrated with the scoping review to quantify and contextualize the evolution of research on goal-scoring in futsal.

The complete dataset generated by this review, including coding sheets and bibliometric data, is publicly available on the Open Science Framework (OSF) under protocol number DOI: [10.17605/OSF.IO/K5SCF](https://doi.org/10.17605/OSF.IO/K5SCF).

Eligibility criteria

Inclusion criteria:

- Peer-reviewed publications in Portuguese, Spanish, or English.
- Articles in which goal-scoring was considered as a dependent variable, independent variable, or both.
- Any competitive level, age category, or gender.
- Studies published up to July 2022.

Exclusion criteria:

- Publication types such as letters, editorials, interviews, conference proceedings, book chapters, books, and abstracts without full papers.
- Studies that did not address goal-scoring directly in the context of futsal.

Information sources and search strategy

Five databases were systematically searched: Google Scholar, Scopus, EBSCOhost (Academic Search Premier and SPORTDiscus), SciELO (Scientific Electronic Library Online), and Web of Science. Google Scholar was included to enhance the sensitivity of the search and capture potentially relevant studies not indexed in traditional databases, particularly considering the regional dispersion of futsal research.

These databases were selected for their comprehensive coverage of sport sciences, performance analysis, and physical education research. The search strategy was adapted to each database and used Boolean operators with language-specific terms:

- Portuguese: ("Futsal" OR "Futebol de Salão") AND ("Gol*").
- Spanish: ("Futsal" OR "Fútbol Sala") AND ("Gol*").
- English: ("Futsal" OR "Indoor Soccer" OR "Indoor Football") AND ("Goal*" OR "Scor*").

Duplicate records were identified and removed using reference management software, followed by manual verification. Although scoping reviews do not typically involve formal risk-of-bias assessment, methodological information from each study was systematically extracted to ensure transparency and allow readers to interpret the evidence within its analytical context. No restrictions were placed on publication year. Reference lists of included studies were also screened for additional eligible publications.

Selection process

Two independent reviewers conducted the selection process in three stages: (1) identification, (2) screening, and (3) eligibility. The final set of included studies was gathered for analysis. In the identification stage, all search results from the selected databases were imported into reference management software for duplicate removal. Additional potentially relevant studies were sought by manually screening the reference lists of included articles.

During the screening stage, titles and abstracts were assessed against the predefined inclusion criteria. Discrepancies between reviewers were resolved through discussion until consensus was reached. In the eligibility stage, the full texts of potentially eligible studies were retrieved and assessed using the same inclusion and exclusion criteria. When full texts were not directly accessible, complementary searches were performed. A retroactive search of reference lists was done to look for further studies that might not be gathered in the process.

Articles published in Portuguese, English, or Spanish were analysed in their original language by the reviewers, who were proficient in all three. No formal assessment of methodological quality of the articles was conducted, as the aim was to map the breadth, characteristics, and conceptual orientations of the literature rather than evaluate the effectiveness of specific findings. Consequently, the findings should be interpreted as representing the structure and characteristics of the evidence base rather than the relative strength or quality of individual studies.

Data extraction

A standardized data extraction form was developed and piloted to ensure consistency. The following variables were collected from each study:

1. Temporal distribution of publications.
2. Geographical distribution of authors.
3. Language of publication.
4. Study type (goal as a variable).
5. Study objectives.
6. Age of participants.
7. Gender of participants.
8. Competitive level.
9. Sample size.
10. Variables analysed.
11. Data collection methods.
12. Data source and methods of analysis.
13. Statistical procedures.

Data analysis

Studies were interpreted according to their underlying analytical orientation. Particular attention was given to how goal-scoring was operationalized, the characteristics of the variables analysed, and the extent to which studies incorporated contextual dimensions of performance. This analytical lens was adopted to examine whether the literature predominantly reflects event-centred or process-based perspectives on goal-scoring.

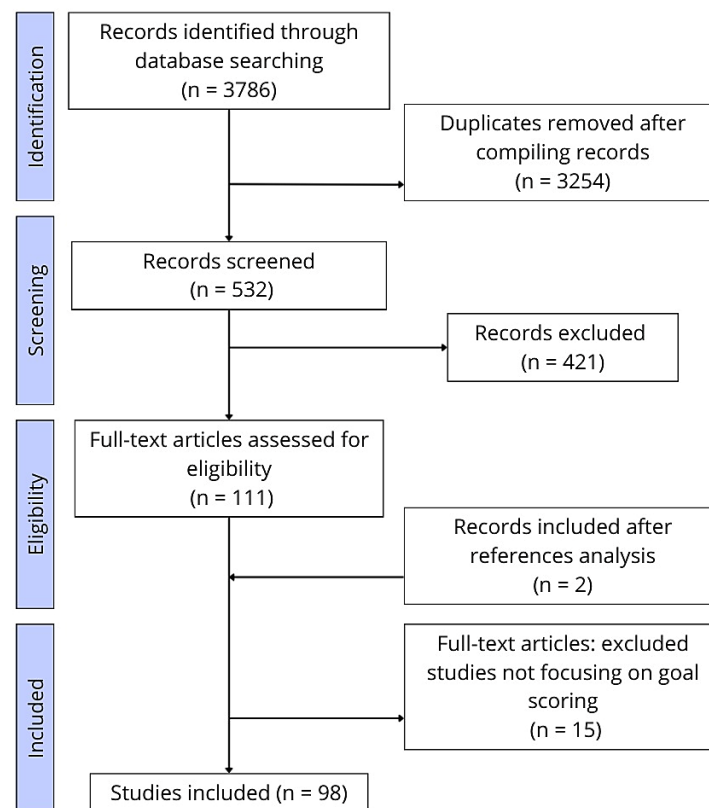
Data analysis comprised two analytical procedures:

- Reporting: The study selection process followed a PRISMA-ScR flow diagram (Tricco et al., 2018).

- Scoping synthesis and bibliometric analysis: A combination of scoping synthesis and bibliometric analysis was adopted to organize and quantify the evidence base by categorizing structured information about (1) evolution and concentration of knowledge production, (2) characteristics of investigated populations and contexts, (3) conceptualization of goal-scoring and (4) methodological and analytical tendencies.

RESULTS

The search process yielded 3,786 records across the five selected databases. After removal of 3,254 duplicates, a total of 532 records were screened by title and abstract. Of these, 421 were excluded, resulting in 111 full-text articles assessed for eligibility. After full-text review, 15 studies were excluded for not meeting the inclusion criteria (no direct relation to goal-scoring in futsal). Additionally, two studies were identified through reference list searches. Therefore, 98 studies were included in the final synthesis (Figure 1).

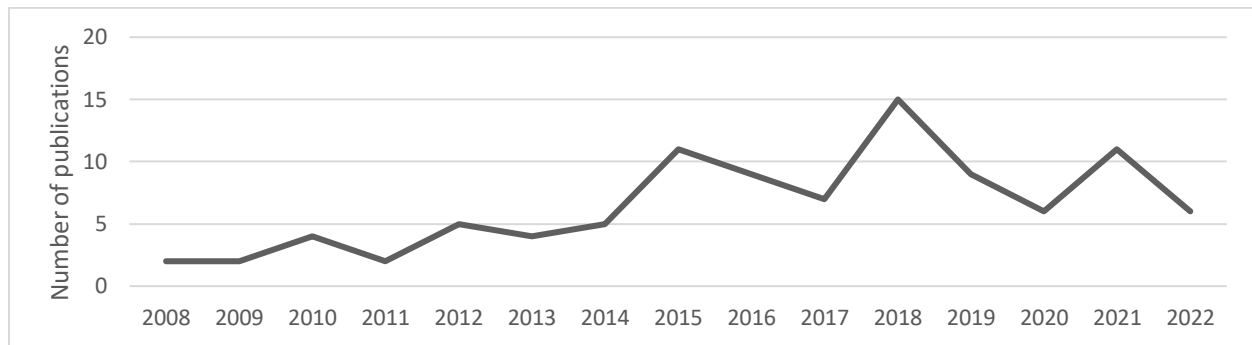


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Figure 1. PRISMA flow diagram. Scoping review process of study selection.

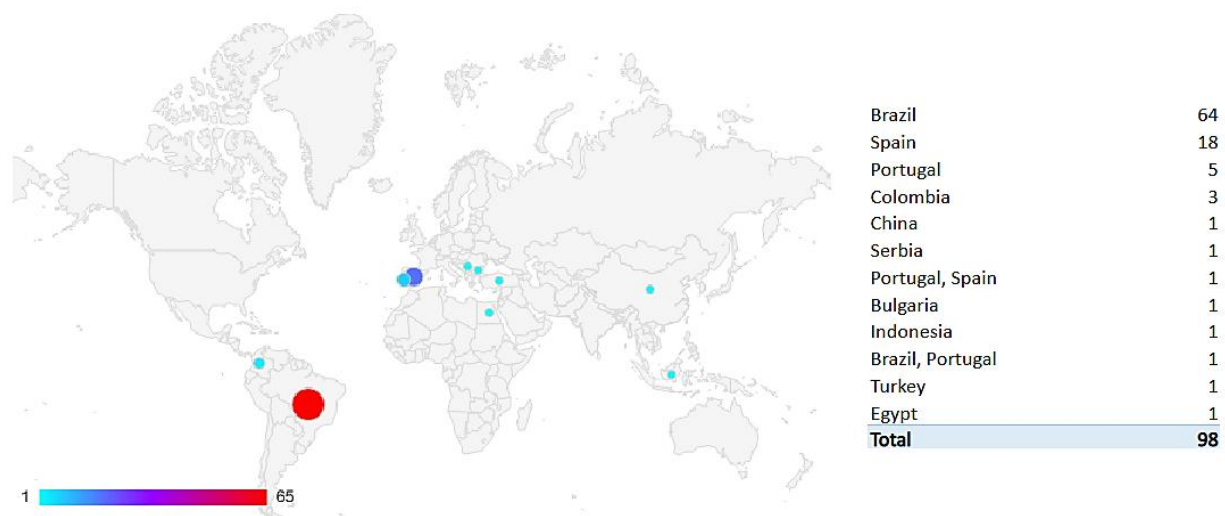
Evolution and concentration of knowledge production

Temporal distribution of publications: The earliest study identified was published in 2008. Between 2008 and 2014, the number of studies remained low, with fewer than five publications per year. From 2015 onwards, the number increased steadily, reaching a peak of 15 studies in 2018. After 2019, annual publications fluctuated between 6 and 12 studies per year, with output maintained up to the last year of data collection (Figure 2).



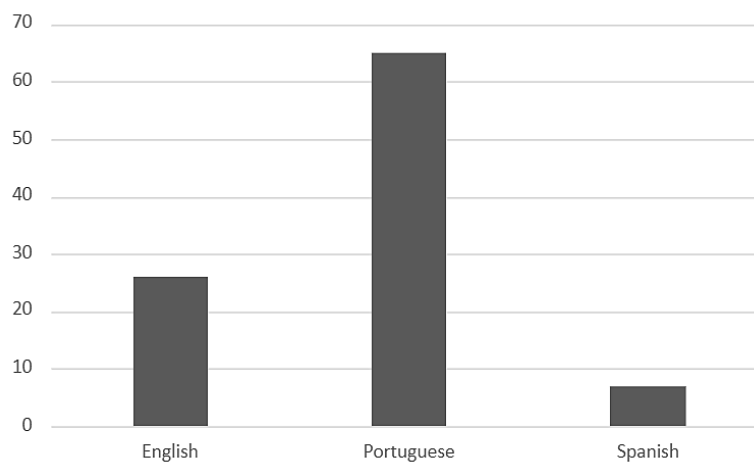
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Figure 1. Temporal distribution of publications.



Source: Research data.

Figure 2. Geographical distribution of authors.



Source: Research data.

Figure 3. Language of publication.

Geographical distribution of authors: The included studies were authored predominantly by main researchers from Brazil ($n = 64$; 65.3%) and Spain ($n = 18$; 18.4%). Additional contributions came from Portugal ($n = 5$; 5.1%) and Colombia ($n = 3$; 3.1%). Occasional studies were produced in collaboration with researchers from Portugal and Spain ($n = 1$; 1.0%) and Brazil and Portugal ($n = 1$; 1.0%). Articles from other countries that met the inclusion criteria ($n=6$; 6.1%) were sparse and are listed below (Figure 3).

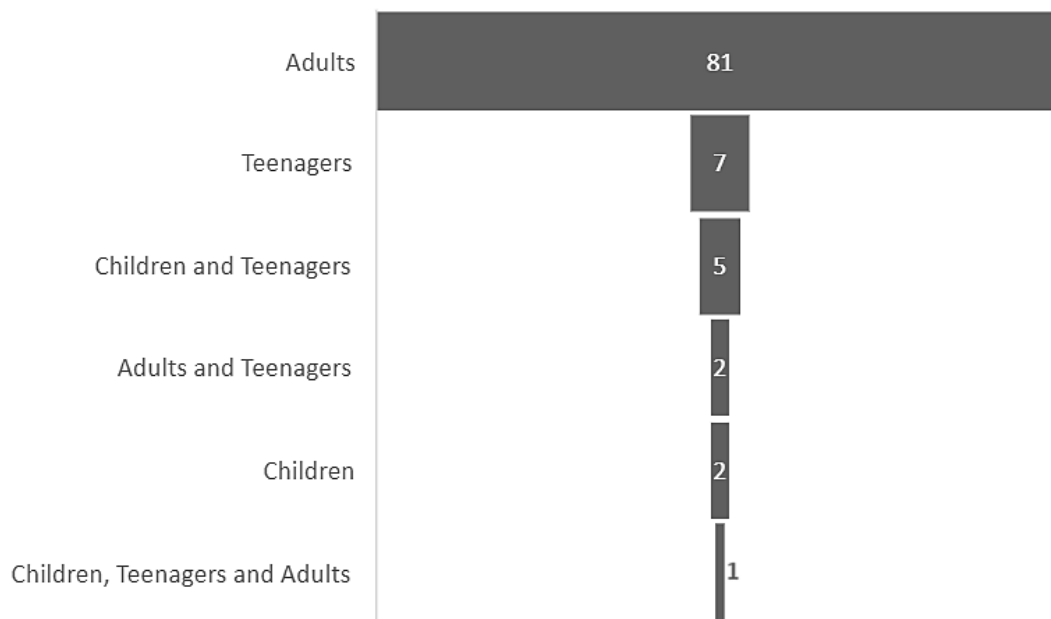
Language of publication: Most studies were written in Portuguese ($n = 65$; 66.3%), followed by English ($n = 26$; 26.5%) and Spanish ($n = 7$; 7.1%).

Interpretative synthesis of evolution and concentration of knowledge production

The growth of goal-scoring literature in futsal has been accompanied by a relatively concentrated structure of knowledge production. The dominance of countries with established futsal traditions and the predominance of Portuguese-language publications suggest that scientific development in the field has occurred within a limited set of cultural, competitive, and analytical contexts. While this concentration has fostered substantial advances in understanding performance in elite futsal, it may also restrict the emergence of alternative perspectives, methodological diversity, and broader theoretical dialogue with the international performance analysis literature.

Characteristics of investigated populations and contexts

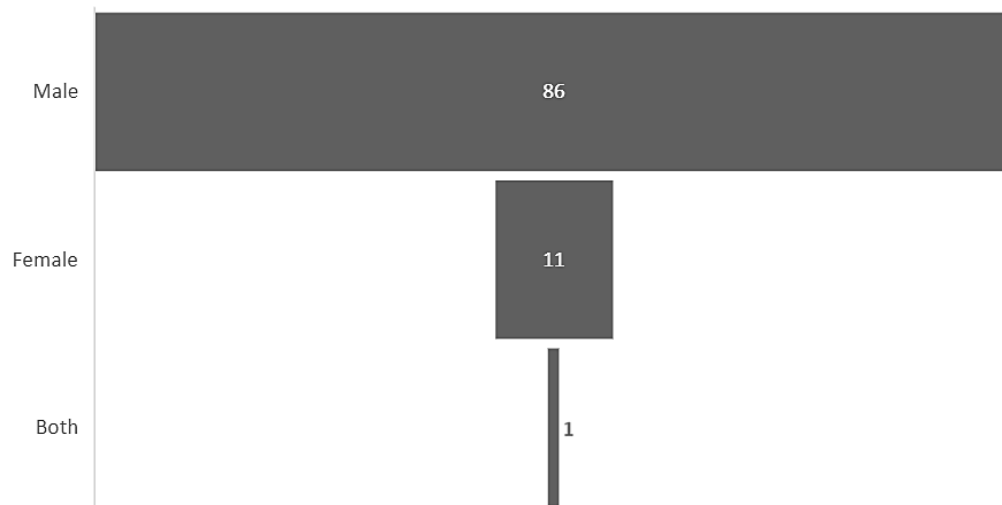
Age of participants: Research has been concentrated on adult players ($n = 81$; 82.7%), followed by teenagers ($n = 7$; 7.1%), and children ($n = 2$; 2.0%). Studies compared goal-related variables across more than one age group: children and teenagers ($n = 5$; 5.1%), adults and teenagers ($n = 2$; 2.0%), and children, teenagers and adults ($n = 1$; 1.0%). (Figure 5).



Source: Research data.

Figure 5. Age of participants.

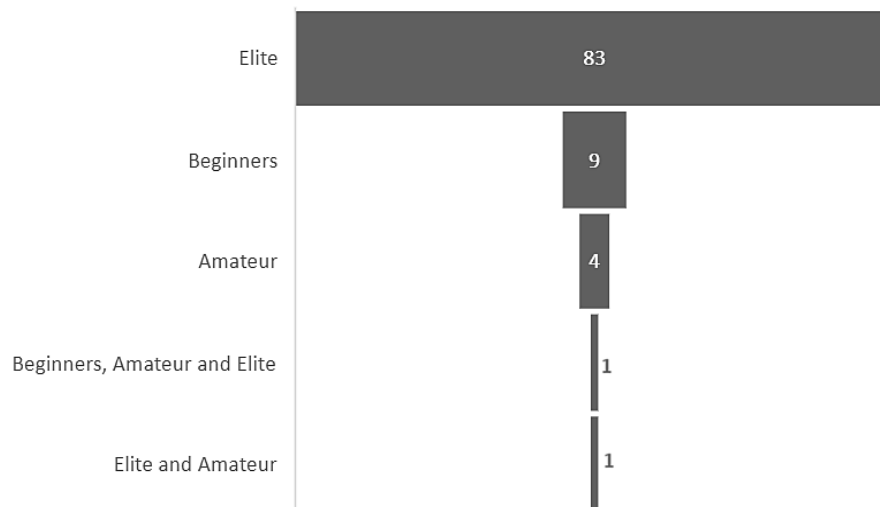
Gender of participants: Research predominantly involved male players ($n = 82$; 83.7%), whereas female players ($n = 16$; 16.3%) were represented in a smaller number of studies (Figure 7).



Source: Research data.

Figure 7. Gender of participants.

Competitive level: Most studies were based on elite competitions ($n = 83$; 84.7%), and the FIFA Futsal World Cup games were focused in 15 studies. Most of elite competitions analysed were from national leagues from Brazil ($n = 20$; 20.4%) or Spain ($n = 16$; 16.4%). Sub-elite or amateur competitions ($n = 15$; 15.3%) and developmental contexts such as school or university futsal ($n = 11$; 11.2%) were less frequently investigated (Figure 6).



Source: Research data.

Figure 4. Competitive level.

Interpretative synthesis of investigated populations and contexts

Knowledge production on goal-scoring in futsal has been largely constructed from a narrow segment of the sport ecosystem, namely elite adult male competitions. Consequently, prevailing models and explanations of goal-scoring performance are grounded in specific competitive realities and may not adequately capture the

developmental, contextual, and gender-related variations that characterize the broader futsal landscape. This concentration raises important questions regarding the generalizability of current findings and highlights the need for more diverse research contexts to support a comprehensive understanding of goal-scoring processes.

Conceptualization of goal-scoring

Study type (goal as a variable): Sixty-six (66) studies (67.4%) analysed goal-scoring as an independent variable, 20 studies (20.4%) treated it as a dependent variable, and 12 studies (12.3%) considered it as both dependent and independent.

Study objectives: The majority of studies ($n = 74$; 75.5%) aimed to describe technical or tactical determinants of goal-scoring (e.g., location, sequence of passes, match period). The remaining studies ($n = 24$; 24.5%) focused on contextual aspects such as match status, competition type, or team formation.

Variables analysed at goal-scoring: The most frequent variables included:

- Type of offensive action (positional attack, counterattack, set piece) - reported in 26 studies (26.5%).
- Shot location or distance - 29 studies (29.6%).
- Number of passes or sequence length - 26 studies (26.5%).
- Match period (first or second half; time subdivision) - 42 studies (42.9%).
- Match status (winning, losing, drawing) - 6 studies (6.1%).

Interpretative synthesis for the conceptualization of goal-scoring

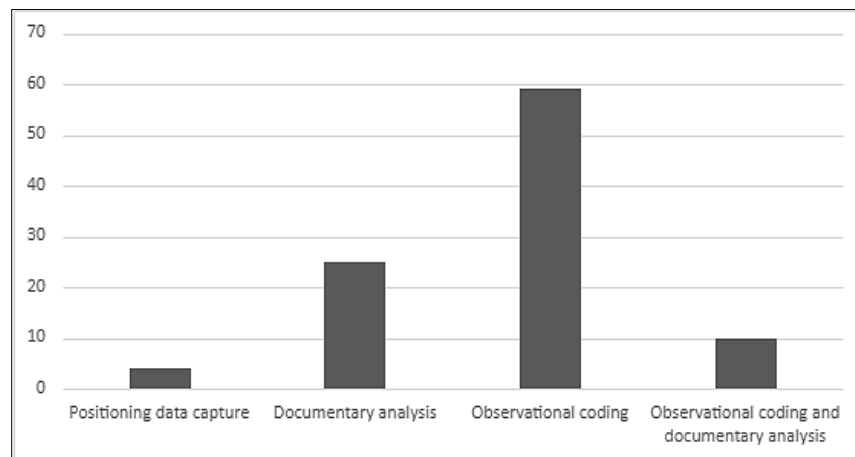
Goal-scoring has been primarily treated as a measurable event rather than as an emergent performance process. Most studies focus on identifying isolated determinants and recurring descriptive patterns, while comparatively little attention has been devoted to understanding how interactions among players, teams, and contextual constraints shape the creation and conversion of scoring opportunities. The reliance on a restricted set of operational variables further suggests that the multidimensional and dynamic nature of goal-scoring remains only partially represented within the current evidence base.

Methodological and analytical tendencies

Sample size: The number of matches analysed per study ranged from 0.5 (first half of a game) to 1325. The number of goals analysed per study ranged from 13 to 4716. The number of offensive actions analysed on goal events per study ranged from 90 to 17430. Studies using international competitions typically included larger samples (more than 100 units of analysis, mostly), while those focused on local tournaments, non-elite players or single teams used smaller datasets (less than 50 units of analysis).

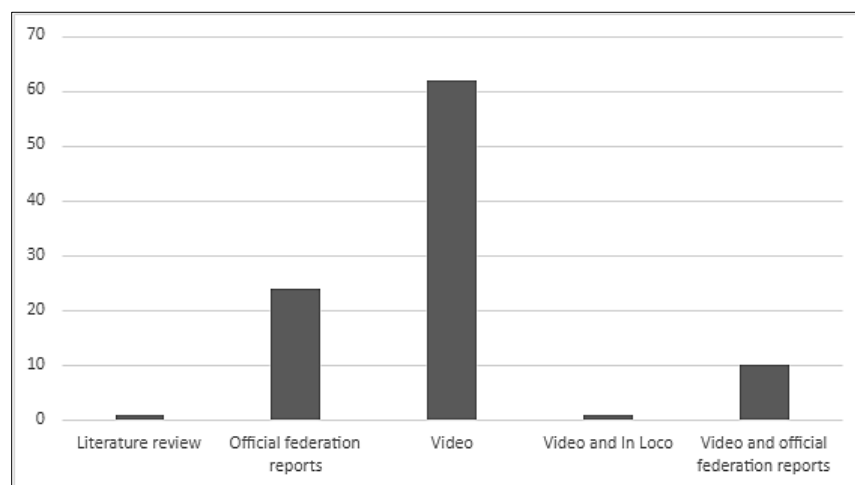
Data collection methods: The majority of studies used observational coding ($n = 59$; 60.2%), followed by documentary analysis from official reports ($n = 25$; 25.5%), and hybrid methods combining observational coding and documentary data ($n = 10$; 10.2%). The use of automated positional tracking was reported in four studies ($n = 4$; 4.1%) (Figure 8).

Data source and methods of analysis: The most frequent data sources were video recordings ($n = 62$; 63.3%), official federation reports ($n = 24$; 24.5%), and the combination of video recordings and official federation reports ($n = 10$; 10.2%). Few studies used the combination of video recordings and observations in loco ($n = 1$; 1.0%) or literature review ($n = 1$; 1.0%) (Figure 9).



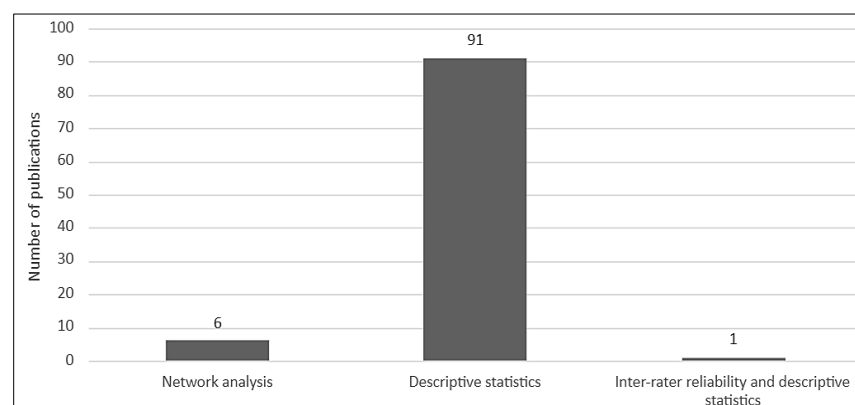
Source: Research data.

Figure 5. Data Collection methods.



Source: Research data.

Figure 6. Data source and methods of analysis.



Source: Research data.

Figure 7. Statistical procedures.

Statistical procedures: The most common analytical approach was descriptive statistics ($n = 91$; 92.9%). Other methods included network analysis ($n = 6$; 6.1%) and inter-rater reliability combined with descriptive statistics ($n = 1$; 1.0%) (Figure 10).

Interpretative synthesis of methodological and analytical tendencies

The study of goal-scoring in futsal has been shaped by analytical traditions primarily designed to describe events rather than explain processes. The predominance of observational coding, video-based notational analysis, and descriptive statistics reflects a research paradigm focused on documenting performance indicators, whereas the incorporation of higher-resolution technologies and analytical approaches capable of modelling interactions, temporal dynamics, and complex system behaviour remains limited. Consequently, the methodological tools currently employed may only partially represent the complexity underlying the emergence of goal-scoring opportunities.

DISCUSSION

This study systematically mapped, synthesized, and critically examined research on goal-scoring in futsal, identifying thematic and methodological patterns, conceptual orientations, and knowledge gaps to clarify the current state of the field and support the advancement of performance analysis research and practice. To date, no review had specifically focused on goal-scoring as a distinct object of investigation while simultaneously exploring how it has been conceptually framed, operationalized, and analytically investigated across the literature. The methodological combination of scoping synthesis and bibliometric analysis adopted in the study has been recommended in sport performance research as it may provide a more comprehensive understanding of knowledge production, prevailing themes, and future directions for investigation and practice (Clemente, 2023; Plakias, 2025).

The findings suggest that contemporary knowledge on goal-scoring in futsal has been produced within a relatively concentrated scientific ecosystem. Although the field has expanded considerably since the first studies that focused on goal-scoring in 2008 (Duarte, 2008; Junior, Garcia, & Silva, 2008), scientific production remains largely concentrated in Brazil and Spain, countries with strong historical, cultural, and competitive traditions in the sport (Fahey, 2022). This concentration is reflected not only in the geographical distribution of publications but also in the predominance of Portuguese-language outputs. While these characteristics have contributed to the development of a robust evidence base, they may also have limited methodological diversification and broader theoretical dialogue with the international sport science community (Agras, Ferragut, & Abrales, 2017). Consequently, prevailing conceptualizations of goal-scoring have largely emerged from a restricted set of competitive, cultural, and analytical contexts. This concentration may also help explain the methodological homogeneity observed across studies, as a relatively small number of research groups and publication outlets have historically shaped the dominant analytical traditions within the field.

A similar pattern of concentration was identified in the populations investigated. Research has been predominantly conducted in elite adult male competitions, a tendency also reported in other invasion sports (Armendáriz, Spyrou, & Alcaraz, 2023). This pattern likely reflects the historical development of performance analysis, which has traditionally evolved in close association with male high-performance sport environments where access to video footage, official statistics, and research resources is more readily available. Consequently, prevailing explanations of goal-scoring performance within elite male futsal raise important questions regarding their generalizability to youth, female, amateur, and developmental contexts.

More importantly, the review revealed a dominant paradigm through which goal-scoring has been conceptualized. Rather than being conceptualized as an emergent phenomenon arising from interactions among players, teams, and contextual constraints (Rigon et al., 2026), goal-scoring has predominantly been approached as a measurable event explained through isolated technical, tactical, or situational indicators. This tendency appears closely linked to the historical influence of performance analysis traditions, which were originally developed to classify, quantify, and compare observable game events. Although such approaches have generated valuable practical knowledge and contributed substantially to the identification of performance indicators, they may also contribute to the fragmentation of complex performance phenomena into discrete analytical units (Praça, 2025).

The methodological patterns identified in the study reinforce this interpretation. The predominance of observational coding, video-based notational analysis, and descriptive statistical procedures reflects a research trend primarily oriented toward documenting performance outcomes. However, they are limited in their ability to explain performance processes, capturing only part of the dynamic interactions, collective adaptations, and spatiotemporal relationships that characterize goal-scoring situations in invasion games. The limited adoption of positional tracking technologies, automated data acquisition systems, and advanced analytical approaches further suggests that the methodological evolution of the field has not yet fully matched contemporary theoretical developments in performance analysis (Memmert, Lemmink, & Sampaio, 2017; Memmert & Raabe, 2023).

Overall, the study findings suggest that the central challenge facing future research is not merely methodological, but also conceptual. The literature also remains largely oriented toward describing where, when, and under which conditions goals occur, whereas considerably less attention has been devoted to explaining how goal-scoring opportunities emerge and evolve during play. This distinction is particularly important because goals do not arise from isolated actions but can be understood as the outcome of a dynamic process emerging from continuous interactions among players, teams, and contextual constraints (Rigon et al., 2026). In this regard, the present study may advance research and practice beyond previous mapping efforts by identifying a dominant analytical paradigm underlying goal-scoring literature and by outlining a theoretical pathway toward more integrative models of performance analysis.

Implications for the evolution of performance analysis research

Current performance analysis systems, although increasingly sophisticated, still rely on simplifying assumptions and show limited integration with decision-making theories, often operating as opaque “*black boxes*” (Memmert, 2025a). From this perspective, integrative frameworks capable of jointly accounting for spatiotemporal, decisional, and technical dimensions represent a critical step toward capturing the complex dynamics underlying goal-scoring in futsal.

Among the theoretical alternatives capable of addressing these limitations, the Concept of Advantage (CoA) (Rigon, 2023) stands out as a promising analytical construct. The CoA conceptualizes attacking performance as a dynamic emergence of imbalances between offensive and defensive systems. By emphasizing how advantage emerges, stabilizes, and transforms over time, this framework shifts performance analysis beyond isolated indicators toward a relational, process-oriented understanding of finishing and goal-scoring situations (Rigon et al., 2026).

Although the present review focuses on futsal, many of the identified patterns mirror broader tendencies reported across invasion games. Similar concerns regarding the predominance of descriptive approaches, limited integration of contextual variables, and difficulties in representing dynamic interactions have been

highlighted in football, basketball, handball, and hockey research. In this regard, futsal may serve as a particularly valuable model system due to its reduced space, higher interaction density, shorter action cycles, and greater frequency of finishing situations (Travassos, Araújo, & Davids, 2017).

These characteristics make emergent performance processes more directly observable and provide fertile ground for developing, testing, and validating integrative performance frameworks. Conversely, football's larger spatial scale and longer temporal sequences may benefit from similar constructs to better connect positional structures with emergent attacking opportunities, highlighting opportunities for cross-sport theoretical transfer and comparative research.

There is also a promising research pathway to bridge observational and theoretical constructs with emerging analytical technologies (Praça, 2025). For example, positional tracking data, computer vision, and machine learning approaches can enable more precise, scalable, and interpretable analyses of how advantages are created and converted into goal-scoring opportunities, particularly when guided by theory-driven modelling frameworks (Memmert, 2025b). Additionally, wearable inertial measurement units (IMUs) and other sensor-based monitoring systems may enhance the ecological validity of performance data by capturing players' movement dynamics and interaction patterns in real time. Advancing in this direction will require performance analysis research to move beyond predominantly descriptive traditions and adopt methodological ecosystems capable of representing the multilevel and emergent nature of game behaviour. In sum, future research should:

1. Expand the diversity of samples, including youth, female, and amateur populations, to enhance the ecological validity of findings.
2. Operationalize and validate theoretical constructs to enable more robust examination of decision-making and tactical imbalances in finishing actions.
3. Adopt advanced data acquisition technologies (e.g., positional tracking, sensor-based monitoring) and integrate them with machine learning to strengthen the objectivity and depth of tactical analysis.
4. Develop comparative research with football and other invasion games to explore transferability and cross-sport learning processes.
5. Establish longitudinal datasets to capture the evolution of offensive behaviours over time, allowing for the assessment of developmental trajectories and contextual influences on goal-scoring patterns.

Practical implications for practitioners

There is a need for more integrative approaches to performance analysis in futsal that move beyond isolated indicators and focus on how scoring opportunities and other events are constructed during play. In applied contexts, adopting frameworks to capture the emergence of goals and the evolution of offensive processes preceding goal-scoring can help analysts and coaches structure their workflows to identify decisive moments within attacking sequences, interpret players' decisions under pressure, and translate these insights into more representative instructions and training tasks.

The quality and scope of collected data represent another critical dimension of goal-scoring and overall performance analysis in futsal. Integrating contextual variables into analytical models can enhance the understanding of goal-scoring dynamics and support decision-making in both training and competitive environments. For instance, combining information on attacking structure, match status, temporal context, and court location of actions (e.g., shots) allows for a more comprehensive interpretation of scoring situations.

From an operational perspective, combining systematic video analysis with more sophisticated technological resources can increase the precision and practical value of feedback. Although full positional tracking is not

always feasible, the use of structured coding protocols, semi-automated tagging, and computer-vision-assisted tools can enhance the consistency and depth of match analysis, making insights more actionable for coaching staff.

From a training design perspective, there is a gap in considering goal-scoring as a process rather than a discrete event, suggesting that this perspective should be more explicitly incorporated into coaching instructions and the design of practice tasks. Practice tasks that deliberately manipulate spatial, temporal, and numerical constraints can help players perceive and exploit emerging advantages before the final action, aligning analytical insights with learning objectives. In this sense, performance analysis becomes a pedagogical instrument that informs task design, supports tactical periodization, and guides player development. In sum, practical applications are:

1. Selecting key performance indicators that capture the processes preceding shots and goal-scoring situations.
2. Integrating contextual variables to achieve a deeper understanding of goal-scoring dynamics.
3. Using structured and systematic analytical procedures (e.g., coding protocols, semi-automated tagging, or computer-vision-assisted tools) when advanced tracking technologies are not available.
4. Aligning analytical insights with coaching instructions and learning objectives to enhance performance and player development.

Strengths and limitations

This study provides a robust mapping of the literature by integrating a scoping synthesis with bibliometric analysis, ensuring both breadth and contextual depth. Strengths comprise the use of multiple databases, the inclusion of studies in three languages, and open access to coding and datasets. Nevertheless, some limitations should be acknowledged. The concentration of studies in Portuguese may have excluded insights from other linguistic and cultural contexts. Despite extensive database coverage, some relevant studies may not have been captured due to differences in indexing. The heterogeneity of study designs, analytical approaches, and operational definitions of goal-related variables also limit interpreting the synthesized evidence. Because no formal quality assessment was conducted, the findings should not be interpreted as evidence of the relative validity or strength of particular approaches, but rather as indicators of prevailing research trends and patterns within the field. Variations in data collection procedures, sample characteristics, and variable operationalization may also affect the reliability, comparability, and generalizability of specific findings reported across studies. Furthermore, while bibliometric analysis enabled the visualization of collaboration networks, the choice of thresholds and metrics may have influenced the representation of certain authors or themes.

CONCLUSION

The study shows that goal-scoring research in futsal is a relatively recent and geographically concentrated field, predominantly driven by studies conducted in Brazil and Spain and largely focused on elite adult male players. The literature remains mainly descriptive, with limited adoption of multidimensional frameworks and advanced analytical approaches, which constrains the ability to capture the dynamic and relational complexity of finishing actions and, consequently, goal-scoring. These findings highlight a central gap in the field: the limited consideration of goal-scoring as a dynamic and emergent process shaped by interacting spatiotemporal and other game constraints. Addressing this gap will require the operationalization of theory-driven constructs, the diversification of samples across populations and competitive contexts, and the integration of innovative data acquisition and analytical technologies. The current study provides a structured foundation for advancing futsal research and practice, supporting a shift toward more sophisticated,

integrative and process-oriented perspectives on performance. More broadly, it reinforces the need for approaches capable of representing the multilevel and emergent nature of game behaviour. These insights also encourage cross-sport theoretical dialogue with other sports facing similar analytical challenges.

AUTHOR CONTRIBUTIONS

All authors meet the criteria for authorship in accordance with established ethical guidelines. Contributions are specified according to the CRediT (Contributor Roles Taxonomy) as follows: Conceptualisation: Thiago André Rigon. Methodology: Thiago André Rigon and Rene Drezner. Formal analysis: Thiago André Rigon and Larissa Rossi Talarico. Investigation: Thiago André Rigon and Larissa Rossi Talarico. Data curation: Thiago André Rigon and Larissa Rossi Talarico. Writing – original draft: Thiago André Rigon. Writing – review & editing: Thiago André Rigon, Larissa Rossi Talarico, and Rene Drezner. Supervision: Thiago André Rigon.

All authors have critically reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this manuscript.

AI USE DISCLOSURE

In accordance with current publishing ethics and transparency recommendations, artificial intelligence (AI) tools were used solely to assist with translation and language editing, with the aim of improving clarity and readability. No AI tools were used in the generation of scientific content, including the study design, data collection, analysis, interpretation of results, or the formulation of conclusions. The authors retain full responsibility for the content of the manuscript and confirm its originality, integrity, and accuracy.

DATA AVAILABILITY STATEMENT

The dataset generated and analysed during the current study, including coding sheets and bibliometric data, is publicly available in the Open Science Framework (OSF) repository at <https://osf.io/k5scf/>. The primary sources analysed are cited within the manuscript.

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