# Exploratory review of the scientific production of 5-blind soccer with the Bibliometrix tool

*Revisión exploratoria sobre la producción científica del fútbol 5 ciegos con la herramienta Bibliometrix*


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## Abstract

Background/Objective. Different studies have investigated blind 5-a-side football through quantitative and qualitative studies, seeking to identify the factors that influence the practice of this sport. However, to date, no exploratory review has been reported that identifies research trends on blind 5-a-side football. The aim was to provide an overview of the research area on blind 5-a-side football to identify trends and research gaps in this topic.
Materials and methods. Research was conducted through the following databases: Scopus, Web of Science, PubMed, ScienceDirect, and Google Scholar. Finally, a total of 85 documents were included. Analyses were performed using the R program Bibliometrix, considering the occurrence of authors, keywords, institutional affiliations, countries and journals.
Results. Quantitative studies are prevalent (84.70%) versus qualitative studies (12.94%) and mixed designs (2.35%). Most studies focus on injury studies, body composition, and to a lesser extent, on the analysis of external load in competition and the study of technical-tactical variables. The most prolific author is Gamonales, J.M., with 10 studies reported in Scopus. Brazil and Spain are the most productive countries, with English being the predominant language. The journal with the largest number of published documents is Retos. the most frequently cited concepts are humans, young adults, and injuries.
Conclusions. The analysis of scientific production on blind 5-a-side football reveals the need for more studies in other areas that have been less explored, including studies on technical, psychological, and psychosocial variables. Ultimately, this could result in a greater impact and reach of blind 5-a-side football in various contexts, allowing for a deeper understanding of the relationship between different performance factors.



## Keywords

Visual impairment; paralympic sport; team sport; adapted physical activity; sport adapted.



## Resumen

Antecedentes/Objetivo. Diferentes estudios han investigado el fútbol 5 para ciegos a través de estudios cuantitativos y cualitativos, buscando identificar los factores que influyen en la práctica de este deporte. Sin embargo, hasta la fecha, no se ha publicado ninguna revisión exploratoria que identifique las tendencias de la investigación sobre el fútbol 5 para ciegos. El objetivo fue proporcionar una visión general del área de investigación sobre el fútbol 5 para ciegos para identificar las tendencias y las lagunas de investigación en este tema.
Materiales y métodos. La investigación se llevó a cabo a través de las siguientes bases de datos: Scopus, Web of Science, PubMed, ScienceDirect y Google Scholar. Finalmente, se incluyeron un total de 85 documentos. Los análisis se realizaron utilizando el programa R Bibliometrix, considerando la ocurrencia de autores, palabras clave, afiliaciones institucionales, países y revistas.
Resultados. Predominan los estudios cuantitativos (84,70%) frente a los cualitativos (12,94%) y los diseños mixtos (2,35%). La mayoría de los estudios se centran en el estudio de las lesiones, la composición corporal y, en menor medida, en el análisis de la carga externa en competición y el estudio de variables técnico-tácticas. El autor más prolífico es Gamonales, J.M., con 10 estudios reportados en Scopus. Brasil y España son los países más productivos, siendo el inglés el idioma predominante. La revista con mayor número de documentos publicados es Retos. Los conceptos más citados son humanos, adultos jóvenes y lesiones.
Conclusiones. El análisis de la producción científica sobre el fútbol 5 para ciegos revela la necesidad de más estudios en otras áreas que han sido menos exploradas, incluyendo estudios sobre variables técnicas, psicológicas y psicosociales. En última instancia, esto podría resultar en un mayor impacto y alcance del fútbol 5 para ciegos en diferentes contextos para comprender la relación entre los diferentes factores de rendimiento.



## Palabras clave

Discapacidad visual; deporte paralímpico; deporte de equipo; actividad física adaptada; deporte adaptado.

## Introduction

Currently, scientific production on the study of physical activity (PA) has been increasing due to its effects on physiological response, mental well-being, and psychosocial development, especially in people with disabilities (Kohl et al., 2013; Pan & Mcnamara, 2020). In this sense, adapted physical activity (APA) has been a term used to refer to the changes that physical activity generates in people and, consequently, to provide new knowledge to adapt or modify physical activities for people with disabilities (Hutzler & Hellerstein, 2016). APA research has been mainly approached from the perspective of sports science and other areas like physiology and biomechanics in wheelchair sports (Briley et al., 2023; Hernández-Beltrán et al., 2024; Seron et al., 2019) and athletes with visual impairments (Alcaraz-Rodríguez et al., 2021; Gamonales et al., 2018a; Magno e Silva et al., 2013). There are also different adapted sports (athletics, swimming, judo, alpine skiing, soccer, triathlon, chess), as well as a specific sport for the blind called goalball.

The study of visual impairment in sports has contributed to a better understanding of the main characteristics of participation trends in sports for blind athletes (Stratton et al., 2022). The training process of para-athletes is set back by different processes related to financial shortages to support sports management, as well as the lack of visibility in the media (Rodríguez Macías et al., 2022). In this same vein, the systematic review prepared by Rodríguez-Macías et al. (2023) determined that the coach and the family favour the sporting and social context of the athletes, contributing in turn to the reduction of stress and the stimulation of self-esteem and motivation. Another study developed research on Paralympic athletes' training factors identifies essential development elements such as the family, coach, psychological aspects, technical-tactical aspects, and physical condition in an integrated way (Rodríguez Macías et al., 2023).

The 2024 Summer Paralympic Games, held in Paris, France, featured approximately 4,400 athletes from more than 80 countries in 549 events, spanning more than 22 sports and 24 disciplines (Lexell et al., 2023). The increase in participation across different sports has allowed some sports, including blind 5-a-side football, to gain prominence within the Paralympic movement. It is also one of the most popular sports for people with visual impairments (Gamonales et al., 2016).

Blind 5-a-side football allows the participation of people with visual impairments and was incorporated into the blind sports program through a football subcommittee in 1996 by the International Blind Sports Federation (IBSA) (2017).

In essence, blind 5-a-side football is an adaptation of conventional futsal, played by people with visual impairments who are classified into three levels: B1 for people who do not perceive light and are unable to recognize shapes, B2 with visual acuity of 2/60 to recognize shapes in a visual field of less than 5 degrees, and B3 for partially blind people who have visual acuity ranging from 2/60 to 6/60 and a visual field of 5 to 20 degrees (Gamonales et al., 2018a; Powis et al., 2019).

The classification allows two types of football players to participate: B1 for athletes with total blindness and B2/B3 for partially sighted athletes (Powis et al., 2019). B1 football players, also known as sound football, adapted football, and football for people with visual impairments, debuted at the World Cup in 1998 and at the Athens 2004 Olympic Games, and since then, the participation of different countries has been increasing (IBSA, 2017). Blind 5-a-side football is regulated by the rules of the International Federation of Association Football (FIFA, 2025), although specific adaptations have been made to promote the participation of blind players (Magno e Silva et al., 2013a).

In this sense, although there is greater participation of blind 5-a-side football players, research is still scarce, mainly when referring to whether these studies are indexed in the main databases. Thus, the main indexed studies in blind 5-a-side football have analyzed various factors, mainly associated with the evaluation and characterization of sports performance. These studies include the relationship between sports practice and sports injuries (Gamonales et al., 2022; Gonçalves Santos et al., 2021; Magno e Silva et al., 2013a; Muñoz-Jiménez et al., 2022; Webborn et al., 2016), physical and physiological variables (Castelli Correia de Campos et al., 2015; Esatbeyoglu et al., 2021; Papadopoulos et al., 2023) and body composition assessment (Castelli Correia de Campos et al., 2013; Hernández-Beltrán et al., 2023; Lameira Oliveira et al., 2018; Lameira Oliveira et al., 2023).

Furthermore, there are qualitative studies aimed at recognizing coaches' perceptions through self-narrative approaches (Mycock et al., 2021) and cultural mediation in blind 5-a-side football based on the relationships that develop between players, family, and the coach to mediate learning in sport (Pereira et al., 2011). Based on the above, scientific evidence continues to seek different approaches to the study of blind 5-a-side football, although there remains a low scientific output regarding qualitative approaches. Thus, various bibliometric studies in other sports involving disabilities have concluded that it is necessary to continue developing research that integrates concepts and methodologies from the multiple perspectives with which disability has been studied (Hernández-Beltrán et al., 2024; Pisà-Canyelles et al., 2023; Umar et al., 2024). Faced with this, the same scientific evidence proposes different procedures to understand the interaction of various capacities that contribute to thinking about new research perspectives in this sports practice (Francis et al., 2023).

Furthermore, no bibliometric analysis or scoping review has been reported to date that evaluates the trends in research on blind 5-a-side football in indexed databases such as Scopus, PubMed, Web of Science (WoS), ScienceDirect and Gooogle Scholar, which reveals a significant gap in the current literature. This study aim was to provide an overview of the research area on blind 5-a-side football to identify trends and research gaps in this topic, which will allow a comprehensive view of the research gaps that require greater attention.

The results of this research can be highly beneficial for coaches, academics, and sports organizations that seek to promote the development of blind 5-a-side football through methodologies based on scientific evidence. This type of study contributes to the recognition of less explored lines of research in adapted sport, as reported by other bibliometric studies (Pisà-Canyelles et al., 2023). Therefore, the objective was to develop a bibliometric review and an exploratory review to identify the research trends accomplished in the study of blind 5-a-side football.

## Method

### *Design*

To evaluate scientific production, this study uses bibliometrics as a reference, a research technique that has been reported in various studies (Becerra Patiño et al., 2024a; Becerra Patiño et al., 2024b; Cabo et al., 2024; Gutiérrez-Hellín et al., 2023; Powell & Connaway, 2004). The study was theoretical, following the postulates of Powell and Connaway (2004) because it seeks to theorize, systematize, and analyze a large amount of information through indicators of temporality and evolution of the topic studied (Donthu et al., 2021; Passas, 2024).

### *Sources of information*

The search strategies consider the following characteristics:

Date: until march 15, 2025

The following databases were consulted: Scopus, PubMed (Medline), WoS, ScienceDirect, and Google Scholar.

### *Search strategy*

Initially, the search for documents was not restricted by type of study, language or year of publication.

To design the search strategy, the PICOS formula (Participants, Intervention, Comparison, Outcomes, Study Design) was applied, as suggested by the guidelines for preparing reviews (Aslam et al., 2010). The Boolean commands "AND" and "OR" were used to group the terms mentioned. A similar procedure was followed for each of the databases. Before constructing the final search phrase for each base, different combinations were tested with the following list of keywords: (“football for the visually impaired” [Topic]) OR (“football for the blind” [Topic]) OR (“blind soccer” [Topic]) OR (“5-a-side football” [Topic]) OR (blind 5-a-Side Soccer” [Topic]) OR (“football 5-a-Side for Blind” [Topic]) OR (“football 5-a-side” [Topic]) OR (“five-a-side soccer” [Topic]) OR (“five-a-side foot-ball” [Topic]) OR (“FA5 for blind persons” [Topic]) OR (“impaired five-a-side soccer athletes” [Topic]). Finally, from these terms, the following search equation was constructed: ("football for the visually impaired" OR "football

for the blind" OR "blind soccer" OR "5-a-side football" OR “Blind 5-a-Side Soccer” OR “football 5-a-side for blind” OR “football 5-a-side” OR “five-a-side soccer” OR “five-a-side football” OR “FA5 for blind persons” OR “impaired five-a-side soccer athletes”) AND (“physical fitness” OR “performance OR analysis) AND (competence OR training) AND (Characterization OR technical OR tactics OR injuries OR body composition OR gender) AND (“cross-sectional study” OR “longitudinal study” OR “qualitative study” OR “quantitative study”).

The first 600 papers that appeared in the academic Google search were reviewed. Additionally, controlled vocabulary searching was executed with keyword searching to improve retrieval. They were performed to identify studies with no restrictions regarding publication date, language, or study design. Similarly, citation searches were performed for key included studies. When it was not possible to obtain the full texts of articles from institutional or open-access subscriptions, we attempted to contact the corresponding authors directly or search for documents on ResearchGate.

### *Data extraction*

The search was conducted by two researchers (B.A.B.-P. & J.O.-A.) who independently searched and screened the articles. Information was screened by two independent researchers to determine the total number of documents included. The percentage of disagreement between the two researchers did not exceed 5% of the total included studies. When disagreement arose, a third independent reviewer reviewed the documents to determine the list of included studies. A systematic process was followed to select the included documents. Initially, 450 documents were found and then subjected to metadata regulation in database, which was eliminated due to duplication, lack of full access, or lack of relevance to the study topic. Document research was also attempted using other methods. After screening the documents, 62 were included through databases and 23 through Google Scholar that met the eligibility criteria established for the present study. In total, the final sample consisted of 85 documents (Figure 1). This section explains how the research was done. The design of the same is described and it explains how it was put into practice, justifying the choice of the methods used. This section should contain the type of quantitative research, the scope or depth of the research (exploratory, correlational and/or explanatory), population and sample, and the techniques used should be added. This section is fundamental, because it is the one that will allow the scientific community to reproduce the result. Most of this section should be written in the past tense, in a descriptive style.

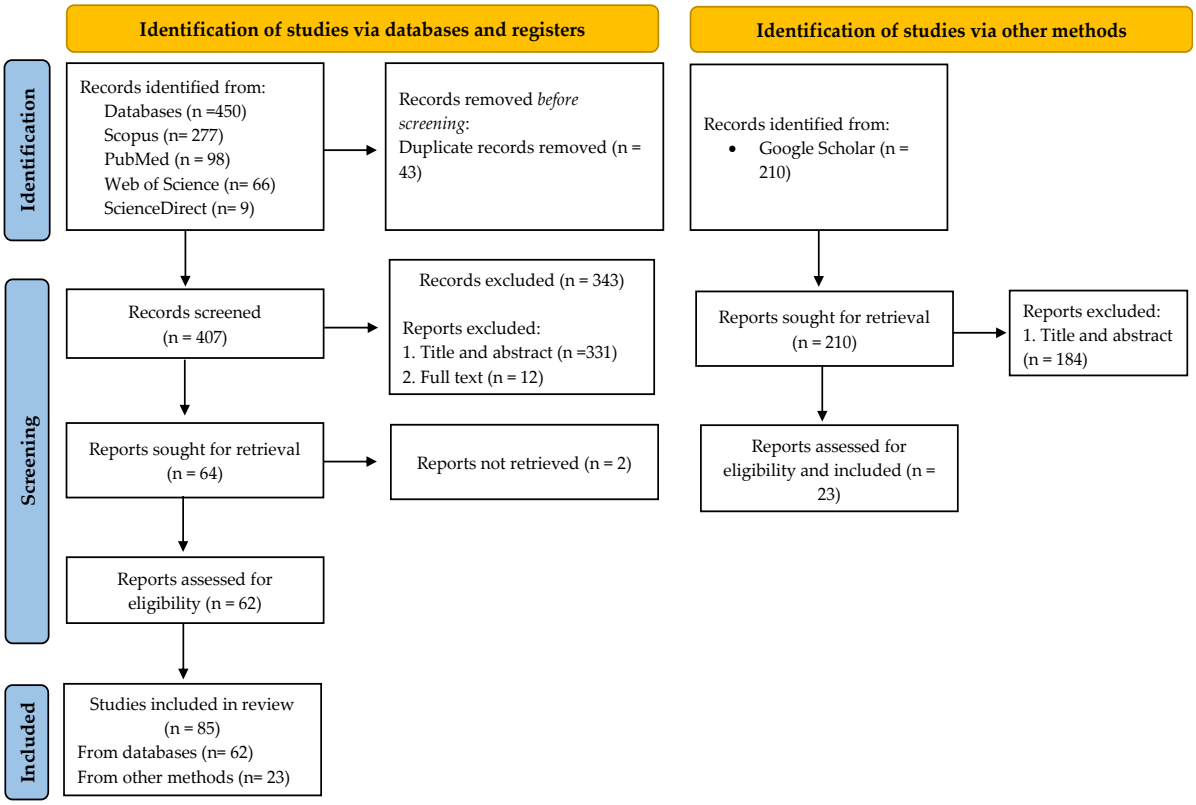


Figure 1. Flow chart of the search documents.

### *Elegibility criteria*

The inclusion criteria for the studies were: (i) empirical, experimental, review studies, books, and/or book chapters; ii) quantitative studies that considered assessment in blind soccer players; iii) qualitative studies that examined perceptions in blind soccer players; iv) original full-text studies reviewed by academic peers; v) access to the full document to complement the initial review; vi) publication date between January 1, 2011 and december 31, 2024. Studies without language restrictions were included. The exclusion criteria were: (i) undergraduate, master's, and doctoral theses; (ii) letters to the editor.

### *Data analysis*

The identified data were extracted in two formats: CSV, and then a copy was processed in Microsoft Excel. The Excel document allows for descriptive and percentage analyses of the results using a Microsoft Excel spreadsheet (v. 2006, Microsoft Corporation, Redmond, WA, USA). The CSV format was used to create the maps in the VOSViewer program (v. 6.19, Center for Science and Technology Studies, Netherlands). A fragmentation analysis was performed with a value of 3 for attraction and -3 for repulsion. The VOSviewer program allows for the creation of two-dimensional graphs (Van Eck & Waltan, 2014) from nodes to establish the main relationships that develop from the scientific production stored in the different databases (McAllister et al., 2022). Likewise, the R Bibliometrix program was used to systematize and visualize the data in ® from a programming language for statistical calculations and graphics (Aria & Cuccurullo, 2017).

For the bibliometric analysis, the following laws were considered to support the bibliometric review: i) Price's Law based on the $R^2$ coefficient to determine the strength of the linear relationship between two variables (Price, 1976), in this case, the number of published documents and citations about the years, as well as the number of citations; ii) Lotka's Law, which allows us to identify the authors who have published the most studies (Bufrem & Prates, 2005; Coile, 1977); iii) Zipf's Law, which is aimed at establishing the occurrence of the most frequently used keywords (Vega-Muñoz et al., 2022). Likewise, the h-index was used, which determines academic productivity based on how a given number h of documents have been cited at least a minimum number h of times (Hirsch, 2005).

For its part, the scoping review is a useful methodology to determine the coverage of a topic or field of knowledge and thus identify trends and gaps in existing knowledge (Munn et al., 2018). On the other hand, Sankey diagrams were used to determine the weight index as an inclusion index weighted by the occurrence of the word.

Thus, the node flows in the graph represent the direction and evolution of the topics in relation to other categories (Schmidt, 2008). Due to the large number of documents in the present study, conventional frameworks for systematic reviews or meta-analyses were not strictly followed. However, the preferred reporting guidelines for systematic reviews and meta-analyses that include scoping reviews (PRISMA-Scr) were applied (Tricco et al., 2018).

### *Scoping review categorization*

This section conceptualizes the key categories used in this study to classify existing research trends in blind 5-a-side football. These categories are related to the prevalence of the topics addressed. When reviewing the scientific production on the most studied variables in blind 5-a-side soccer, six main categories have been established: i) sports injuries; ii) body composition; iii) physical and physiological demands; iv) technical-tactical actions; v) qualitative considerations of Blind 5-a-side football practice; vi) analysis of the most cited documents.

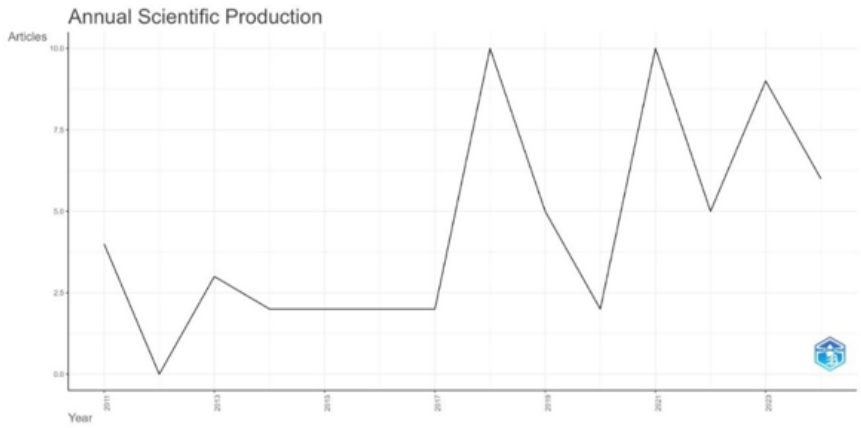
## Results

### *Evolution of the Number of Documents and Citations*

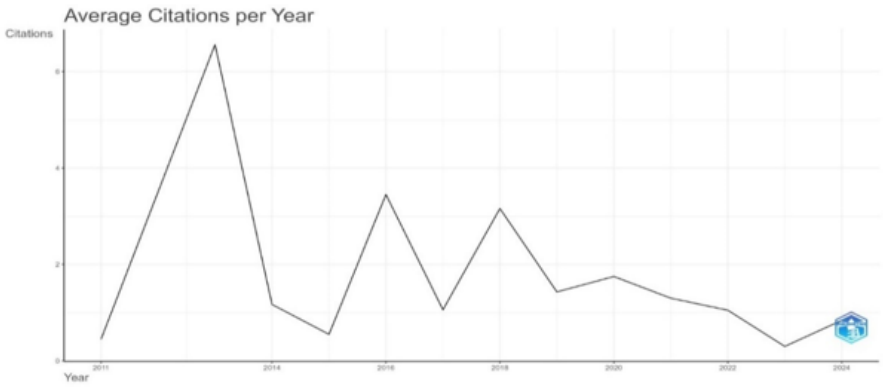
The increase in scientific production related to the number of documents published per year between 2011 and 2024 ($R^2$ = 0.47) reveals no systematic increase in published studies, with the years 2018, 2021, and 2023 being the years with the highest production, and the years 2012-2017. Regarding the number of citations per year, exponential increases are detailed for 2012 and 2013 and, to a lesser

extent, for 2016 and 2018. Since 2019, the number of citations received by studies on blind 5-a-side football has been decreasing.

Figure 2. Evolution of the number of annual publications and citations.




a. Number of annual publications




b. Number of annual citations.

## *Types of documents*

There are different types of documents published when performing bibliometric studies (Martínez Benítez & Becerra Patiño, 2023). There are different types of documents that have been published to disseminate studies related to blind 5-a-side football. However, the trend reveals that the majority are published in article form, and there are a low number of reviews. Likewise, there is a low number of qualitative studies compared to quantitative ones. These low levels of review and qualitative studies are associated with the scientific development of the topic addressed.

Table 1. Types of documents published and studies design

| Type of document | Number of documents | Percentage % |
|---|---|---|
| Article | 78 | 91.76 |
| Review | 3 | 3.52 |
| Conference paper | 2 | 2.35 |
| Book Chapter | 2 | 2.35 |
| Total | 85 | 100 |
| Design quanitative | 72 | 84.70 |
| Design qualitative | 11 | 12.94 |
| Design mix method | 2 | 2.35 |
| Total | 85 | 100 |

## *Trend topics*

The analysis of the most relevant topics detailed in Figure 3 shows that the most recent topics used to study blind 5-a-side football are: "injury," "athletic performance," and "cross-sectional study."

Meanwhile, between 2015 and 2017, the most representative topics were: "incidence," with a frequency of 10 terms per year, and between 2017 and 2019, the most representative topics were: "blindness" and "Young adult," with a frequency of 10 terms, and "adult," with a frequency of 20 terms per year.

Figure 3. Trend themes. The X-axis represents the year, and the Y-axis represents cumulative occurrences to the number of keywords.

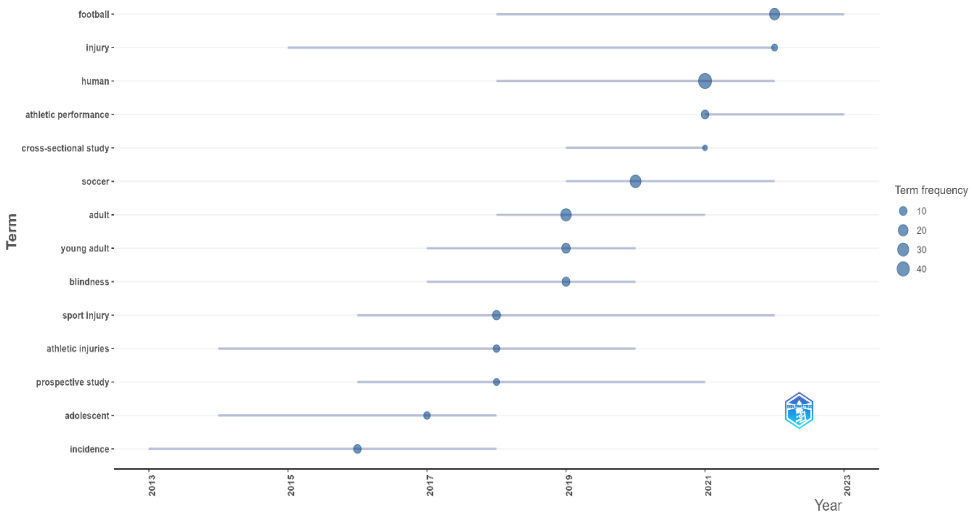
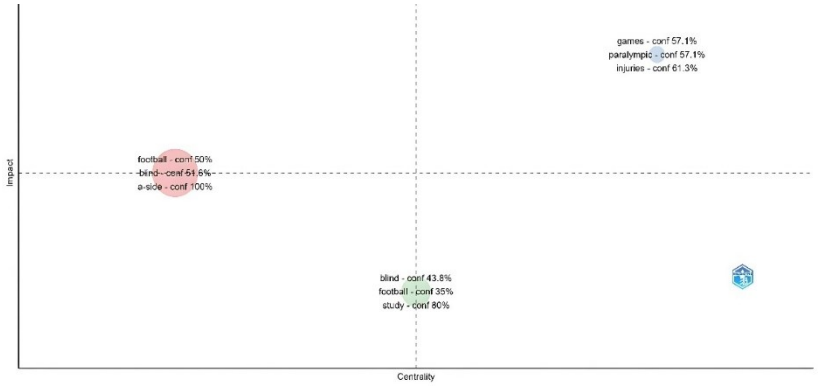
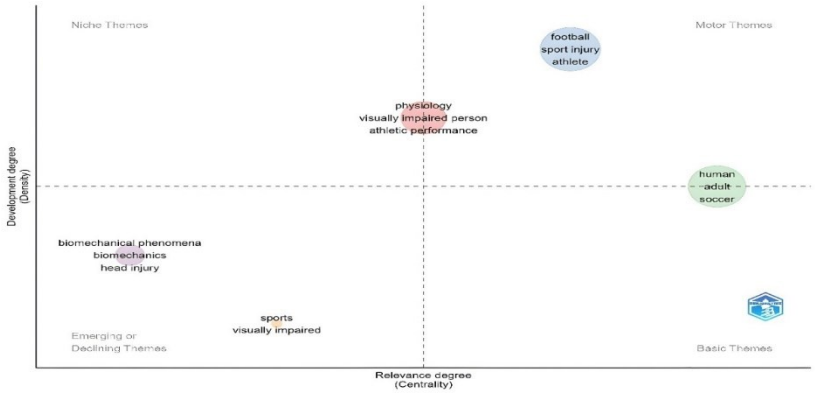



Figure 4 reveals the concepts used from different categories. The clusters by author coupling reveal that these concepts refer to contrasting percentages in the figure. The most representative concepts are a-side (100%), injuries (61.3%), and study (80%). Meanwhile, Figure B reveals that the specialized terms are related to physiology and athletic performance. Search topics for scientific productivity on blind 5-a-side football reveal that the most related concepts are: football, sport injury, and athlete. The basic topics that continue to be researched are human, adult, and soccer. Finally, the emerging or declining terms that appear in the study of blind 5-a-side football are: biomechanical phenomena, biomechanics, and head injury.

Figure 4. Degree of development and density of key concepts in blind 5-a-side soccer.



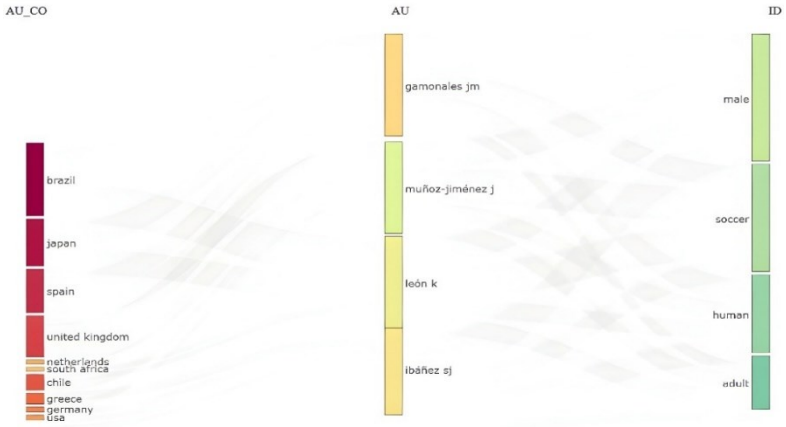

a. Coupling of concepts by authors




b. Density and centrality of key concepts

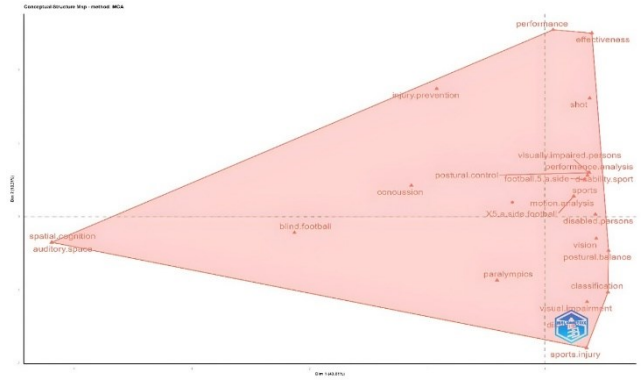
Figure 5 shows the relationships through the Sankey diagram and responds to the scientific production about the key concepts in response to the relationships established between countries, authors, and keywords. It stands out as the countries with the greatest production are Brazil, Spain, and Japan and are related to the most representative authors led by Gamonales J.M., Muñoz-Jiménez, J., and Ibañez, S.J., and who are related to the concepts: male, soccer, human and adult.

Figure 5. Relevance degree and development of key concepts.




Finally, factor analysis reveals the trend of the concepts used (Figure 6). Thus, dimension 1 recovers 43.81% and dimension 2 18.31% of the total information. Thus, 62.12% of the total inertia is recovered. It reveals that there are concepts that are not related to any other idea, such as "spatial cognition" and "auditory space." Meanwhile, other concepts are related to each other in the various published studies, such as "disability sport" with "motion analysis," "performance analysis," and "5-a-side football."

Figure 6. Factor analysis and dimensionality of key concepts.



### *Analysis of the authors*

Based on the number of publications for the first author, Table 2 shows that academic productivity is a maximum of five documents. The vast majority have one or a minimum of two publications per author. However, two authors with only two papers receive the most significant citations, representing 94.8% of the total in the table. Despite considering both Spanish and English languages, all articles for the first 13 authors are written in English.

Table 2. Number of documents per author considering the first author.

| Author | Number of publications | Publication language | Number of citations received |
|---|---|---|---|
| Gamonales, J.M. | 10 | English-Spanish | 139 |
| Oliveira, G.L. | 4 | Spanish-Portuguese | 10 |
| Morato, M.P. | 3 | English-Portuguese | 15 |
| Velten M.C.C. | 2 | English | 41 |
| Castelli Correia de Campos, L.F. | 2 | English-Portuguese | 34 |
| Runswick, O. | 2 | English | 23 |
| Tsutsumi, S. | 2 | English | 2 |
| Total | 24/85 | Three idioms | 264 |

Table 3 shows academic collaboration about the number of authors per published document. The highest academic output was found in documents with 3 to 4 and 5 to 6 authors, representing 66.27% of the total papers and citations (457 citations). It is also evident that the lowest scientific output is found in those with 1 to 2 authors, which corresponds to the lowest number of citations received.

Table 3. Total number of documents by author

| Number of authors | Number of documents | Citations | Percentage % |
|---|---|---|---|
| 1 to 2 | 12 | 60 | 14.11 |
| 3 to 4 | 35 | 320 | 41.17 |
| 5 to 6 | 22 | 137 | 25.88 |
| ≥6 | 16 | 378 | 18.82 |
| Total | 85 | 894 | 99.99 |

Figure 7 shows the trend in authors' scientific production between 2011 and 2024. It reveals the number of documents produced by each author based on the year and the number of citations received per year. The authors who stand out the most in terms of their production and citations are: Gamonales, J.M., Muñoz-Jiménez, J., and Ibañez, S.J. However, the author Webborn, N., has published several documents and received citations between 2013 and 2021.

Figure 7. Trend themes. The X-axis represents the year, and the Y-axis represents cumulative occurrences in response to the number of papers per author.

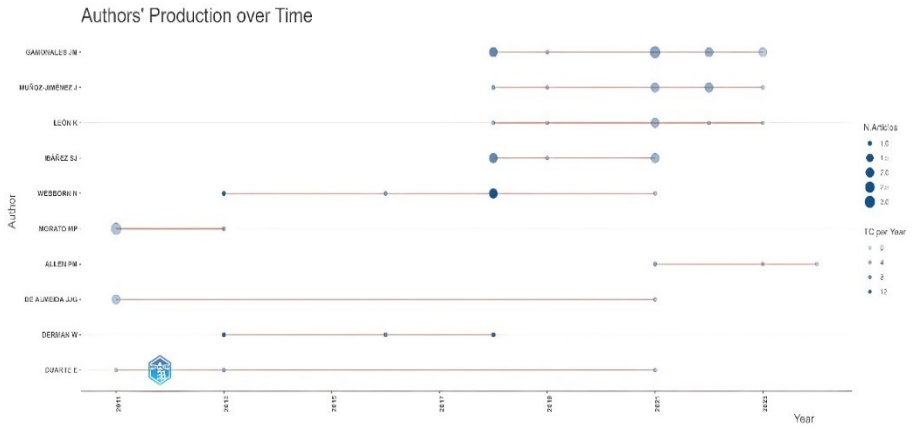
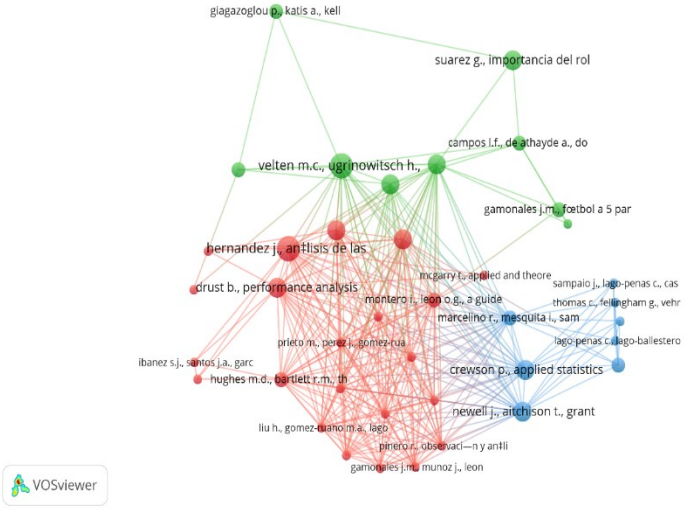



Figure 8 reveals the nodes established between cited references used in scientific publications on the study of blind 5-a-side football. There are three major nodes. The red node establishes the most

connections, highlighting studies on both blind 5-a-side football specifically and other references that refer to this sport as a cooperative-opposition sport (Hernández, 2005). The green node is led by the study by Velten et al. (2016). Finally, the blue node contains indirectly cited references that do not specifically mention blind 5-a-side football.

Figure 8. Nodes by cited references.

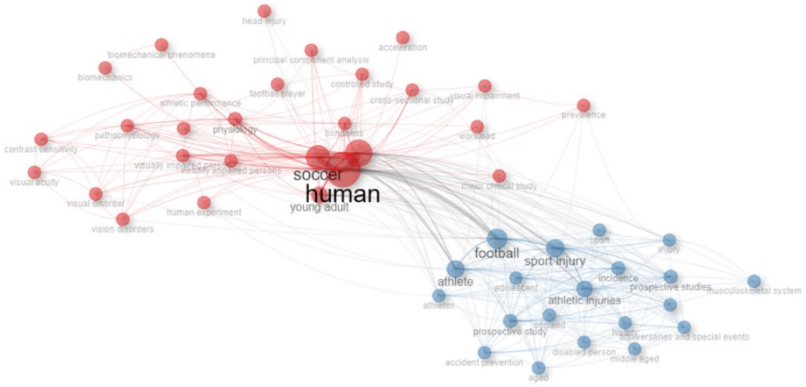



## *Keyword analysis*

Figure 9 shows the mapping of keywords about the most representative concepts and how they relate to each other. Figure 9a shows a wide variety of terms. However, the most prevalent are population-based, such as "human", "football soccer", "adult", and "young adult." Likewise, there are other concepts related to the specific study of blind 5-a-side football, among which several concepts associated with the training stand out, including: "athletic performance," "sports injury," "physiology," and "athletic injuries." Finally, another important category of key terms used to study blind 5-a-side football is study designs, highlighting concepts such as "prospective studies," "clinical article," "controlled study," "cross-sectional study," and "principal component analysis." Meanwhile, Figure 9b reveals two large nodes, one in red representing concepts associated with research designs and physiological and biomechanical processes. The blue node, on the other hand, is more representative of the concepts of injuries and ages of the participants.

Figure 9. Occurrence by keywords between 2017 and 2021.


a. Key concepts

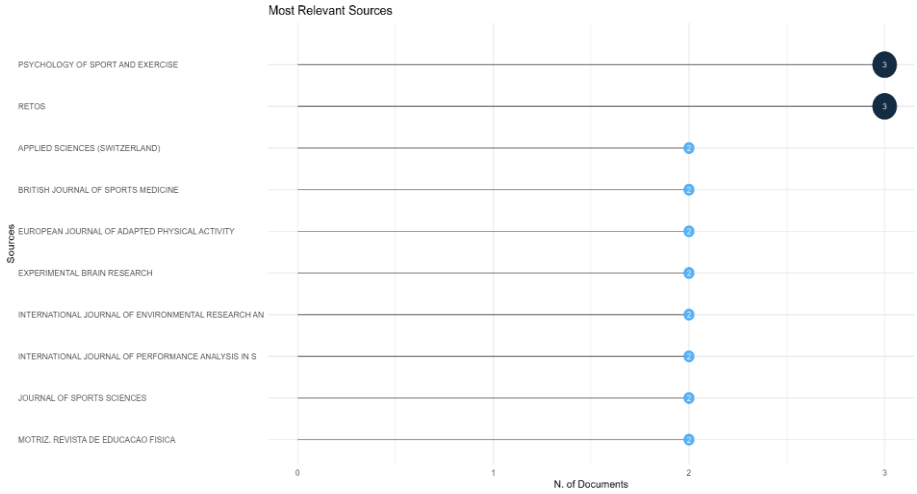



b. Concepts interaction

## *Journals analysis*

The following Figure 10 presents the 10 most relevant journals that stand out for their productivity. The two journals indexed in Scopus and Scimago Journal Rank with the largest number of studies are "Psychology of Sport and Exercise", "Retos" and "Revista Brasileira de Medicina do Esporte".

Figure 10. Most productive journals on the study of blind 5-a-side football.




The analysis of the journals shows that the 10 journals that produce the greatest number of documents correspond to 5 countries, being from the European and South American continent. Likewise, these 10 journals have developed 27.05% of the total scientific production. The journals correspond to the first 4 quartiles, being Q1 and Q2 the ones with more studies. For the country analysis, United Kingdom (n= 3 and 328 citations) and Spain (n= 21 papers and 334 citations) are the countries with the highest number of papers and citations. For the analysis of the categories, the great majority is in the category "Sports Sciences".

Table 4. Name of the journal, country of the journal, number of publications, Category Rank, SJR Category, Quartile, SJR 2024, total citations and average number of citations per published article.

| Journal | Country Journal | Num Pub | H Index | SJR Category | Cat Q | SJR 2024 | Total Nu Cit |
|---|---|---|---|---|---|---|---|
| Retos | Spain | 3 | 33 | Sport Sciences | Q1 | 0.33 | 20 |
| Psychology of Sport and Exercise | Netherlands | 3 | 125 | Sport Sciences | Q1 | 1.45 | 58 |
| Revista Brasileira de Medicina do Esporte | Brazil | 3 | | | | | 11 |

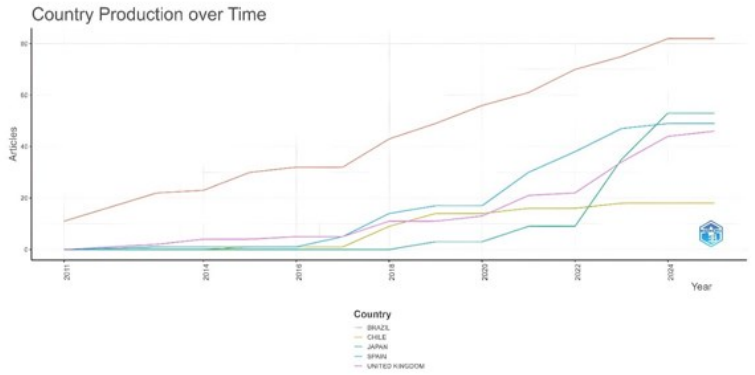
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| European Journal of Adapted Physical Activity | Czech Republic | 2 | 12 | Physical Therapy, Sports Therapy and Rehabilitation | | Q3 | | 0.30 | 46 |
| International Journal of Performance Analysis in Sport | United Kingdom | 2 | 52 | Physical Therapy, Sports Therapy and Rehabilitation | | Q2 | | 0.60 | 19 |
| International Journal of Environmental Research and Public Health | Switzerland | 2 | 229 | Health, Toxicology and Mutagenesis | | Q2 | | 0.91 | 14 |
| Revista Andaluza de Medicina del Deporte | Spain | 2 | 20 | Sport Sciences | | Q4 | | 0.13 | 10 |
| Revista Internacional de Medicina y Ciencias de la Actividad Fisica y del Deporte | Spain | 2 | 28 | Sport Sciences | | Q4 | | 0.20 | 39 |
| Journal of Sports Sciences | United Kingdom | 2 | 171 | Sport Sciences | | Q2 | | 1.02 | 23 |
| British Journal of Sports Medicine | United Kingdom | 2 | 271 | Sport Sciences | | Q1 | | 4.71 | 286 |
| Total: 10 Journals | 5 Countries | 23/85 | | 3 areas | Q1 | Q2 | Q3 | Q4 | 526 |
| | | | | | 3 | 3 | 1 | 2 | |

Num Pub: Number of publications; SJR Category: Scimago Journal Rank; Cat Q: Category Quartile; SJR 2024: Scimago Journal Rank; T N Cit*: Total number of citation.

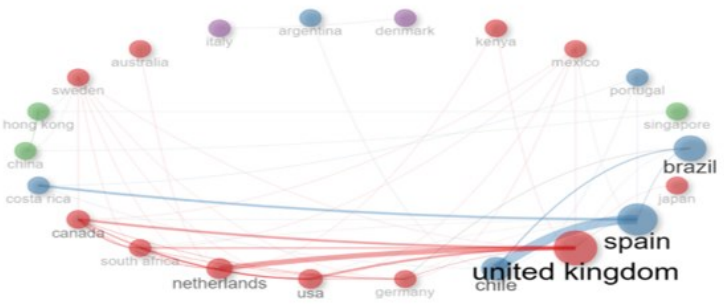
## *Analysis by country*

Figure 11a details the five most productive countries, highlighting that these three countries represent three different continents. Brazil and Spain have been progressively and systematically developing several studies; however, countries such as the United Kingdom and Japan have increased scientific production since 2020. This reveals the importance of studying this topic for certain countries. Figure 11b also shows the interactions between different countries to define international academic cooperation. Countries such as Spain, the United Kingdom, Brazil, and Japan stand out as the countries that generate the most production and establish the greatest number of connections.

Figure 11. Citation by countries based on density.




a. Density

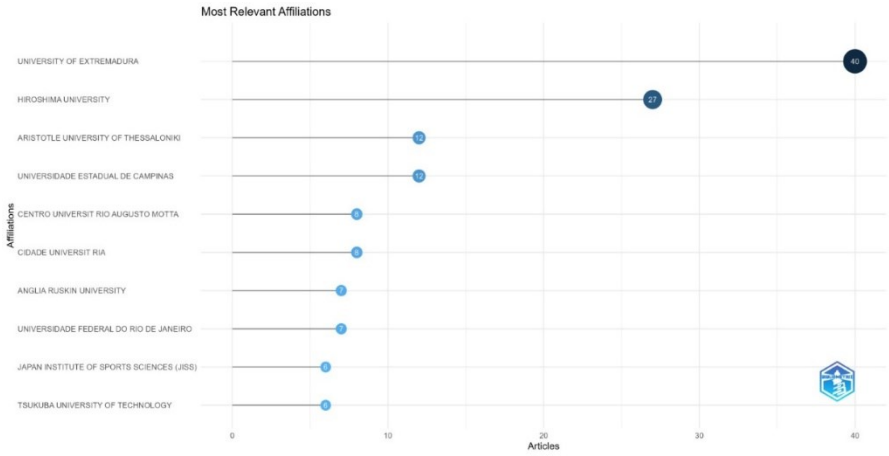



b. Countries interaction

## *Organizations*

For co-authorship by institutional affiliation, it was determined that of the top 10 organizations that have contributed to the study of the scientific output of blind 5-a-side football, the University of Extremadura and Hiroshima University stand out with 40 and 27 documents each (Figure 12).

Figure 12. Co-authorship by organizations.




## *Analysis of publishing groups*

The scientific output produced by publishing editorial that publish scientific knowledge on the study of blind 5-a-side football reveals that Taylor & Francis is the publishing group that publishes the largest number of documents and, in turn, receives the highest number of citations. It also details how five publishing houses have received more than 300 citations (Taylor & Francis, Elsevier, Springer, Public Library Science, Human Kinetics). The top four publishers represent half of the total scientific output (51.74%) and, in turn, four publishing houses that have received more than 1,000 citations (Table 5).

Table 5. Total number of documents published by the publishing groups

| Name | Number of documents | Number of citations |
|---|---|---|
| Routledge - Taylor & Francis | 14 | 79 |
| Elsevier | 6 | 135 |
| Springer | 4 | 27 |
| MDPI | 4 | 20 |
| Sage Publications Ltda. | 3 | 24 |
| Federación Española Asociación Docentes Ed Física | 3 | 10 |
| Total: 10 editoriales | 34/85 | 295 |

## *Scoping Review*

The second objective of this study was to conduct a scoping review. Each of the 85 documents included was analyzed in depth. At least three studies were defined as outcome measures for each category. This allowed us to identify the research trends shared below:

### *Sports Injuries*

There is a clinical incidence of 2.7 injuries per athlete and an injury rate of 0.12 per game played, it is also reported that the most common injuries occur in the lower limbs (80%), followed by head injuries (8.6%) and spine injuries (5.7%) (Magno e Silva et al., 2013b). The incidence of injuries increases as competition progresses, due to muscle pain and stress, where internal and external loading do not explain the incidence of injuries (Muñoz-Jiménez et al., 2022). The retrospective study conducted by Weiler et al. (2022) revealed that the incidence per 1000 hours of play was lower in training, being 5.5/1000 hours in training (CI 3.5-8.6) and 44.0/1000 (CI 26.1-74.3) in official matches. Similarly, joint injuries, not bone/ligament injuries (43%), were the most common in blind 5-a-side football (Weiler et

al., 2022). Another injury factor in blind 5-a-side football players is the overload caused by the repetition of the technical movement of the kick, which is represented by muscle strains (28.6%), public, and periostitis (28.6%) (Gonçalves Santos et al., 2021). Finally, a systematic exploratory review of injuries in visually impaired footballers concluded that the area's most frequently affected during sports practice are foot, hip, knees, and quadriceps (Gamonales et al., 2022).

*Body Composition*

The body composition of 12 blind 5-a-side football players did not show significant differences in response to laterality and playing position (Hernández-Beltrán et al., 2023). In contrast, the study by Lameira Oliveira et al. (2023) determined that wing players have a lower percentage of body fat (%F=17.4%) compared to defenders (23.1%) and pivots (21.5%). In turn, the sample evaluated (63 adult players = 28.0 ± 5.8 years) had a mesoendomorphic profile with superiority in the muscular component. Along the same lines, it has been established in the literature that when analyzing body composition and somatotype by position in blind 5-a-side football, defenders, and pivots have a balanced mesomorphic profile, while wingers and goalkeepers have a mesoendomorphic profile (Lameira Oliveira et al., 2018; Lameira Oliveira et al., 2023). In a study that evaluated 5 players from a 16-week pretest and posttest, it was determined that body composition did not change, and the players expressed a mesomorphic somatotype (Castelli Correia de Campos et al., 2013).

*Physical and physiological demands*

There are statistically significant differences in the physical and physiological demands of the teams because the losing teams had a greater physical load in the final phase (accelerations: ACC, decelerations: DEC, accelerations/minute, deceleration/minute, average speed), while the winning teams expressed it in the initial rounds. Likewise, heart rate and impacts >8G are differentiating variables that are associated with the result of the match (Gamonales et al., 2020). In another study, which evaluated the physical demand in different periods (1st game, 2nd game, 3rd game) it was revealed that the highest amount of accelerations (n/min) occurred in the second game (ACC 65.39±18.52; DEC: 65.52±18.64) and to a lesser extent in the first game (ACC 36.26±8.08; DEC 36.24±8.02), while the player load (a.u/min) was higher in the second game (0.59±0.15) compared to the first (0.54±0.21) and third (0.58±0.00) (Muñoz-Jiménez et al., 2022). The total distance covered by blind 5-a-side football players in competition is 1416–1687 meters (Gamonales et al., 2020), while another study has reported that the average distance covered is 1820 meters with an average heart rate of 161 beats per minute, demonstrating that running performance in this sport is not related to maximal oxygen consumption (Papadopoulos et al., 2023). Meanwhile, the evaluation of external load and locomotion variables according to the competition outcome revealed statistical differences in accelerations per minute, with losing teams performing a greater number of these actions compared to winning teams. Winning teams also performed a greater number of jumps (0.09±0.05) and had a higher average heart rate (142.7±3.91) compared to losing teams, which jumped less (0.08±0.09) and had a lower average heart rate (134.85±20.55) (Gamonales et al., 2021).

*Technical-tactical actions*

One of the main characteristics that influence the outcome of blind 5-a-side football competitions is the relationship between contextual variables and game actions and shooting, with winning teams performing a greater number of shots at the opponent's goal (Gamonales et al., 2023). In another way, the technical-tactical evolution of blind 5-a-side football has been moving from a game based on dribbling and throwing in the World Cups to more collective actions involving passing, control, and throwing in the Paralympic Games (Gamonales et al., 2021b). The kinematic differences in the actions performed with the instep of blind players have indicated that the speed of the ball is 20.81 m/sec and the relationship between the ball/foot speed is 1.35 (Giagazoglou et al., 2011). Within these specific technical action's players with visual impairments, they express greater trunk flexion angles in the action (Finocchietti et al., 2019). Another study reported that the precision of ball striking increases through stability in the lower limb of the torso in the frontal plane that is accompanied by a forward swing, a product of the inclination that players with visual impairments manifest (Sakuma et al., 2020).

*Qualitative considerations of Blind 5-a-side football practice*

Blind 5-a-side football training establishes a bond between athletes and coaches, which is influenced by the different situations that occur during practice, including teaching styles and strategies, the support received, and infrastructure conditions (Mycock et al., 2021). Similarly, cultural mediation in blind 5-a-side football is influenced by the interaction between athletes, coach, family, and friends who regulate the mediation of learning (Pereira et al., 2011). Another study, which evaluated the perspectives of athletes with visual impairments on sports classification, concluded that there is a lack of trust in these systems to identify the diversity of visual impairment (Powis & Macbeth, 2019). There, sports spaces can foster an understanding of disability in different social cultures, allowing athletes, sports, and spectators to connect (de Haan et al., 2023). In this sense, the study developed by Ohshima et al. (2023) proposed a football broadcasting system for the blind through an updated touch screen, demonstrating that research through human interfaces can promote the transmission of kinesthesia and thereby reduce the socially imposed barriers for people with visual impairments.

### *Analysis of the most cited documents*

In the consultation of the documents, only one review article was observed where the authors carried out an exploration of different characteristics associated with the practice of blind 5-a-side football, among which the following stand out: adapted physical activity, sports biomechanics, sports science, motor development, motor development, motor control and motor learning, exercise physiology, sports management, sports history, sports information, sports medicine, sports sociology (Gamonales et al., 2018a). Among the ten articles with the highest citation rates, it is noted that there is a predominance of intervention studies focused primarily on areas of sports training, with injury studies being the most cited topic in research on blind 5-a-side football. It is also noted that the population samples evaluated are primarily high-performance athletes. The year 2013 was the year in which the studies with the highest citation rate were found, effectively allowing for the continued development of studies focused on a clearer understanding of this sport for people with visual impairments.

Table 6. Most cited articles.

| Author and PY | Journal | Sample and Cont | Aged (Yrs) and exp | Var | Main Findings | Conclusions | Tc |
|---|---|---|---|---|---|---|---|
| Magno E Silva et al. (2013a) | Int J Sports Med | 13 male players | No reported | Injuries | There is an incidence of 2.7 injuries per player and an injury rate of 0.12 per game. Overuse injuries (20%) were lower than traumatic injuries (80%), with lower limb injuries being the most common, particularly in areas such as the knee (28.6%), feet (17.1%), ankle, and thigh (11.4%). | The study of the nature of the most common injuries in blind 5-a-side football primarily manifested in the lower limbs. These findings favor strategies focused on prevention. | 49 |
| Webborn et al. (2016) | PM and R | 70 male players | No reported | Injuries | The injury incidence rate for blind 5-a-side football was 22.4 injuries per 1,000 player-days, and the injury incidence ratio reported values of 31.4 injuries per 100 players. It is also notable that at least 25% of the injuries occurred in the head and neck. | The lower extremities were the most frequently injured body regions. 62.5% of injuries were linked to foul play. These findings support strategies aimed at preventing the practice. These findings allow us to determine the injury mechanisms and risk factors prevalent in blind 5-a-side football. | 46 |
| Gamonales et al. (2018a) | EUJAPA | 40 documents | No reported | Sport Biomechanics, coaching science, motor behavior, Motor Development, Motor Control and Motor Learning, sport and exercise physiology, sport medicine, sport sociology, sport history | Blind 5-a-side football is an emerging topic. Various sciences have been studying blind 5-a-side football. In the end, 11 sports science disciplines were identified as leading scientific research. | There is a need to research specific topics to address in future studies, including performance evaluation in competition at different levels of sport. | 42 |
| Gamonales et al. (2018b) | | 12 coaches | | | Technical actions for shooting at goal. | The design of instruments for assessing technical actions contributes to the | 28 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Rev Int Med Cien Act Fis Dep | | No reported | Technical actions for shooting at goal. | The observational instrument for assessing shooting at goal in blind 5-a-side football has optimal validity levels for the game items (0.875) and the penalty kick (0.96). | understanding of blind 5-a-side football, making it a valuable contribution for sports science professionals, technical staff, and others. | |
| Castelli Correia de Campos et al. (2013) | Revista Andaluza de Medicina del Deporte | 4 players | 27.3 ± 5.5 | Physical fitness, body composition. | There were significant differences in Vo2peak (50.3 ± 3.2 ml·kg min-1), average power (491 ± 72.9 W), low power (405.4 ± 79.6 W), and fatigue index (29.2 ± 12.7%) after a 16-week training process. | The effects of 16 weeks of training can produce changes in cardiorespiratory capacity and anaerobic efforts in blind 5-a-side football players, while body composition did not reveal changes. | 27 |
| Velten et al. (2016) | Psychology of Sports and Exercise | 9 professional players | 30.7 ± 10.1 | Auditory stimulus | Blind players use simple labels to more accurately categorize directions. | The representation of auditory space is enhanced by the stimulation of non-visual information provided by blind 5-a-side football training. | 23 |
| Finocchietti et al. (2019) | Scientific Reports | 6 players | No reported | 5 m shuttle test and, 60 s ball passing against a wall | Players with visual impairments reported lower peak and turn speeds compared to fully sighted players. Furthermore, players with visual impairments reported a lower foot conduction speed in passing actions than fully sighted players. | Players with visual impairments reported specific running, turning, and conduction speeds related to trunk and arm flexion movements when passing. This information is useful for coaches seeking to improve competitive performance. | 22 |
| Runswick et al. (2021) | Journal of Sports Sciences | 18 experts | 16.8 ± 10.2 | Functional classification system | The experts established specific measures for classifying visual function, which requires consideration of dynamic acuity, perception, depth and movement, contrast sensitivity, and brightness. | The identification of specific technical skills such as ball control, dribbling, passing, and perceptual and cognitive skills are affected in players with visual impairment. A change in the evidence-based classification is needed. | 21 |
| Velten et al. (2014) | Psychology of Sports and Exercise | 9 professional players | 29.7 ± 9.7 | Auditory stimuli | In blind 5-a-side football players, there are five groups of two neighboring directions each, represented by the frontal and posterior regions. The mental representation of auditory space is influenced by the level of experience. | The identification of auditory stimuli is enhanced by the players' experience. It is necessary to develop training processes based on auditory stimulation to promote better performance in blind 5-a-side football players. | 21 |
| Li et al. (2018) | Psychology of Sports and Exercise | 10 players | No reported | Exhaustion, sleep | The longitudinal study revealed that athletes experienced low levels of exhaustion and moderate levels of sleep quality. | Exhaustion and sleep do not appear to be related in soccer players, while exhaustion is a risk factor affecting sleep in athletes. These results help inform long-term training strategies, considering other invisible factors of sports preparation. | 18 |

The average number of citations per year was calculated from the date of publication until march 15, 2025*.
Note: PY: Publication year; TD: Type document; Con: Context; Yrs: Years; Exp: experience; Var: Variables; Tc: total citation; Art: Article; Rev: Review; Int J Sports Med: International Journal of Sports Medicine; Rev Int Med Cien Act Fis Dep: Revista Internacional en Medicina y Ciencias de la Actividad Física y el Deporte; EUJAPA: European Journal of Adapted Physical Activity.

## Discussion

To our knowledge, this is the first study to conduct a bibliometric analysis of scientific publications related to blind 5-a-side football and a scoping review of studies indexed in the major databases. Therefore, the objectives were: 1) to analyze scientific production and the trend in the number of studies related to blind 5-a-side football from 2011 to December 31, 2024, and 2) to conduct a scoping review to identify the most researched topics.

Referring to the scoping review conducted by Gamonales et al. (2018a), which determined that research on blind 5-a-side football is highly diverse and particularly informative, it has been determined that productivity has been increasing in recent years, with an increasing number of peer-reviewed studies indexed in the major databases. According to other bibliometric studies on athletes with disabilities or

adapted sports, there is evidence of an increasing trend in the number of studies in recent years, with the United States and Spain and the journal Retos being the most productive (Pisà-Canyelles et al., 2023). These findings are confirmed in the present study, where the journal Retos is also one of the leading publications on blind 5-a-side footballers, with Brazil, Spain, and the United Kingdom being the most productive countries.

This increase in scientific production is associated with greater dissemination of blind 5-a-side football and adapted sports, which could be related to other manifestations of adapted sports that have been reported in other bibliometric studies, especially in the analysis of the 50 most cited articles on sports for people with disabilities in more than three decades of research (Khoo et al., 2018), the 50 most cited Paralympic sports (Khoo et al., 2022), adapted sports between 2001 and 2020 (Liu et al., 2022), and wheelchair basketball (Hernández-Beltrán et al., 2024). Likewise, other bibliometric studies on football for cerebral palsy determined that there is a low number of studies published in a specialized database such as Scopus (n = 43), with English being the pre-dominant language in publications and Spain being the country with the highest productivity (Umar et al., 2024). All these results are partially confirmed by the data of the present study, where only 38 indexed documents were found in Scopus, English predominates in scientific production, and Spain is the third most productive country.

Another important bibliometric criterion relates to the occurrence of the key concepts that are most reiterated in different studies that use bibliometrics as a research technique. There, in the study developed by Pisà-Canyelle et al. (2023), it is detailed that the most studied concepts are "adapted sport", "adaptative sport", "disability", "inclusion", and "physical activity". In other bibliometric studies, it has been reported that the most used concepts were: <<performance>>, <<disability>>, <<exercise>> and <<people>> (Bloemen et al., 2015; Groff et al., 2009; Yazicioglu et al., 2012). These concepts refer mainly to the sample/participants of the studies, the most investigated variables within the fields of action of adapted sport, and the main category of study. In the present research these concepts were represented for the population from the keywords: <<human>>, <<adult>> and <<young adult>>, while the most investigated variables in blind 5-a-side football are related to training processes, these were: <<athletic performance>>, <<injuries>> and <<physiology>>.

A bibliometric study of articles on blind football has been reported, analyzing studies between 2009 and 2022. It determined that 57 documents had been published by that year, corroborating the analysis by institutional affiliation that Spain and Brazil were the countries with the highest production (Oliveira et al., 2023). However, the present study found 85 documents included, with the University of Extremadura and Hiroshima University standing out as the institutions with the largest number of published documents. This demonstrates the growing interest in adapted sports in a country like Japan, as reported in another biblio-metric study (Liu et al., 2022). The findings of this bibliometric study allow for the visualization of re-search trends on blind 5-a-side football, which helps contextualize the status of the topic, including recognizing the main contributions from countries, organizations, journals, and authors. One of the contributions generated by this research is precisely the understanding that each time the Paralympic Games are held, the amount of research increases; however, there are still research gaps related to the specificity of the sport and the athletes, especially about psychological factors (Sanz-Milone et al., 2023; Öner, 2023). These conclusions are associated with those of the present review, where there is a lack of analysis of psychological variables in blind 5-a-side football.

Another bibliometric study that conducted a scoping review on rowing for people with disabilities simultaneously revealed that the most studied concepts focus on injuries and physiological and psychological responses. In turn, there are few relationships between nodes, resulting in a highly fragmented community due to the low number of clusters (Puce et al., 2023). These results are related to those reported in the present study, where injuries and physiological variables have also been studied in greater depth, with no reported studies of psychological variables in blind 5-a-side football. Likewise, there is little aca-demic cooperation that would help foster greater scientific production in this sport.

### *Limitations*

This research presents a series of limitations related to the characteristics of the population samples, the instruments used, and the small sample sizes, which make it difficult to generalize the results. Similarly, knowledge mapping is difficult because many documents focused on the study of blind 5-a-side football are not indexed in the main databases. Finally, it is important to mention that there is great

diversity in the practice of blind 5-a-side football, which may have led to some documents not being considered in this review.

### *Future perspectives*

Quantitative studies require longitudinal design and randomized controlled trials that evaluate different abilities through causal relationships. Qualitative studies require studies that address sports participation, coach knowledge transfer, and the social factors that influence the practice of blind 5-a-side football from a hermeneutic and phenomenological perspective (Becerra Patiño & Escorcia Clavijo, 2023). It is necessary to increase the number of studies in different contexts to continue understanding football played by athletes with visual impairments. Also, it is important to develop studies based on principal component analysis, seeking to evaluate the interactions produced between different groups of variables (Becerra Patiño et al., 2025; Gómez-Carmona et al., 2021; Rojas-Valverde et al., 2020).
Finally, it is suggested that the denomination of blind 5-a-side soccer should be unanimous, since it has been found that there are multiple ways of mentioning this practice, which may hinder access to scientific dissemination. From the search reviewed, it is suggested that the concept addressed is "blind 5-a-side soccer".

## Conclusions

The increase in research production reflects the scientific community's interest in understanding the sporting and social dynamics represented by football played by people with visual impairments. The study of the occurrence of key concepts reveals the need for studies that analyze other areas of knowledge related to nutrition, psychology, social factors, etc., and the recognition of the perceptions of players and coaches. Furthermore, research trends reveal an interest in relating variables such as injuries and athletic performance. The most productive countries are few, which encourages greater scientific pro-duction in other countries and contexts, and, in turn, greater academic cooperation that is not reflected in institutional affiliations.

It is confirmed that the specialized literature on blind 5-a-side football favors quantitative designs, with physiological, physical, morphological, and technical-tactical variables being the most studied. These results could foster academic cooperation, as the metrics obtained can be useful for researchers, coaches, and institutions responsible for promoting studies, programs, and policies for athletes with disabilities.

## Informed consent

Not applicable.

## Conflict of interest

The authors declare no conflicts of interest.

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