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REVIEW ARTICLE

Analysis of research trends in para-athletics from 2015 to 2025: Bibliometric review

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ABSTRACT

Introduction: para-athletics is an adaptation of athletics for athletes with disabilities and has experienced notable interest in recent years. This expansion has generated increasing research output across disciplines related to sport, rehabilitation, and performance. Objective: To analyse global research trends in para-athletics between 2015 and 2025 by examining publication output, keywords, journals, countries, institutions, and emerging research topics. Methods: A bibliometric review was conducted using publications indexed in the Web of Science Core Collection (WoSCC). Only articles published between 2015 and 2025 were included. Bibliometric indicators were analysed using Microsoft Excel (v.2504) and VOSviewer (v.1.6.11) to examine publication patterns, collaboration networks, keyword co-occurrence, and thematic development. Results: A total of 1,237 articles were identified. Scientific production increased steadily between 2015 and 2022, followed by a decline in 2023. USA, England, and China showed the highest research output. The most productive journals were Journal of Athletic Training, American Journal of Sports Medicine, and Human Sport Medicine. The most frequent keywords were performance, exercise, and sport, indicating a strong focus on performance. Conclusion: Research in para-athletics has expanded significantly over the past decade, revealing global publication patterns and dominant research themes that may guide future studies in the field.

Keywords: Para-athletics, Adapted sport, Para-sport, Inclusive sport, Disability sport.

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INTRODUCTION

Para-athletics is a sport for people with disabilities who must be eligible according to a classification process based on their disability (Van Biesen et al., 2021; van der Linden et al., 2021). Participation focuses on athletes with a physical, visual, or cognitive impairment. It is based on a variety of competitions that present physical challenges, where athletes participate in running, jumping, and throwing events. para-athletics is currently practiced by athletes with disabilities in various settings, including recreational, developmental, and competitive levels. The competitive aspect is most prominent at the high-performance level, and the most prestigious event is considered to be the Paralympic Games, with approximately 179 countries participating.

The educational and recreational development of para-athletics offers numerous advantages for people with disabilities, generating personal, social, health, and rehabilitation benefits, among other aspects encompassed by adapted sports (Sakalidis et al., 2023). However, high performance does not guarantee participation for all people with disabilities. This is because, to participate in the competitive arena, they must undergo a classification process regulated by World Para-athletics (IPC), which aims to ensure competitive equity across the spectrum of disability. Therefore, athletes in the competitive arena, and especially at the high-performance level, prioritize athletic performance over any other condition of the eligible athlete (Marques & Alves, 2021).

In recent years, para-athletics has experienced significant growth since its beginnings in the 1960s in Rome, Italy, culminating in the last major event held in Paris, France in 2024. Similarly, research in para-athletics, due to its divergence between recreational, educational, and competitive aspects, has generated new lines of development and a diversity of topics to be addressed (Heffernan, 2022). In this study, the objective was to investigate the literature on para-athletics, evaluating the impact of countries, institutions, authors, journals, and topics. The findings of this study can provide comprehensive information and suggestions on global trends in para-athletics research and future research directions.

MATERIALS AND METHODS

Bibliometric indicators included annual publication output, country productivity, journal distribution, author productivity, research categories, and keyword co-occurrence networks.

Database source

The articles published were recovered from a topic search in the Web of Science Core Collection with the search topic (TS = (Para athletic* OR Athletic* in persons with disability OR athletic* + disability OR Athletic* + Parasport* OR special + athletic* OR unified + athletic* OR inclusive + athletic* OR Deaflympic* + athletic* OR athletic* + for + disabled OR Athletic* + for + handicap OR Athletic* + for + the + impaired OR athletics + for + physical + disability OR athletics + for + sensory + disability OR Athletics + for + special + needs OR blinds + athletics Or deaf + Athletics OR wheelchair + athletic*)) AND (PY = ("2015" OR "2016" OR "2017" OR "2018" OR "2019" OR "2020" OR "2021" OR "2022" OR "2023" OR "2024" OR "2025")).

Inclusion criteria

Studies designated as "*articles*" were considered for inclusion. Full records and cited references from publications were imported from Web of Science. Science Core Collection (WoSCC). Only literature published in English was included. If a publication was attributed to more than one country/region or institution, the information from the corresponding authors was considered.

Exclusion criteria

Other types of documents were excluded, such as retractions of publication (3) and Proceeding Papers (9), and book chapters (17). 1271 results were found, of which 34 articles were excluded because, after review, they were not directly related to the search topics, leaving 1237 articles for analysis.

Statistical analysis

VOSviewer 1.6.20 [6] and Excel version 2504 (compilatio 18730.20186) were used to identify and visualize critical information from the publications. VOSviewer was used for network visualisation maps were generated to analyse collaboration patterns between countries and authors, as well as keyword co-occurrence clusters representing major research themes.

RESULTS

WoSCC database, according to the search strategy mentioned above. Figure 1 shows the publication output on para-athletics research over the last 10 years (2015–2025). The number of annual publications grew steadily from 2015 to 2022, with a decrease in 2023. The majority of the research was published in 2024 (n = 176 publications, 14.20%). It is worth noting that the challenge for this year is to increase para-athletics research, as only 60 articles have been reported to date through the end of May 2025. Table 1.

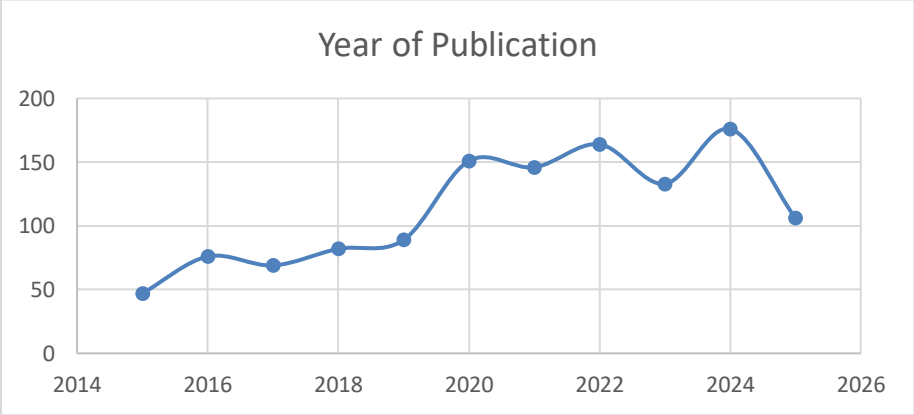

Figure 1. Annual number of publications per year.

Table 1. Annual number of publications and percentages

Year	No.	%
2025	106	8.555
2024	176	14.205
2023	133	10.734
2022	164	13.236
2021	146	11.784
2020	151	12.187
2019	89	7.183
2018	82	6.618
2017	69	5.569
2016	76	6.134
2015	47	3.793

Note. n = 1239 items.

According to the corresponding author's country, a total of 84 countries/regions have contributed to Para-athletics research over the past decade. Between 2015 and 2025, 34 countries contributed more than 10 articles to para-athletics research. The top ten countries/regions (by corresponding author's country) are led by North America, comprised of the United States and Canada, with the United States leading the way with 440 articles. This is followed by Europe, comprised of England, Italy, Germany, Spain, and the Netherlands, with five countries contributing a total of 288 articles. All other regions have only one representative in the top ten. South America is represented by Brazil with 89 articles, Asia by China with 87, and Oceania by Australia with 85.

Figure 2 shows 34 leading countries/regions across different time periods from 2015 to 2025 that have achieved 10 publications in the last 10 years. Table 2 presents the 83 countries/regions that have published on para-athletics.

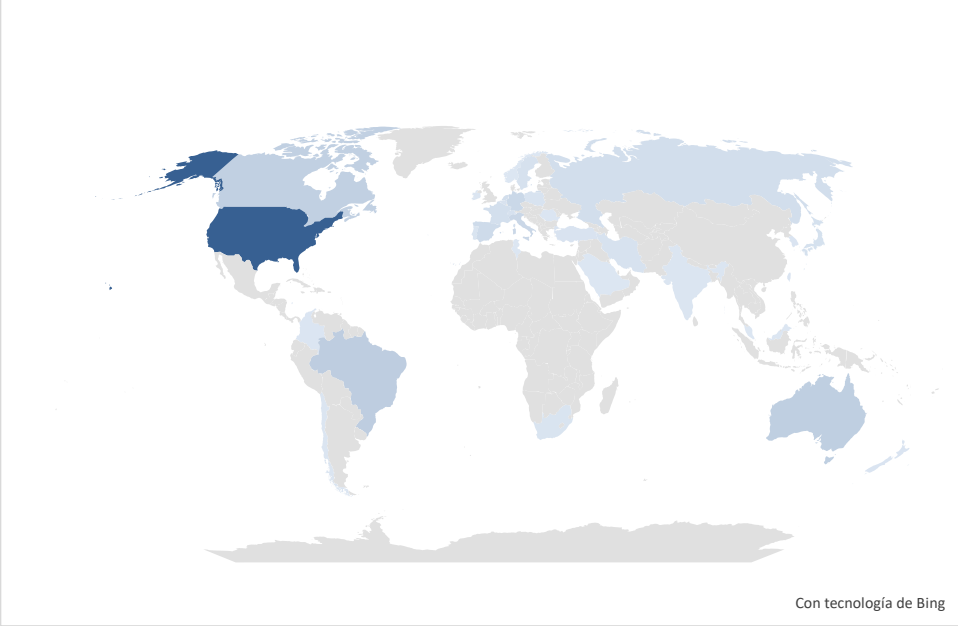

Figure 2. Map of publications by country/region that published over 10 articles in the last decade.

Table 2. Number of publications per country/region on 10 articles in the last decade.

Country	No.	%
United States	452	36.481
England	95	7.667
China	93	7.506
Brazil	91	7.345
Australia	87	7.022
Canada	82	6.618
Italy	59	4.762
Germany	57	4.600
Spain	47	3.793
Netherlands	37	2.986
Russia	37	2.986
France	34	2.744

Japan	28	2.260
Sweden	27	2.179
Switzerland	25	2018
Iran	24	1937
Belgium	22	1.776
Turkey	21	1.695
Poland	20	1.614
Türkiye	19	1.533
Portugal	18	1.453
South Africa	17	1.372
New Zealand	16	1.291
South Korea	16	1.291
Taiwan	16	1.291
Chili	14	1.130
Scotland	14	1.130
India	13	1.049
Ireland	13	1.049
Colombia	12	0.969
Romania	12	0.969
Norway	11	0.888
Saudi Arabia	11	0.888
Malaysia	10	0.807
Tunisia	10	0.807

Note. n = 84 countries.

Para-athletics was published in 556 academic journals. The top ten journals for the last 10 years and each five-year period are presented in Table 3. Over the last 10 years , the Journal of Athletic Training (n = 42 articles) published the most research about para-athletics , the following These journals were American Journal of Sports Medicine (n = 22), Human Sport Medicine (n = 22), PLOS ONE (n = 20), Sport in Society (n = 18), Journal of Sports Medicine and Physical Fitness (n = 17), Orthopaedic Journal of Sports Medicine (n = 17), International Journal of Environmental Research and Public Health (n = 16), Revista Brasileira de Medicina do Esporte (n = 16), and Journal of Sport Rehabilitation (n = 15). Most of these journals are linked to sports science and medicine.

Table 3. The top 10 journals that published articles on research in para-athletics

Publication titles	**Number of records**	**%**
Journal Athletic Training	42	3.395
American Journal of Sports Medicine	22	1.778
Human Sport Medicine	22	1.778
Plos One	20	1.617
Sport in Society	18	1.455
Journal of Sports Medicine and Physical Fitness	17	1.374
Orthopedic Journal of Sports Medicine	17	1.374
International Journal of Environmental Research and Public Health	16	1.293
Sports Medicine Magazine	16	1.293
Journal of Sport Rehabilitation	15	1.213

Note. n = 556.

An analysis by categories was carried out in which 101 were found in total, to simplify the visualization in Table 4 the 10 main ones are shown: Sport Sciences (n = 515), Social Sciences Other Topics (n = 155), Orthopedics (n = 145), Rehabilitation (n = 118), Physiology (n = 106), General Internal Medicine (n = 72), Education Educational Research (n = 65), Physiology (n = 64), Neurosciences Neurology (n = 57), Science Technology Other Topics (n = 49).

Table 4. The top 10 categories in which articles on research in para-athletics were published.

Web of Science categories	Number of records	%
Sport sciences	515	41.633
Social sciences other topics	155	12.530
Orthopedics	145	11.722
Rehabilitation	118	9.538
Physiology	106	8.569
General internal medicine	72	5.821
Education educational research	65	5.255
Physiology	64	5.174
Neurosciences neurology	57	4.608
Science technology other topics	49	3.961

Note. n = 101.

An analysis was performed by the most relevant author in which 5322 were found in total, to simplify the visualization in Table 5 the 10 main authors are shown Winckler C (n = 10), De Mello MT (9), Silva A (n = 9), Neto FR (n = 8), Connick MJ (n = 7), Costa RRG (7), Valier ARS (n = 7), Burke LM (n = 6), Derman W (n = 6), Tweedy SM (n = 6).

Table 5. The top 10 authors who published articles on research in para-athletics.

Author	Number of records	%
Winckler Ciro	10	0.815
De Mello MT	9	0.733
Silva A	9	0.733
Net FR	8	0.652
Connick MJ	7	0.570
Costa RRG	7	0.570
Valier ARS	7	0.570
Burke LM	6	0.489
Derman W	6	0.489
Tweedy SM	6	0.489

Note. n = 5322.

The ten keywords with the highest occurrence frequencies were: performance (n = 156), exercise (n = 135), sport (n = 109), Athletic performance (n = 106), disability (n = 104), Sports (n = 103), children (n = 79), strength (n = 68), health (n = 67) and participation (n = 58).

A keyword clustering analysis was performed using VOSviewer (Figure 3). With a threshold of ≥ 10 occurrences, 158 keywords were selected, and four clusters emerged through co-occurrence clustering analysis.

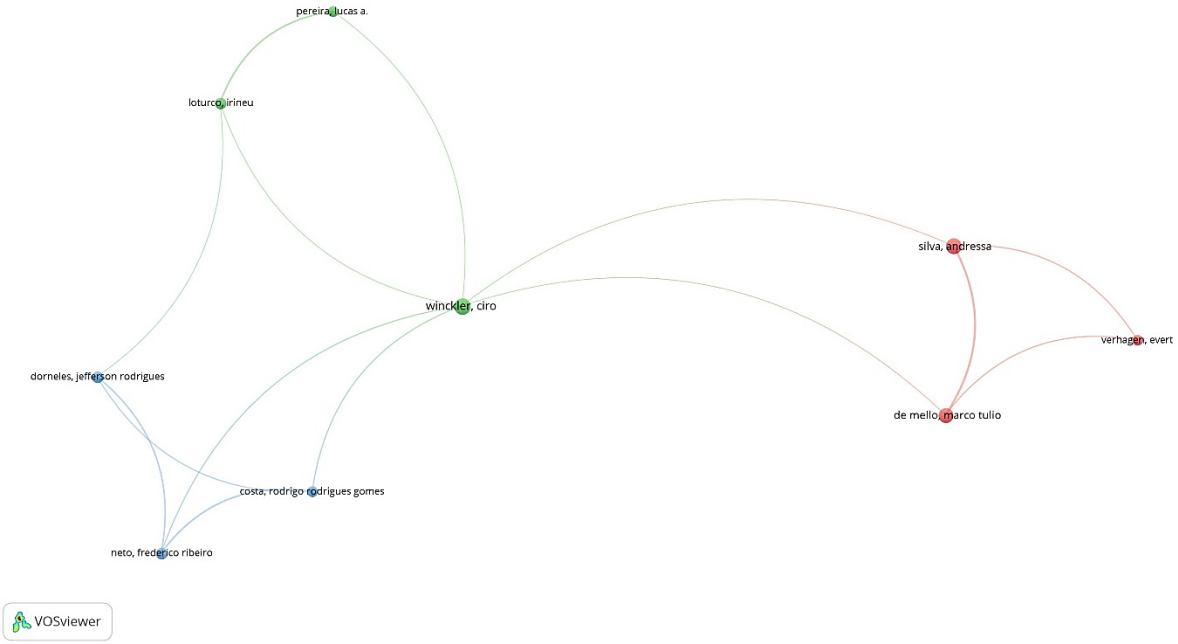

Figure 3. Top 10 authors who have published articles on Para Athletics research, co-occurrence analysis.

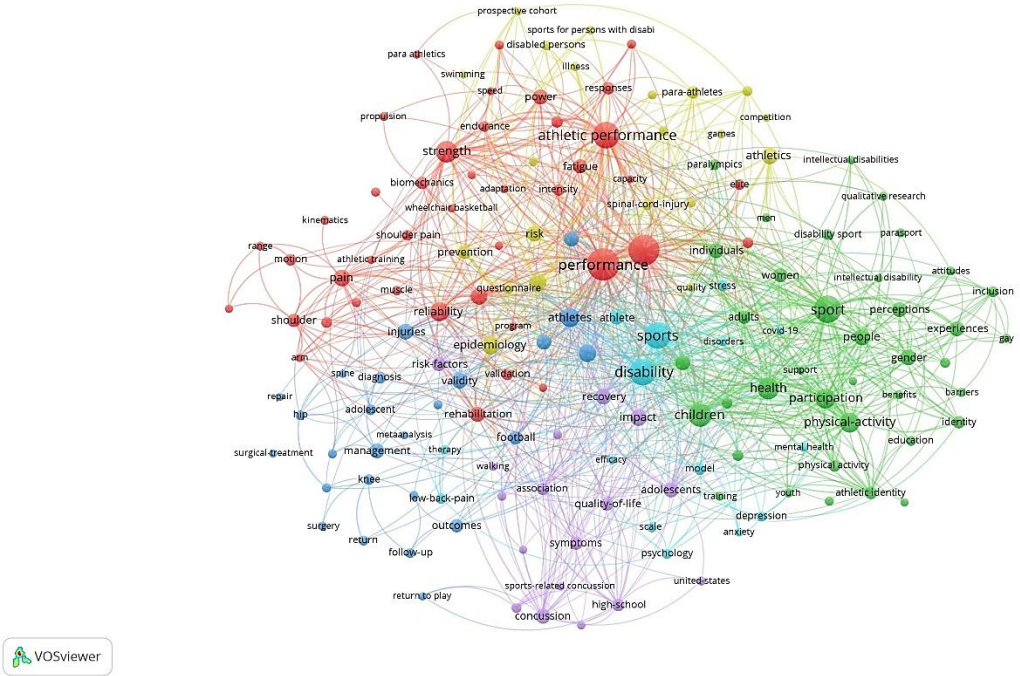

Figure 4. Keywords in publications on adapted sport over the last ten years, co-occurrence clustering.

Figure 5 shows the analysis of keywords in publications on adapted sports over the last ten years. The year of publication is shown as a gradient colour change.

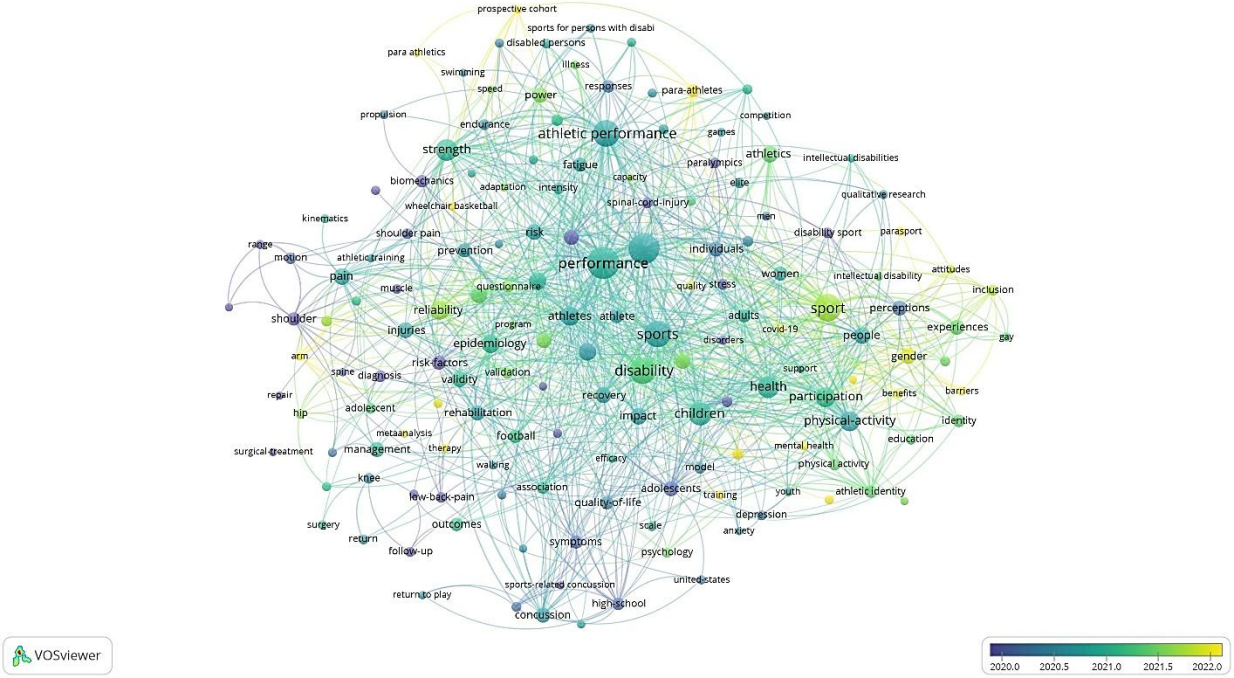

Figure 5. Keywords in publications on adapted sport, with colour variation by chronology.

DISCUSSION

The growth in publication output reflects the increasing scientific interest in disability sport and the professionalisation of para-sport research.

Bibliometrics provides a comprehensive and statistical view of the impact of research on specific topics. The inquiry in this article focused on a bibliometric analysis of studies related to para-athletics (IPC, 2024) over the last decade, identifying 1237 articles that were subjected to an analysis that provided comprehensive and objective information on the impact of para-athletics in scientific publications. This information is valuable for current and future research, as it allows for the identification of publication characteristics, research trends related to para-athletics, and critical points that can be addressed.

Observing research over the last decade allows us to reflect on the scientific contributions and development that para-athletics has undergone, both in year-on-year monitoring with a comprehensive view, and how these have increased alongside their respective exceptions. The annual results for para-athletics show a significant decline in 2023. The continuous growth in publications stagnated, which can be attributed to the socio-political or scientific context of the time, problems in scientific production, decisions by authorities or organizations that regulate para-athletics research, global economic investment in the field, or interruptions caused by sporting events held around that period. This phenomenon, reflected in this article, can open avenues for future research to investigate which factors affect scientific production in para-athletics and anticipate the research barriers that produce it (Marques & Alves, 2021).

The highest scientific output by country shows a trend toward more developed nations, which have produced a greater number of publications on para-athletics. High-income countries in North America and Western

Europe, along with Asia, lead this production of articles (Hurt et al., 2022). These countries have achieved outstanding research development in para-athletics over the last decade, consolidating their scientific leadership worldwide with a strong association to economic standards (Kudinska, Solovjova, & Korde, 2025). This analysis also suggests a strong correlation between the sporting results obtained in the Paris 2024 medal count and the last decade of scientific output in the countries that have most developed research in para-athletics. The concentration of research output in high-income countries may reflect disparities in research funding, infrastructure, and access to elite para sport programmes.

The trends by country can be attributed to the organization of sporting events where para-athletics competitions have been held (Baade & Matheson, 2016; Tien , Lo, & Lin, 2011; Kovpak, 2021; Pan, 2023), as is the case of Brazil with the Rio 2016 Games, Japan with Tokyo 2020, and France with Paris 2024. In fact, Brazil ranks fourth in publications, Japan thirteenth, and France twelfth; all three countries are also among the world's top three in publications with more than 10 articles in the last decade, reflecting this trend. This association is also found in the winter games, with a relationship with South Korea with 16 publications in the last decade with the games held in PyeongChang in 2018 and in Beijing China, held in 2022, finding China in the third place of countries with the most publication in para-athletics.

In addition, eighty-four countries have published articles related to para-athletics. The distribution of countries that managed to maintain an average of one article per year over the last decade shows a heterogeneous regional distribution, which could attribute a strong collaborative work in the northern hemisphere regions, unlike the publications in the southern hemisphere regarding para-athletics. In general, collaboration between institutions should continue to be strengthened with a view to the development of this topic.

Regarding journals, research related to it for athletics has been published in 556 journals, the main one being the Journal of Athletic Training, with 42 publications in the last decade regarding para-athletics, representing 3.40 % of the total, is the journal of Athletic Training. Of Athletic Training is by far the most influential magazine on the subject, almost doubling the number of publications of its successor, the American Journal. The Journal of Sports Medicine, with 22 publications, represents 1.78% of the total publications by journal, reflecting and confirming the research impact of the Journal. Of Athletic Training and the trend of para-athletics to publish scientific articles linked to training and the medical sciences that are linked to para-athletics over other impacts such as at the community, social, economic and humanities level (Alhumaid, Adnan, Said, Alobaid , & Khoo, 2024; Fagher , DeLuca, Derman, & Blauwet , 2022; Yamashita, 2021).

Regarding the keywords, co-occurrence was identified, reflecting the preferences of the studies, interests, trends, and research subjects. It is important to emphasize that the keywords show a frequency of non-specific information on research guidelines related to para-athletics. This study highlights the strength of keywords related to performance (Buhmann, Sayers, O'Brien, & Borg, 2024) of athletes in para-athletics, with 156 entries, followed by exercise (Fagher et al., 2022) with 135 and sport with 109. This reflects that trends in para-athletics are strongly related to athletic performance, rather than sociological and psychological aspects or athletic effects outside of performance, which accounted for a smaller proportion of publications related to the keywords.

Key words that appear isolated and infrequently in publications on the map were explored in depth to determine new guidelines or links to it for athletics. Such as the case of sports-related concussion (Lexell, Lovén, & Fagher, 2021). sports inclusion for people with disabilities (Rakaa, Bassiri, & Lotfi, 2025) and pain (Zwierzchowska , Gaweł, & Rosołek, 2022).

Regarding the most prominent authors in the field of para-athletics, Winckler, C; is the only one to have published 10 articles in the last decade, averaging 1 article per year and representing 0.815% of the articles related to para-athletics. His research focuses on taxonomies of sports disciplines related to para-athletics and physical exertion tests (Winckler et al., 2024). Furthermore, the map shows a connection with other prominent authors in the area of sports, such as De Mello, MT and Silva A, who both have 9 publications each, including the characterization of para-athletes. (Pinheiro et al., 2024)and the prevalence of injuries respectively (Resende et al., 2025).

This study had some potential limitations. Notably, it focused solely on literature indexed in WoSCC because it provided the most authoritative and credible publication information. Inevitably, some useful information from other databases of similar relevance may have been omitted. Also, due to the large number of included articles, only the titles and abstracts of each publication were identified. Therefore, other sports were not classified, which could lead to potential inaccuracies in the included keywords compared to manual annotation. Finally, there could be some biases caused by linguistic restrictions in the search strategy. To achieve a more accurate range of evaluation, linguistic restrictions were imposed on the study. While only English-language publications were considered, some mixed-language publications might have a greater impact than English-only publications, potentially resulting in linguistic bias. All of the above factors could affect the accuracy of the bibliometric analysis.

CONCLUSION

This research evaluates the development of the scientific literature on para-athletics using a quantitative approach. The analysis provides a comprehensive overview of para-athletics research over the last decade, from 2015 to 2025. Annual publication output increased steadily from 2015 to 2022, before declining in 2023. The United States, England, and China stood out as the countries with the highest scientific output in the field of para-athletics. The most frequently published scientific journals are: Journal Of Athletic Training, American Journal "*The Journal of Sports Medicine and Human Sport Medicine*" were ranked as the three most productive journals in the last decade. The main categories were sports science, orthopedics, rehabilitation, and physiology. The main keywords associated with para-athletics are; performance, exercise, and sport.

This bibliometric study provides a comprehensive overview of global research trends in para-athletics from 2015 to 2025. The results highlight a sustained increase in scientific production, with research concentrated in economically developed countries and primarily focused on sport performance and exercise science. Future research should expand towards social inclusion, policy development, and long-term health outcomes in para-athletes to support a more holistic understanding of disability sport.

AUTHOR CONTRIBUTIONS

All authors meet the criteria for authorship in accordance with established ethical guidelines. Eduardo Reinoso González (Main Author); participated in the conceptualization (direction), research, methodological design, data curation and manuscript writing. Mauricio Godoy Rencoret (Co-Author); participated in the final editing and revision of the manuscript. 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.

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