

# EXPLORING THE WEIGHT-BEARING EXERCISE LANDSCAPE: A BIBLIOMETRIC STUDY IN SPORTS SCIENCE

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## Abstract

*This bibliometric analysis explores weight-bearing exercise research in sports science from 1997 to 2022. We began with 729 documents, refining to 49 open access articles. Findings reveal a modest decline in research output, emphasizing the need for renewed interest. However, a high average citation rate (44.02) indicates the impact of existing research. Global collaboration, with a 30.61% international co-authorship rate, enriches the field. Diverse keywords reflect multifaceted research. Annual production analysis shows evolving trends, from early interest to recent fluctuations. The United States leads in scientific production, underlining the global nature of weight-bearing exercise research. This analysis informs future research priorities in sports science.*

**Keywords:** *Weight bearing exercise, Sports Science, Bibliometric analysis.*

## Introduction

Weight-bearing exercise plays a pivotal role in sports science, contributing to the enhancement of athletic performance, injury prevention, and overall well-being of athletes (Faigenbaum, et al., 2018). In recent years, this form of exercise has garnered increasing attention from researchers, coaches, and athletes alike, owing to its profound impact on various physiological and biomechanical aspects of sports performance (Joy, et al., 2013). The term "weight-bearing exercise" refers to any activity that requires an individual to support their own body weight against gravity, often involving the skeletal system and muscles (Hespanhol, et al., 2015). These exercises include but are not limited to weightlifting, resistance training, plyometrics, and calisthenics. prepare reference for each line (Schoenfeld, et al., 2017). The

application of weight-bearing exercise in sports science has expanded considerably, encompassing a wide range of disciplines, including exercise physiology, biomechanics, sports medicine, and sports psychology.

In recent years, bibliometric analyses have become valuable tools in comprehending the research landscape within specific scientific domains (Bornmann, & Leydesdorff, 2014). A bibliometric analysis involves the systematic examination of scientific publications, citation patterns, and research trends to gain insights into the development and impact of a particular field of study (Moed, et al., 1985). Such analyses can provide a comprehensive overview of the progress, key contributors, influential publications, and emerging topics within the domain of weight-bearing exercise in sports science (Bornmann, & Mutz, 2015).

This bibliometric analysis aims to explore the evolution of research in weight-bearing exercise within the realm of sports science, highlighting pivotal research papers, influential authors, and prominent journals. By analysing the scholarly literature, this study seeks to identify trends, knowledge gaps, and future directions in this field, ultimately contributing to a better understanding of the role of weight-bearing exercise in optimizing athletic performance and promoting athlete well-being.

## Methodology

To conduct a comprehensive bibliometric analysis on the subject of weight-bearing exercise in the field of sports science, we initiated our study by conducting an initial search on the Web of Science database, using relevant keywords. This initial search yielded a total of 729 documents. In order to refine our dataset and ensure that we focus exclusively on pertinent research, we established a set of inclusion and exclusion criteria. Firstly, we included only documents directly related to the domain of sports science, eliminating any records that did not meet this criterion. This refinement process reduced the dataset to 200 documents that were deemed relevant to sports science. Subsequently, we further narrowed our focus to peer-reviewed articles by excluding other document types such as conference proceedings, reviews, letters, and editorials. This step resulted in a dataset comprising 157 articles. To facilitate accessibility and promote transparency, we made the decision to include only open access articles in our analysis. After applying this criterion to the 157 articles, we retained a final set of 49 open access articles for the bibliometric analysis.

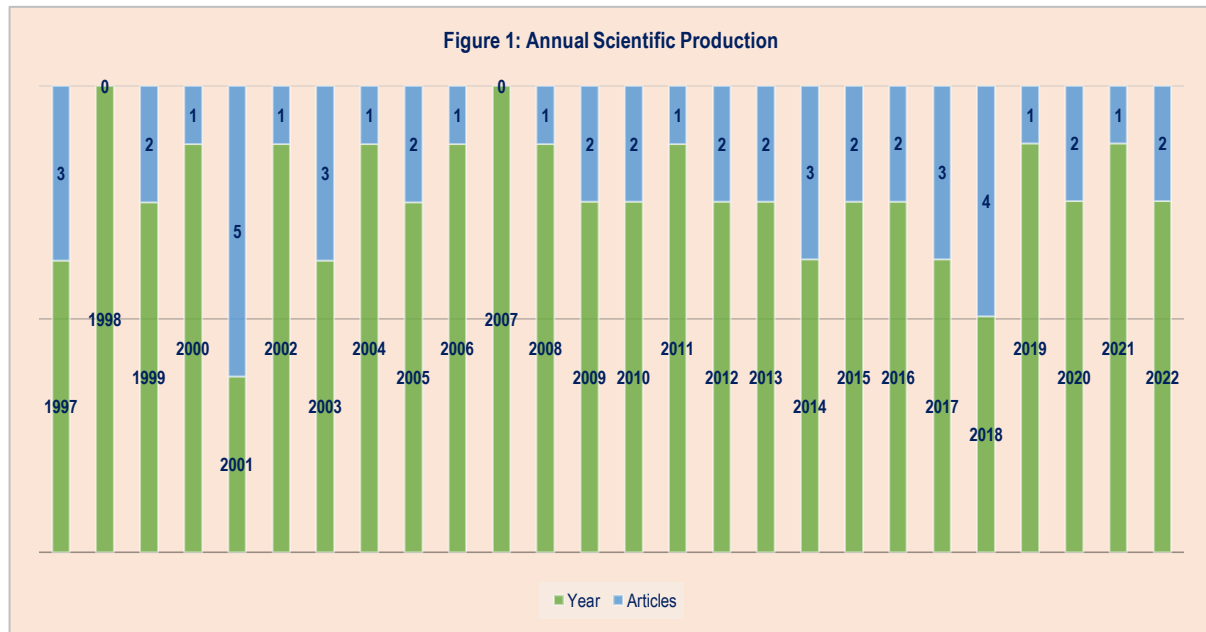
With this curated dataset at our disposal, our analysis will encompass a diverse set of bibliometric metrics. These metrics will include a year-by-year breakdown of publication details and an examination of scientific production by the countries of corresponding authors.

## Results

The bibliometric analysis conducted over a 25-year period from 1997 to 2022 offers valuable insights into the research landscape of weight-bearing exercise in sports science. With data drawn from 23 different sources, including journals and books, the dataset encompasses 49 documents that serve as the foundation for this analysis. Notably, the negative annual growth rate of -1.61% suggests a modest decline in the number of publications over time, emphasizing the need for renewed interest and investment in weight-bearing exercise research within the sports science domain. However, the average citation rate of 44.02 citations per document demonstrates that the existing body of research has garnered substantial scholarly attention and recognition. Furthermore, the international co-authorship rate of 30.61% highlights the global nature of research in this field, showcasing the value of diverse perspectives and expertise. The presence of diverse keywords and author's keywords in the dataset underscores the multifaceted nature of weight-bearing exercise research.

The analysis of annual scientific production (Figure 1) in the field of weight-bearing exercise provides a comprehensive view of research trends over the past few decades. The data reveals interesting patterns in the evolution of research output. In 1997, three articles signaled early research interest, suggesting a budding awareness of the significance of weight-bearing exercise in sports science. However, subsequent years, particularly 1998 and 2007, saw a notable drop in publications, possibly indicating fluctuating attention to this specific area during those periods.

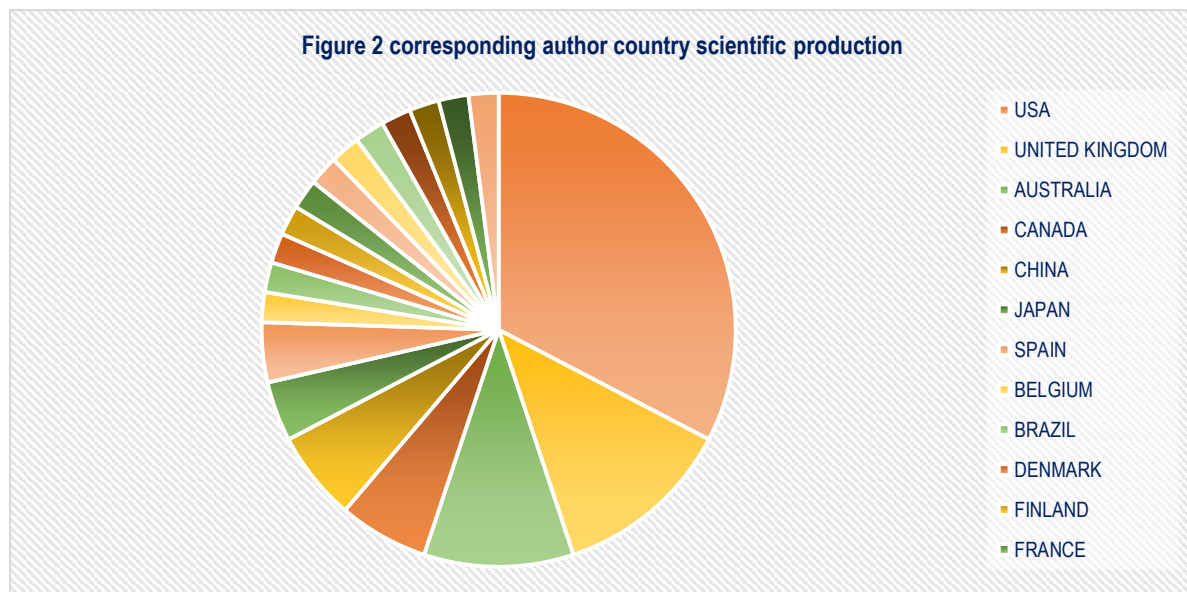
From 2003 to 2008, there was a significant resurgence in research activity, marked by a gradual increase in the number of articles. This upswing reflects a growing recognition of the importance of weight-bearing exercise in sports science, leading to increased scholarly output. The following years, from 2009 to 2014, continued to show consistent research output, indicating sustained interest and contributions to the field.



However, from 2015 to 2018, there was a slight dip in annual publications. This might indicate a stabilization or maturation of research topics. Nonetheless, the number of articles remained substantial, affirming the enduring significance of weight-bearing exercise research in sports science. In the more recent years, from 2019 to 2022, the annual scientific production fluctuated, with some years featuring a higher number of publications and others showing fewer. This variability may be attributed to evolving research priorities, emerging trends, or external factors influencing research agendas.

Figure 2 provides valuable insights into the geographic distribution of scientific production in weight-bearing exercise research within sports science, highlighting the countries that have actively contributed to this field. The United States (USA) emerges as the frontrunner with 16 articles, demonstrating a strong commitment to weight-bearing exercise research. This prominence aligns with the USA's extensive investment in sports science, driven by its emphasis on optimizing athletic performance and athlete well-being. Following closely is the United Kingdom (UK) with six articles, indicating a significant presence in the field. The UK's

contributions reflect its active engagement in weight-bearing exercise studies, leveraging its expertise in sports science. Australia, with five articles, showcases its dedication to researching weight-bearing exercise. This aligns with Australia's sports-centric culture and its ongoing efforts to enhance sports performance through scientific inquiry. Canada, China, and Japan each contribute three articles, signifying their shared interest in weight-bearing exercise. Canada's involvement likely stems from its vibrant sports community, while China and Japan's contributions underscore the growing international interest in sports science. Spain, with two articles, further adds to the international dimension of weight-bearing exercise research. Spain's



participation reflects its prominence in sports-related studies and its commitment to advancing sports science. Several countries, including Belgium, Brazil, Denmark, Finland, France, Germany, Korea, Malaysia, Norway, South Africa, and Sweden, each contribute one article, highlighting the global reach of weight-bearing exercise research. These diverse contributions emphasize the collaborative and international nature of sports science research in this field.

## Conclusion

The comprehensive bibliometric analysis conducted over a 25-year period offers several key implications for the field of weight-bearing exercise research within sports science. Firstly, the negative annual growth rate of -1.61% suggests a potential decline in research output over time. This indicates a need for renewed interest and investment in weight-bearing exercise research within the sports science domain, ensuring that it remains a vibrant area of study with evolving insights and applications.

Secondly, the average citation rate of 44.02 citations per document underscores the impact and recognition of the existing body of research in this field. It signifies that weight-bearing exercise research has made a significant contribution to the broader scholarly community and continues to influence scientific discourse.

Thirdly, the international co-authorship rate of 30.61% highlights the global nature of research in weight-bearing exercise. Collaborations across borders and diverse perspectives enrich the quality and relevance of research outcomes. These international connections should be encouraged and fostered to advance the field collectively and address global challenges.

Furthermore, the presence of diverse keywords and author's keywords in the dataset underscores the multifaceted nature of weight-bearing exercise research. This diversity reflects the complex interplay of physiological, biomechanical, and psychological aspects in this field, suggesting that researchers should embrace this complexity and explore various dimensions of weight-bearing exercise. In addition, the annual scientific production analysis reveals fluctuations in research output over the years, emphasizing the importance of considering historical trends. Past research can provide valuable insights into current priorities and future directions in weight-bearing exercise research, ensuring a well-rounded approach to scientific inquiry.

Lastly, Figure 2 showcases the global reach of weight-bearing exercise research, with contributions from countries around the world. This diversity of perspectives and experiences enriches the field and underscores its universal relevance. Collaborative efforts should continue to harness this global expertise to drive advancements in optimizing athletic performance and promoting athlete well-being.

In conclusion, these implications highlight the need for a revitalized focus on weight-bearing exercise research, recognition of its impact, the importance of global collaboration, the multifaceted nature of the field, and the value of historical perspectives. Researchers, institutions, and policymakers can leverage these insights to shape the future of weight-bearing exercise research in sports science, ultimately benefiting athletes and advancing scientific understanding.

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