



Geriatric and Gerontology Research: A Scientometric Investigation of Open Access Journal Articles Indexed in the Scopus Database

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Received: May 24, 2023

Revised: July 6, 2023

Accepted: July 18, 2023

Background: Scientometric analyses of specific topics in geriatrics and gerontology have grown robustly in scientific literature. However, analyses using holistic and interdisciplinary approaches are scarce in this field of research. This article aimed to demonstrate research trends and provide an overview of bibliometric information on publications related to geriatrics and gerontology.

Methods: We identified relevant articles on geriatrics and gerontology using the search terms "geriatrics," "gerontology," "older people," and "elderly." VOSviewer was used to perform bibliometric analysis. **Results:** A total of 858 analyzed articles were published in 340 journals. Among the 10 most contributory journals, five were in the United States, with the top journal being the *Journal of the American Geriatrics Society*. The United States was the leading country in research, followed by Japan, Canada, and the United Kingdom. A total of 5,278 keywords were analyzed. In the analysis of research hotspots, the main global research topics in geriatrics and gerontology were older adults (n=663), education and training (n=471), and adults aged 80 years (n=461). These were gradually expanded to include areas related to caring for older adults, such as geriatric assessments (n=395). **Conclusion:** These results provide direction for fellow researchers to conduct studies in geriatrics and gerontology. In addition, they provide government departments with guidance for formulating and implementing policies that affect older adults, not only in setting academic and professional priorities but also in understanding key topics related to them.

Key Words: Older adults, Geriatrics, Gerontology, Bibliometric analysis, Trends

INTRODUCTION

Due to the accelerated growth of older adult populations worldwide, there is an urgent need for the development of research and public health policy to understand and support healthy aging.¹⁾ A growing research consensus indicates that the characteristics of aging, once considered disparate, are likely interconnected. This scenario promotes a greater need for interdisciplinary research as this field of study is extremely complex. Interdisciplinary research enables a greater understanding of the extent of topics of interest to

increase scientific productivity and provide theoretical and practical support for professional training.²⁻⁴⁾ The exponential increase in interdisciplinary research in the field of geriatrics and gerontology results from the accelerated aging process worldwide and the financial investments of public and private institutions.²⁾ Considerable progress has been made in understanding the aging process through multidisciplinary and/or interdisciplinary methods. However, despite these developments, many important issues require better understanding.

In an editorial on new perspectives in gerontology and geriat-

rics,⁵ the authors highlighted the need to assess the cooperation and impact of studies in this area to identify trends and generate new topics, materials, and research methods. Thus, interdisciplinary research requires the exploration of a field of study using a more holistic approach. The quantitative increase in scientific publications in this area in different databases and newspapers underscores the urgent need for analyses to allow researchers to obtain information about the topic of interest. Among these approaches, bibliometric analyses reveal perspectives inherent to the main trends related to the geriatric population. Bibliometrics (or bibliometric analysis) is a statistical method that determines which topics are trending through a quantitative analysis of articles in a defined field of study.⁶

While some bibliometric investigations in geriatrics and gerontology have been published, these studies have investigated more specific areas, such as Alzheimer’s dementia,⁷ cardiovascular diseases,⁸ psychological and physical activity,⁹ multimorbidity,¹⁰ sarcopenia,¹¹ falls, healthy aging,² coronavirus disease 2019 (COVID-19),¹² and social participation.¹³ In addition to specific investigations, literature reviews on geriatrics and gerontology can provide researchers with a broader view of this field and clarify possible research directions. However, few literature reviews of geriatrics and gerontology have been conducted from a holistic perspective.¹³

Moreover, few studies have investigated the development and trends of research in geriatrics and gerontology, and the hotspots in this field remain unclear. Therefore, this study aimed to identify the research trends and hotspots to provide an overview of bibliometric information on publications related to geriatrics and gerontology using the Scopus database.

MATERIALS AND METHODS

Bibliometric methods are an integral part of research evaluation

methodology within scientific fields and are increasingly used in the study of various aspects of science.¹³ This study analyzed the Scopus database, an Elsevier product with a broad scope, which is the largest database, with citation data from peer-reviewed articles in various disciplines.¹⁴ The Scopus database offers several features that facilitate bibliometric analysis. These operational functions include the journal name, document type, year of publication, authors and their affiliations, citation count, and h-index metrics for documents.^{15,16} Screening of this database revealed 858 articles, which were included in the bibliometric analysis. Fig. 1 shows the schematic flowchart of the article selection process.

Search Strategy

The data for this study were acquired from the Scopus database without defining the analysis period. The search started on January 21, 2023, and contained all articles with terms using the Medical Subject Headings (MeSH) combination: (geriatrics AND gerontology AND elderly OR older AND adult) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re")). This strategy enabled a broader and interdisciplinary analysis of geriatrics and gerontology. Therefore, these keywords were used such that the maximum number of relevant publications were incorporated into the extracted data.

Inclusion and Exclusion Criteria

All data from the Scopus database, including article information, such as author names, titles, journals, keywords, institutional affiliations, citations, and abstracts, were downloaded. All data were imported into a Microsoft Excel file (xls format) to check for data errors. Then, all downloaded data were filtered by the inclusion criteria, as follows: (1) open access (OA) publications (all OA publications were included); (2) papers published as articles; and (3) articles published in English. The corresponding authors of the present study, LSSN and NBO, reviewed the titles of all articles

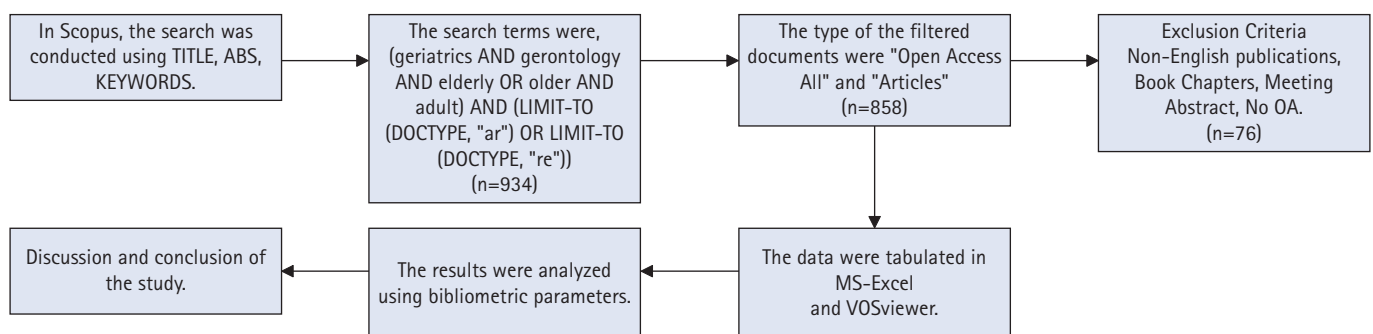


Fig. 1. Research flowchart.

for inclusion in the analysis. Any differences between them were discussed and resolved by a third author. Duplicate documents were defined as articles with the same title, authors, and year and were identified using Microsoft Excel software. In recent years, the importance of OA for authors has been heightened by the policies of major research funders in many countries, which have required that publications arising from funded work be freely available to all.

Statistical Analysis

Scientometrics is involved in productivity analysis and the measurement of scientific fields. The quantitative assessment of publication productivity through scientometric parameters is a reliable technique used to understand the impact of any research on a community.^{16,17)} We explored global publications related to geriatrics and gerontology through the quantitative metrics of scientometrics and bibliometrics. OA articles were analyzed. The large increase in subscription rates for conventional subscription-based journals and traditional publication editions led to the formation of the Open Access Academic Communication Movement. In this study, we used Microsoft Excel version 2019 (v16.0) and VOSviewer (v1.6.18; <https://www.vosviewer.com/>) to describe the basic characteristics of the publications, countries, institutions, keywords, and citations. VOSviewer uses text mining functions and advanced visual analysis to perform co-occurrence analyses.¹⁸⁾ Co-occurrence analysis helps quantify common information in various data, revealing the association between content and common information relations.¹⁹⁾ The types of co-occurrence analysis research are broad, including co-country, co-institution, co-keyword, and co-citation analyses. After searching the literature, we extracted publication dates, journals, countries, institutions, and keywords using Microsoft Excel. The analysis was then separated into three stages: (1) a descriptive statistical analysis of the growth patterns, numbers, years, institutions, countries, and main journals of the publications; (2) a co-occurrence analysis of keywords using VOSviewer; and (3) a co-citation analysis to rank the most influential articles in this field.

The results and discussion are presented together for clarity. The topics include survey status, hotspots and co-institutions, survey hotspots, and top topics.

Ethics Statement

This study complied the ethical guidelines for authorship and publishing in the *Annals of Geriatric Medicine and Research*.²⁰⁾

RESULTS

Bibliometric analysis provides an idea of the progress of research

and the contributions of researchers in a given field. In this study, we searched the Scopus database to analyze the current status and research development trends in geriatrics and gerontology to identify the contributions of different nations, institutions, and partnerships. Research hotspots were tracked using cluster keyword mapping and burst term analysis. Finally, co-citation analysis was used on the Scopus database, and global trends and the most-contributing articles in geriatrics and gerontology were compared to encourage further dialogue among scholars.

Research Status, Topics, and Co-institutions

The 858 articles analyzed from the Scopus database, published between 1965–2022 confirmed the trend of increasing research publications in geriatrics and gerontology (Fig. 2). Interdisciplinary research in geriatrics and gerontology has become more widespread, thus promoting a wide range of more in-depth research.²¹⁾ In the last 8 years (2014–2022), referred to as the “prosperity” period, global publications in this field have increased, indicating gradually increasing attention from scholars, a growth trend that is expected to continue. We consider this period to be the “perfect storm,” in the sense that the aging of the population advances quickly and dynamically, together with the availability of new instruments, procedures, methods, and technologies to drive the development of research in geriatrics and gerontology. A bibliometric study by Ang et al.²²⁾ reported that geriatrics and gerontology are new research areas, as no journals have published more than 10,000 articles. This reinforces the need for greater investments from public and private institutions and researchers to consolidate this field of study.

The articles were published in a total of 340 journals. The two journals with the largest contributions were from the clinical area of geriatrics; however, most journals had more interdisciplinary scopes, with contributions from various disciplines, especially in health and social and educational gerontology. Among the 10 journals with the highest contributions in this study (Table 1), five are from the United States, including the *Journal of the American Geriatrics Society* and the *Journal of the American Medical Directors Association* with the highest impact factors (IF), respectively. The bibliometric analysis by Ghamgosar et al.¹⁾ on geriatric nursing also showed that these two journals published the most articles in that field. Our results showed that the listed journals are active and have high IFs based on Journal Citation Reports (JCR). In recent years, the importance of OA for authors has been heightened by the policies of major research funders in many countries, which require that publications arising from funded work be freely available.²⁾ Although the listed journals are traditional subscription-based periodicals, authors may choose to pay to have their articles published

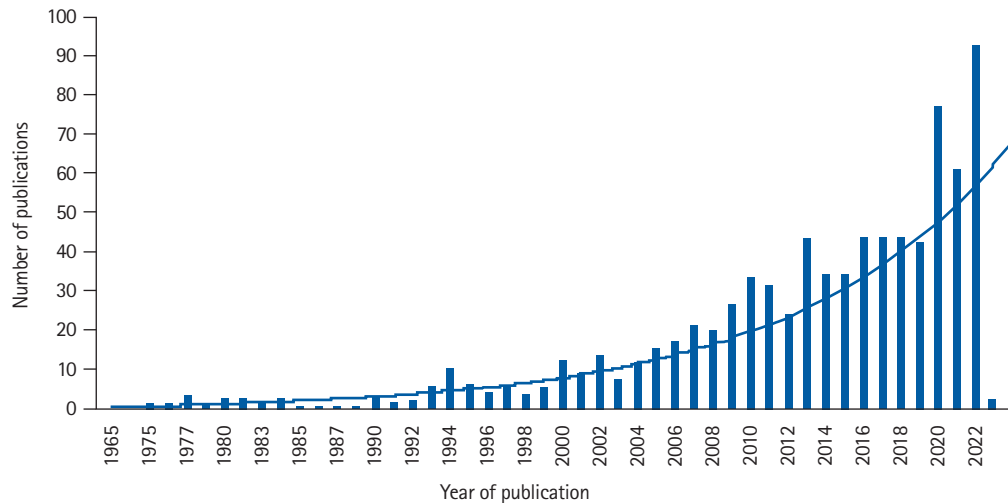


Fig. 2. Trends in publications of research on geriatrics and gerontology from 1965 to January 2023.

with OA, making them immediately and permanently available for everyone to read and download. Researchers can access most studies in geriatrics and gerontology by following the journals listed in [Table 1](#).

The United States ($n = 378$) was the leading country in geriatrics and gerontology research, followed by Japan ($n = 127$), Canada ($n = 79$), the United Kingdom ($n = 34$), and Germany ($n = 32$). We observed a stable cooperative relationship between North America and Europe as well as in Asian countries such as Japan and South Korea. The institutions listed in [Fig. 3](#) illustrate the partnerships and cooperation between those actively publishing in the fields of geriatrics and gerontology. Xiao et al.²³ identified the economy as one of the main factors affecting the productivity of countries. Additionally, countries with high rates of population aging, such as Japan and European countries, are also significant contributors of research on older adult populations, especially those aged ≥ 80 years.²⁴ We observed that the keyword “80+ elderly” was cited 461 times, confirming that these countries are also studying older adult individuals in this age group.

In the co-citation analysis, the article by Jerome A. Yesavage, MD, published in 1988, titled “The Geriatric Depression Scale” (GDS) was the most cited ($n = 478$) ([Table 2](#)). We believe that this study made important contributions to the development of this research field. Krishnamoorthy et al.²⁵ described the GDS as one of the most commonly used instruments to track and detect older adults with or at risk of depression, which is a public health problem. These data are consistent with the results of our analysis of the frequency of occurrence of the 20 main keywords ([Table 3](#)) and our identified key terms such as geriatric assessment, psycho-

logical aspects, depression, and risk factors.

Classification of the studies in [Table 2](#) by macro-themes revealed three themes: cognitive assessment (articles #1, #3, #7, and #10), functional capacity (articles #2, #4, #5, and #9), and frailty (articles #6 and #8).

Research Hotspots and Topics

We analyzed 5,278 keywords. The analysis of research hotspots showed that the main global research topics in geriatrics and gerontology were older adults ($n = 663$), education and training (educational research) ($n = 471$), and older adults aged ≥ 80 years ($n = 461$). These hotspots gradually expanded to include care for older adults through geriatric assessments ($n = 395$), geriatric nursing ($n = 367$), and procedures and management ($n = 308$) ([Table 3](#), [Fig. 4](#)). Topics related to mental health, classified into sub-areas such as psychiatry and psychology, as well as the macro-theme of functional capacity, were also research hotspots in geriatrics and gerontology. These themes were also frequently reported in other bibliometric analyses.^{13,23}

In contrast, the term dementia, which was prominently featured in the studies above, appeared in only 44 articles in the co-occurrence analysis; we attribute this contrary finding to the choice of database and search strings. However, the analysis of the co-occurrence of the term dementia with the term “oldest-old” (80+) ($n = 44$ publications) showed that 73% of studies on dementia focused on elderly people aged ≥ 80 years; thus, it seemed to be a research topic.²⁶ Original studies ($n = 178$), reviews ($n = 93$), and epidemiological prevalence studies ($n = 52$) appeared to be more commonly reported by researchers in geriatrics and gerontology.²⁷⁻²⁹

Table 1. Top-10 journal contributions

Rank	Journal title	Country	Number of articles	IF
1	<i>Journal of the American Geriatrics Society</i>	USA	100	7.538
2	<i>Journal of the American Medical Directors Association</i>	USA	27	7.802
3	<i>Gerontology</i>	Switzerland	27	5.597
4	<i>Gerontologist</i>	USA	26	5.422
5	<i>The Journal of Nutrition, Health & Aging</i>	Italy	17	5.285
6	<i>Archives of Gerontology and Geriatrics</i>	Ireland	17	4.163
7	<i>International Journal of Environmental and Health Research</i>	England	16	4.477
8	<i>Journal of Gerontological Social Work</i>	USA	15	3.608
9	<i>Geriatrics and Gerontology International</i>	Japan	14	3.387
10	<i>Educational Gerontology</i>	USA	12	1.389

IF, impact factor (Clarivate Science Citation Index-2021).

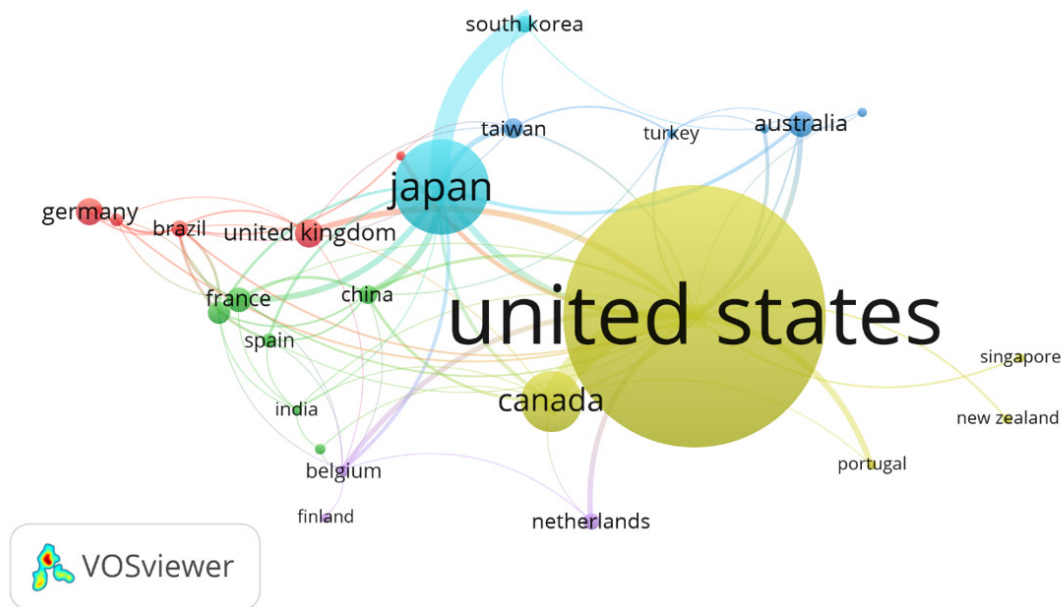


Fig. 3. Global research co-country analysis.

Table 2. Top-10 most cited articles

Rank	Title	Year	Number of citations	Journal
1	Geriatric Depression Scale	1988	478	<i>Psychopharmacology Bulletin</i>
2	Assessment of older people: self-maintaining and instrumental activities of daily living	1969	256	<i>The Gerontologist</i>
3	The mini-mental state examination	1983	177	<i>Archives of General Psychiatry</i>
4	Human aging: usual and successful	1987	175	<i>Science</i>
5	Barthel index	1965	156	<i>Maryland State Medical Journal</i>
6	Frailty in older adults: evidence for a phenotype	2001	149	<i>The Journals of Gerontology Series A</i>
7	Measurement of competence: reliability and validity of the TMIG Index of Competence	1991	136	<i>Archives of Gerontology and Geriatrics</i>
8	Frailty in elderly people	2013	132	<i>The Lancet</i>
9	The timed "Up & Go": a test of basic functional mobility for frail elderly persons	1991	126	<i>Journal of the American Geriatrics Society</i>
10	Practice parameter: Early detection of dementia: Mild cognitive impairment (an evidence-based review) [RETIRED]: Report of the Quality Standards Subcommittee of the American Academy of Neurology	2001	120	<i>Neurology</i>

TMIG, Tokyo Metropolitan Institute of Gerontology.

ACKNOWLEDGMENTS

CONFLICT OF INTEREST

The researchers claim no conflicts of interest.

FUNDING

None.

AUTHOR CONTRIBUTIONS

Conceptualization, LSSN, NBO; Data curation, FCFD, MDF; Investigation, FCFD, MDF; Methodology, FCFD, MDF; Writing-original draft, ABF, TSR, RCP, HLC, DVO; Writing-review & editing, LSSN, NBO.

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