Mapping the Intellectual Structure of Telehealth Research in Geriatrics: A Bibliometric Analysis

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Abstract:

Introduction: The current investigation seeks to perform a bibliometric analysis of the geriatric telehealth research literature disseminated from 1989 to 2023. The objective will be achieved through the utilization of the databases known as Scopus and Web of Science. **Methodology:** To exhibit the bibliometric study, open-source tools, namely ScientoPy and VOS viewer, are utilized. We also identified the contributions of journals, countries, and widely cited articles. **Results:** European nations, dominating most publications on this topic, have made significant contributions to recovery research in telehealth-related studies among older adults. Notably, the Journal of Telemedicine and Telecare has been granted the opportunity to disseminate the most publications in this specific field. The most common co-occurring terms were shown and mapped visually to represent the relationships, specifically highlighting each connection. The paper entitled "A systematic review of the benefits of home telecare for frail elderly people and those with long-term conditions" had the most citations with 242. **Conclusion:** This bibliometric analysis will make it worthwhile for an apprentice to survey ongoing research on telehealth in the geriatric population.

Keywords: Bibliometric Analysis, Co-citation analysis, Geriatrics, Telehealth, Rehabilitation

Introduction:

The population of individuals aged 65 and above is expected to reach 1.5 billion by 2050, making the aging population one of the world's fastest-growing demographic groups. According to WHO (2022), we can determine that people become more prone as they age to chronic health issues, impairments, and disabilities that call for ongoing medical care and support (Chou et al., 2021). Additionally, because of their complex medical requirements, older adults frequently have higher healthcare costs than their younger counterparts.

The primary enablers or barriers preventing older adults from accessing healthcare services were frequently identified as being accessibility and acceptability (Mohd Rosnu et al., 2022).Therefore, to effectively address the specific healthcare needs of older adults while ensuring accessibility, innovative and cost-effective approaches to healthcare delivery, such as telehealth or online interventions, are required. Telehealth has been defined as "the use of electronic information and telecommunications technologies to support and promote long-distance clinical health care, patient and professional health-related education, public health, and health administration (WHO (2022). This change has been made possible by healthcare providers' increased use of telehealth, increased access to technology, and older adults' acceptance and adoption of telehealth (Alsabeeha et al., 2023; Bhatia et al., 2022).

This enables timely and efficient assessments, facilitating appropriate management and care planning for older adults. Regarding the effectiveness of interventions through telehealth among older adults, multiple research studies have shown favorable results in various domains, including chronic disease management(Sánchez-Gutiérrez et al., 2022), mental health support (Belanger & Winsberg, 2022), and musculoskeletal health (Jirasakulsuk et al., 2022).

A recent scoping review exploring the utilization of telehealth and the commonly used platforms among older adults with mild cognitive impairment (MCI) or cognitive frailty (CF) revealed that telephones or smartphones with internet capabilities were the most prevalent technology used, followed by television-based assistive integrated technologies, mobile applications, and video conferencing (Fadzil et al., 2022). It is noteworthy that while the evidence supports the effectiveness of telehealth in assessment and management among older adults, certain considerations such as technological barriers, access to appropriate devices, and the need for caregiver assistance may influence individual experiences and outcomes (Hall et al., 2022). An overall portrait of telehealth research in geriatrics is still not available. Given this, a bibliometric analysis has the potential to provide valuable insights for evidence-based practice and policy development in this area of interest (Azizan et al., 2024).

Significant pre-processing was conducted to ensure the quality of the data, resulting in a polished dataset that has been set up for further analysis and examination. This investigation aimed to address the following research questions to highlight key aspects related to telehealth research in geriatrics:

RQ1: How many publications and growth trends over the years and how did the study evolve?

RQ2: Which journals have published the most articles on telehealth in geriatrics?

RQ3: Which countries are the biggest contributors to telehealth research in geriatrics, and how has their contribution changed over time?

RQ4: What articles in telehealth research within the geriatrics sector have the highest number of citations, and what are their primary results or contributions?

Methodology:

Procedure Analysis

We used Scopus and the Web of Science (WoS) databases in our search for this study, which was performed on May 21, 2023, focusing on the years 1989–2023. The reason for this selection includes having an extensive citation and abstract database of peer-reviewed scientific publications (Pranckutė, 2021) and ease of use with multiple software programs, allowing the retrieval of essential information for bibliometric analysis. The expert's opinion is considered while defining the essential keywords in the bibliometric analysis of "telehealth in older adults." Table 1 shows the division of essential keywords into two identified keywords and search queries.

Table 1: Identified keywords

Identified Keywords	
"telehealth"	**"Older adults"**
Telehealth telemedicine remote health care services, remote patient monitoring, telecare	Older adults elderly, seniors Geriatric

Table 2: Search queries

Search Queries
("telehealth" OR "telemedicine" OR "remote health care services" OR "remote patient monitoring" OR "telecare" AND "older adults" OR "elderly*" OR "senior*" OR "geriatric*").

Data Analysis

Figure 1 shows the diagram of the search process. The pre-processing of bibliographic datasets was performed using the ScientoPy tool (Ruiz-Rosero, Ramirez-Gonzalez, & Khanna, 2019), and the VOS viewer (Nees et al., 2019) was used to generate co-occurrence maps of keywords related to telehealth and older persons and to conduct network and bibliometric analyses. To retrieve article metadata, a keyword search was conducted in the Scopus and WoS databases that included searching for the titles "telehealth "OR "telemedicine" OR "remote health care services" OR "remote patient monitoring" OR "telecare" AND "older adults" OR "elderly" OR "senior*" OR "geriatric*". A filter was simultaneously applied to look for papers exclusively written in English. The documents included in the search were limited to articles, proceeding papers, and review papers.

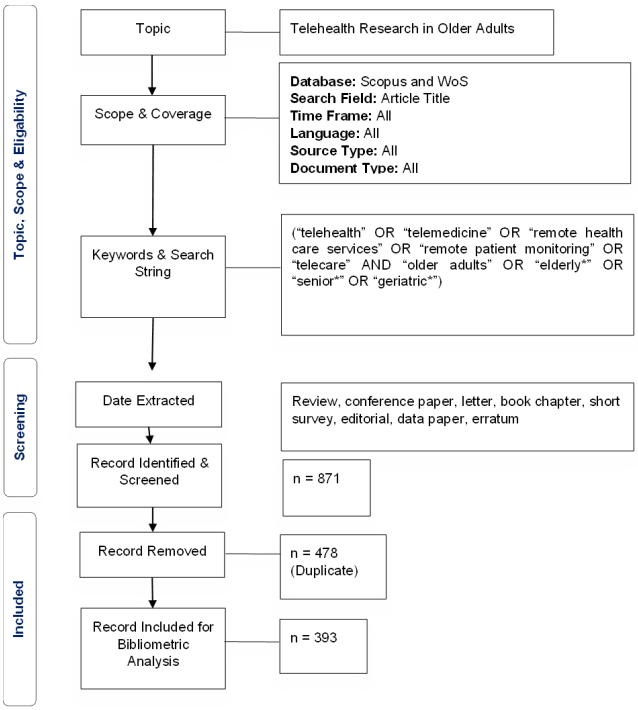

Figure 1: Diagram of the search process

Initially, the dataset consisted of 871 papers. However, 230 papers were omitted based on their document type, including review, conference paper, letter, book chapter, short survey, editorial, data paper, and erratum accounting for approximately 26.4% of the original dataset. After removing these omitted papers, the remaining dataset comprised 641 papers. Among the loaded papers, 44% (282 papers) were retrieved from the Web of Science (WoS) database, while 56% (359 papers) were obtained from the Scopus database. This distribution highlights the utilization of multiple sources to gather a comprehensive collection of relevant papers. The analysis further identified 249 duplicate papers (38.8% of the dataset). Only one duplicate paper was found in the WoS dataset, representing a mere 0.4% of the total duplicates. In contrast, 248 duplicate papers (69.1%) were removed from the Scopus dataset. Additionally, 181 duplicate papers showed variations in the number of citations they received. After the removal of duplicates, the dataset was reduced to 393 papers. Among these, 71.7% (281 papers) originated from the WoS database, while the remaining 28.3% (111 papers) were sourced from Scopus.

The list of publications used in the current study exceeded the minimum criterion of 300, as stipulated by (Donthu et al., 2021), and is deemed suitable for conducting bibliometric analysis. Furthermore, Glänzel and Moed(2013) asserted that conducting a bibliometric review requires a minimum of 100 publications. The final statistics after the duplication removal filter reveal the distribution of papers based on their document types within each database. Notably, the WoS dataset contained a higher proportion of articles, reviews, and proceedings papers compared to Scopus. This differentiation showcases the unique characteristics and focus areas of each database in terms of the document types they index. In addition, the VOS Viewer program was used to conduct network and bibliometric analyses.

Results:

Publication Trends and Growth Rates

The dataset exhibited in Figure 2 provides an illustrative demonstration of the publication trends and growth outcomes over an extended period between the Web of Science (WoS) and Scopus databases. The annual growth rate (AGR) reveals fluctuations in publication growth over the years. WoS exhibited both positive and negative AGR values, indicating periods of accelerated growth and periods of slower expansion. On the other hand, Scopus maintained a relatively stable AGR of around 0, suggesting a consistent rate of publication growth.

WoS consistently demonstrated higher average daily yield (ADY) values compared to Scopus. This discrepancy might be attributed to differences in the rate of article inclusion and indexing in the respective databases. The h-index for WoS was consistently higher than Scopus, suggesting that the publications indexed in the WoS database tend to receive more citations, indicating a potentially higher overall research impact.

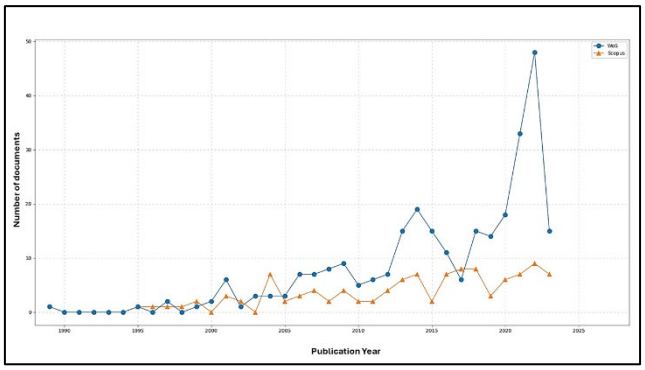

Figure 2: Publication trends and growth rates

Top Journals Publishing Telehealth and Older Adults Research

Table 3 showcases the top journals publishing papers related to telehealth and older adults. The Journal of Telemedicine and Telecare has established itself as a prominent publication in this field, with 27 published papers and a high Cite Score of 12.6. Telemedicine and e-Health, the Journal of the American Geriatrics Society, and the Journal of Medical Internet Research are also among the top journals publishing in this area.

Table 3: The top ten most productive journals

No	Journal	TP	Cite Score 2022	SJR 2022	SNIP 2022	Publisher
1	Journal of Telemedicine and Telecare	27	12.6	1.223	1.647	SAGE
2	Telemedicine and E-health	19	8.1	1.237	1.601	Mary Ann Liebert
3	Journal of the American Geriatrics Society	12	10.4	2.054	2.072	Wiley-Blackwell
4	Journal of Medical Internet Research	6	12.1	1.992	2.162	JMIR Publications Inc.
5	International Journal of Environmental Research and Public Health	5	5.4	0.828	1.280	Multidisciplinary Digital Publishing Institute (MDPI)
6	Journal of Applied Gerontology	5	4.8	1.061	1.516	SAGE
7	Research in Gerontological Nursing	5	2.1	0.501	0.496	Slack Incorporated
8	BMC Geriatrics	4	5.1	1.127	1.546	Springer Nature
9	Journal of Geriatric Oncology	4	5.8	1.025	1.065	Elsevier
10	Journal on Information Technology in Healthcare	4	-	0.128	0.442	Optimum

Notes: Abbreviations, total publication;NCP,number of cited publications; TC, total citation, C/P, average citations per publications; C/CP, average citation per cited publication; h, h-index; g, g-index

Publishing research by top countries

Figure 3 presents the top and active countries publishing articles related to telehealth in older adults. The United States stands out as a leader in this field, with a significant lead in the total number of published articles (163). France, Canada, the United Kingdom, and China also demonstrate consistent research efforts in exploring telehealth applications for older adults.

Top cited publications (minimum of 100 citations)

Table 4 exhibits the preeminent papers in the realm of telehealth for the elderly, wherein only those garnering a minimum of 100 citations have been considered. Barlow, Singh, Bayer, and Curry (2007), performed a comprehensive analysis, published in the esteemed Journal of Telemedicine and Telecare, that has accrued an astounding 242 citations. The paper explores the benefits of home telecare for frail elderly individuals and those with long-term conditions.

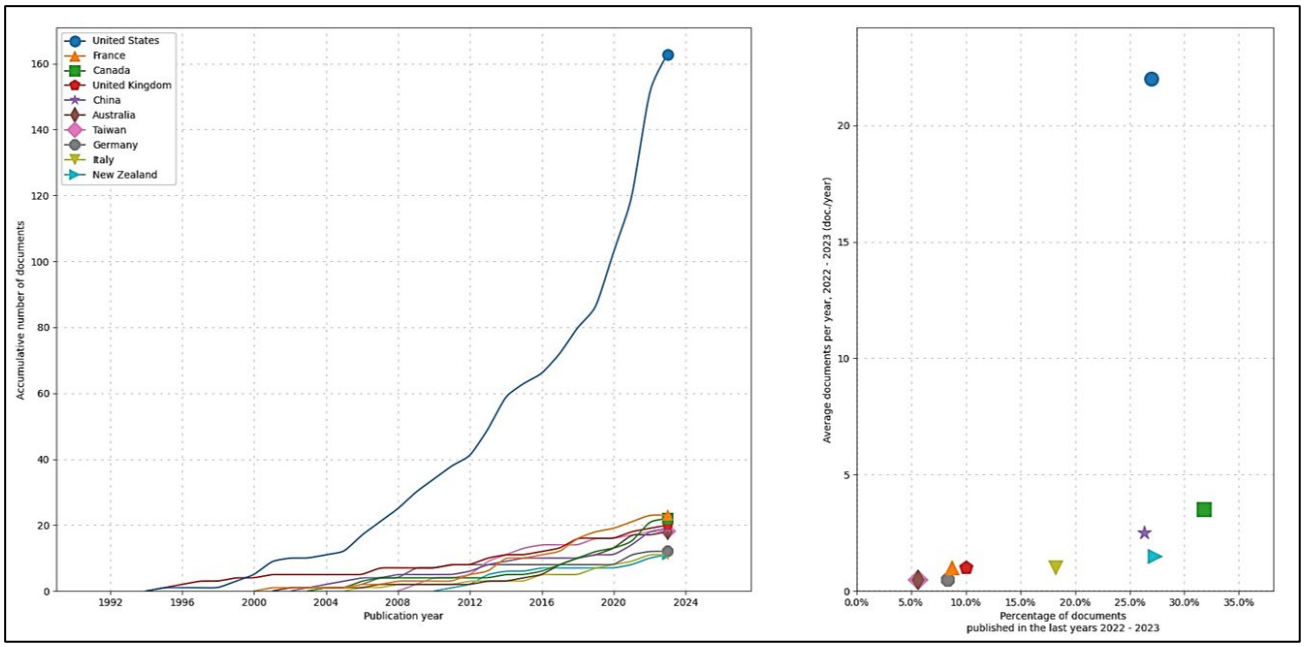

Figure 3: Publishing research by top countries

Table 4: Highly cited publications (Minimum of 100 citations)

Titles	Author(s)	Citations	Source Title
A systematic review of the benefits of home telecare for frail elderly people and those with long-term conditions	Barlow J, Singh D, Bayer S, Curry R	242	Journal of Telemedicine and Telecare
Telehealth Home Support During COVID-19 Confinement for Community-Dwelling Older Adults with Mild Cognitive Impairment or Mild Dementia: Survey Study	Goodman-Casanova JM, Dura-Perez E, Guzman-Parra J, Cuesta-Vargas A, Mayoral-Cleries F.	185	Journal of Medical Internet Research
Older Adults' Perceptions of Home Telehealth Services	Cimperman M, Brenčič MM, Trkman P, Stanonik M de L.	121	Telemedicine and E-Health
Current status and future perspectives in telecare for elderly people suffering from chronic diseases.	Botsis T, Hartvigsen G.	119	Journal of Telemedicine and Telecare
Outcomes of a Telehealth Intervention for Homebound Older Adults with Heart or Chronic Respiratory Failure: A Randomized Controlled Trial	Gellis ZD, Kenaley B, McGinty J, Bardelli E, Davitt J, Ten Have T.	113	Gerontologist
Six-Month Postintervention Depression and Disability Outcomes of In-Home Telehealth Problem-Solving Therapy for Depressed, Low-Income Homebound Older Adults	Choi NG, Marti CN, Bruce ML, Hegel MT, Wilson NL, Kunik ME.	108	Depression and Anxiety
Telehealth Problem-Solving Therapy for Depressed Low-Income Homebound Older Adults	Choi NG, Hegel MT, Marti CN, Marinucci ML, Sirrianni L, Bruce ML.	103	American Journal of Geriatric Psychiatry

The high citation count suggests that this comprehensive review has had a significant impact on the field, likely due to its thorough evaluation of the advantages of home telecare in supporting older adults with complex healthcare needs. Their research was recently published in the prestigious Journal of Medical Internet Research, where it received a noteworthy 185 citations (Goodman-Casanova et al., 2020).

Given the relevance of telehealth during the global health crisis, the study's findings and insights have garnered significant attention within the research community, leading to its high citation count. The study conducted by (Cimperman et al., 2013) investigated the attitudes and experiences of older adults concerning home telehealth services. This study has amassed a total of 121 citations in the prestigious journal Telemedicine and e-Health. Their investigation offers valuable insights into the perceptions of this population regarding such services.

The findings of Botsis and Hartvigsen (2008), disseminated their findings in the esteemed Journal of Telemedicine and Telecare, garnering an impressive 119 citations. Their research affords valuable insights into the existing state and forthcoming prospects of telecare for geriatric individuals afflicted with persistent maladies. The examination of the possible advantages and difficulties of telecare is likely to have enhanced its influence and number of citations, as it provides vital insights for healthcare professionals and policymakers. The randomized controlled study conducted by Gellis et al., (2012) in the field of gerontology has received 113 citations. The study's findings are a valuable addition to the field of telehealth interventions for depression management in this population, as the paper addresses a critical mental health concern among older adults.

Discussion:

The findings from this bibliometric analysis provide valuable insights into the intellectual structure and research trends in the field of telehealth for geriatric populations (Kang et al., 2021). The fluctuations in publication growth rates and the differences in database coverage and citation patterns observed between WoS and Scopus highlight the need for a comprehensive and harmonized approach to capturing and analyzing research in this domain (Singh et al., 2021).

The dominance of the United States in telehealth research for older adults is likely attributable to its robust research infrastructure, technological advancements, and sustained efforts to address the healthcare needs of the aging population (Goldberg et al., 2021). This aligns with findings from previous studies that have identified the United States as a global leader in telehealth research and implementation (Lieneck et al., 2021; Rangachari et al., 2021) The contributions of other leading countries, such as France, Canada, the United Kingdom, and China, demonstrate the growing global interest and investment in leveraging telehealth to improve the well-being of older adults (Anthony Jnr, 2020). This trend reflects the increasing recognition of telehealth as a valuable tool for addressing the unique healthcare needs of the geriatric population worldwide.

The identification of top-performing journals in this field underscores the importance of specialized and high-impact platforms for disseminating cutting-edge research and facilitating knowledge exchange. These journals play a crucial role in shaping the research agenda and driving advancements in telehealth applications for geriatric populations (Sahoo et al., 2023). This finding is consistent with previous studies that have highlighted the significance of specialized journals in fostering research and innovation within specific domains (Pramod, 2022).

The highly cited publications provide a snapshot of the influential work that has significantly shaped the understanding and development of telehealth interventions for older adults. These studies offer valuable insights into the benefits, perceptions, and challenges associated with telehealth services, which can inform future research, policymaking, and clinical practice (Ladin et al., 2021; Kristin Jonasdottir et al., 2022). This aligns with the growing body of evidence that suggests telehealth can effectively address the diverse healthcare needs of the geriatric population, ranging from chronic disease management to mental health support (Kirakalaprathapan & Oremus, 2022).

The strength of this bibliometric analysis lies in its comprehensive approach to mapping the intellectual structure of telehealth research in geriatrics. By examining publication trends, growth rates, top journals, and highly cited publications, the study offers a multifaceted understanding of the research landscape in this field. However, it is important to acknowledge that the analysis is limited to the data available in the Web of Science and Scopus databases, which may not capture the entirety of the research landscape (Nwagwu & Onyancha, 2022). Additionally, the findings are based on the state of

research up to August 2023, and the landscape may have evolved further since then. Ongoing monitoring and updates to this analysis would be necessary to capture the most recent trends and developments in this rapidly evolving field.

Overall, this bibliometric analysis provides a comprehensive overview of the research landscape in telehealth for geriatric populations, highlighting the global engagement, influential work, and the need for a harmonized approach to capturing and analyzing research in this domain. The insights gained can inform future research, guide funding priorities, and support the development of effective telehealth interventions to address the healthcare needs of older adults.

Conclusion:

This bibliometric analysis suggests that there has been a significant increase in research regarding telehealth in recent years. It is important to note that most of these studies have primarily focused on Western countries, with limited representation from low- to middle-income countries. In terms of publication, many articles were found in digital health journals, with notable representation in journals such as "Journal of Telemedicine and Telecare," which publishes the most in this field. In future studies, there is a need to explore the co-creation of telehealth platforms for rehabilitation and preventive healthcare among older adults, as it has the potential to engage a larger number of individuals in this age group.

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Disclosure:

The author reports no conflicts of interest in this work.

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