

## Bibliometric Analysis of the Concept of Successful Aging

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### ABSTRACT:

**Purpose:** The concept of "successful aging" includes various elements such as avoiding illness, high physical and mental functioning, active participation in life, absence of illness, psychological well-being, life satisfaction, financial security and a positive outlook on life. This study aims to reveal the structure and productivity of the fields of study regarding the concept of successful aging.

**Material and Methods:** In this study, the search term "successful aging" was entered into the Scopus database and scanned using the advanced search feature. The bibliometric analysis software VOSviewer (Visualization of Similarities), which is widely used internationally, and the R Studio Biometrix package programs were applied to analyze and visualize the relationships between authors, countries, journals, citations, keywords and themes.

**Results:** There are 6601 authors in 1731 articles downloaded from Scopus with the keyword "successful aging" between 2000-2023. 144 of these authors wrote articles alone. 138 articles were published in 2023, 119 in 2022, 123 in 2021, and 154 in 2020. According to the Sankey diagram, the country that has produced the most works in the field of successful aging is the USA. The author named Pahor M has the most works in the literature and finally successful aging is the most used keyword.

**Conclusion:** It is believed that our findings, which summarize in depth the research conducted on the concept of "successful aging", will be a guide for the rapidly increasing elderly population. In conclusion, this study provides important and up-to-date information that faculty and students can use in their studies.

**Keywords:** Aging; bibliometric analysis; successful aging

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### INTRODUCTION

The elderly population in Türkiye is increasing rapidly, similar to the rest of the world. According to the 2023 data of the Turkish Statistical Institute, the proportion of the elderly population in the total population increased from 8.8% in 2018 to 10.2% in 2023 (TÜİK, 2023). The increasing elderly population and the life expectancy at birth exceeding 80 years of age are extending the time spent in old age. For this reason, it is increasingly important for elderly individuals to be involved in production and to live a more active old age. (Çelebi, 2021). Due to demographic changes and the increasing proportion

of the aging population in society, successful aging has become a goal worldwide. This situation forces both individuals and health policies to cope with the consequences of aging (Özdemirkan et al., 2020; Akbayrak and Aysan, 2022; Öztürk and Kayıhan, 2018; Işık et al., 2021). Successful aging, which has many components, aims to evaluate older individuals in a holistic way. Accepting old age, which is one of the life stages, and fulfilling the responsibilities that each stage brings, constitute the basis of successful aging (Özsungur, 2018). The concept of successful aging is an approach that aims to increase the quality of life and well-being of older

individuals. This approach aims to support individuals in a way that will increase their quality of life by taking into account their needs and desires (Vaillant and Mukamal, 2013). Providing the necessary support in the areas of health, economy, social life and personal development and emphasizing the strengths of older people are the basic elements of successful aging. In addition, this concept is an important approach and set of practices not only at the individual but also at the societal level (Zacher, 2015; Blazer, 2006; Wang et al., 2022). It can increase the social participation and economic productivity of the elderly population and reduce the need for health services. Adopting a healthy lifestyle is one of the most important elements of successful aging strategies (Estebansari et al., 2020). Healthy aging is a concept that includes various elements such as reducing multimorbidity, social interaction, healthy nutrition, physical activity, environmental factors, cognitive and functional competence, and improving socioeconomic status (Tan and Soysal, 2021). While these elements help manage the aging process well, activities such as participating in social activities, stress management and cognitive activities can help older individuals maintain their mental health and maintain their independence. Managing health problems from an early age is an important strategy. Regular medical check-ups and health screenings accelerate the detection of health problems and enable their treatment. As a result, it is of great importance to adopt effective aging strategies for a healthy and peaceful life.

According to Rowe and Kahn, the concept of "successful aging" includes various elements such as avoiding illness, high physical and mental functioning, active participation in life, absence of illness, psychological well-being, life satisfaction, financial security and a positive outlook on life (Bowling and Dieppe, 2005; Hazer and Özsungur, 2017; Rowe and Kahn, 1998). Accordingly, low risk of illness is one of the basic indicators of successful aging (Rowe and Kahn, 1998). When the literature is reviewed, it is seen that there is no single limited definition for the term "successful aging", since many different components are taken into account in defining this concept (Çelebi, 2021; Ebner and

Freund, 2007).

Bibliometrics is a quantitative assessment of bibliographic data that provides a systematic and data-driven method for understanding the research landscape. It is an effective technique for tracking new discoveries and monitoring research trends. Bibliometric analysis is frequently used in many fields of study. Bibliometric analysis plays an important role in providing a comprehensive understanding of the existing literature. This approach not only helps in mapping the intellectual structure of research, but also facilitates the identification of influential publications, authors, and research clusters (Demir et al., 2024a).

## **MATERIAL and METHODS**

### **Purpose and Questions of the Study**

This study aims to reveal the structure and productivity of the fields of study regarding the concept of successful aging. In line with these aims, the following questions were sought:

- What is the growth trend and citation status of articles on successful aging?
- Who are the most cited leading authors in the field of successful aging?
- Which are the most cited documents, journals, organizations and countries?
- What are the main research points and thematic issues in successful aging practices?
- Which is the most cited publication?

### **Creating the Data Set**

In this study, the search term 'successful aging' was entered into the Scopus database and scanned using the advanced search feature. As a result of the search, it was observed that there were 4611 publications. Only articles were included in the scope of the research, and a total of 2530 publications in the field of medicine between the years 2000-2023 were included in the scope of the research. Only articles (2993) were scanned through the Scopus database. English publications (3866), journals (3689) and only published articles (4106) were included in the search string. As a result of these filters, 1731 articles were downloaded from the Scopus database. In this study, the bibliometric

analysis software VOSviewer (Visualization of Similarities), which is widely used internationally, and the R Studio Biometrix package programs were applied to analyze and visualize the relationships between authors, countries, journals, citations, keywords and themes.

**RESULTS**

**Indicative Statistics of Publications**

This study provides a detailed summary of the publications and evaluates the average number of citations per publication and the annual growth rate of the publications. In addition, the journals and universities that have contributed the most to the literature and received the most citations are determined. Then, the authors with the most works in the literature and the authors and countries that have received citations for these works are shown. In addition, the country, keyword and author

relationships are analyzed with the Sankey diagram and the leading countries are identified.

**Analysis of the Data**

A general evaluation of the studies for the concept of successful aging obtained using Biblioshiny was made. The obtained data is given in Figure 1.

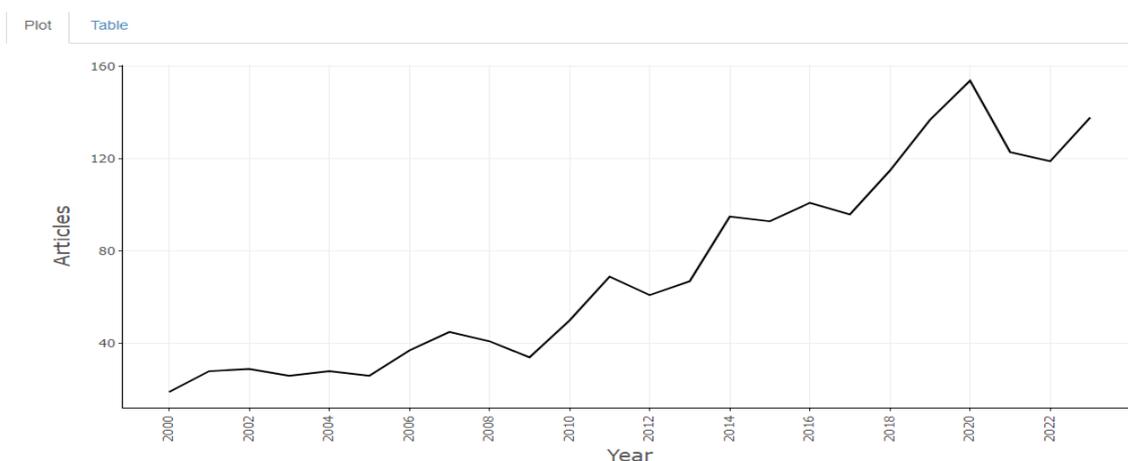
There are 6601 authors in 1731 articles downloaded from Scopus with the keyword "successful aging" between 2000-2023. 144 of these authors wrote articles alone. The average number of citations to articles per year is 33.63. In addition, the average age of the articles is 8.67 years.

**Annual Growth of Publications**

Figure 2 shows that "successful aging" studies have tended to increase over the years. The most studies were conducted in 2020. 138 articles were published in 2023, 119 in 2022, 123 in 2021, and 154 in 2020.



**Figure 1.** Identifying Information



**Figure 2.** Annual Status of Publications

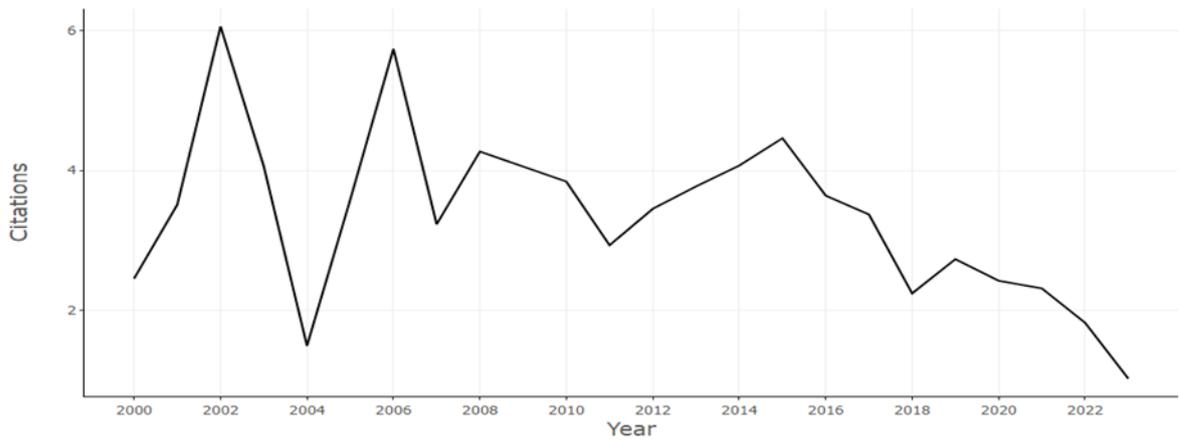


Figure 3. Annual Average Status of Articles

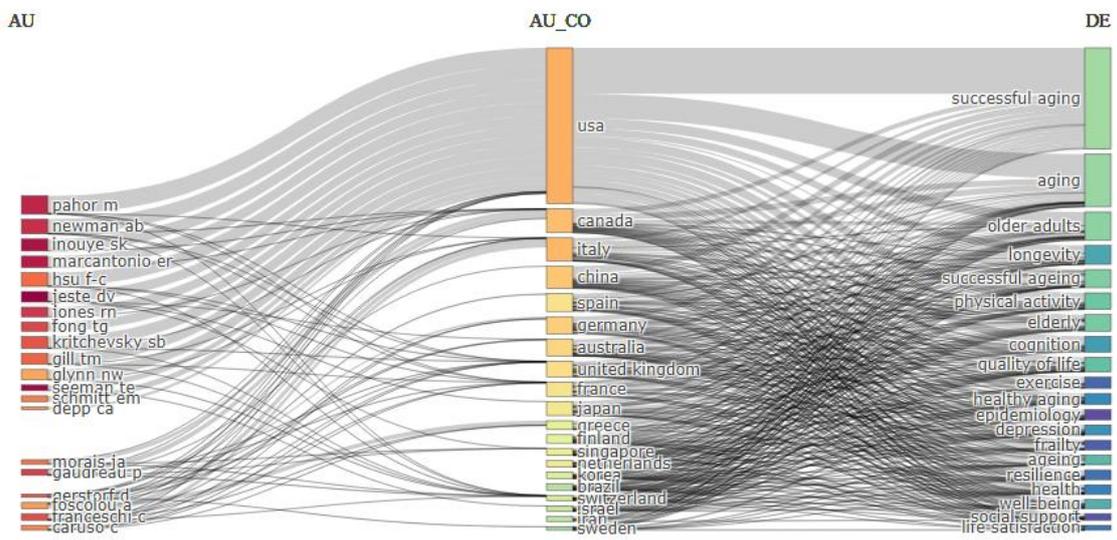


Figure 4. Sankey Diagram

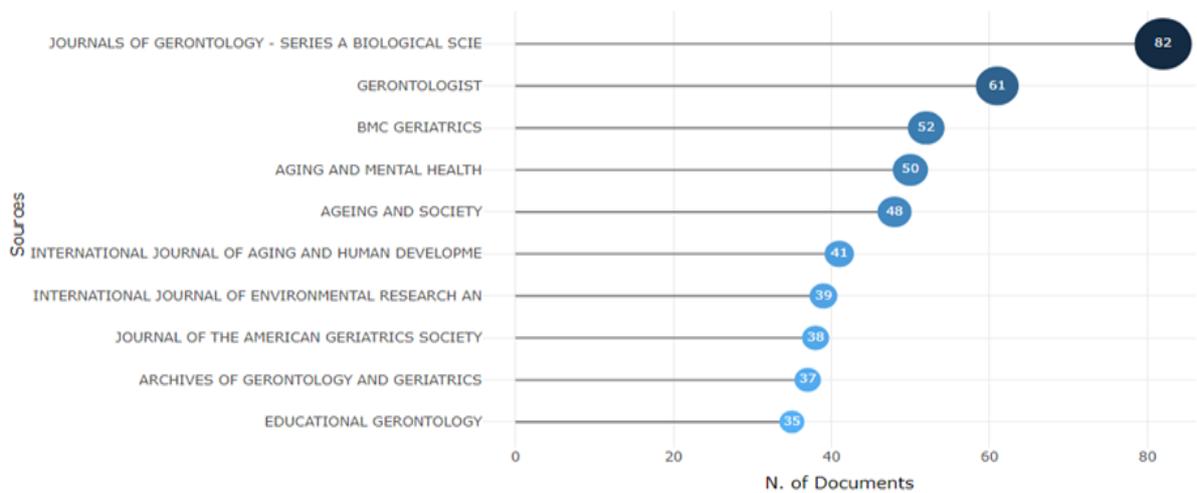


Figure 5. Most Important Journals

### Annual Average Status of Citations

The citations received by publications in the field of “Successful Aging” over the years are shown in Figure 3.

According to Figure 3, it can be said that the citations differ. There were 1.02 annual citations in 2023, 1.82 in 2022, 2.31 in 2021, 2.42 in 2020, 2.73 in 2019, 2.24 in 2018, 3.37 in 2017, and 3.64 in 2016.

### Sankey Diagram

The three variables that are desired to be associated, namely country, author and keyword, are set in the options section of the biblioshiny program and the best results for each parameter are presented in Figure 4. According to Figure 4, the size of the rectangles shows the importance of the variables used in the literature. According to the Sankey diagram, the country that has produced the most works in the field of successful aging is the USA. The author named Pahor M has the most works in the literature and finally successful aging is the most used keyword.

### Analysis of Journals

The ranking of journals publishing on the subject of “Successful Aging” is given in Figure 5.

In the field of successful aging medicine, Journal of Gerontology ranks first with 82 articles, Gerontologist journal ranks second with 61 articles, and BMC Geriatrics journal ranks third with 52 articles.

### Universities with the Most Publications

The number of publications of the universities to which the authors studying the keywords “Successful Aging” are affiliated are shown in Figure 6.

The University of California, which studies successful aging, ranks first with 213 articles, the University of Pittsburgh ranks second with 140 articles, and Harvard Medical School ranks third with 136 articles.

### Most Popular Authors

The top publishing authors using the keywords “Successful Aging” are shown in Figure 7.

In the field of successful aging medicine, Jeste DV ranks first with 39 articles, Seeman TE ranks second with 27 articles, and Inouye SK ranks third with 24 articles.

### Most Productive Countries

In this analysis, the most productive countries are given in Figure 8 and the relationship map between these countries is given in Figure 9.

The most productive countries in studies on successful aging in the medical field are the USA with 3249 studies, Italy with 582 studies, Canada with 476 studies, China with 461 studies and Germany with 376 studies, respectively.

In terms of cooperation, the countries that cooperate most with the US are Canada with 27 studies, Germany with 26 studies, and China with 25 studies.

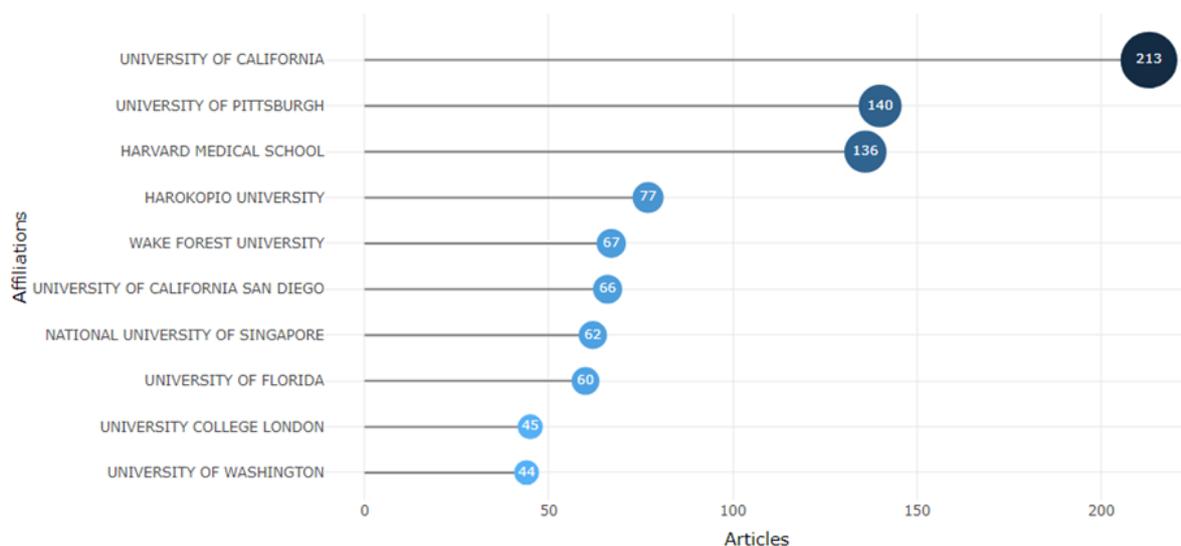


Figure 6. Universities with the Most Publications

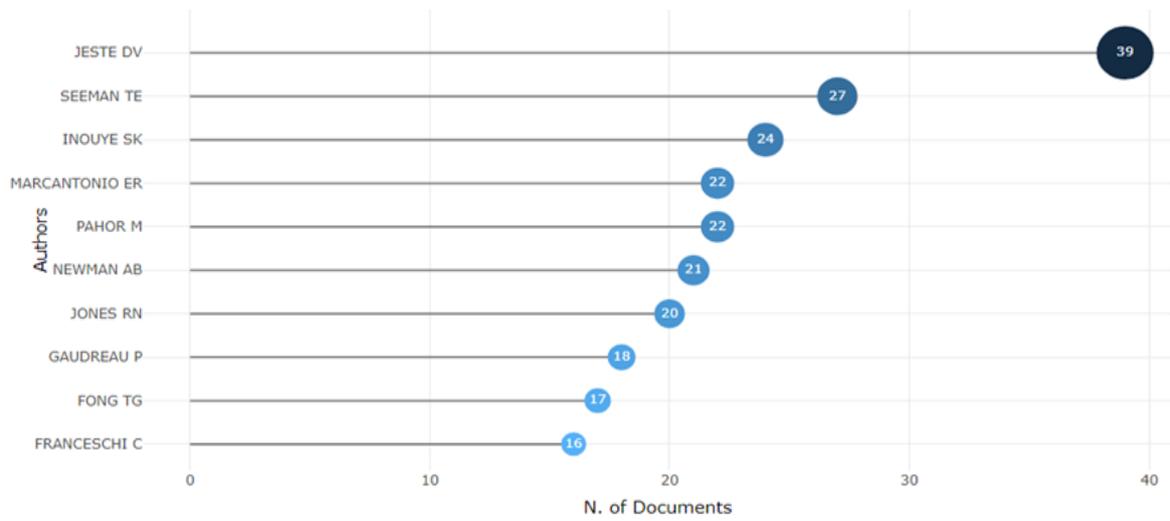


Figure 7. Most Important Authors

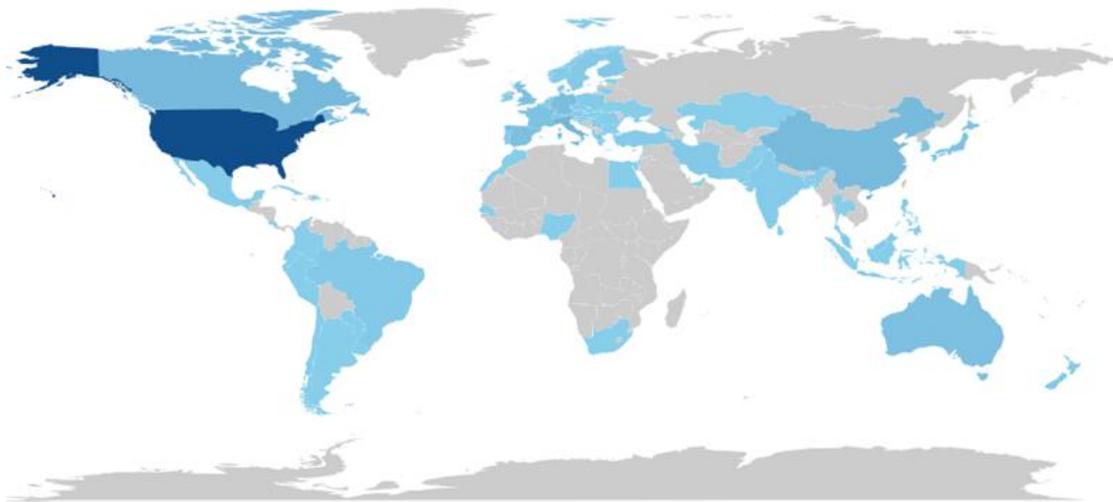


Figure 8. Productivity of Countries

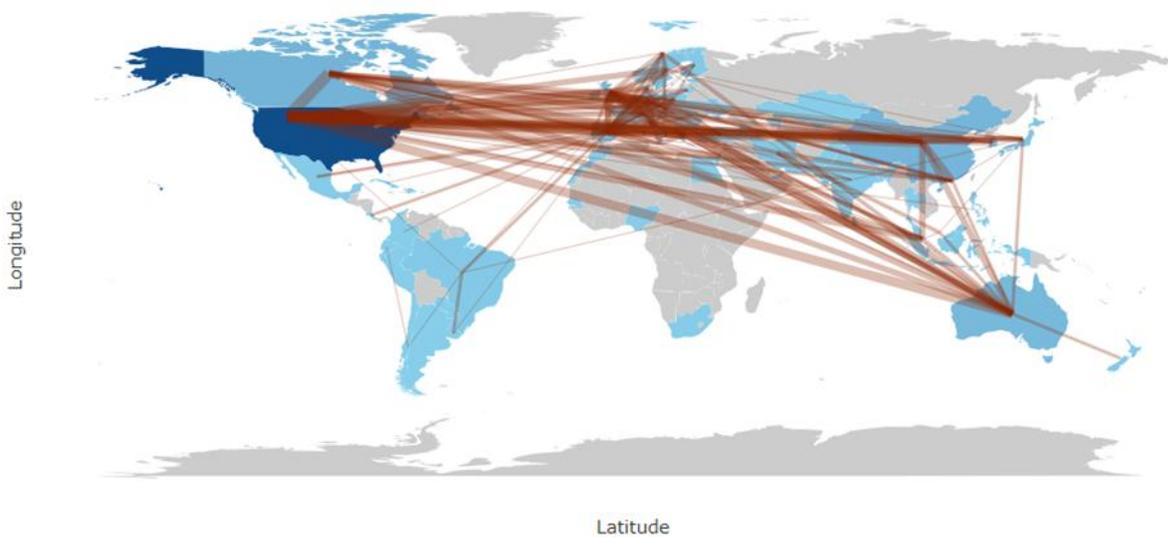


Figure 9. Network Map of Countries' Cooperation

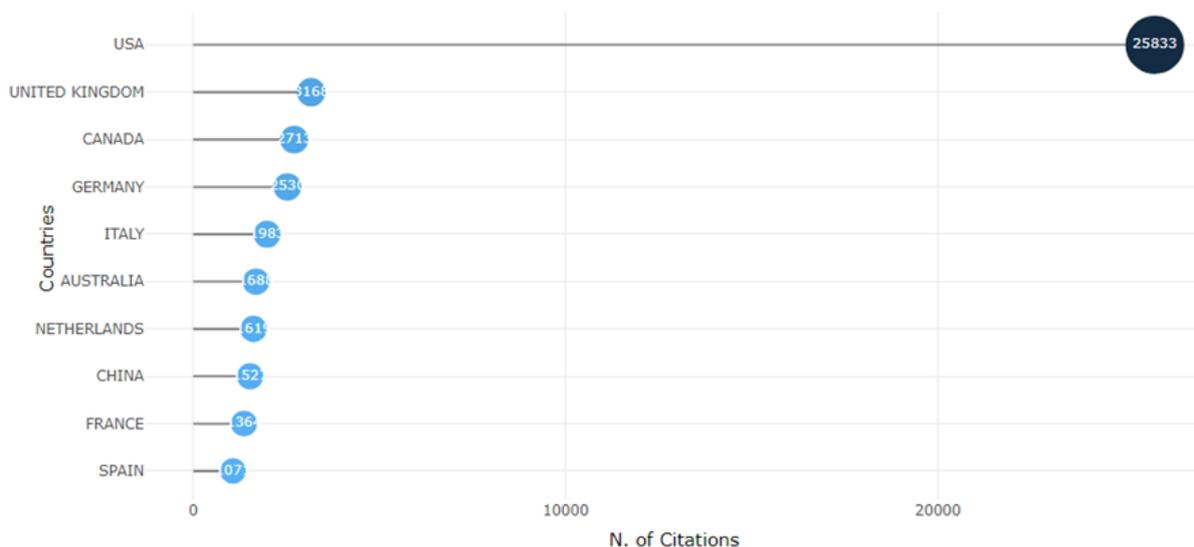


Figure 10. Most Cited Countries

Paper	DOI	Total Citations	TC per Year	Normalized TC
PAHOR M, 2014, JAMA	10.1001/jama.2014.5616	1028	93,45	22,94
DEPP CA, 2006, AM J GERIATR PSYCHIATRY	10.1097/01.JGP.0000192501.03069.bc	899	47,32	8,25
BRUCE B, 2003, J RHEUMATOL		634	28,82	7,11
SEEMAN TE, 2001, HEALTH PSYCHOL	10.1037/0278-6133.20.4.243	614	25,58	7,29
PAHOR M, 2006, J GERONTOL SER A BIOL SCI MED SCI	10.1093/gerona/61.11.1157	561	29,53	5,15
BRANDTSTÄDTER J, 2002, DEV REV	10.1006/drev.2001.0539	544	23,65	3,90
BOWLING A, 2005, BR MED J	10.1136/bmj.331.7531.1548	508	25,40	7,09
STRAWBRIDGE WJ, 2002, GERONTOLOGIST	10.1093/geront/42.6.727	470	20,43	3,37
WEAVER JD, 2002, NEUROLOGY	10.1212/WNL.59.3.371	467	20,30	3,35
CESARI M, 2016, J AM MED DIR ASSOC	10.1016/j.jamda.2015.12.016	465	51,67	14,18

Figure 11. Most Cited Articles

### Most Cited Countries

The countries with the most citations in the field of successful aging in medicine are the United States in first place with 25,833 citations, the United Kingdom in second place with 3,168 citations, and Canada in third place with 2,713 citations.

### Most Cited Articles

The most important article is the one with the highest total number of citations, accordingly the ten most important articles are given (Figure 11).

The article published in the journal “Jama” by Pahor M (2014) is the first most cited work with 1028 citations. The article published in the journal “Geriatr Psychiatry” by Depp CA (2006) is the second most cited work. The article published in the journal “J Rheumatol” by Bruce B (2003) is the third most cited work.

### Analysis of Scientific Maps

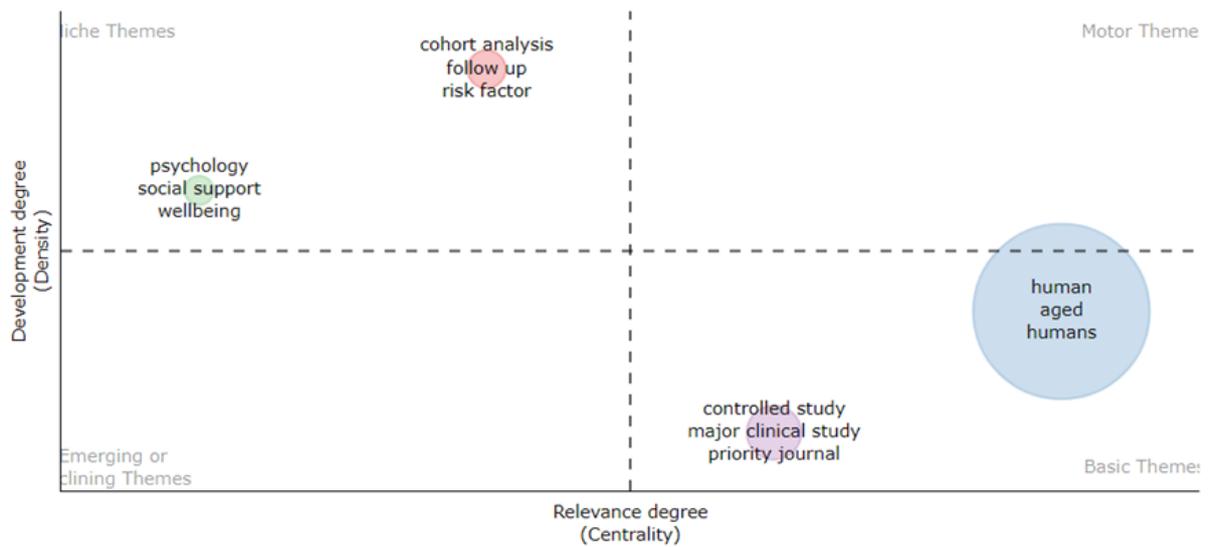
Scientific mapping is the use of computational techniques as a whole to visualize, analyze and model various scientific and technical activities through maps (Demir et al., 2024a; Demir et al., 2024b; Demir et al., 2024c).

### Conceptual Structure Map

In this section, the author’s keyword-based network map, trending topics, tree map and thematic map are presented.

### Thematic Map

The thematic map of successful aging articles represents the keywords used by the most important authors in the field. Figure 12 shows the thematic map of the words "successful aging".



**Figure 12.** Thematic Map Based on Keywords

item	freq	year_q1	year_med	year_q3
aged	2213	2012	2017	2020
aging	2015	2012	2016	2020
female	1958	2012	2017	2020
male	1903	2012	2016	2020
human	1442	2012	2017	2020
article	1108	2010	2016	2020
health status	478	2011	2015	2018
very elderly	443	2016	2018	2020
psychology	354	2016	2018	2020
priority journal	283	2007	2012	2017

**Figure 13.** Trending Topics

In the literature, “human” “aged” “humans” is still used as a motor theme. “Cohort analysis” “follow up” “risk factor” and “psychology”, “social support”, “wellbeing” are used as niche themes.

**Trending Topics**

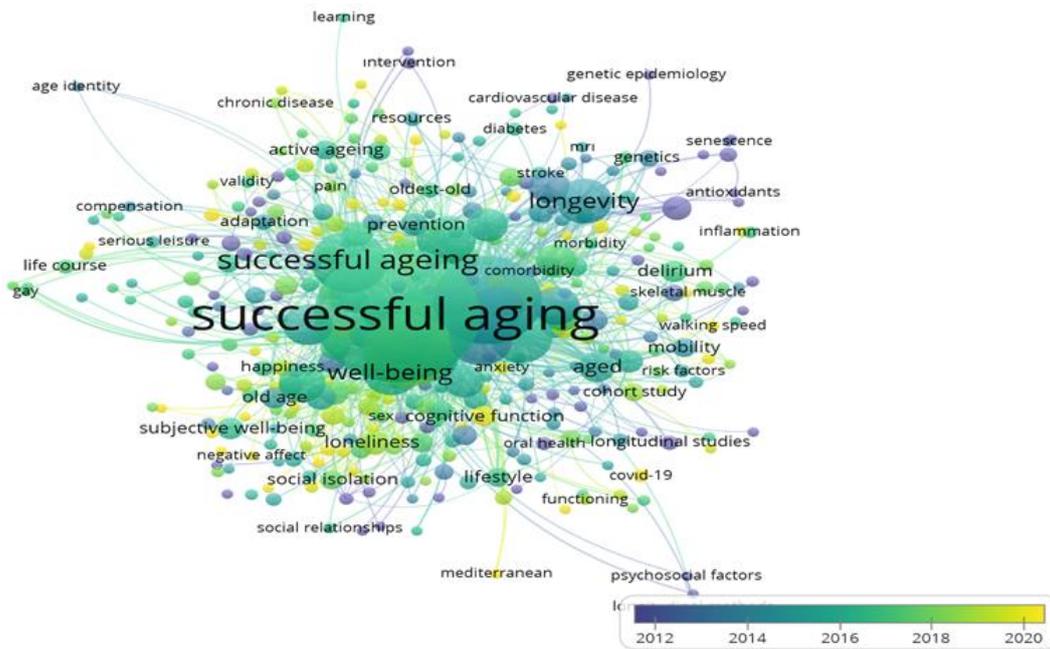
The most important words in articles containing the words “successful aging” between 2000 and 2023 are given (Figure 13).

The word “aged” was used 2213 times in the literature. It was the most used word in the first quarter of 2012, the second quarter of 2017, and the third quarter of 2020. The word “aging” was used 2015 times and was the most used word in the first quarter of 2012, the second quarter of 2016, and the

third quarter of 2020. The word “female” was used 1958 times in the literature and was the most used word in the first quarter of 2012, the second quarter of 2017, and the third quarter of 2020.

In the treemap, the size of the rectangles indicates the number of publications in which the keyword was used. The treemap of the keyword “Successful Aging” is presented in Figure 14. The size of the rectangles indicates the frequency of the keyword used. The word “Aged”, which was used 2213 times with a rate of 10%, is in the first place, the word “Aging”, which was used 2015 times with a rate of 9%, is in the second place, and the word “Female”, which was used 1958 times with a rate of 8%, is in the third place.





**Figure 16.** Timeline of Words

**DISCUSSION**

The number of publications related to the concept of “successful aging” is constantly increasing. Scopus database was used to perform bibliometric analysis of these increasing studies. Initially, English articles from 4611 journals were filtered and downloaded from the database. The annual growth rate of publications was 9%, the average age of articles was 8.67 years, and the average number of citations per document was 33.63. 144 of 6601 authors published alone. In terms of collaboration between authors on documents, international co-authorship was 22.82%. According to the Sankey diagram, the most important country is “America”, the most important author is Pahor, M, and the most important keyword is “successful aging”. In the field of successful aging medicine, *Journal of Gerontology* is in the first place with 82 articles, *Gerontologist* journal is in the second place with 61 articles, and *Bmc Geriatrics* journal is in the third place with 52 articles. In the field of successful aging, University of California is ranked first, University of Pittsburgh is ranked second, and Harvard Medical School is ranked third. In the field of successful aging, Jeste DV is ranked first, Seeman TE is ranked second, and Inouye SK is ranked third. The most productive countries working on the concept of successful aging are, respectively,

the USA, Italy, Canada, China, and Germany. In terms of collaboration, there is more collaboration from the USA to Canada with 27 studies, Germany with 26 studies, and China with 25 studies. The countries most cited in the field of successful aging in the field of medicine are, respectively, the USA, the United Kingdom, and Canada. The most cited authors are, respectively, Pahor M, Depp CA, and Bruce B. This bibliometric study examines works related to the concept of "successful aging" and identifies the most productive authors, reference works, universities, countries and academic disciplines. The results of the study revealed that different colors for keywords indicate various keyword groups. "Successful aging" was determined as the most frequently used keyword. In this study, scientific maps were used to provide a detailed overview of the main trends and results in research related to the concept of "successful aging" to determine the main themes and trending topics that classify how an author's work is affected. In the analysis conducted to determine the themes in which the keywords were used, keywords such as "human", "aged", and "humans" were determined as motor themes. The most frequently used keywords are "Aged", "Aging", and "Female", respectively. Keywords such as "Successful aging", "longevity", and "older adults"

are among the prominent keywords in the period 2012-2016. It can be said that keywords such as "cognitive function", "training", and "intervention" have also been widely used in the literature in the recent period.

There are bibliometric analysis studies related to the concept of healthy aging in the literature (Gu et al., 2019; Kim and Freddolino, 2024; Jamshidi and Hashemi, 2024). The advantage of our study over others is that it contains more data and is more up-to-date. When the studies in the literature are examined, Gu et al. published a bibliometric analysis study in 2019. This study covers the years 2013-2017. The concept of "healthy aging" is most frequently used in neuroscience, neurology, psychology, geriatrics and gerontology studies in the literature. The most frequently repeated words in "healthy aging" studies were "Alzheimer's disease", "dementia", "performance" and "mild cognitive impairments". The most frequently used words in anti-aging were "gene expression", "dietary restriction" and "lipid peroxidation" (Gu et al., 2019). In another study, Kim and Freddolino aimed to show the changes in the topic clusters of successful aging research over the years. From the 1960s to the 1990s, 11 topic clusters emerged, ranging from health to emotional well-being, without a dominant domain. In the 2000s, 2 clusters related to social support and health emerged as the main clusters. In the 2010s, 1 topic cluster containing words related to health and social participation was found to be the largest. In the 2020s, emotional health and social participation emerged again as one of the main clusters, and health-related topics began to be subdivided into physical health and mental health. In all publication years combined, the main cluster contained words related to health or social domains (Kim and Freddolino, 2024). Jamshidi and Hashemi, who included the years 1908-2023 in their study, aimed to understand the various interdisciplinary factors affecting the research on "aging in place". According to their findings, the concept of "aging in place" has 5 main topic clusters: aging-in-place facilitators, age-friendly communities, housing, assistive technologies, and mental health (Jamshidi and Hashemi, 2024). Our study is very different from the studies in the literature in terms of content and

timeliness.

Among the limitations of our study, we include only the Scopus database, only articles published in journals, and only articles written in English. In future studies, databases such as Dimensions, Web of Science, Cochrane Library and PubMed should also be investigated. We also think that publication types such as books, book chapters, reviews, letters, and publications written outside the English language should also be investigated.

## CONCLUSION

It is believed that our findings, which summarize in depth the research conducted on the concept of "successful aging", will be a guide for the rapidly increasing elderly population. This study provides valuable data regarding the assessment of the concept of "successful aging" in the current literature regarding the most influential sources, most influential authors, most influential links and most influential studies. Researchers and practitioners have the option to choose which articles to reference, which articles are most relevant and which articles have the most impact on "successful aging". For studies on "successful aging," this bibliometric review can help provide a comprehensive overview of past and current research and identify future research directions. The findings of the study reflect the status of research on the concept of "successful aging". In addition, as a reference point, this study provides researchers with a comprehensive understanding of the concept of "successful aging". By using citation analysis, researchers can identify different research streams or fields that make up their intellectual structure and gain information about themes. Depending on the research area, it is possible to identify gaps in the literature and potential research directions.

In conclusion, this study provides important and up-to-date information that faculty and students can use in their studies.

## Conflict of Interest

Authors declare that there are no conflict of interest between them. Also, we note that our manuscript contains original material.

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