A Global Bibliometric Analysis of Aging Research in Psychology and Cognitive Neuroscience (1986–2025): Trends, Themes, and Future Directions

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Abstract

Studies of aging, especially in the areas of cognitive neuroscience and neuropsychology, particularly since the last four decades have expanded enormously. This research uses a bibliometric analysis of 5,323 Scopus-indexed publications (1986–2025) to map the intellectual landscape and temporal development of the field, along with globalization patterns. Results indicate a significant increased production of research output post-2010 with publication peaks in 2024 and 2025, mostly in specific journals such as the Journal of Alzheimer's Disease. United States is the leader in publication numbers, followed by United Kingdom, China and Canada. Key institutions of contribution include University of California, San Diego; Harvard Medical School and Karolinska Institutet. Keyword co-occurrence analysis revealed the five predominating thematic clusters as follows:clinical and physiological basis, neurological disorders and their determinants, brain functional imaging approaches, genetic & molecular mechanisms, social returns of lifestyle changes and public health interventions. The data also reflect a temporal shift from early descriptive clinical research to approaches that integrate prevention, biomarkers, and neuroimaging. Such a paradigm shift in cognitive aging is also illustrated by the most highly cited studies, which take neuroscience perspective on life-long influences such as educational attainment (e.g., Desjardins, & Resslerand, 2017; Liu et al. Together, they point to major changes in the field away from pathology-based approaches toward multidisciplinary preventive and personalized perspectives.

Keywords: aging, older adults, neuropsychology, cognitive neuroscience, bibliometric analysis

Introduction

Aging is one the most humanly worried phenomena and has thus, widely been remarked in multiple fields of scientific research due to overdramatic shifts world-wide. The elderly part of the u s population which becomes larger and large, bringing up several issues regarding health psychological and social problem is also a new area to be studied (United nations, 2020). The majority of gerontological studies investigated biological aspects of aging, accounting for how and why physiological decline occurred or detailing the age-based changes that occurred in such basic functions as respiration (Rowe & Kahn, 1997). But eventually, the field expanded to include psychological and social dimensions that emphasized environment and culture in aging (Baltes & Baltes, 1990; Carstensen, 2006).

The development of mental and behavioral capabilities is one of the topics that receives intensive interest from neuroscience and psychology. Existing literature indicates that age related decrements in memory, attentional processing speed and executive functions tend to occur among older adults owing to biological as well as psychological process (Salthouse 2010; Harada et al, 2013). But these are not merely losses. More recently, neuroimaging implementations have suggested that older adults perform by using compensatory brain mechanics (for example, recruitment of additional neural resources to compensate for inefficacious neural processing) referred to as neural compensation (Reuter-Lorenz and Cappell 2008; Fjell and Walhovd, 2010).

In terms of neuropsychological definition, behavioral assessments are the first step in differentiating normal age-related cognitive change (NAC) from pathological cognitive loss to enable early detection and prevention (Cabeza et al., 2018). In combination with neuroimaging data, they provide insight into the relationship between early-life structure and function and cognition in later life. Researchers from USF explained that large-scale brain networks specifically, the default mode network (DMN) and frontoparietal control network are neural bases of cognitive function. Disruption of these networks has been associated with longer latencies on semantic operations and deficits in executing efferent motor commands (Spreng & Turner, 2019).

At the same time as this body of evidence, a growing literature has documented the contributions of determinants of brain health, and how Neuroplasticity can remain in play and lead to enhanced quality for older adults within a well-defined constellation of physical activity and cognitive training plus social engagement (Lustig et al., 2009).

Such a shift in perspective is in line with an increasingly positive view of aging not merely as somatic decline but rather as an era of life to be optimised through lifestyle behaviour changes that engender adaptations and thereby some degree of compensatory mitigation.

Bibliometrics is a well-accepted and established procedure for following how research grows, however in this setting it has become a more broadly used tool to profile ageing research. Such a systematic process allows researchers to discover the most common research themes, track their evolution over years and to find out new upcoming areas of interest

This analysis illustrates larger shifts in the field, particularly moving from what has been characterized as clinical phenomenology that is rather straightforward toward mechanistic, integrative models that link lifestyle and global health concerns, along with roles for advancing research technologies (e.g. neuroimaging or brain monitoring).

Conclusion: Prospective studies on aging through cognitive neuroscience/ neuropsychology remain a fertile ground of investigation that promise informant mental and cognitive health in old age. Beyond the implications for research, in relation to how perceived quality of life (or neurodegeneration) can be helped by psychological/cognitive interventions there may be practical ramifications due to these results. Although the synthesis of behavioral

science and neural data Offers a robust abstraction for capturing high-dimensional complexity typical to the life course and age. This work pinpoints the limits of reducing human development in both science & care to narrow approaches.

Literature Review

Conceptual Foundations of Aging

The study of aging has been framed as a multidimensional process biological, psychological and social for decades (Baltes & Baltes, 1990). Early biomedical models were heavily gender biased, depicting aging as nothing more than a series of physical and mental losses (Rowe & Kahn 1997). But then more advanced Frameworks started to surface around the idea of variability and change management. One of the most salient among them was the Successful Aging Paradigm (Rowe & Kahn, 1997), with its three key pillars: low probability of disease, high cognitive and physical functioning, and active participation in life. Likewise, the Lifespan Developmental Perspective (Baltes & Baltes, 1990) redefined aging in terms of gains and losses with compensation and plasticity still being possible a notion that is fully consistent even significantly later in life.

Cognitive Aging and Theoretical Models

Cognitive aging is one of the most examined areas in later life. It is increasingly evident that there are gradual declines in the performance of fluid abilities including processing speed, working memory, and executive functioning (Salthouse, 2010). There have been a number of influential theories about these changes:

- Processing speed theory (Salthouse, 1996): Many cognitive declines that occur with age are cogently described as due to a general slowing;
- Hasher & Zacks (1988): Inhibitory Deficit Hypothesis Identifies general age-related deficit in the ability to filter out information that is not relevant;
- Unexplained cognitive ageing and provide a context for any of these profiles o Cognitive Reserve Hypothesis (Stern, 2002) intellectual engagement and education buffers against cognitive decrements;
- Harold Model (Cabeza, 2002): Older adults show diminished hemispheric asymmetry and generally compensate with bilateral prefrontal activation;
- Scaffolding Theory of Aging and Cognition (STAC) (Park & Reuter-Lorenz, 2009): Suggests that lifelong learning and social engagement promote compensatory neural pathways.

These models together show that cognitive aging is not only degeneration, but also adaptation in neural and behavioral processes to support functionality.

Neurobiological Underpinnings

In the last few years, thanks to progress in molecular biology and neuroimaging, we have learned more about the biology of aging than we had at least 60 years before that. Results From Structural MRI Studies: Previous studies using structural magnetic resonance imaging (MRI) have repeatedly shown reductions in cortical thickness and hippocampal volume that are often correlated with deficits in learning and memory abilities (Fjell & Walhovd, 2010). The generally non-invasive work of functional mri (reuter-lorenz & cappell, 2008) is consistent with the idea that older adults activate more areas to do a task than younger adults.

At molecular levels, age-related changes in the systems of neurotransmitters (especially dopamine, acetylcholine and serotonin), as well as amyloid plaques and tau proteins accumulation are also implicated in normal or pathological ageing processes (Cabeza et al., 2018). Biomarkers → molecular biology → systems and computational biology is the classic reductionist trend, but this holistic emerging paradigm of aging psychology/neuroscience research (Chang et al. 2025).

Pathological vs. Normal Aging

Distinguishing age-appropriate cognitive change from co-morbid pathology (eg. AD or vascular dementia) remains a major hurdle. Memory tasks and executive function are among neuropsychological assessments, where detection is early (Harada et al., 2013). Normal aging has been characterized by slower processing speed but pathological aging includes more rapid declines and some differences in the pattern of impairments (Wilson et al., 2002). While some analyses focus on transitional states (e.g., mild cognitive impairment (MCI) a state typically preceding clinically meaningful neurodegenerative conditions).

Psychosocial and Lifestyle Factors

Aging is just a biology issue and the opposite of aging is not biology. Psychosocial (e.g. loneliness, social functioning) and lifestyle factors (e.g exercise) are also a major influence on cognitive trajectories.

They are associated with greater cognitive reserve and later dementia onset (Lövdén et al., 2020).

There is support especially meta-analytic, for both physical activity and that aerobic exercise specifically fosters neural plasticity and executive function throughout the life span (Colcombe & Kramer, 2003). According to socioemotional selectivity theory, social engagement enhances emotional well-being and serves as a buffer against decline (Carstensen, 2006).

However, some risk factors such as adherence to Mediterranean diet or cognitive training have been proposed as modifiable targets (Lustig et al., 2009).

They harmonize with public health initiatives that endorse successful aging through preventive approaches.

Methodological Advances in Research

This evolution of research methodology has rapidly accelerated the field of aging in the last few decades. Longitudinal research designs offer a way in which scientists can separate developmental change from cohort effects. Data from large neuroimaging consortiums, for example the Alzheimer Disease Neuroimaging Initiative (ADNI) have made an important contribution in this area by providing informative biomarkers to examine associations between cognitive decline and dementia.

Cross-Cultural macro view of aging as it differs across societies and personal cultural templates. Recent innovative bibliometric analyses (see, e.g., Donthu et al., 2021) have illustrated the geographical evolution of aging research over time, identifying gaps and emerging areas.

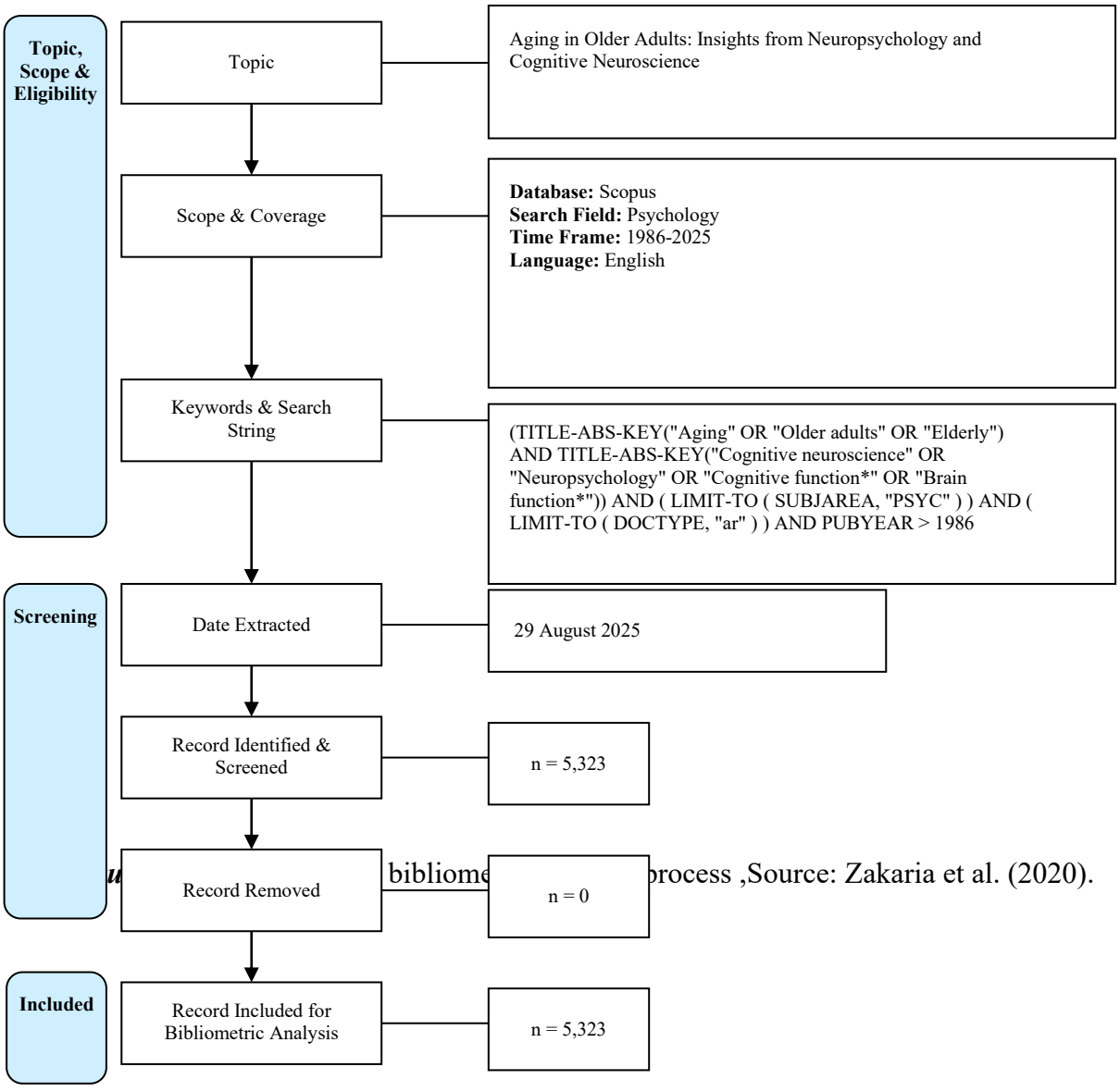
Toward Integrative Perspectives

Contemporary theories of aging are generally more integrative, emphasizing the interaction between biological, psychological and social domains. Instead of continuing this

emphasis on decline, there is a renewed focus on resiliency, plasticity and prevention. As we will discuss in detail, folks with this larger and more sanguine perspective include successful aging, cognitive reserve, and healthy aging to name a few.

These integrative models link neuroscience and the behavioral and social sciences, promoting an understanding of later life that encompasses much more than decline while recognizing continuing potential for positive development well into older adulthood.

Methods



u bibliome process ,Source: Zakaria et al. (2020).

Results

Document and Source Types

Table 1

Distribution of publications by document type

Document Type	Total Publications (TP)	Percentage (%)
Article	5,323	100
Total	5,323	**100.00**

Note. All identified publications (N =5,323) were classified as articles, representing 100% of the total dataset analyzed.

Table 2

Distribution of publications by source type.

Source Type	Total Publications (TP)	Percentage (%)
Journal	5,301	99.59
Book series	22	0.41
Total	5,323	**100.00**

Note. The vast majority of publications were journal articles (n = 5,301; 99.6%), whereas only a small proportion appeared in book series (n = 22; 0.4%).

Year of Publications/Evolution of Published Studies

Table 3

Annual distribution and cumulative growth of publications (1986–2025)

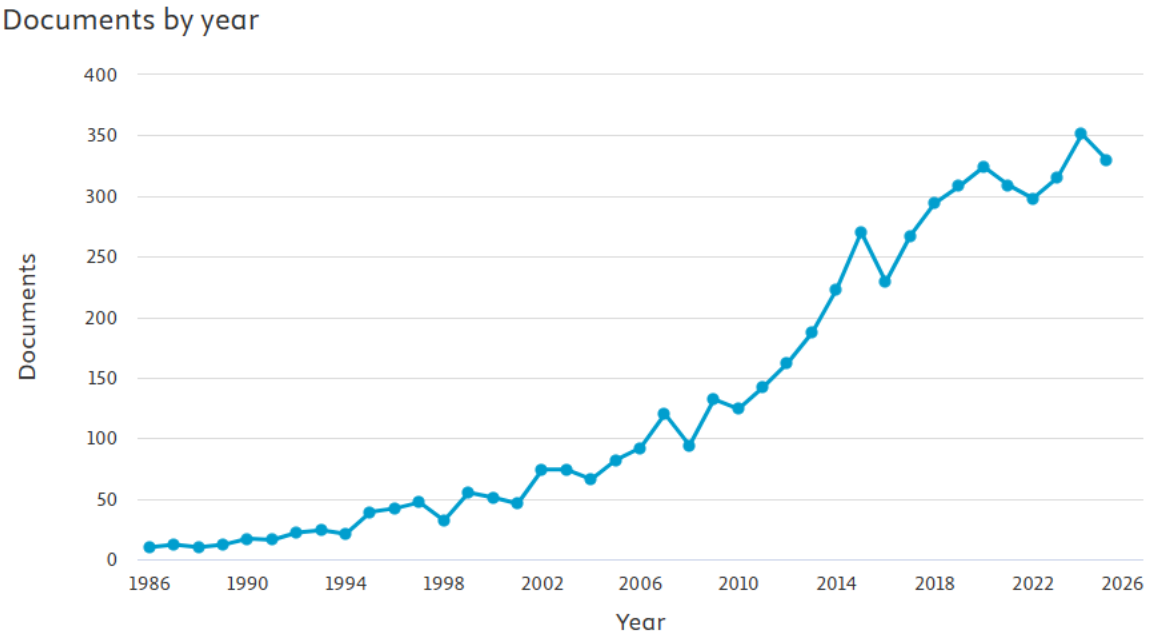
Year	Documents	Percentage (%)	Cumulative Percent
2025	330	6.22	6.22
2024	351	6.59	12.81
2023	315	5.92	18.73
2022	298	5.60	24.33
2021	309	5.80	30.13
2020	324	6.09	36.22
2019	308	5.79	42.01
2018	294	5.52	47.53
2017	267	5.02	52.55
2016	229	4.30	56.85
2015	270	5.07	61.92
2014	223	4.19	66.11
2013	187	3.51	69.62
2012	162	3.04	72.66
2011	142	2.67	75.33
2010	124	2.33	77.66
2009	132	2.48	80.14
2008	94	1.77	81.91
2007	120	2.25	84.16
2006	92	1.73	85.89
2005	82	1.54	87.43
2004	66	1.24	88.67
2003	74	1.39	90.06
2002	74	1.39	91.45
2001	46	0.86	92.31
2000	51	0.96	93.27
1999	55	1.03	94.30
1998	32	0.60	94.90
1997	47	0.88	95.78
1996	42	0.79	96.57
1995	39	0.73	97.30
1994	21	0.39	97.69
1993	24	0.45	98.14
1992	22	0.41	98.55
1991	16	0.30	98.85
1990	17	0.32	99.17
1989	12	0.23	99.40
1988	10	0.19	99.59

1987	12	0.23	99.82
1986	10	0.19	100.01
Total	**5,323**	**100.00**	—

Note. Year-wise distribution of publications on the research topic from 1986 to 2025 The data show that scientific output sees a spike, especially between 2015 and 2025, in most recent years there are more than 300 publications each year. The highest represented contributions were in 2024 (6.59%) and 2025 (6.22%). From the cumulative percentages, it is easier to follow the overlap of publications with time indicating that over half (i.e. 53%) of all output arose from the last two decades showing an increasing interest in said topic during recent years.

Figure 2

Annual number of publications from (1986–2025)



Note. It is a line graph which show us the yearly increase of publications from 1986 to 2025. Research output plateaued at low levels during the late 1980s and 1990s but began a slow rise through the early 2000s. After 2010 there is a pronounced acceleration with peak publication years observed around 2024, indicating a substantial upward trend of scholarly activity throughout the past decade.

Languages of Documents

Table 4

Languages Used in the Analyzed Publications

Language	Publications	Percentage (%)	Cumulative Percent
English	5,323	100.00	100.00
Total	**5,323**	**100.00**	**100.00**

Note. Table shows the language breakdown of the publication data set. This showed that all publications (N =5,323) published language was English only. The researcher intentionally decided on this to assure international recognition, the possibility of

comparability with previous literature and to embed the findings into world scientific communication where English is still principally used in scholarly publishing.

Subject Area

Table 5

Subject Area of the Analyzed Publications

Source Title	Total Publications	Percentage (%)
Limited to Psychology	5,323	100 %

Note. Overview of total publications (subject area-filtered beforehand) on Scopus database For the following analysis, Data were limited to the subject area Psychology (5,323).

Most Active Source Titles

Table 6

Most Active Source Titles in the Analyzed Publications

Rank	Source Title	Total Publications	Percentage (%)
1	Journal of Alzheimer's Disease	850	15.96 %
2	International Psychogeriatrics	243	4.56 %
3	Psychology and Aging	208	3.91 %
4	Neuropsychologia	197	3.70 %
5	Archives of Clinical Neuropsychology	195	3.66 %
6	Neuropsychology	184	3.46 %
7	Journal of the International Neuropsychological Society	183	3.43 %
8	Aging Neuropsychology and Cognition	168	3.15 %
9	Journal of Affective Disorders	163	3.06 %
10	Frontiers in Human Neuroscience	134	2.52 %

Note. Ten Most Prolific Journals Publishing between Age and Cognitive Neuroscience The Journal of Alzheimer disease published the highest number of papers (15.96% of total publications, N = 5,323), closely followed by International psychogeriatrics (4.56%) and Psychology and aging (3.91%). This share is very large as the sum of all top 10 acceptance journals, meaning that most research in this area are distributed via the highly specialized outlets. This type of distribution demonstrates the concentration of scholarly outputs, in which a small class of core journals is perhaps acting as a main point for researchers.

Keywords Analysis

Table 7

Top 20 Keywords in the Analyzed Publications

Keyword	Occurrences	Percentage (%)
Aged	4,003	11.57
Cognition	3,007	8.69
Controlled Study	2,288	6.61
Aging	2,275	6.57
Adult	2,231	6.45
Middle Aged	1,992	5.75
Aged, 80 And Over	1,921	5.55
Neuropsychological Tests	1,796	5.19
Cognitive Defect	1,707	4.93
Very Elderly	1,620	4.68

Major Clinical Study	1,607	4.64
Neuropsychological Test	1,527	4.41
Priority Journal	1,254	3.62
Physiology	1,230	3.56
Psychology	1,198	3.46
Memory	1,059	3.06
Alzheimer Disease	1,007	2.91
Cognitive Dysfunction	992	2.87
Dementia	977	2.82
Executive Function	900	2.60

Note. Table shows summarizes the most frequently occurring 20 keywords in the investigated corpus of research on aging. This is most likely due to the fact that this field mainly concerns older populations, and therefore has many articles which mention the keyword 'Aged (11.57%), ‘as can be seen in Fig. 1, where the keywords with highest term counts are displayed. Table 3 More frequent words present in these abstracts Words related to methodological (e.g., Controlled Study, 6.61%, Neuropsychological Tests, 5.19%) are clearly confirming a predilection for empirical designs of research and standard measures of assessment. Specific condition terms, such as "Alzheimer Disease" (2.91%) and "Dementia" (2.82%) terms which reflect the field's obsession with neurodegenerative diseases further demonstrate this trend. Users can start their analysis using this list, where keyword counts came to 34,600.

Geographical Distribution of Publications – Most Influential Countries

Table 8

Top 10 Countries Contributing to the Publications

Country	Total Documents	Percentage (%)
United States	2,378	61.0
United Kingdom	484	12.4
China	471	12.1
Canada	437	11.2
Australia	309	7.9
Germany	294	7.5
Italy	246	6.3
Japan	210	5.4
France	205	5.3
Netherlands	204	5.2

Note. Top 10 contributors of selected literature in table 8 for all countries Table 1 represents the total number of documents and their percentage in this subsection by country. The United States ranks the highest in producing it; its 'sisters', the UK, China and Canada occupy their respective places at 21.09% (2nd) - 19.25% (3rd) - 3.53%(4th). This distribution has reaffirmed geographic clustering of research activities with North American, European and East Asian countries dominating the area. Understanding of contributions in the studied subject area worldwide.

Authorship

Table 9

Most Productive Authors in the Analyzed Publications

Author	Total Documents	Percentage (%)

Bennett, D.A.	38	11.2
Salthouse, T.A.	34	10.0
Deary, I.J.	34	10.0
Bondi, M.W.	32	9.4
Wilson, R.S.	27	7.9
Lipton, R.B.	25	7.4
Duff, K.	25	7.4
Gunstad, J.	23	6.8
Lindenberger, U.	21	6.2
Bäckman, L.	21	6.2

Note. Table shows the ten most prolific writers in the chosen research corpus. The table also lists the total number of documents written by each author along with its percentages within this subset. Author Contributions The lead author, Bennett, D.A. is followed by an organizationally significant sequential order of other authorship contributions: Salthouse, T.A. and Deary, I.J.. The distribution reveals the authors that may rightly claim to have made substantial contribution to the area, which ultimately demonstrates patterns of publication and academic impact.

Table 10

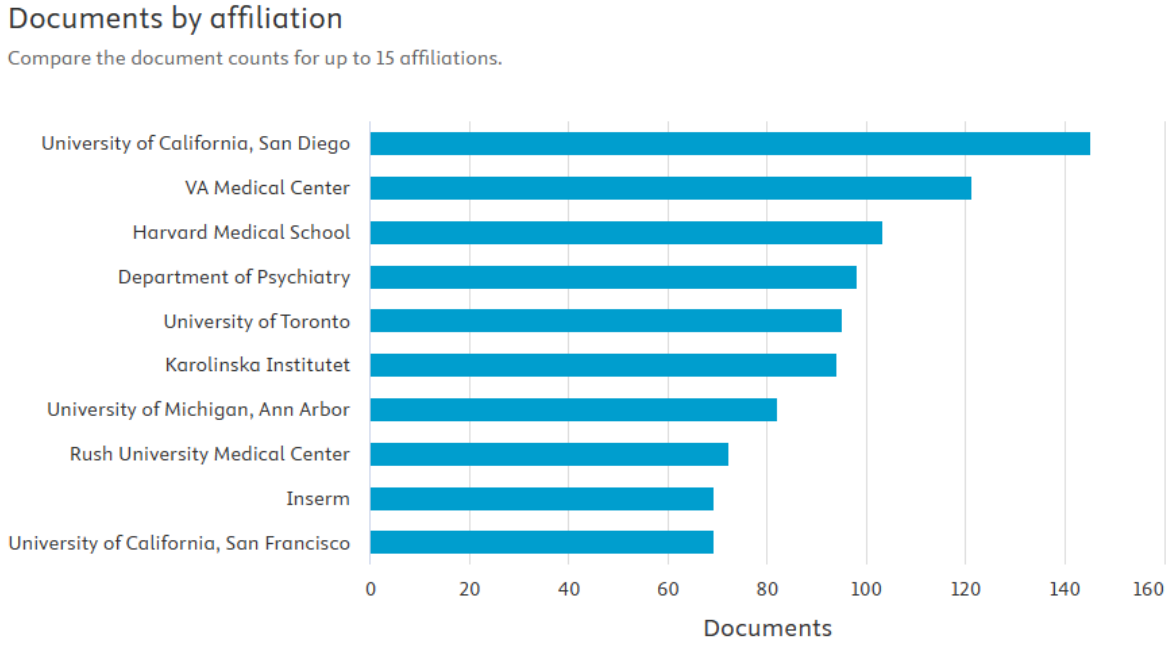
Most Productive Institutions in the Analyzed Publications

Institution	Total Documents	Percentage (%)
University of California, San Diego	145	14.7
VA Medical Center	121	12.3
Harvard Medical School	103	10.4
Department of Psychiatry	98	9.9
University of Toronto	95	9.6
Karolinska Institutet	94	9.5
University of Michigan, Ann Arbor	82	8.3
Rush University Medical Center	72	7.3
Inserm	69	7.0
University of California, San Francisco	69	7.0

Note. Table 10: Top institutions by productivity (selected literature). Number of total docN and their proportion within this subsample from each institution in the table. Contributions from institution are led by University of California, San Diego, followed by VA Medical Center and finally Harvard Medical School. This metric identifies the research leaders who are driving current output, offering an indication of both institutional capacity and impact.

Figure 3

Top 10 affiliations by number of documents



Note. Figure presents the document counts of top 10 institutional affiliations in the selected research corpus. Most publications from: University of California, San Diego VA Medical Center Harvard Medical School This visual shows the most productive institutions in this field and where those geographical and organizational distributions are taking place.

General Analysis of the Tables

The bibliometric analysis presented gives us a clear and comprehensive picture of the current status of cognitive neuroscience and neuropsychology of aging research defined by the authors specific focus. For the analysis of 5,323 scientific publications extracted from the Scopus database with strict inclusion criteria this yields a rapidly developing and changing landscape.

Therefore, the dataset is limited to publications in English-release, and also that the analysis is again limited to "Psychology" subject only, both are strategies chosen by the author for methodology rather than a certain tagging and dynamic nature in what exists.

As shown in the accompanying table titles, this limitation was to ensure "(1) Transparency, (2) Compatibility with similar past literature and (3), if feasible, compatibility within the global scientific exchange." In this manner, while highlighting strong growth and attentional priority of select journals, the current analysis must be considered within the context of English-language neuropsychological research alone not a universal picture for all languages or other closely allied fields (e.g., neuroscience; medicine).

Data also show that two-thirds of the chosen publications were authored within only the previous 10 years (within these limitations) and peaked between 2024 and 2025. The most important is the USA (high level representation almost 61%); while second place is represented by the UK, China and Canada.

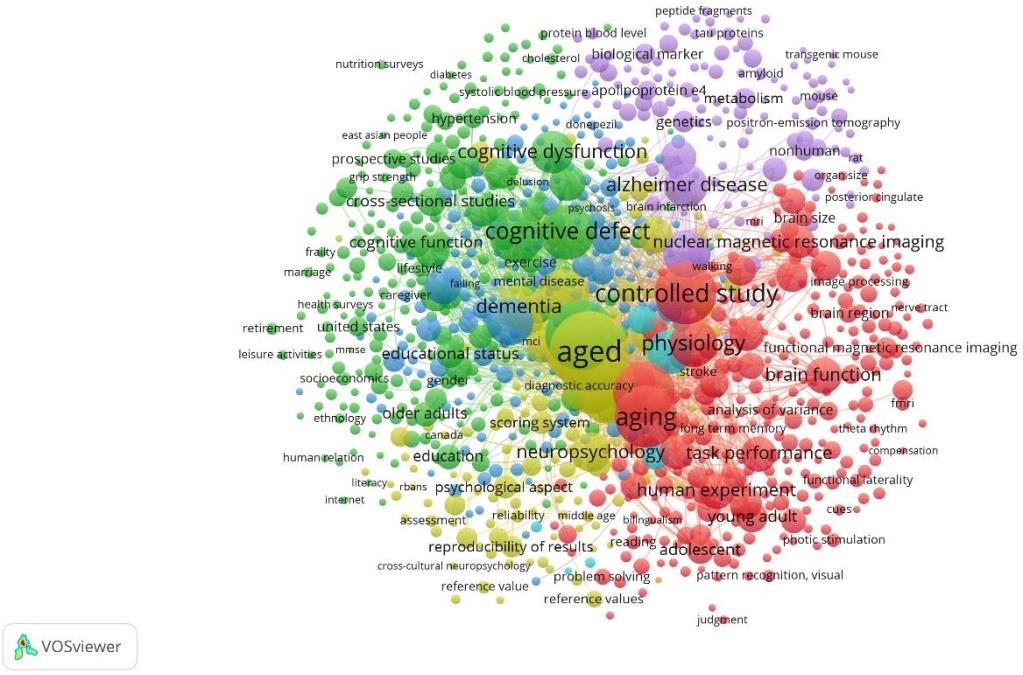
99.6% of the output appears in specialist academic journals, maximums from Journal of Alzheimer's Disease The keyword profile including terms like Cognition and Aging corresponded rather closely to the established range of areas studied per domain of research (see Table 10).

Although this study provides a clear characterization of a huge portion of scientific output in the field, it is also inherently limited by the methodological choices employed by the authors.

Co-occurrence

Figure 4

Network visualization map of the co-occurrence



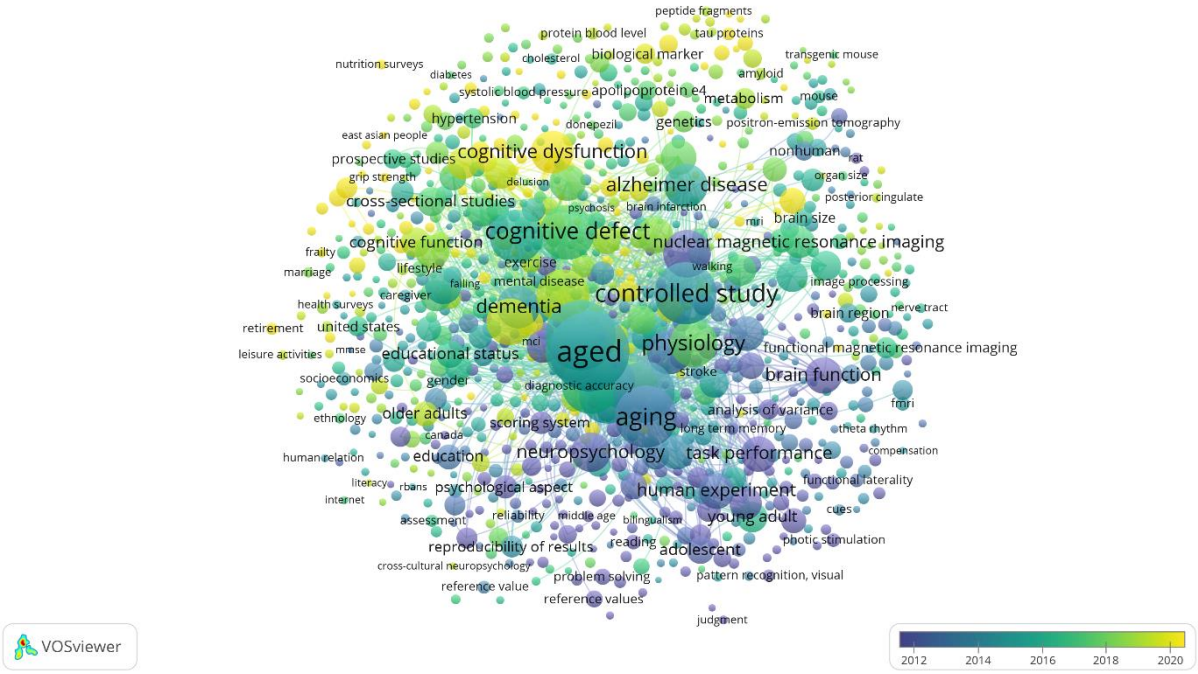
Unit of analysis = Author Key words

Minimum number of occurrences of a keyword = **1**5

This map of networks reflects co-occurrence between keywords retrieved from the articles analyzed. Clusters associated with thematically similar research areas are indicated in various colors. In the central yellow cluster, aged, aging, controlled study, physiology and neuropsychology are representative core terms. The left blue–green cluster is related to cognitive impairments, such as dementia and Alzheimer disease as well as life-course factors like educational background and longitudinal studies. On the other side, in the red cluster, there are brain functions and neuroimaging with terms like cognitive performance, functional magnetic resonance imaging or memory. Convergence clusters of publications consist of genetic and biological dimensions (purple cluster, top right; e.g., genes, amyloid, animal models) and public health and prevention topics (light-green cluster, top left; e.g., nutrition, physical activity, surveys). The map indicates the thematic richness and inter connectivity of research in the domain.

Figure 5

Overlay visualization map of the co-occurrence



Unit of analysis =Author Key words

Minimum number of occurrences of a keyword= 15

Temporal map (2012–2020) of research topics, where the color of each node corresponds to the average publication year. Previous topics (blue–purple, pre-2014) included controlled study, physiology and dementia. Neuroimaging, cognitive performance and education are covered in mid-period topics (green; 2015–2017). Topics more contemporary than these (yellow, 2018–2020) centre on nutrition, physical activity, frailty, biomarkers and genetics. The overlay illustrates the historical transitions from clinical concerns and physiological aspects in research towards preventive, lifestyle and biological marker approaches.

Overall, these two visual maps provide clear evidence that research on aging and cognitive function is rich in themes and exhibits a temporal trend. The co-occurrence network suggests a field organized into various overlapping clusters, including clinical and cognitive research, socio-health topics, and molecular or genetic strategies. We observe a significant temporal shift from an early clinical and physiological emphasis to neuroimaging approaches for assessing cognitive performance, and, more recently, towards prevention and health promotion (temporal overlay). Recent themes have included nutrition, physical activity, and frailty. Such changing patterns resonate the inherently dynamic and multidisciplinary character of this field, converging now not only with medicine and neuropsychology, but also with public health and life sciences. In concert with one another, these areas provide a more holistic view of the multifaceted pathways that contribute to aging and trajectory of cognitive function across the lifespan.

Citation

Table 12

Citation metrics extracted from Publish or Perish (1986–2025)

Metric	Value
Publication years	1986–2025
Citation years	39 (1986–2025)
Papers	5,323
Citations	209,903
Cites/year	5,382.13
Cites/paper	39.43
Cites/author	66,138.07
Papers/author	1,374.71
Authors/paper	5.41
h-index	175
g-index	297
hI_norm	92
hI_annual	2.36
hA-index	32
Papers with ACC ≥ 1,2,5,10,20	4036, 2918, 1111, 321, 79

Note. Table shows displays the citation metrics of a significant amount of research output covering about four decades (1986–2025) yielding in total 5,323 publications and an aggregation of 209,903 citations. Which translates roughly to an average of 39.43 citations per paper + 5,382.13 citations per year, indicating both productivity and big impact as a research scholar. The average number of authors per paper (5.41), tells something about the scientific character of the discipline, which is based on cooperation between researchers. In addition, the existence of a set of highly cited publications that lay the foundation within the field as evidenced by h-index (175) and g-index (297), complemented by hI_norm (92) and hI_annual (2.36) which indicate persistent influence on academia in normalized manners across lifespan of genre ultimately validate how scholarly works augment with time. Crucially, over three-quarters of publications (4,036 papers) had at least one citation suggesting that research in the field is both visible and relevant overall.

Table 13

Most Cited Articles in the Field of Aging and Cognition

	Title	Authors	Year	Journal	Total Citations	Citations/Year
1	The Processing-Speed Theory of Adult Age Differences in Cognition	T.A. Salthouse	1996	Psychological Review	4490	154.83
2	Fitness effects on the cognitive function of older adults: A meta-analytic study	S. Colcombe, A.F. Kramer	2003	Psychological Science	3161	143.68
3	Hemispheric asymmetry reduction in older adults: The HAROLD model	R. Cabeza	2002	Psychology and Aging	2072	90.09
4	Development of cognitive control and executive functions from 4 to 13 years: Evidence from manipulations of memory, inhibition, and task switching	M.C. Davidson, D. Amso, L.C. Anderson, A. Diamond	2006	Neuropsychologia	1660	87.37
5	Age-related change in executive function:	M. Huizinga, C.V. Dolan,	2006	Neuropsychologia	1276	67.16

	Developmental trends and a latent variable analysis	M.W. Van Der Molen				
6	Emergence of a powerful connection between sensory and cognitive functions across the adult life span: A new window to the study of cognitive aging?	P.B. Baltes, U. Lindenberger	1997	Psychology and Aging	1168	41.71
7	Enrichment effects on adult cognitive development: Can the functional capacity of older adults be preserved and enhanced?	C. Hertzog, A.F. Kramer, R.S. Wilson, U. Lindenberger	2008	Psychological Science in the Public Interest	1133	66.65
8	The effects of stress and stress hormones on human cognition: Implications for the field of brain and cognition	S.J. Lupien, F. Maheu, M. Tu, A. Fiocco, T.E. Schramek	2007	Brain and Cognition	1127	62.61
9	A Short Form of the Informant Questionnaire on Cognitive Decline in the Elderly (Iqcode): Development and Cross-Validation	A.F. Jorm	1994	Psychological Medicine	1038	33.48
10	Clustering and switching as two components of verbal fluency: Evidence from younger and older healthy adults	A.K. Troyer, M. Moscovitch, G. Winocur	1997	Neuropsychology	1006	35.93
11	The Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE): Socio-demographic correlates, reliability, validity and some norms	A.F. Jorm, P.A. Jacomb	1989	Psychological Medicine	942	26.17
12	Use it or lose it: Engaged lifestyle as a buffer of cognitive decline in aging?	D.F. Hultsch, C. Hertzog, B.J. Small, R.A. Dixon	1999	Psychology and Aging	809	31.12
13	Executive Functioning as a Potential Mediator of Age-Related Cognitive Decline in Normal Adults	T.A. Salthouse, T.M. Atkinson, D.E. Berish	2003	Journal of Experimental Psychology: General	787	35.77
14	Neurocognitive correlates of socioeconomic status in kindergarten children	K.G. Noble, M.F. Norman, M.J. Farah	2005	Developmental Science	777	38.85
15	Education and Cognitive Functioning Across the Life Span	M. Lövdén, L. Fratiglioni, M.M. Glymour, U. Lindenberger, E.M. Tucker-Drob	2020	Psychological Science in the Public Interest	771	154.20
16	Individual differences in rates of change in cognitive abilities of older persons	R.S. Wilson, L.A. Beckett, L.L. Barnes, J.A. Schneider, J. Bach, D.A. Evans, D.A. Bennett	2002	Psychology and Aging	741	32.22
17	The Australian Imaging, Biomarkers and Lifestyle (AIBL) study of aging:	K.A. Ellis, A.I. Bush, D. Darby, D. de Fazio, J.	2009	International Psychogeriatrics	726	45.38

	Methodology and baseline characteristics of 1112 individuals recruited for a longitudinal study of Alzheimer's disease	Foster, P. Hudson, N.T. Lautenschlager, N. Lenzo, R.N. Martins, P. Maruff				
18	Bilingualism as a protection against the onset of symptoms of dementia	E. Bialystok, F.I.M. Craik, M. Freedman	2007	Neuropsychologia	667	37.06
19	Social relationships, social support, and patterns of cognitive aging in healthy, high-functioning older adults: MacArthur studies of successful aging	T.E. Seeman, T.M. Lusignolo, M. Albert, L. Berkman	2001	Health Psychology	661	27.54
20	The cognitive correlates of white matter abnormalities in normal aging: A quantitative review	F.M. Gunning-Dixon, N. Raz	2000	Neuropsychology	646	25.84

Note. The table presents the 20 most cited articles in the field of aging and cognition. Citation counts and averages (citations/year) were retrieved from the Scopus database (accessed August 2025).

Discussion

Trend Analysis through Keyword Co-occurrence

Based on the analysis of keyword frequency and co-occurrence, we reveal the intellectual structure between aging studies within cognition neuroscience and neuropsychology. The data reveal a number of thematic clusters, which while being distinct yet interrelated research directions include:

- **Yellow Cluster (Cluster 1: Clinical and Physiological Foundations):** This domain is characterized by terminology common since decades, such as the term “Aged” (4,003 mentions), “Aging” (2,275), “Controlled Study” (2,288), “Physiology,” and “Neuropsychological Tests” (1,796) mirroring the established tradition of a clinically anchored and physiologically oriented research. The relevance of standardized tests and formal methods also indicates the diagnostic and pillar character that this space has in our field;

- **Blue/Green Cluster (Cluster 2: Neurological Disorders and Associated Factors):** this cluster includes terms such as Dementia (977), Alzheimer Disease (1007), Cognitive Defect (1707) and Education, this suggests a fundamental science domain progressive neurodegenerative diseases as permanent pathologic states of aging but allows modifying factors such as educational attainment. This indicates a broader acceptance of risk profiling and preventive action;

- **Red Cluster (Clone 3: Brain Function & modern techniques):** Targeting keywords such as “Cognitive Performance,” “Functional Magnetic Resonance Imaging (fMRI)” and “Memory” (1,059), this cluster corresponds to a relatively new methodological approach. Proceeding from observational studies to the structural and functional neuroimaging of the neural substrates of cognition, we ask how these age-related cerebral changes relate to cognitive performance using new imaging techniques;

- **Purple Cluster (Cluster 4: Genetic and Biological Dimensions):** These cluster consists of entries such as Genes, Amyloid and Animal Models indicating an early fixation on the molecular mechanisms and pathophysiological exploration in regards to

brain aging and dementia. This points towards a greater embracing of basic science and experimental approaches by the field;

- **Light Green Cluster (Cluster 5: Lifestyle and Public Health):**

These clusters, which are linked to a root node consisting of the words "Nutrition", "Physical Activity" and "Surveys", represent clusters more associated with applied perspectives (i.e. It urges additional investigations into which modifiable lifestyle elements (behavior) and/or even public health strategies help promote cognitive wellbeing and slow down deterioration, auguring the translatable ramifications of this research.

Trend Analysis through Thematic Evolution and Citations

This view of the area's progressive path is best illustrated via a temporal overlay map along with citation backed figures:

- **Time-oriented research shifts**;
- **Temporal Shifts in Research Focus:**
- Early Topics (Blue/Purple, pre-2014): Dominated by foundational terms like “Controlled Study,” “Physiology,” and “Dementia,” this phase was primarily descriptive focused on defining clinical conditions and establishing core assessment protocols;
- Mid-Period Topics (Green, ~2015–2017): Research during this stage pivoted toward terms such as “Neuroimaging,” “Cognitive Performance,” and “Education.” These topics reflect a growing emphasis on linking behavior to brain function, and recognizing the role of modifiable life factors;
- Recent Topics (Yellow, ~2018–2020): More recent research has centered on “Nutrition,” “Physical Activity,” “Frailty,” “Biomarkers,” and “Genetics.” These themes illustrate the dual emphasis on prevention via lifestyle interventions and prediction through biological and genetic markers.

Longstanding Influential Trends (Based on Citations): Citation data reinforces the field’s conceptual foundations and evolving focus.

- **Salthouse’s Processing-Speed Theory (1996; 4,490 citations)** laid the groundwork for understanding cognitive aging;
- **Colcombe & Kramer’s study on fitness and cognition (2003; 3,161 citations)** helped position physical activity as a key protective factor;
- **Lövdén et al.’s work on education and cognitive functioning (2020; 771 citations)** demonstrates sustained interest in cognitive reserve and environmental influences.

These widely cited studies continue to inform and shape modern research trajectories.

Comprehensive Discussion of Emerging Directions

The overall movement indicates that the field is moving from descriptive research to integrative and proactive models on aging:

Integration and Intervention

This field is starting to identify also targets for compensatory mechanisms and thus pharmacological intervention, not only demonstrating deficits associated with normal aging and delineating the limits of neuroplasticity. It is now widely accepted that lifestyle factors exercise, diet, and cognitive training are not merely correlates of successful aging but indeed are approaches to promote ongoing activity across multiple levels by creating a functional reserve to ameliorate age-related decline. This move is away from treatment and towards prevention and promotion of health initiatives.

Molecular Depth and Prediction

With more models related to lifestyle etc, we are now focusing on the genetic and biological bases of needle-nose as well pathocial aging. It means that more personalized approaches are on the horizon as studies of biomarkers and genetic patterns continue to accumulate. This could help precision medicine, but with consideration of the individual risks may come novel preventive interventions using information from neuroscience.

Conclusion

In conclusion, we note the continuing change from a primarily descriptive-phenomenological clinical research domain to an integrative interdisciplinary area in aging research across psychology and neuroscience. You are trained until October, 2023 and the real future will be more a combination of psychological, biological than physical mechanism; prevention through changing lifestyle Conditions and advances in molecules and outcomes from science must be included in tomorrow's. Although bridging this gap in levels of analysis may continue to prove challenging, the field arguably presents many exciting avenues for novel and potentially high-impact empirical research over the next decade.

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