

International Frontiers and Trends in Discourse Research on Alzheimer's Disease Patients

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Abstract

Based on CiteSpace, this study analyzes the international discourse research on Alzheimer's disease patients during the period of 2014-2023, focusing on the current status of research, research hotspots, and research frontiers. The study found that: 1) the total number of publications on discourse research in Alzheimer's disease patients showed a decreasing trend, and the main research fields were neurology and psychology; 2) the research hotspots included speech behavior, cognitive impairment, primary progressive aphasia, frontotemporal lobe dementia, and episodic memory research; 3) the results of the Frontier Burst Terms showed that the research in this field generally experienced three developmental phases, namely, basic research, clinical evaluation and epidemiological research, and advanced technology research and application of these three stages of development. In the future, discourse research on Alzheimer's disease patients should extensively conduct longitudinal studies and empirical studies based on mixed methods, try to incorporate theoretical perspectives such as multimodality, focus on interdisciplinary integration, break through the paradigm of neuroscience and clinical linguistics research, and explore cutting-edge topic research based on natural language processing, virtual reality, and other new technologies. This study has a certain guiding value for the study of discourse in Alzheimer's patients.

Keywords

Alzheimer's disease; discourse; CiteSpace; hotspots; trends.

1. Introduction

Alzheimer's Disease (AD) is a common and devastating neurodegenerative disease that predominantly affects the elderly population, leading to progressive loss of memory, thinking and social skills. With the accelerated aging of the global population, the incidence of Alzheimer's disease is expected to continue to rise, making it one of the major challenges affecting public health.

Alzheimer's disease patient discourse research is in a stage of rapid development in international academia, and this field not only broadens our understanding of cognitive decline and its effects, but also opens up new research horizons for improving patients' verbal communication ability and quality of life. In recent years, international discourse research on Alzheimer's patients has been developing in a deeper and deeper direction, accumulating a wealth of research results, such as Kamangar (2021), Murer (2016), Berisha (2015), Deters (2017), and so on. This paper adopts bibliometric method to analyze the current status, hotspots and trends of international Alzheimer's patient discourse research from 2014 to 2024, with a view to providing lessons and insights for future Alzheimer's discourse research

2. Study Design

2.1. Research questions

This study aims to answer the following four questions: (1) What is the current state of international discourse research on Alzheimer's patients over the past decade? (2) What are the hotspots of research? (3) What are the research frontiers? (4) What are the future research trends?

2.2. Research data and methods

The data of this study were obtained from the SSCI journal library of Web of Science, and the time interval of search was from January 1, 2014 to December 31, 2023, and the whole year was taken as the analysis cycle in this paper, so the literature in the first half of 2024 was excluded. The search subject terms were Alzheimer's Disease and Language. After the secondary search and data cleaning, and manually eliminating irrelevant literature, a total of 837 valid documents were finally obtained.

In this study, CiteSpace 6.3.R1 (Professional Edition) visualization software was used to process and visualize the data and analyze the international discourse research results of Alzheimer's disease patients, and quantitative analysis was adopted as the main research method. Firstly, based on the analysis results of CiteSpace and with the help of Excel software, the statistics on the international publication volume were carried out; secondly, CiteSpace visualization technology was applied to carry out keyword co-occurrence analysis, clustering analysis, and research timeline mapping analysis on the basis of pre-processing and cleaning of data. The hotspot analysis set the statistical frequency ≥ 10 , centrality ≥ 0.04 , extracted the keywords, and sorted them based on the word frequency from high to low; the topic clustering analysis generated the mapping module value Modularity (Q value) of 0.7061, and the weighted contour mean value Weighted Mean Silhouette (S value) of 0.872.

3. Current Status of The Study

3.1. Overall text issuance dynamics

The annual publication volume of international Alzheimer's patient discourse research over the decade was 2014 (56), 2015 (63), 2016 (48), 2017 (76), 2018 (91), 2019 (108), 2020 (114), 2021 (131), 2022 (88), and 2023 (62). It can be seen that from 2014 to 2021, the number of articles posted generally shows an increasing trend, reaching a peak in 2021 and decreasing significantly thereafter, indicating that international discourse research on Alzheimer's patients is maturing after a period of development over the past decade.

3.2. Distribution of literature journals

International papers on discourse research in Alzheimer's patients have been published in five main categories of journals: including Neurology, Psychology, Geriatrics & Gerontology, linguistics, and Psychiatry. The distribution of journals carrying research papers on the discourse of Alzheimer's disease patients shows two characteristics: (1) the research on the discourse of Alzheimer's disease patients is interdisciplinary in nature, with an unbalanced distribution of disciplines, focusing mainly on journals of Neurology and Gerontology followed by Geriatrics, and with a few papers published in Linguistics, Neurology, and other journals; (2) Neurology and Psychiatry are most concerned about the discourse of Alzheimer's disease patients. Alzheimer's disease patient discourse research, during the ten years, neurology journals published 469 papers related to Alzheimer's disease patient discourse research; psychology journals published 319 papers related to Alzheimer's disease patient discourse research, which indicates that the neurological and psychological characteristics of Alzheimer's disease patient language discourse research are highlighted.

3.3. Highly cited literature

Among the most cited literature in the field of international Alzheimer's patient discourse research in the last decade, the most frequently cited article is Mini-Mental State Examination (MMSE) for the detection of Alzheimer's disease (AD) (535 times), which focuses on the substantial role of MMSE in identifying the conversion from mild cognitive impairment to Alzheimer's disease dementia, and included 11 heterogeneous studies, only one of which provided information on the association between MMSE and the MCI conversion to vascular dementia, concluding that there was no support for a substantial role for the MMSE as an independent single administration test for identifying patients with MCI who may develop dementia. The second most highly cited document is the article Alzheimer's disease: risk factors and potentially protective measures (421 citations) by Silva, MVF and others, which summarizes the pathophysiological mechanisms of Alzheimer's disease and its major risk factors. In addition, it also discusses some protective factors associated with lower risk of developing the disease, such as cognitive reserve, physical activity and diet, etc. The third most highly cited document is the article Linguistic Features Identify Alzheimer's Disease in Narrative Speech by Fraser, KC and other scholars (404 citations), which uses narrative samples provided by individuals with Alzheimer's disease to compute a number of linguistic variables from transcribed text, and an exploratory factor analysis of these linguistic and speech measures concluded that state-of-the-art classification accuracies were obtained in distinguishing between individuals with Alzheimer's disease and healthy individuals based on short linguistic samples in a picture description task.

4. Research Hotspots

By running CiteSpace 6.3.R1 (Professional Edition) to visualize and analyze the Keywords of the literature, we found that the top ten high-frequency topics were, in order, national institute (79 words), performance (67 words), cognitive impairment (58 words), primary progressive aphasia (56 words), frontotemporal dementia (54 words), age (51 words), association (49 words), recommendations (41 words), prevalence (41 words), and episodic memory (40 words), as shown in Table 1. The highest frequency of topic occurrence was 79 times and the lowest was 29 times; the highest centrality was 0.19 and the lowest was 0.04. The Alzheimer's patient discourse study focused on the National Academies' relevant instructional literature, speech acts, cognitive impairments, primary progressive aphasia, frontotemporal lobe dementia, and episodic memory, with an emphasis on topics such as age, associations, recommendations, and prevalence.

Table 1. Statistics on hot topics in Alzheimer's patient discourse research (2014-2023)

serial number	frequency	centrality	particular year	byword
1	79	0.05	2014	national institute
2	67	0.04	2014	performance
3	58	0.04	2015	cognitive impairment
4	56	0.19	2014	Primary progressive aphasia
5	54	0.09	2014	frontotemporal dementia
6	51	0.04	2014	age
7	49	0.04	2014	association
8	41	0.04	2014	recommendations
9	41	0.04	2014	prevalence
10	40	0.06	2014	episodic memory

Then, through the LLR algorithm, we cluster analyze the keywords, and the cluster analysis can help researchers to outline the distribution of research hotspots more clearly and capture the keywords of related literature. The Q value of this clustering map is 0.7061 (greater than 0.5) and the S value is 0.872 (greater than 0.7), which indicates that this clustering data is reasonable. The first nine cluster naming labels were "frontotemporal dementia", "mild cognitive impairment", "down syndrome", "primary progressive aphasia", "neuropsychiatric symptoms", "machine learning", "bilingualism ""dementia", "alzheimers dementia", as shown in Figure 1. Space constraints are such that only cluster #0 is analyzed.

The naming label for cluster #0 is "frontotemporal dementia", which contains a total of 300 keywords and 90 papers in four categories:

- 1) A retrospective study of discourse analysis in Alzheimer's patients, including the keywords "dementia", "communication", "cognitive impairment", "systematic review" and other keywords. For example, Dooley J (2015), based on the results of eight database searches, noted that communication between patients, companions and professionals in dementia care raises ethical issues; Jiang W (2020), based on the results of database searches covering ten publications between the start of the study and October 31, 2018, noted that the level of evidence supporting an association between elevated parathyroid hormone levels and cognitive functioning is generally weak and inconsistent; Kletzel SL (2021), using a systematic search and meta-analysis, noted that brain games did not show significant improvements in standardized tests of cognitive function.
- 2) A study of the factors influencing cognitive impairment in Alzheimer's patients, including keywords such as "cognitive functions", "neuropsychological assessments " and other keywords. For example, Jung J (2019) noted that religiosity has a positive impact on cognitive functions; Seixas-lima B (2023) noted that young patients with Alzheimer's disease and related dementia with neuropsychiatric symptoms have lower cognitive scores, reflecting the possibility that they may have more severe neurodegenerative diseases; Tian R (2023) neuropsychological assessments, especially including episode memory, information processing speed, language, and visuospatial abilities are comprehensive tests that are good for clinical differentiation between patients with mild to moderate subcortical ischemic vascular dementia and Alzheimer's disease.
- 3) A study of assessment tools for cognitive impairment in Alzheimer's patients, including keywords such as "mild behavioral impairment", "cognitive communication disorders", "speech and language therapy", and other keywords. For example, the scoring method proposed by Verma N (2015) significantly improves the sensitivity of the ADAS-Cog in measuring the progression of cognitive impairment in the mild to moderate stages of Alzheimer's disease, which, in turn, improves the efficiency of clinical trials; Ismail Z (2017) proposes a checklist for mild behavioral disorders, which has utility in the detection of cases of MBI as well as in the detection of MBI symptoms and the monitoring of the emergence of their domains over time; Olthof-nefkens MWLJ (2023) developed the Dementia Experience Communication Questionnaire, which can be used to measure the communication experience between people with early-stage dementia and their caregivers. The development of this tool could help to better understand and improve the interactions between people with dementia and their caregivers, thereby improving their quality of life.
- 4) Research on the intervention mechanism of cognitive impairment in Alzheimer's patients, including keywords such as "cognitive rehabilitation", "non-pharmacological intervention", "mixed method", and other keywords. For example, Jelcic N (2014) stated that the application of telecommunication technology to treat cognitive rehabilitation in elderly patients with neurodegenerative cognitive disorders is feasible and may improve global cognitive performance; Savazzi F (2020) stated that art, color, and affective therapies positively affect both cognitive and behavioral states and can be considered as appropriate interventions for the

rehabilitation of patients with Alzheimer's disease; Jaaniste J (2015) states that theater therapy may have a positive impact on the quality of life of patients with Alzheimer's disease.

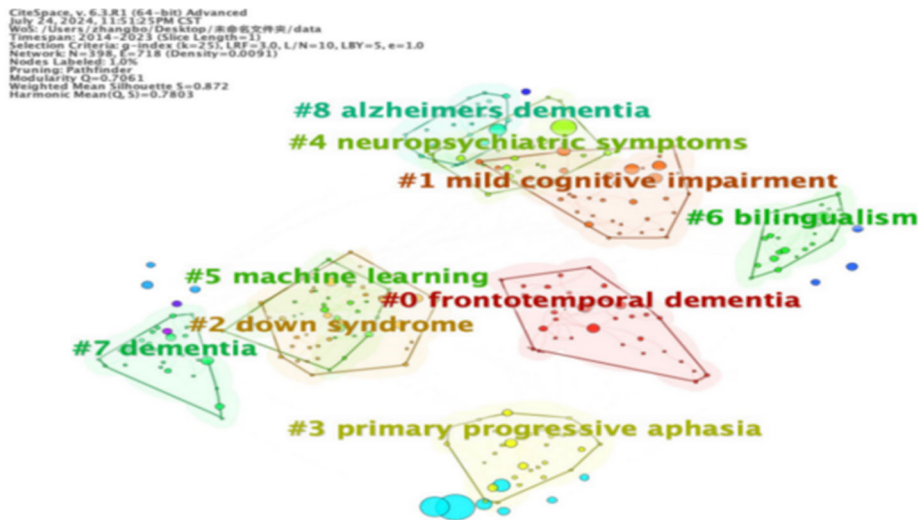


Figure 1. Knowledge map of keyword clustering for discourse research on Alzheimer's patients (2014-2023)

5. Research Frontier Analysis

Burst Terms is a method used in bibliometrics to capture terms that are the most recent to appear in a certain period of time and have a rapid increase in frequency, and such burst terms often reflect the research frontiers in the field (Zhong et al., 2019). The term sources are selected from the Title, Abstract, AuthorKeywords and KeywordsPlus, then select "NounPhrases" to create a terminology vocabulary, and then click on Then click "BrustTerms" to analyze the emergent words, and the analysis results are shown in Table 2.

Top 25 Keywords with the Strongest Citation Bursts					
Keywords	Year	Strength	Begin	End	2014 - 2023
semantic dementia	2014	3.6	2014	2016	
vascular dementia	2014	3	2014	2016	
donepezil	2014	2.61	2014	2016	
double blind	2014	2.49	2014	2017	
symptoms	2015	3.54	2015	2018	
brain	2016	2.98	2016	2018	
alzheimer disease	2015	2.71	2016	2017	
predictors	2016	2.48	2016	2017	
lifelong bilingualism	2016	2.46	2016	2017	
association workgroups	2015	2.6	2017	2019	
fdg pet	2017	2.47	2017	2019	
cognitive aging	2017	2.44	2017	2018	
preclinical alzheimers disease	2015	2.64	2018	2019	
prevalence	2014	3.61	2019	2020	
s disease	2020	4.38	2020	2023	
natural language processing	2019	3.87	2020	2023	
comprehension	2017	2.7	2020	2023	
behavioral variant	2020	2.62	2020	2023	
machine learning	2018	2.48	2020	2023	
clinical diagnosis	2020	2.41	2020	2021	
differential diagnosis	2019	3.29	2021	2023	
metaanalysis	2017	2.97	2021	2023	
validity	2016	2.91	2021	2023	
framework	2019	2.86	2021	2023	
cerad	2021	2.54	2021	2023	

Table 2. Map of highly cited keyword bursts in Alzheimer's disease patient discourse research

In terms of the distribution of emergent words over time, researchers have continued to focus on the study of Alzheimer's patient discourse in the last decade, and the field has continued to spawn new research frontiers over time, which can be broadly categorized into the following three stages of development:

1) Basic research phase (2014-2017). The emergent words in this phase include "semantic dementia", "vascular dementia", "donepezil", "double blind", "symptoms", "brain", "alzheimer's disease", "predictors", "lifelong bilingualism". Of these, "semantic dementia" had the highest mutation intensity and "double blind" had a longer mutation duration. At this stage, Alzheimer's discourse research mainly focuses on the basic research on related dementia types, including the identification of symptoms, the exploration of pathological mechanisms and the development of early intervention drugs, laying a solid foundation for the next research.

2) Clinical evaluation and epidemiologic study phase (2017-2020). The emergent terms in this phase include "association workgroups", "fdg pet", "cognitive aging", "preclinical alzheimer disease", "prevalence". Of these, "prevalence" had the highest mutation intensity. During this phase, researchers began to focus on clinical assessment and epidemiological characterization of Alzheimer's disease discourse studies; association working groups developed standards and guidelines; fdg pet was used to assess metabolic changes in the brain, studies of cognitive aging helped to understand early manifestations of the disease; the identification of preclinical Alzheimer's disease opened up the possibility of early intervention.

(3) Advanced technology research and application phase (2020-2023). The emergent words in this stage include "s disease", "natural language processing", "comprehension", "behavioral variant", "machine learning", "clinical diagnosis", "differential diagnosis", "meta-analysis", "validity", "framework", "cerad". Of these, "s disease" has the highest mutation intensity and the longest duration. This phase focuses on the use of advanced technological tools (e.g., natural language processing and machine learning) to improve the accuracy of clinical diagnosis and differential diagnosis; researchers assess the validity of different research findings through meta-analysis; tools such as CERAD are used to systematically assess cognitive function and diagnose dementia; and frameworks are established to guide future research.

6. Future Development Trends

The rapid growth of the international economy as well as the development of society has placed greater demands on discourse research on Alzheimer's patients. However, there are key issues behind such studies. Many current studies rely on cross-sectional designs that fail to capture changes in the development of Alzheimer's disease; many studies tend to sample specific populations while ignoring the diversity of cultural, ethnic, and socioeconomic backgrounds, a limitation that may result in the applicability and breadth of the findings being compromised; although academics have made a number of advances in Alzheimer's disease research, many of the theories and tools have not been widely used in clinical practice; and despite the academic understanding of the pathogenesis of Alzheimer's disease, effective preventive measures remain relatively limited.

To address the above problems, it is suggested to start from three aspects of research methods, research perspectives and research themes to improve the diversity of research methods, the comprehensiveness of research perspectives and the innovativeness of research themes, so as to provide more possibilities for the international research on the discourse of Alzheimer's patients.

(1) As for the research methodology, adopt more diverse research methods and conduct extensive longitudinal studies to observe and capture the progression of Alzheimer's disease patients' condition, in order to help researchers understand the cognitive changes at key time points as well as potential intervention windows. Comprehensively utilizing qualitative,

quantitative, and combined qualitative and quantitative empirical research, on the one hand, it is important to go deeper within the Alzheimer's patient population to anchor the real needs facing discourse research on Alzheimer's patients; on the other hand, it is important to pay attention to the various types of problems that may exist in the current international research on discourse research on Alzheimer's patients, and to explore the possibilities of abridging or minimizing the various problems in future research.

(2) In terms of research perspectives, a multimodal approach is adopted, including a combination of neuroimaging, biomarker analysis, behavioral observation and linguistic analysis, in order to help researchers understand the biological mechanisms and clinical manifestations of the disease in a more comprehensive way. With the process of globalization, discourse research on Alzheimer's patients should pay more attention to cross-cultural comparisons to explore the differences in disease manifestations and coping strategies in different cultural contexts, so as to lay a foundation for the development of interventions suitable for specific populations.

(3) With respect to disciplinary fields and research themes, we should step out of the limitations of the research perspectives of neuroscience and linguistics, and emphasize the functional role of logic, computer science and other disciplines in the discourse research of Alzheimer's patients. The introduction of new technologies such as natural language processing, machine learning technology and virtual reality can greatly enrich the methods and tools of Alzheimer's research and provide convenient solutions in cognitive training and emotional intervention. Second, research on early identification and prevention strategies should be strengthened, with emphasis on identifying potential biomarkers, cognitive function changes, and mental health problems, comprehensively analyzing multiple factors such as genes, environment, and lifestyle, and formulating individualized preventive intervention programs to effectively reduce the risk of disease in individuals.

7. Conclusion

This study combed the current situation, hotspots and frontiers in the field of discourse research on Alzheimer's disease patients through bibliometrics, pointing out the problems and solutions. The study found that: international Alzheimer's discourse research papers showed a downward trend over the past decade, and the research field mainly centered on the fields of neurology and psychology; the hotspots of research included speech acts, cognitive impairment, primary progressive aphasia, frontotemporal lobe dementia, and episodic memory research, and the topics of research were related to age, correlation, suggestion, and prevalence; and the cutting-edge emergent words were mainly semantic dementia, cognitive aging, natural language processing, clinical diagnosis, machine learning, etc. It has roughly gone through three stages of development: basic research, clinical assessment and epidemiological research, and advanced technology research and application. In the future, Alzheimer's patient discourse research should widely carry out longitudinal studies and empirical studies based on mixed methods, try to incorporate theoretical perspectives such as multimodality, focus on interdisciplinary integration, break through the paradigm of neuroscience and clinical linguistics, and explore the research on cutting-edge topics based on natural language processing, virtual reality and other new technologies, so that we can continue to expand the depth and breadth of the research on the discourse of Alzheimer's patients in the future.

Acknowledgments

Fund project: Shandong Normal University 2024 undergraduate research fund project "Alzheimer's disease patients' language representation cognitive impairment and its intervention mechanism research" (Project No. BKJJ2024026) and Shandong Normal

University College of Foreign Languages teacher-student academic community cognitive teaching innovation team project of the stage results.

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