Analysis of Research Trends and Hot Spots of Proactive Health Research for Elderly with Disabilities in China from the Perspective of Bibliometrics

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Abstract: Based on bibliometric methods, this study uses CiteSpace software for a visual analysis of the literature related toproactive health research for disabled elderly individuals, both domestically and internationally. The aim is to explore its development status and research hotspots. Literature onproactive health research for disabled elderly individuals, published from January 2014 to October 2024, was retrieved from databases including China National Knowledge Infrastructure (CNKI), Chinese Biomedical Literature (CBM), Weipu, and Wanfang. Bibliometric analysis was conducted using NoteExpress V4.X, and visual mapping was performed using CiteSpace 6.2.R2 for interpretation. A total of 472 articles from Chinese databases were included. The overall publication volume showed an upward trend. High-frequency keywords in domestic research included disabled elderly, family caregivers, proactive health, social support, and long-term care. Ten clusters were identified, including terms such as disabled elderly, integrated medical and nursing care, and proactive health. Emergent keywords included mental health, stress relief, family caregivers, optimization of elderly care service models, and disabled elderly in rural areas. Research on the proactive health of disabled elderly individuals has been increasingly emphasized in China. Future studies should focus on emerging hotspots and trends, particularly on the psychological health of disabled elderly, the urban-rural disparities in the elderly disabled population, the optimization of service systems, and innovations in the full-cycle health management model.

Keywords: Elderly; Proactive Health; Citespace; Bibliometric Analysis; Development Trends

1. Introduction

With the global population ages, the number of disabled elderly individuals continues to grow. It is predicted that the proportion of disabled elderly people in China will increase year by year, reaching 13.68% by 2050, [1] which would amount to 126.06 million people. [2] Disabled elderly individuals are those who, due to aging, illness, injury, or disability, experience functional impairments that prevent them from independently completing daily activities. [3] Disability not only limits an individual's physiological functions, but also burdens their mental health and reduces social participation, posing a significant public health challenge under the goal of 'healthy aging.' 4,5] In 2015, the Ministry of Science and Technology introduced the innovative concept and model of "active health" in the"13th Five-Year Plan" for digital healthcare and health promotion. This concept received national support and was included as a key research and development program. [6] Proactive health involves not only individuals' proactive management of their physical, mental, and social well-being, but also serves as an important means to stimulate bodily functions, prevent diseases, and promote health, holding profound significance for achieving healthy aging. [7] However, current research mainly focuses on the factors influencing the proactive health of disabled elderly individuals and reviews international studies in this field, with a lack of exploration regarding the research hotspots and development trends of proactive health for disabled elderly in China [7,8]. In this context,

this study uses CiteSpace software for a visual analysis of the literature in the field of proactive health research for disabled elderly in China. By mining and organizing a large amount of literature data, knowledge maps are generated to reveal the overall trends and development of this research, providing references to promote the development and application of proactive health research for disabled elderly in China.

2. Data and Methods

The literature for this study was sourced from databases such as the China National Knowledge Infrastructure (CNKI), Wanfang, Chinese Biomedical Literature (CBM), and Weipu (VIP). The search strategy was finalised and constructed after several pre-searches ([subject =Disab* OR Handicapped OR Physically Challenged OR Physically Disabled OR Physically Handicapped OR Frail Elderly OR Frail Elders OR Frail Older Adults OR Functionally-lmpaired Elderly] AND [subject =Aged OR older OR elderly OR elders OR seniors OR older people OR old people OR older adults] AND ([subject =proactive health* ORproactive health OR health promotion]). The matching method was an exact search and the time range was from January 1, 2014, to October 30, 2024. All searches were completed on 30 December 2024.

The inclusion criteria were as follows: the literature had to be directly related to proactive health research for elderly with disabilities. There were no restrictions on the type of studies considered. The following were excluded from the search: newsletters, notices, announcements, calls for papers, and conference proceedings; duplicate or repeated studies; studies with missing data; and literature where the full text could not be accessed.

3. Research Methods

In this paper, two researchers with expertise in bibliometrics independently performed literature retrieval and screening according to predetermined inclusion and exclusion criteria. In cases of disagreement, a third researcher was consulted, and consensus was reached through discussion. The retrieved literature was imported into NoteExpress V4.X software for duplicate removal. Following examination of titles, abstracts, and full texts, eligible documents were saved as "download" and transferred to CiteSpace 6.2.R6. The timespan was set from January 2014 to October 2024 with yearly time-slicing. Text sources included topics, abstracts, and keywords, while node types were selected based on research objectives (e.g., keywords), with other parameters retaining the software defaults. Keyword co-occurrence networks, cluster maps, timeline views, and burst detection visualizations were generated. Analytical insights were derived by leveraging the unique features of each CiteSpace visualization combined with supporting quantitative metrics.

4. Results

4.1 Annual Publication Trends

A total of 888 Chinese publications were initially retrieved, with 472 articles ultimately included in the analysis after removing duplicates and applying inclusion/exclusion criteria through systematic screening of titles, abstracts, and full texts. A line graph illustrating annual publication trends was constructed (Figure 1). As shown in Figure 1, the publication count demonstrated a gradual increase from 2014 to 2016, stabilizing at approximately 10 articles annually. The growth rate accelerated between 2017 and 2020, culminating in 53 publications by 2020. Notably, an exponential surge occurred in 2023, with 118 articles recorded. The 2024 data, collected up to October, showed fewer publications due to incomplete annual records. Nevertheless, the overall upward trajectory in publication volume signifies growing academic attention to this research domain within China. The trend line analysis further indicates rapid development in the field of proactive health management for disabled elderly individuals over the past decade in China.

4.2 Co-Occurring Keywords and Cluster Analysis

Keywords represent the core conceptual framework of research topics. Co-occurrence analysis of keywords as nodes enables the identification of temporal shifts in focal research areas, analytical perspectives, and

methodological approaches within a discipline, thereby revealing intrinsic connections and identifying core thematic elements [9]. In the study of proactive health management for disabled elderly individuals, the frequency distribution of keywords reflects the prevailing research hotspots in this field. The threshold for high-frequency keywords was determined using Price's formula: M≈0.749×nmax1/2, where M represents the high-frequency threshold and nmax denotes the maximum frequency of keyword occurrences in the included literature [10]. Based on this calculation, (M≈10), with keywords occurring ≥10 times classified as high-frequency. This study counted the top 10 keywords (in terms of frequency and intermediary centrality) from 2014 to 2024; the keywords with the highest frequency were disabled elderly, see Table 1.

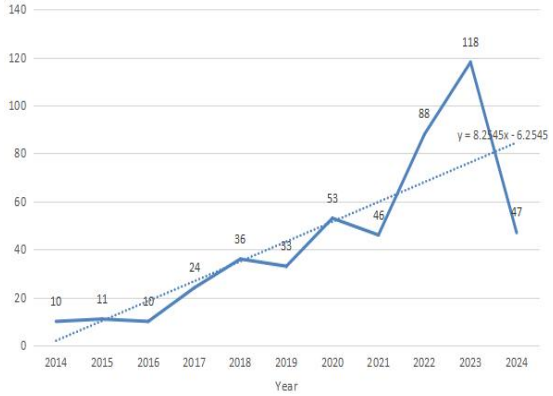

Figure 1. Annual Trend Chart of Publications

Building upon the keyword co-occurrence analysis, a cluster analysis was further conducted to identify thematic groupings (Figure 2). The modularity Q value reflects the density and separation of nodes within the network, where a higher Q value indicates superior clustering efficacy. The mean silhouette S value evaluates the homogeneity of clusters, with a higher S value signifying greater intra-cluster consistency and credibility. As visualized in Figure 3, We eventually obtained 11 clusters: #0 disabled elderly, #1 elderly, #2 functionally impaired elderly, #3 integrated healthcare. #4 semi-disabled elderly, #5 proactive health, #6 active aging, #7 rural disabled elderly, #8 design strategies, #9 construction strategies. These clusters represent the primary research domains within the field of proactive health for disabled elderly in China. The clustering parameters yielded Q = 0.5999 (above the threshold of 0.3), demonstrating robust cluster structure, and S = 0.7147 (above the threshold of 0.5), indicating high homogeneity. These metrics confirm that the clustering results are statistically significant, well-differentiated, and methodologically sound.

Table 1. Top 10 Keywords in Frequency in Centrality on Proactive Health Research for Elderly with Disabilities

Keywords	Frequency	Centrality
disabled elderly	166	0.73
elderly	50	0.39
case studies	41	0.07
semi-disabled elderly	30	0.02
long-term care	28	0.11
family caregivers	26	0.01
proactive health	25	0.13
social support	23	0.15
integrated healthcare	23	0.15
teamwork	21	0.03

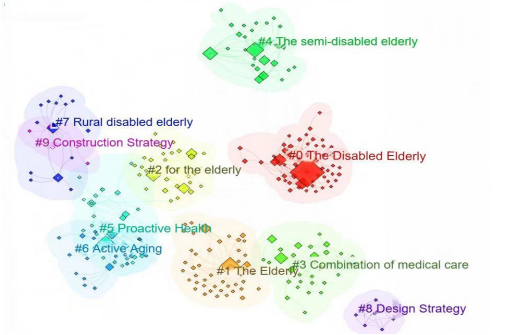

Figure 2. Keywords Cluster Analysis Co-Occurrence Map

4.3 Keywords with Citation Bursts

The top 25 keywords with the strongest citation burst from 2014 to 2024 are shown in Figure 3. Burst keywords refer to terms that exhibit a significant increase in citation frequency within a specific timeframe, and their intensity variations can reveal dynamic evolution characteristics of research hotspots in a disciplinary field. By tracking the fluctuation trajectories of such terms, researchers can effectively capture the evolutionary trends of academic frontiers and phased focal points [11]. In the figure, "Strength" represents the burst intensity, while "Begin" and "End" indicate the starting and ending times of the bursts, respectively. Recent Chinese literature has focused on mental health, stress management, family caregivers, and optimization of elderly care

service models. Research trends emphasize the psychological support needs of disabled elderly individuals and family caregivers, integration of community resources, promotion of elderly care facility development, policy implementation, technological integration, and service model innovation. These emerging burst keywords in recent years represent the current research trends and hotspots in the field.

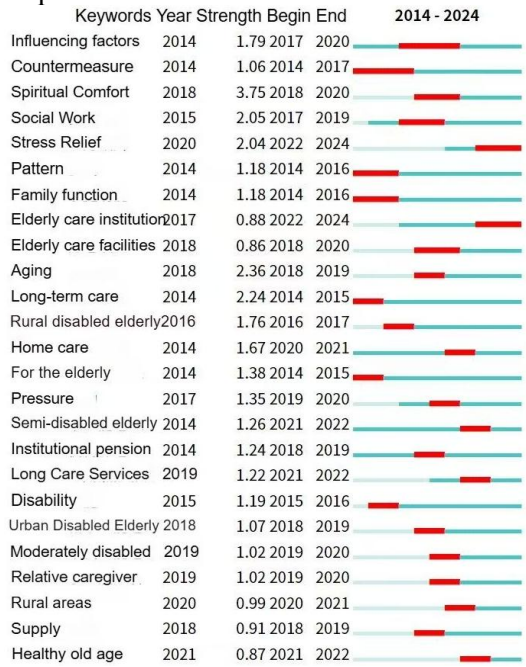

Figure 3. Top 25 Keywords with the Strongest Citation Bursts

5. Discussion

5.1 Research Progress in Proactive Health Research for Elderly with Disabilities in China

Our results show that proactive health for disabled elderly in China has shown an overall upward trend over the past decade. Notably, there has been a significant increase in annual publications since 2016, rising from single digits to 14-30 articles per year, indicating sustained scholarly interest in this domain within China. This growth primarily stems from national policy directives promoting proactive health initiatives. The pivotal "Healthy China 2030" Strategic Plan issued in 2016 marked a paradigm shift in healthcare strategy, transitioning from disease-centered to health-centered approaches. [12] This policy explicitly incorporated the disabled elderly as a key target population in national health strategies, thereby directing academic focus toward preventive health interventions and rehabilitation research for this vulnerable group. Subsequently, the "Healthy China Action (2019-2030)" initiative further reinforced the concept of proactive health management by emphasizing individual responsibility for health, while specifically calling for enhanced research on functional maintenance and health management in the elderly population. [13] Concurrently, the "National Strategy for Active Response to Population Aging" has catalyzed research in integrated healthcare for the elderly and community health services, including innovative areas such as remote health monitoring technologies for homebound disabled elderly. [14] Given the current phase of intensified implementation of Healthy China initiatives, it is projected that the volume of Chinese literature on proactive health management for disabled elderly will continue to experience substantial growth in the coming years.

5.2 Hot Issue of Proactive Health Research for Elderly with Disabilities in China

For this study, CiteSpace 6.2.R6 software was utilized to generate keyword co-occurrence maps and cluster maps in the field of proactive health management for disabled elderly individuals in China, enabling the identification of current research hotspots through comprehensive analysis. The visual analysis of keywords revealed that domestic research focuses primarily on disabled elderly, family caregivers, proactive health, integrated healthcare and elderly care, mental health, and healthy aging. Notably, the emphasis on mental health aligns with findings from Gong et al. [8] visual analysis of international research on elderly health management, underscoring the growing recognition of mental health as a critical research focus in disabled elderly health studies due to its significant role in enhancing quality of life and delaying functional decline. From the perspective of betweenness centrality analysis, the core keyword "Proactive Health Research for Elderly with Disabilities in China" demonstrated strong connections with related concepts such as case studies, long-term care, family caregivers, social support, and integrated healthcare models. This suggests an

emerging research trend focusing on multidimensional health management strategies, innovative integrated healthcare models, and collaborative family-community care systems.

Cluster analysis further indicated that future research directions will likely prioritize personalized interventions, service model innovation, mental health integration, environmental adaptation optimization, and regional equity enhancement in proactive health management for disabled elderly individuals. Additionally, there will be an increased emphasis on interdisciplinary collaboration and policy support to address the complex challenges posed by an aging society. The "Healthy Aging Special Plan for the 14th Five-Year Period" explicitly emphasizes the establishment of a comprehensive elderly health service system, particularly in areas such as disabled elderly care and integrated healthcare models. [15] Gong et al. [16] highlighted the necessity of strengthening the preventive functions and precision services within the healthcare system, encouraging elderly participation in health management and social activities, and developing comprehensive strategies to promote positive interactions between aging populations and socioeconomic development. Furthermore, multiple studies have revealed lower levels of proactive health awareness among rural elderly populations and significant disparities in health resource allocation between urban and rural areas. [17,18] Consequently, future research under policy guidance should focus on deepening multidimensional health management studies and refining proactive health intervention systems to establish comprehensive health management models spanning from disability prevention to post-disability rehabilitation. Priority should be given to optimizing integrated healthcare service models in rural and resource-limited areas, analyzing urban-rural disparities in service demand and provision for disabled elderly populations, and formulating region-specific service optimization strategies, particularly addressing the accessibility of long-term care resources in rural regions. Concurrently, efforts should be made to strengthen family-community collaborative care systems, construct diversified support networks, prioritize mental health and active aging initiatives, and promote the effective implementation and high-quality development of proactive health strategies for disabled elderly populations.

5.3 The Future Direction of Proactive Health Research for Elderly with Disabilities Development

The prominence of keywords such as "rural disabled elderly" and "rural area" in the burst graph highlights rural areas as a focal research domain. Combined with the trending keywords "supply" and "elderly care facilities," future research directions are likely to prioritize studies on urban-rural differential analysis and optimization of service systems. there is a pressing need to holistically address the dynamic requirements of rural elderly populations across their life cycles, advocating for a diversified elderly care service supply system that operates under a "government-led, family-based, community-supported, and institution-assisted" framework. [19] Furthermore, the surge in the keyword "long-term care " post-2019 signals a paradigm shift from reactive care to proactive health management, emphasizing holistic health status, individual agency, and systematic health management rather than solely focusing on biometric indicators or medical interventions. [20] For example, within the context of long-term care systems, emerging research paradigms emphasize multidisciplinary integration, focusing on diverse stakeholders including elderly individuals and caregivers. Leveraging digital health technologies, these studies aim to develop integrated long-term care systems that address the entire trajectory of functional changes in the elderly population by combining proactive health management, precision nursing services, and intelligent support systems. [21]

6. Conclusions

In China, the role of the proactive health research for elderly with disabilities is currently in a period of rapid development. Relying on the "Healthy China 2030" plan, which outlines strategic deployments for managing the health of the aging population, as well as the practical experience accumulated in areas such as integrated healthcare and active aging, research teams

can further leverage the advantages of policy guidance. Specifically, efforts should focus on deepening the following areas: integrating policy and practice, optimizing care service content, and improving the quality of care services. In the future, the goal is to meet the care needs of disabled elderly individuals and alleviate the long-term caregiving pressures inherent in the currently dominant family-based caregiving model. At the same time, "spiritual comfort" and "social work intervention" remain hot research topics in China. In the future, scholars are expected to conduct in-depth studies in these areas. Additionally, keyword co-occurrence analysis indicates that "proactive health" is related to "stress relief," "social support," and other concepts, though a systematic research framework has yet to be established. Future research could integrate medical resources based on the dynamic needs throughout the lifecycle of disabled elderly individuals. This integration would combine medical rehabilitation (such as chronic disease treatment and physical function recovery) with engineering technologies (such as rehabilitation robots and smart assistive devices), while incorporating psychological interventions (such as stress relief, emotional comfort, and the cultivation of psychological resilience). Furthermore, training for family members (such as caregiving skills training and communication techniques) can enhance family support efficacy. This would form a comprehensive intervention model that integrates "medical rehabilitation-engineering technology-psychological support.

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