

Chinese Nursing Home Design Studies Based on Changes in Design Formal Language

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ABSTRACT

To figure out the research progress in the field of nursing home design in China and to clarify the future development direction of this field. This study conducted a visual graph analysis of the design formal language of relevant literature in the CNKI database using Citespace. This study summarizes the research development process and current situation in this field, and explores the future development direction. The results indicate that in terms of research topics, current research on the design of nursing homes in China is mainly based on the physiological and psychological needs of the elderly population, and optimizing the design of lifestyle has been a research hot spot in the past two years. There are certain limitations in research in cutting-edge fields such as smart elderly care compared to foreign countries; In terms of research methods, the integration of interdisciplinary theory and practice is the main approach. Looking at the development history and current situation of research in this field, the future development direction of nursing home design in China is proposed.

Keywords: Citespace, Nursing home design, Formal language, Visual analysis

INTRODUCTION

The changes in design language are often closely related to changes in user needs and the current development of the industry. Taking the design of Chinese nursing homes as an example, Wang (2019) explores a truly suitable rehabilitation landscape design method for elderly care institutions based on the neglect of the physiological, psychological, and behavioral needs of the elderly population in Chinese nursing homes, combined with environmental psychology, plant therapy, horticultural therapy, mobile concept theory, and behavioral and psychological needs of the elderly. Li (2020) conducted research on the architectural design of elderly care institutions under the medical and elderly care integration model, based on the current situation that traditional single-function elderly care institutions are no longer able to meet the current elderly care needs in the context of Chinese increasingly aging society. Shan, Yu & Qin (2023) proposed optimization and improvement suggestions for elderly care institutions in the post-epidemic era based on alleviating the psychological pressure caused by the closed management of the epidemic on the elderly and promoting the construction of a healthy

environment for the elderly. Therefore, based on the analysis of the changing characteristics and paths of design formal language, this study discusses the development process, current situation, and future development trends of Chinese nursing home design. Intended to provide directional guidance for subsequent nursing home design through further in-depth research on the development of nursing home design.

Based on the serious phenomenon of “getting old before getting rich” in Chinese current aging population, the structural shortage of elderly care and medical service labor force, and the serious shortage of nursing staff, the demand for elderly care services among the elderly population is becoming increasingly strong (Zuo, 2018, p. 26, Wang, 2016). Nursing homes and other elderly care institutions cannot effectively cope with the rapidly developing aging situation in China, alleviate the burden of family elderly care, and improve the elderly care experience for the elderly population. According to the research results of China Elderly Care Weekly, the proportion of elderly people living in elderly care institutions in China is 0.73%, which indirectly reflects that there are still certain obstacles to the general acceptance of elderly care institutions among Chinese elderly people and a certain stage of development is still needed. According to the theory of environmental psychology, the environment we shape has a significant impact on our behavior, psychology, and other aspects. Therefore, the scientific shaping of space is closely related to the improvement of user space acceptance. Based on this, this study starts with formal language and researches the design of nursing homes, sorting out the relationship between the current development status of nursing home design and the general acceptance of nursing homes, and exploring innovative development paths for future nursing home design.

METHODS

This article is based on the design research of Chinese nursing homes with changes in formal language, using Citespace software as a visual analysis tool. Through using Citespace, the information can be present into the form of a graph distribution (Chen et al., 2015), and it also can combine the obtained graph to analyze the discipline structure, hot topics, and frontiers in the relevant fields of this study (Du, Peng & Lian 2017). There have been some studies on Citespace visualization knowledge graphs in the field of design in China, which mainly involve comparisons between domestic and foreign research, research hotspots, analysis of research status, and prospects for development. Zhou & Yao (2023) utilized the functions of category analysis, institutional analysis, keyword co-occurrence analysis, and keyword detection in Citespace to compare and analyze participatory design at home and abroad in terms of spatiotemporal relationships, publishing institutions, publishing fields, and journals, research hotspots, and development trends. Lou & Zheng (2022) utilized Citespace to analyze the research hotspots and frontiers of community renewal in China and provided prospects for the future. Zhou et al. (2022) used keyword co-occurrence analysis in Citespace to investigate the current research status and development prospects of elderly-friendly smart homes in China. All have produced excellent research results, enriching the research achievements in the field of design. However,

there is currently no research on visual knowledge graphs related to nursing homes and other elderly care institutions. Based on this, this article uses Citespace software to visually analyze the formal language of nursing home design, aiming to conduct research on the development history, current status, cutting-edge hotspots, and prospects of nursing home design by analyzing the network graph, timeline clustering graph, and clustering time zone graph of the formal language of nursing home design. It aims to explore the design laws of nursing homes more systematically and deeply, and based on existing research, find breakthroughs in optimizing the design of nursing homes.

Search Strategy

The data for this study was obtained from an advanced search in the CNKI database using the keywords “Theme=Nursing Home*Space Design” or “Title=Nursing Home*Space Design”. The time slot is from January 2008 to November 2023. The search was conducted on November 2, 2023, with all literature selected as the source category, resulting in a total of 303 initial citation data.

Exclusion Criteria

Exclusion criteria were: 1) opening remarks; 2) book reviews; 3) news reports; 4) newspapers; 5) irrelevant literature.

Data Processing Strategy

Based on the fact that the knowledge graph directly generated by importing literature data in Citespace cannot accurately represent the design formal language discussed in this study, and contains many vocabulary that cannot reflect the design form. This study combined the title, keywords, and abstract of each piece of literature to organize the design formal language of 253 valid entries. Given the previous definition of formal language, this study focuses on extracting “design methods and strategies”, “design concepts”, and “design theories” from the design formal language involved in each literature. During the process of refining the design formal language of 253 valid literature, many design formal languages with different expressions but similar meanings were found. Therefore, based on representative literature in this field, this study unifies and integrates the design formal language with the same meaning mentioned in 253 valid literature on terms such as “design methods and strategies”, “design concepts”, “design theory”, etc. Finally, this study extracted a total of 55 design formal languages (Appendix 1).

RESULTS AND ANALYSIS

Analysis of Research and Development History

The time zone graph of language clustering for the design of Chinese nursing homes (Figure 1) shows the time period when the design formal language first appeared in related research, which can indirectly reflect the development process of research in the relevant field. According to the time zone graph of language clustering for the design of Chinese nursing homes (Figure 1), it can be seen that the development of nursing home design in China has

gone through three stages of development. The first stage is the initial stage of development (2008–2011), with an average of 1.5 new design formal languages emerging each year. During this stage, the formal language involved in the research of nursing home design in China is mostly related to the spatial design methods themselves, such as “Accessible Design”, “Aging-friendly Design”, “Safety Design”, etc., which are mostly the basis of nursing home design research and have a lot of correlation and integration with subsequent research content, with less involvement in the interdisciplinary or theoretical introduction. The second stage is a period of rapid development (2012–2019), with an average of 3.5 new design formal languages emerging each year. During this stage, the number of new design formal languages has shown a stable growth trend. Among them, formal languages such as “Smart Elderly Care”, “Medical and Elderly Care Integration”, and “Virtual Reality Emotion Measurement” involve a wide range of interdisciplinary fields. In addition, a large number of specific design strategies have emerged in the formal language of this stage, with a focus on the physiological needs of the elderly population, proving that research in this field has begun to pay more attention to the special physiological needs of the elderly population and provide guidance for design practice. The third stage is the innovation enlightenment stage (2020–2023), with an average of 4.75 new design formal languages emerging each year. The number of new design formal languages in this stage is still relatively high. Different from the second stage of development, the design language of the third stage incorporates many psychological theories and cultural design strategies such as “Colorology”, “Religious Elderly Care”, “Virtual Reality Emotion Measurement”, and “Maslow’s Hierarchy Theory”, with a focus on the psychological and spiritual cultural needs of the elderly population. In addition, compared to the second stage, there is less correlation between this stage and the basic design of formal language in this field, which indirectly proves that research on the basic design of formal language in this field has been relatively sufficient, reflecting that research in this field has begun to enter the stage of innovation enlightenment, and there is still great room for innovative development.

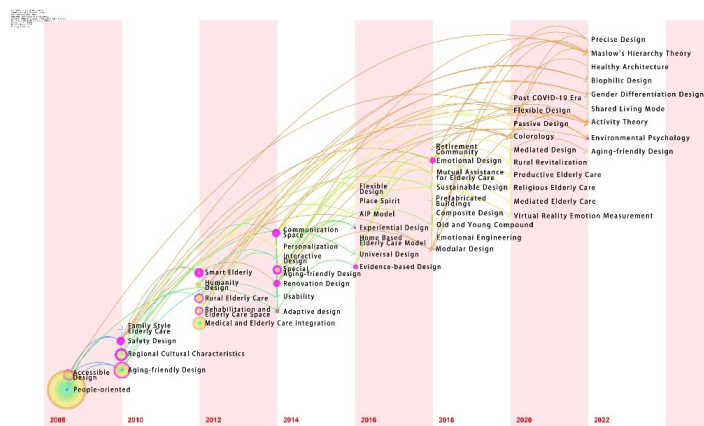


Figure 1: Language clustering time zone graph of Chinese nursing home design forms.

Analysis of Current Research and Development Status

Set the time slot from January 2008 to November 2023 to generate a visual network graph of Chinese nursing home design formal languages (Figure 2) and a frequency list of Chinese nursing home design formal languages (Appendix 2). Among them, the module value (Q value) is 0.5263, within the interval of [0,1], and >0.3, which proves that the community structure identified in this study is significant.

According to the visual network graph of Chinese nursing home design form language (Figure 2), it can be seen that there are 55 nodes, 109 connections between nodes, and a network density of 0.0734, indicating that research in the field of nursing home design is relatively concentrated. However, a higher degree of research concentration represents my lower level of innovation in this field.

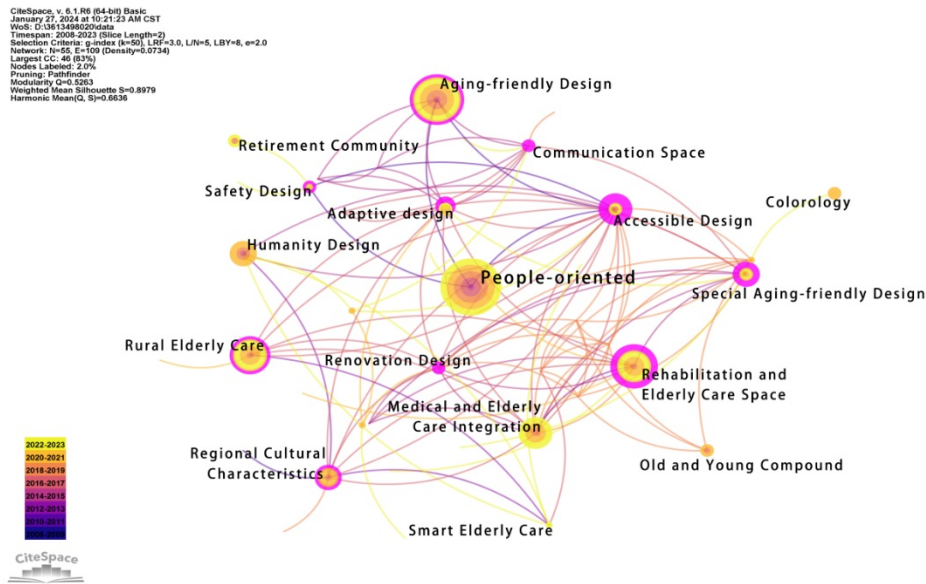


Figure 2: Visual network graph of chinese nursing home design form language.

The following are analyses of current research hotspots and limitations:

Analysis of Research Hotspots

Through the analysis of the visual network graph of design language for Chinese nursing homes (Figure 2) and the frequency list of design language (Appendix 2), it can be seen that research on nursing home design in China mainly focuses on design language forms such as “People-oriented”, “Aging-friendly Design”, “Medical and Elderly Care Integration”, “Rural Elderly Care”, and “Rehabilitation and Elderly Care Space”. Among them, “People-oriented” has the highest frequency of occurrence, with a total of 57 occurrences. The high attention paid by domestic scholars to “People-oriented” and “Aging-friendly Design” indicates that current research on nursing home design in China places great emphasis on meeting the physiological and psychological needs of the elderly population. Through the study

of theories such as geriatric behavior and geriatric psychology, design strategies are proposed to improve the auditory, visual, and thermal comfort of the elderly population, with a focus on endowing nursing homes with humanistic care, Centered on the elderly population, user oriented, and tailored to the actual needs of the elderly population. At the same time, the high frequency of “Humanity Design”, “Accessible Design”, and “Special Aging-friendly Design” also reflects the attention paid by Chinese nursing home design to the special needs of the elderly population. In addition, the high frequency of “Medical and Elderly Care Integration” and “Rehabilitation and Elderly Care Space” conforms to Chinese guidance on further promoting the development of medical and elderly care integration; “Rural Elderly Care” is in line with Chinese opinions on the key work of comprehensively promoting rural revitalization. At present, there is a structural shortage of the labor force and a serious shortage of nursing staff in Chinese elderly care and medical services (Zuo, 2018, p. 26). Therefore, the widespread integration of information technology in the design of nursing homes can effectively improve the efficiency of elderly care services while ensuring service quality. Compared to the current research status abroad, in recent years, China has paid less attention to emerging fields such as “Smart Elderly Care” and “Interactive Design”.

In addition, the timeline clustering view (Figure 3) conducted by Chinese nursing home design formal language shows that “Post COVID-19 Era”, “Shared Living Mode”, “Biophilic Design”, and “Gender Differentiated Design” are the formal languages that have emerged in the field of nursing home design in China in recent years.

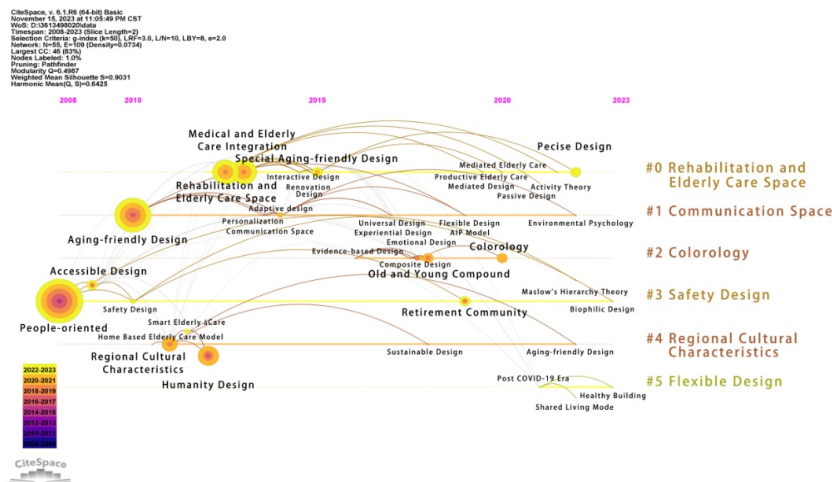


Figure 3: Timeline clustering view of Chinese nursing home design formal language.

Analysis of Research Limitations

The design research of nursing homes in our country has hardly taken into account the needs of nursing home service personnel and the families of user groups. The node centrality in Appendix 2 illustrates the importance of this

design formal language in the domain and its correlation with other design formal languages in the domain. A design formal language with a node centrality value exceeding 0.1 is the central node in that domain. Through the analysis of the frequency list of design formal languages (Appendix 2), it can be seen that there are 10 central nodes, accounting for less than 20% of the total number of nodes. The number of nodes with a centrality value of 0 is 30, indicating a weak correlation between design formal languages and fewer intersections in multiple directions and fields.

Above all, it can be seen that since 2008, the design of nursing homes in China has mainly focused on meeting the needs of the elderly population and responding to major national policies, and has produced a large number of excellent research results. However, this research field lacks innovation and is less focused on the current cutting-edge fields, with less interdisciplinary research.

Future Research Directions and Prospects

Through the analysis of the research development process and current situation, this article summarizes the following four directions worth further development in the future:

Multidimensional Consideration of User Needs

The current research in this field is mainly based on the needs of the elderly population itself, involving both the physiological and psychological needs of the elderly population to consider users. There have been certain research results so far. As an important component of the nursing home user group, the needs of nursing home service personnel should also be taken into consideration accordingly. In addition, meeting some of the needs of elderly family members should also be incorporated into the design of nursing homes. Therefore, when considering user needs, in addition to maintaining the current emphasis on the physiological and psychological needs of the elderly population, the needs of nursing home service personnel and elderly family members should also be taken into consideration.

Optimizing the Living Mode of Nursing Homes Through Spatial Design

The introduction of lifestyle-related strategies such as “Shared Living Mode” in the design of nursing homes in China has become one of the current research hotspots. With the development of the economy and the growing spiritual and cultural needs of the people, nursing homes are no longer limited to “food” and “housing”, but are developing towards a multifunctional and composite form. Therefore, how to optimize the living mode of nursing homes through space design, enrich the late life of the elderly, and help them improve their sense of self-identity may become a research hotspot in the field of nursing home design.

Exploring the Combination of Cutting-Edge Technology and Aging-Friendly Design

In recent years, the interdisciplinary intersection with artificial intelligence, human-computer interaction, and other fields has been one of the current research hotspots in the field of design, which can effectively improve the efficiency of space use. Many scholars at home and abroad have conducted

varying degrees of research on the field of smart elderly care. However, compared to foreign countries, domestic research in related fields has certain limitations in terms of both the quantity of publications and the breadth and depth of research. Therefore, research on the design of nursing homes in China should strengthen the exploration of cutting-edge fields.

The Deep Integration of Theory and Practice

Based on the current trend of language changes in the design of nursing homes in China, the research method mainly adopts a combination of interdisciplinary theory and practice. The innovation in this field in our country is mostly through the introduction of cross-disciplinary strategies or theories into research for macroscopic guidance, and there is a lack of specific methods for introducing theories into design practice targeting the physiological and psychological characteristics of the elderly population, which generally lacks a certain depth. Given this, future research directions in this field can be based on the current combination of theory and practice, develop existing viewpoints, and creatively expand them. Through sufficient research and analysis of the specific needs of the elderly population, conduct in-depth research on specific design strategies, and propose specific methods or means that can directly introduce theory into practice, For example, under the theory of smart elderly care, research on the planning of the location of smart devices in nursing homes, and the impact of the setting of smart devices in different functional spaces on the acceptance of the elderly population.

CONCLUSION

This study applied Citespace to conduct a visual graph analysis of 253 literature in the field of nursing home design in China in the past 15 years, focusing on the design formal language. Based on the changing patterns of design formal language, the development process, current situation, and future development trends of nursing home design in China were studied, and four directions worth further development and research in the field of nursing home design in China were summarized, This provides directional guidance for the design and research of nursing homes in China.

APPENDIX

Appendix 1. Design formal language vocabulary of this study.

No.	Formal Language	No.	Formal Language	No.	Formal Language
1	Shared Living Mode	19	Rural Elderly Care	37	Composite Design
2	Accessible Design	20	Active Design	38	Flexible Design
3	Medical and Elderly Care Integration	21	Virtual Reality Emotion Measurement	39	Mutual Assistance for Elderly Care
4	Retirement Community	22	Special Aging-friendly Design	40	Sustainable Design

(Continued)

Appendix 1. Continued

No.	Formal Language	No.	Formal Language	No.	Formal Language
5	Aging-friendly Design	23	Passive Design	41	Renovation Design
6	Functional Boundaries	24	Adaptive design	42	Emotional Engineering
7	People-oriented	25	Old and Young Compound	43	Prefabricated Architecture
8	Humanity Design	26	Flexible Design	44	Place Spirit
9	Smart Elderly Care	27	Interactive Design	45	Universal Design
10	Healthy Architecture	28	Maslow's Hierarchy Theory	46	Experiential Design
11	Post COVID-19 Era	29	Environmental Psychology	47	Usability
12	Biophilic Design	30	Precise Design	48	Efficiency
13	Rehabilitation and Elderly Care Space	31	Home-based Elderly Care Model	49	Gender Differentiation Design
14	Family Style Elderly Care	32	Productive Elderly Care	50	Personalization
15	Communication Space	33	Mediated Elderly Care	51	AIP Model
16	Activity Theory	34	Safety Design	52	Evidence-based Design
17	Emotional Design	35	Colorology	53	Mediated Design
18	Modular Design	36	Religious Elderly Care	54	Rural Revitalization
55	Regional Cultural Characteristics				

Appendix 2. Frequency list of chinese nursing home design formal languages.

F	Centrality	Formal Language	F	Centrality	Formal Language
57	0.07	People-oriented	3	0	Mediated Elderly Care
34	0.12	Aging-friendly Design	2	0	Personalization
24	0.05	Medical and Elderly Care Integration	1	0.03	Mutual Assistance for Elderly Care
21	0.11	Rural Elderly Care	1	0.03	Prefabricated Architecture
18	0.23	Rehabilitation and Elderly Care Space	1	0	Functional Boundaries
18	0.01	Humanity Design	1	0	Religious Elderly Care
16	0.18	Regional Cultural Characteristics	1	0	Flexible Design
13	0.42	Accessible Design	1	0	Maslow's Hierarchy Theory
12	0.21	Special Aging-friendly Design	1	0	Active Design
9	0.24	Renovation Design	1	0	Place Spirit
7	0.08	Smart Elderly Care	1	0	Family Style Elderly Care
6	0.21	Communication Space	1	0	Gender Differentiation Design
6	0.21	Adaptive design	1	0	Productive Elderly Care
6	0	Retirement Community	1	0	Activity Theory
6	0	Old and Young Compound	1	0	Universal Design
5	0.12	Safety Design	1	0	Home-based Elderly Care Model

(Continued)

Appendix 2. Continued

F	Centrality	Formal Language	F	Centrality	Formal Language
5	0	Colorology	1	0	Usability
4	0.09	Emotional Design	1	0	Biophilic Design
4	0.02	Evidence-based Design	1	0	Healthy Architecture
3	0.09	Flexible Design	1	0	AIP Model
3	0.07	Post COVID-19 Era	1	0	Virtual Reality Emotion Measurement
3	0.02	Composite Design	1	0	Experiential Design
3	0	Interactive Design	1	0	Environmental Psychology
3	0	Shared Living Mode	1	0	Passive Design
2	0.03	Virtual Reality Emotion Measurement	1	0	Emotional Engineering
2	0	Adaptive Design	1	0	Mediated Design
2	0	Environmental Psychology	1	0	Rural Revitalization

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