

ENHANCING ELDERLY LIVING SPACES THROUGH INTERIOR DESIGN: A CASE STUDY IN JIUJIANG CITY, CHINA

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Abstract

This study seeks to enhance the living spaces of elderly individuals by examining their specific needs and employing effective interior design strategies in Jiujiang City, China. The research encompasses 300 independently living men and women aged 60 and above, residing in their own homes in Jiujiang City, Jiangxi Province, China. The study also considers the actual specifications and relevant documentation of their current residences. Employing a descriptive analysis approach, targeted audience questionnaires, and qualitative research methods, the collected data is thoroughly analyzed.

The findings indicate that, in interior design interventions, priority should be given to barrier-free accessibility in all indoor spaces, ensuring personal safety. Design solutions should align the functional characteristics of each indoor space with the elderly's needs and preferences to truly address their requirements. Where possible, major changes to the familiar environment of the elderly's permanent residences should be avoided, preserving their existing habits. Instead, the focus should be on adding age-friendly facilities and selectively modifying local structures and spaces that directly impact their lives. This approach can effectively enhance their living spaces, ultimately improving their overall quality of life.

Keywords: Interior Design, Aging Society, Elderly, Existing Housing, Quality of Life

Introduction

As China's aging society emerges, traditional methods of providing elderly care face unprecedented challenges. The one-child policy, in effect for over 30 years, has resulted in fewer children in most Chinese families. Consequently, these families face a relatively heavy burden of caring for their elderly, especially in "4-2-1" families (two couples of aged parents, two young couples, and one child), where the young couples are the only children in their respective families. Internationally, the common practice is to establish government-funded nursing homes for the elderly. However, for Chinese families with the tradition of "raising children for old age," such practices are difficult to adopt due to Chinese cultural traditions and ethics. In the future, the primary residence for China's elderly population will likely remain their own homes, as home-based elderly care is the most suitable solution based on the country's conditions, regardless of whether they live with their children or independently.

In fact, home-based elderly care is the preferred choice not only in China but also in countries worldwide, including Western nations. Most seniors are happy to accept this option, while only those without family or income generally choose to live in collective social nursing institutions. Developed aging countries like Japan, the Netherlands, and Sweden have advanced elderly care institutions, yet most older individuals still prefer to live at home, indicating that the nursing environment must be constructed within residential housing.

In recent years, Jiujiang City, a third-tier city in China, has experienced economic growth and an accelerated aging urban population. In smaller cities, due to economic factors and traditional beliefs, home-based elderly care is more accepted by the general population. Most of these elderly individuals currently live in ordinary residences without special design considerations for their changing needs as they age. Over time, these ordinary homes gradually expose

various security issues and inconveniences. Demolition is not a viable option for these residences, as most have not reached the end of their useful lives, and demolition and reconstruction may negatively impact the seniors' emotional well-being by altering their familiar living environments.

Instead, adopting an "elderly-oriented" interior space design can enhance seniors' activity capabilities at home, extend their self-care years, and reduce their need for nursing care. It is crucial to discuss and study this topic, as it could have a profound impact on China's future family patterns and social harmony.

Research objectives

To study the use demand of the elders in rooms in Jiujiang City, China, for reference to the interior design of the residence.

Literature Review

Jiujiang, a prefecture-level city in Jiangxi Province, is a renowned city in southern China with a history of more than 2,200 years. The river of Jiujiang is 270 kilometers long from east to west and 140 kilometers wide from north to south, with a total area of 18,800 square kilometers, accounting for 11.3% of the total area of Jiangxi Province.



Figure 1 : Schematic diagram of the administrative divisions of Jiujiang City

Source: <https://www.jiujiang.gov.cn/zjjj/>

Jiujiang City has been awarded the titles “China's Excellent Tourism City”, “China’s Top 10 Charming Cities”, “China’s Top 10 Livable Cities”, “National Health City”, “National Garden City”, “National Forest City”, “National Model City of Dual Support”, and “the Most internationally Influential Tourism City”. Jiujiang City is a warm, open, and beautiful city, meanwhile, it is one of the most charming cities in China.



Figure 2 : Jiujiang City Landscape Map

Source: <https://www.jiujiang.gov.cn/zjjj/tsjj/spjj/>

According to the seventh census in 2021, Jiujiang City has a permanent population of 460.02 million, of which 812,900 are over 60 years old, accounting for 17.67% of the total population.

Table 1 Seventh Census 2021

In person, %		
Age	Population	Percentage
Total	4600276	100.00
0-14 years old	964298	20.96
15-59 years old	2823062	61.37
Over 60	812916	17.67
Including over 65	580674	12.62

Source: <https://www.jiujiang.gov.cn>

According to the “2019 National Economic and Social Development Statistics of Jiujiang City”, the annual per capita disposable income of urban residents was RMB 38,076, the per capita living expenditure was RMB 23,496, and the per capita living area of residents at the end of the year was 50.20 square meters. For the elderly people without a high income, their current economic conditions prevented them from changing to better housings. What’s more, based on their willingness, they prefer to continue living in familiar environments. Therefore, it is very necessary and urgent to optimize and upgrade the current ordinary residences using interior design.

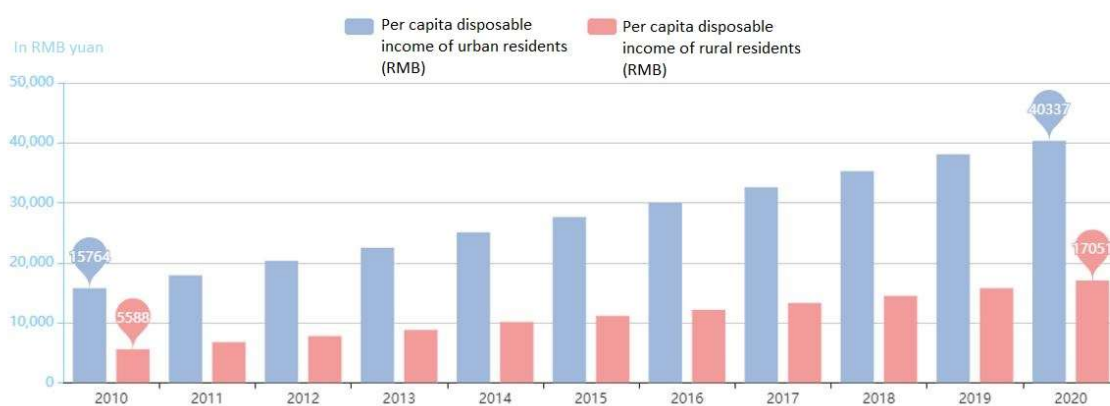


Figure 3 The per capita income of Jiujiang

Source: <https://www.jiujiang.gov.cn>

Dr. Du Du (2018) believed that China is entering an aging society with aggravating aging population situation year by year. Issues such as short conversion cycle, fast development speed, “aging come ahead of wealth” and many other problems are putting China under great pension pressures. Scholar Lu Mingxia (2016) believed that traditional culture and China’s current national conditions are restricting the change of pension models, and home

care will still be the main choice of aged care for a long time in the foreseeable future. Dr. Zhong Zhenya (2016) believed that although it is an internationally common practice for using government funds to build many nursing homes for the elders, such a practice is hard to become the mainstream practice for Chinese families.

Zhou Yanmin (2016) believed that against the historical background of the aging population in China, both new and old residential buildings in cities need to meet the user demands of the elders. At present, in the old residential buildings, residents have shown the tendency of aging or old age, which requires timely renovation to the housings to meet their basic needs in outing, traveling, living, and self-caring.

Burmeister OliverK (2010) believed that reasonable residential space arrangements can effectively avoid accidents for the elders and improve their daily life security. Faith Verity (2015) believed that safety for the elders is the priority in residential renovation design. We should make sure that the elders can understand the visibility of the residential environment; Gupta Rajat (2016) expressed that ensuring a comfortable indoor physical environment can enhance the physical and mental health of the elders.

Chen Shanshan and Li Jianhong et al. (2016) divided the functions of the indoor space environment into four categories: activity, social interaction, rest, and service-based functions according to the investigation of activity features of the elders. Li Qian (2011) initiated the research from comparing the existing old urban residential buildings to the actual needs of the elders, and systematically proposed suitable transformation suggestions for each functional space of residential buildings in the aspects of spatial details, functional dimensions, etc. Liu Dongwei (2015) and Zhou Jingmin (2016) et al. tried to analyze the compatibility of new residential buildings and facilities with the elders by using industrial components. Professor Bao Zonghua (2008) studied the principles and contents of housing reconstruction for the old aged. Drawing on the construction experience compatible to the elders of developed countries, Li Bo (2012) has put forward appropriate renovation methods for old residential areas to be suitable for the aged population. Hu Huiqin and Chang Xiaoxue (2018) have conducted a detailed study on the age compatibility modification to the space of old residential suites and the application of components, which offer a practical reference for the age compatibility renovation of existing residential buildings in Beijing.

Through the analysis of relevant studies at home and abroad, it can be witnessed that after the reform and opening up, significant changes have taken place in social, cultural, and economic fields, accompanied by rapid growth in the construction industry. To solve the contradiction between the population boom and housing shortage, many multi-story houses have been put into construction. With the aging national population, the existing housing fails to meet the home caring demands of the elders. After all, the reason lies in that the current housing design fails to consider the home care needs of the elders from a development perspective.

Large-scale demolition and reconstruction for unified planning and construction were once considered to be effective in solving housing shortage problems and improving housing quality. However, under the context of sustainable development, the national focus turned to the renovation of general housing for the elders and paid attention to the general needs of the elders in living, so that their old age care will not be constrained by locations. At present, our national economy is still under development and the economic strength of the nation cannot yet take the heavy burden of pensions. The country is not able to afford all care expenses for the old people, and neither can send them all to the nursing institution. Therefore, renovation to existing housing to make it compatible with the old aged can effectively extend the service life of the existing residence.

The elders are the main entity of using residences for the old-aged. Therefore, we should establish the idea of putting the old-aged as the core. Residences should fully consider elders' lifestyle, habits, hobbies, psychology, physiology, and other factors, to create a living environment for old people that are healthy, secured, convenient, and comfortable and meet various needs of the old people to the greatest extent.

The renovation capability of interior design is positively correlated with the quality of home-based caring,

which is aimed at extending the self-care ability of the elders, strengthening the adaptability of elders during home caring, and improving the life behavior trajectory at home so that it can be more compatible to the psychological needs of the elders. From the perspective of the living situation and economic condition of the elders, designing and transforming the existing houses will be one of the important ways to adapt to the home caring needs of elderly people in the future.

Methodology

The researchers employed a combination of literature review and questionnaire survey to investigate the interior design requirements of elderly individuals residing in ordinary houses in Jiujiang City, Jiangxi Province, China.

The literature review method involved collecting, identifying, and organizing relevant literature to gain a scientific understanding of the research topic. Primary sources included academic research articles, masterpieces, and high-quality journal literature related to the research questions, sourced from electronic databases such as China Academic Journal Network Publishing Database, Chinese Doctoral Dissertations Full-text Database, and China Yearbook Full-text Database. Additionally, the study incorporated policy documents, statistical data, and research reports released by governmental departments, such as the China Aging Problem National Commission, the Ministry of Civil Affairs, the Ministry of Construction, and the National Bureau of Statistics.

Qualitative analysis was applied to analyze collected data, including books, papers, national and local policies, laws, regulations, and map files, to understand China's aging society development characteristics, existing housing conditions, and the application of interior design in elderly residences within Jiujiang City.

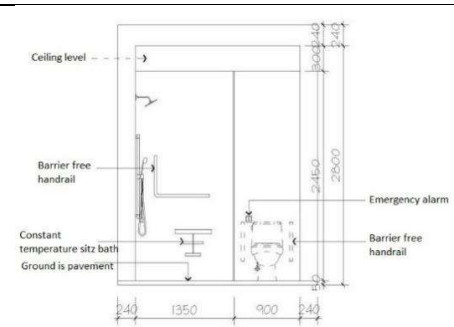
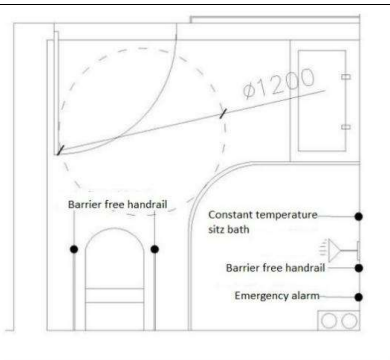

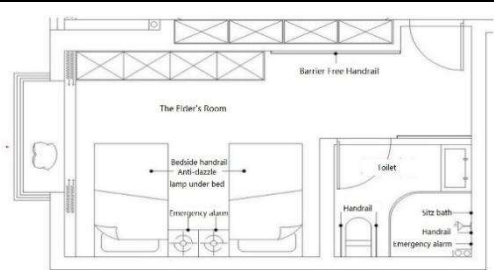
A questionnaire survey was also conducted to gather reliable data. The subjects were self-reliant elderly individuals aged 60 and above, living in their own homes in Jiujiang City, Jiangxi Province, China. A total of 300 eligible participants were selected for data collection. The questionnaire consisted of 45 single-choice questions addressing five aspects: basic information, physical and mental features, living status, smart home technology, and renovation intentions.

The questionnaires were mainly distributed offline due to the characteristics and physical conditions of the elderly participants. Distribution channels included on-site distribution at residential sites and distribution through friends to their family members or acquaintances. The participants completed the questionnaire independently.

Data analysis was conducted using mean, percentage, and standard deviation calculations from the questionnaire responses, as well as through the literature review. The goal was to obtain a clear understanding of the elderly individuals' perspectives, their current living conditions, and their expectations for the future. By integrating the real ideas and needs of the elderly with respect to interior design, this study aims to improve the quality of life for elderly individuals in China.

Results and Discussion

Table 2 Expert Evaluation of Interior Design Applications to Bathroom, Bedroom and Porch Space N=3

Picture	\bar{x}	S.D.	Description
	4.33	0.94	The intelligent bathroom, constant temperature sitz bath, and emergency alarm are used to ensure the safety of the elders.
	4.67	0.47	Lay anti-slip floor tiles and install many handrails for the elders to hold. Reserved over 1200mm wheelchair rotation space for later wheelchair use.
	4.00	0.82	The partition of the shower room is designed as a barrier-free rotating shaft door that can be pushed in both directions to facilitate first aid, and a shower bench (which can be folded) is set which can save space.
	4.00	1.41	The bedroom for elders should be larger than others if possible. It would be better to have an independent toilet.

Picture	\bar{x}	S.D.	Description
	4.67	0.47	Setting two 1.2m single beds for the elders to sleep in separate beds to help improve the quality of sleep for the elders.
	4.33	0.47	Two bedside cabinets are placed to facilitate fetching and putting items.
	4.67	0.47	The shoe cabinet can be used to put items on and serve as handrail support. Place a shoe-changing stool to facilitate the elders to change shoes for daily use.

Source: Kang Zhou

Based on the statistics of the questionnaire survey and Table 1 Expert Evaluation of Interior Design Applications to Bathroom, Bedroom and Porch Space, analytical results have shown that old people living in their current ordinary houses still have great demand for interior space renovation at present. What the elders need to focus on the most is the barrier-free passage in and between each space, the height difference of the ground, and the anti-slip function. While investigating the ranking of interior space design requirements, 48% of seniors regard bathroom design as the most urgent need, bedroom space was the next most popular choice for 32% of the elderly people, and 11% of the elderly people choose the porch space.

The researcher believed that the first thing to be done in space design lies in the barrier-free passage in and between spaces, ground height difference, and anti-slip function, which have prioritized the safety of the elders. Then, the functional features of each interior space are to be designed with combination of features and demands of the elders. Try not to make major changes to the indoor environment which the elders have long been living in or have already been familiar with. Instead, we should mainly increase the facilities suitable for the elders, and repair and improve the local structures and spaces that have negative impacts on the lives of the elders.

The theory of Universal Design was proposed by Ronald L. Ace, a professor at the University of North Carolina in the United States in the 1970s, aiming to apply to every user to the greatest extent. Barrier-free design is the basis of universal design, and universal design optimizes and improves barrier-free design, which signifies the transformation from differential treatment to residents to non-differential treatment. Both theories are based on Ergonomics.

We usually start from the function layout and design the residential space from aspects of traffic flow, function partition, and space quality. Spaces that satisfy life behaviors can be divided into the dining room, kitchen, bathroom, bedroom, hallway, living room, balcony, etc. To conduct basic behaviors, one needs a certain space and interface with security, comfortability, and privacy. Considering the discrepancies in physiological, psychological, and behavioral characteristics of the elderly people and differences in their age groups, the size, function layout, and furniture selection of these important spaces should be reasonably designed according to the actual needs of the elderly people.

The bathroom is the most frequently used area for the elders in their daily life. The sound insulation process shall be adopted to the wall to reduce the impact to the bedroom when someone is using the bathroom. Separate the dry and wet parts of the bathroom, lay anti-slippery tiles, and install more handrails to facilitate the elders to stand up and turn around. To ensure that the elders can be safer when taking bath, the intelligent toilet, constant temperature sitz bath, and emergency alarm were installed to strive to create much security and comfortability for the elders in the bathroom. A wheelchair-turning space of more than 1200mm should be reserved for the elders to use wheelchairs in the future.

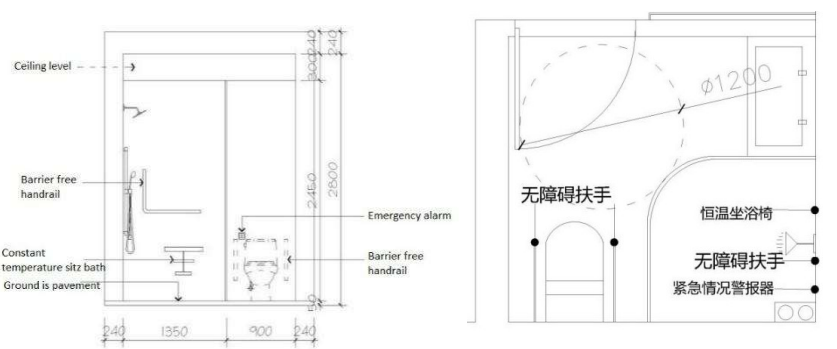


Figure 5 : Bathroom Floor Plan Bathroom Upgrade Plan

Source: Kang Zhou



Figure 6 : bathroom renderings

Source: Kang Zhou

The bedroom for elders should meet their needs such as sleeping, bathing, storing, and other daily activities. The bedroom for elders should be distanced from the bedrooms of other family members to reduce impacts and keep quiet. At the same time, the bedroom for elders should be close to the area for family public activity, which is

conducive to intergenerational communication among family members

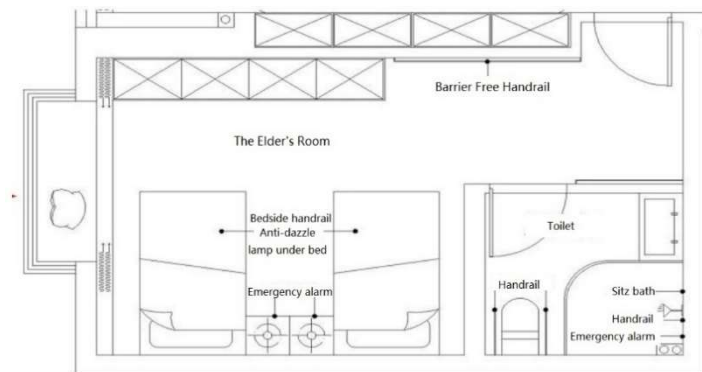


Figure 7 : Bedroom Floor Plan

Source : Kang Zhou

As the quality of sleep gradually deteriorates with aging, two 1.2m single beds are set for the elders to sleep in separate beds, which helps improve the quality of sleep for the elders and reduce the impact of differences in timetables, such as the time to get up or take a rest. Put two nightstands beside the bed, design adjustable brightness of the bedside lamp, and set an emergency alarm. In case of accidents, the elders can be close enough to reach out to the family for help. A line of automatically induced night lights is set at the bedside to avoid accidents caused by the elders looking for light switches at night and thus ensures convenience for the life of elders. Handrails are designed at the bedside and other places for the elders to get up take a walk.



Figure 8 : Bedroom renderings, Bedroom renderings

Source : Kang Zhou

The porch is the only way in and out of the house. Although the area is small, the frequency of use is high. Set up a shoe cabinet in the porch at around 850mm with a mesa and set up automatic induction lightings. This design is not only convenient for placing daily items but also serves as a handrail support. At the same time, a shoe changing stool is placed in the lower compartment of the shoe cabinet to facilitate the elders to change shoes and take shoes for daily needs.



Figure 9 : Entrance renderings

Source : Kang Zhou

Conclusion

The research purpose is to better the living quality of elders by analysing the demands of elders in Jiujiang City, China, and improving the current residence space of elders using interior design methods. The study has found that: 1. Barrier-free access to all indoor spaces and priority protection of personal safety are the top issues to be resolved in the process of design and renovation. 2. For designing, the functional characteristics of each space should be combined with the features and needs of the elders and should effectively satisfy their ideas. 3. Try not to make big adjustments to the indoor environment which the elders have long been living in and be familiar with. We should focus on increasing facilities for the aged, and only repair and improve local structures and spaces that do have actual impacts on the lives of the elders.

In this paper, under the background of an aging population, the residents' feelings toward using living room areas and rest transition areas in urban buildings were studied and summarized, as well as elders' behaviors and habits in functional spaces. From the perspective of users' living demands, this study conducted a series of questionnaire research on the elders as specific targets. And design practices were conducted targeting the space which got the most concerns from the elders. These research and practice results will serve as a reference for the elders in Jiujiang city to improve the quality of life in the existing houses.

At the same time, exploring diversified intelligent development of home furnishing can provide an idea for the design of age-compatible housing under the modern home-based old-age care model. In the 21st century, an era dominated by the Internet and intelligent technology, whether it is the home-based aged caring model or other models, people have higher requirements for comfortability and personalization in addition to the features and functional requirements of the general residences. It is necessary to continue to maximize the liveable life quality of safety, applicability, comfortability, health, and intelligence for the elders from more aspects of the space.

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