

# Study of the Interior Design Based on Elderly People's Psychological Behaviors and Requirements

Yu-xin Jiang<sup>1</sup>, Ai-li Wang<sup>2\*</sup>

<sup>1</sup>Xianda College of Economics and Humanities, Shanghai International Studies University, Shanghai 200083, China

<sup>2</sup>Beijing Company, Yango Group Co., Ltd, Beijing 100016, China

\*Corresponding author: Ai-li Wang, wangaili1@yango.com.cn

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**Abstract:** Nowadays, the elderly have become an increasingly large group of people in China, but still many problems exist in their living space. This paper explores the physiological and psychological behavioral changes of the elderly, studies their living space requirements, and tries to put forward targeted design strategies in response. Therefore, making a better and more reasonable living space for the elderly as well as improving their living quality, finally helping the development of elderly-friendly design in China.

**Keywords:** Interior design; Elderly-friendly design; Elderly's requirement

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## 1. Introduction

China is experiencing a rapid population aging situation, and the trend of an increasingly aging society might run through the 21st century. According to recent population studies, by 2035, the proportion of the aging population which is aged 65 and above will exceed 22% of the total population in China, while by 2050, the proportion of people over 65 may exceed 28%<sup>[1]</sup>. Under the impact of the "silver wave," how to combine the physiological and psychological behavioral needs of the elderly, and how to provide a better living environment for them has become a hot issue for Chinese society. Thus, the study of interior design based on elderly people's psychological behaviors and requirements has certain practical value for current society.

## 2. Analysis of the elderly's physiological and psychological behavioral changes

With the growth of age, elderly people undergo a series of changes in terms of physiological status, mental states, and psychological behavioral characteristics.

## 2.1. Physiological changes

With aging, the physiological functions of the human body degenerate constantly. The most obvious is the body shape change, such as rickets, hunchbacks, pigmentation, and silver hair. Besides, sensory system degeneration like vision, hearing, touch, taste, and smell directly impact the living quality and feelings of the elderly. Such as blurred vision caused by visual aging, and hearing loss or deafness caused by auditory aging. Amongst all, auditory aging is the most frequent problem for the elderly, at least 1/3 of the elderly over 65 undergo the inconvenience due to auditory aging in China <sup>[2]</sup>. Additionally, auditory aging also deepens the communication barriers between the elderly and others, leading to loneliness and a sense of inferiority, even resulting in bad mental states such as suspicion, melancholy, and irritability. Hearing loss can also degenerate autonomous ability and thinking ability <sup>[3]</sup>.

## 2.2. Mental changes

Compared with physiological changes, mental changes of the elderly need more attention and observation. With aging, the degeneration of brain nerve cells leads to cognitive ability loss, which is also one of the omens of Alzheimer's Disease <sup>[4]</sup>. Moreover, communication barriers caused by physiological changes, and lower sense of security caused by surrounding changes such as the death of friends at the same age, lead to mental problems, especially in the following aspects:

- (1) Existential anxiety: such as physiological disorders and death panic, the elderly tend to worry about their own survival which leads to depression and anxiety.
- (2) Loneliness: such as cognitive disorders and living alone, they tend to show depression and lower living enthusiasm.
- (3) Feeling of dependency: with the contact between the elderly and society decreases, they tend to require more response from their family. Otherwise, they will show suspicion, irritability, and depression.

## 2.3. Psychological behavioral changes

The activity periods and territories of the elderly are more regular than those of younger people. Their high-frequency activity periods are typically from 7 a.m. to 10 a.m., 2 p.m. to 5 p.m., and 6 p.m. to 8 p.m. <sup>[5]</sup>. Common indoor activities include cooking, eating, and resting, while outdoor activities often involve strolling. The activity territories consist of personal residences, communities, and public spaces. Personal residences offer the elderly private spaces that help process negative emotions, whereas communities or public places provide open and interactive environments, reducing the occurrence of negative emotions such as loneliness and anxiety.

## 3. Existing problems in the living spaces of the elderly

Elderly people in China are highly concentrated in economically developed areas such as the Yangtze River Delta and the Pearl River Delta <sup>[6]</sup>. In these regions, around 54% of the elderly live in residences that were built more than 20 years ago <sup>[7]</sup>. These residences suffer from “birth defects”—issues stemming from incomplete design considerations at the time of construction, along with evolving design experiences and regulations. As a result, several pain points have emerged, particularly in the following aspects.

### 3.1. Insecurity

There are numerous potential safety hazards in the daily lives of the elderly due to the deterioration of their physical abilities, such as risks of collisions and falls, which threaten their well-being. Many older residences,

where most elderly people live, have safety-related issues, such as steep staircases or bathrooms without anti-slip flooring, increasing the risk of falls. Moreover, unprotected wall corners can cause injury in case of a collision.

### **3.2. Inconvenience**

Due to the degradation of the elderly's physical functions, they are highly dependent on convenient and efficient living spaces. While residences built 20 years ago often featured hanging cabinets, the storage spaces are now too high to be easily reached, posing a potential fall risk when the elderly use stools to access them. Furthermore, unreasonable traffic flow and functional spaces increase the living burden for elderly individuals.

### **3.3. Less variable spatial design**

Rooms and functional spaces in older residences tend to be less adaptable, as walls, ceilings, and furnishings are fixed and cannot accommodate different life stages and needs. For example, narrow doorways and passageways create difficulties for the elderly when using wheelchairs or nursing beds, while small bathrooms pose challenges for barrier-free design.

### **3.4. Low intelligent system design**

Fall risks often lead to further injury or even death, particularly for those who live alone. When they fall and have no means to call for help, it delays effective treatment. Older residences are generally less equipped with intelligent systems or communication applications, limiting the elderly's ability to connect with the outside world, let alone facilitate direct observation from the outside.

### **3.5. Less emotional support**

After retirement, the elderly's social identity changes, and their connection with the public weakens. As a result, they tend to spend more time with their family than before, leading to stronger feelings of dependency on their family.

Old residences rarely consider the emotional needs of the elderly. For example, indoor public spaces like living rooms are often poorly designed, which leads to inadequate family interactions. Additionally, the color and material selections are frequently inappropriate, making it difficult to provide a sense of warmth and belonging for elderly individuals.

## **4. Design strategies based on the elderly's requirements**

Through the analysis above, existing problems in the living space of the elderly can be seen. In response, four design strategies are proposed as follows.

### **4.1. Create safe territory**

A series of security designs can be adapted to provide a sense of security.

#### **4.1.1. Design details**

The elderly are highly threatened by potential safety hazards like collision risk and fall risk. To decrease the occurrence of the potential risks, several design details should be considered.

Firstly, the corner construction of walls and furnishings. Sharp corners can be fatal when people fall onto them, so it is necessary to prevent sharp and vertical-angle corners, instead, filleted corners or corners

with protections can be used. Secondly, height differences should be avoided to provide wheelchair-friendly environments, gentle slopes can be used too. Thirdly, to avoid unexpected barriers to the indoor traffic flow which disturbs the elderly from walking around, furniture should be well collected or less designed. It has been discussed that the floor areas occupied by furnishings should be less than 50% in elderly people's residences <sup>[8]</sup>. Lastly, floor material selection is vital, especially for the kitchen and bathroom, the floor should be designed in anti-slip materials or with rough texture on the surface.

#### **4.1.2. Intelligent system**

With the development of modern science and technology, more and more intelligent facilities can be applied to the living space to ensure safety. Such as water or gas monitoring alarms, provide real-time monitoring, and prevent bad accidents when people forget to turn off the switch. Indoor video monitoring constantly monitors the actions of the elderly, alerts the alarm, or sends reports when abnormal actions occur. Sensor lights can be used to prevent difficulties when the elderly walk around at night.

### **4.2. Create a familiar and convenient environment**

As they age, the elderly's ability to adapt to new environments weakens, leading them to rely heavily on familiar surroundings that provide a sense of security. They often exhibit nostalgic and conservative mental states. Compared to younger people, the elderly tend to choose convenient, efficient, and familiar spaces. Living in such environments helps them maintain their independence and enhances their sense of self-identity. Therefore, targeted design proposals should be developed based on thorough design investigations, with an in-depth understanding of the elderly's living habits and requirements.

#### **4.2.1. Elderly-friendly scales**

Firstly, the width of doorways and passageways should be increased to 1.0 m and 1.2 m, respectively, to ensure accessibility for wheelchair users. The barrier-free design in the living room and bathroom requires at least one area with a diameter of 1.5 m to allow the wheelchair to move easily. Furthermore, the width of the aisle beside the bed should not be less than 80 cm to accommodate bedside care and nursing needs <sup>[9]</sup>.

Secondly, the height of switches, door handles, and worktops in the kitchen or bathroom should be relatively lower for wheelchair users. For example, the height of light switches should not exceed 1.2 m, and research suggests that the height of kitchen worktops for wheelchair users should be designed within the range of 690 mm to 840 mm <sup>[10]</sup>.

Thirdly, the traffic flow length from the bedroom to the bathroom and from the kitchen to the dining room should be short and direct. Designing the bathroom adjacent to the bedroom and the kitchen near the dining room can better accommodate the living needs of the elderly.

#### **4.2.2. Atmosphere creation**

For elderly individuals, the ability to perceive different functional spaces is weaker than their ability to detect changes in color or light and shadow <sup>[11]</sup>. Therefore, the application of various colors can enhance the elderly's sensory capabilities. According to previous research, elderly individuals prefer bright tones such as orange, green, red, and yellow over other colors <sup>[12]</sup>. Walls and decorations in these colors can create a more inviting living atmosphere for them. Additionally, using bright colors in different functional spaces or on guiding signs can provide a sense of security for elderly individuals.

Moreover, proper material selection directly impacts the creation of the atmosphere. Compared to stone and metal, which convey luxurious and calm qualities, wood and fabrics offer mild and gentle characteristics

that are better suited for the living spaces of elderly people.

### **4.3. Variable space design**

People have different living requirements at various stages of life. Therefore, variable space design should be employed to accommodate these diverse needs. For instance, transitions from independent walking to wheelchair use, as well as changes from normal vision to blindness, create specific requirements for scale and functional spaces. Designers should anticipate these changes and make proposals based on careful consideration of the user's potential future needs.

### **4.4. Emotional supportive design**

Elderly individuals primarily express their emotions through interactions with their offspring and are keen on family-oriented activities. Therefore, emotionally supportive design aims to create interactive spaces that foster family togetherness, enhancing the elderly's sense of belonging.

A living room with a larger area can accommodate family activities, allowing three or four generations to communicate fully in this space. The design of a Kitchen-Dining-Living (KDL) area facilitates long-lasting family interactions by integrating cooking, dining, and resting spaces, thus meeting the elderly's need for family engagement.

Decorations that evoke emotional resonance for the elderly, such as family photos and sculptures, can enhance the environment. Furthermore, incorporating beautiful houseplants not only improves the living space but also enriches the leisure time of the elderly. Using bright, warm colors and soft materials contributes to a cozy and peaceful atmosphere, promoting a positive mood for the elderly.

## **5. Conclusion**

In this study, the analysis of the elderly's physiological and psychological behavioral changes reveals the existing problems in their living space. In response, four design strategies have been carried out, hoping to provide certain theoretical support for the elderly's living space design projects, and to meet their requirements, thus improving their living quality and then promoting the harmonious development of our society.

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