

Renovation of Adapting Aging for Small Residential Based on Flexible Design Concept - Take the Old House in Wuhan University of Technology as an Example

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Received: 2 April 2022; Accepted: 24 May 2022; Published: 11 July 2022

Abstract:

With the social and economic development of our country, the elderly population has grown in large quantities, and many elderly people choose to stay at home for the elderly, but most of the design and facilities of old houses cannot meet the needs of contemporary elderly people to stay at home. From the perspective of flexible design, this paper discusses the necessity, related problems and specific measures for renovation of adapting aging for small residential, and after the field investigation, the renovation program of an old house in the West Courtyard of Wuhan University of Technology was design and improved.

Keywords:

Adapte Aging, Flexible Space, Flexible Design

1. Introduction

In recent years, the large growth of the elderly population has made the elderly's pension activities, pension environment, pension needs and other issues increasingly enter people's vision. Under the limited old-age resources, the old-age housing has become an important issue, but the current old residential environment cannot meet the needs of the elderly and their children for home care conditions, so we start from the concept of flexible design to explore the necessity of small residential aging renovation design and related issues and measures.

2. Conceptual Definition

2.1. *The Concept of Adapting Aging Design*

Adapting aging design refers to the design in the residence or in the public space such as shopping malls and schools, under the condition of fully considering the physiological functions, psychological conditions and action characteristics of the elderly, to meet the life and travel needs of the group that has entered the old age life or will enter the old age life later.

The main object of the adapting aging design in this article is the intellectual elderly who have a certain aesthetic pursuit. The principle is to take into account the deterioration of physiological functions and psychological state changes in the elderly after aging, and in the future under the changing circumstances, the existing old house of the elderly is designed and transformed.

2.2. *Flexible Design and Flexible Space*

Flexible Design refers to the design based on the concept of flexible, which can achieve the four purposes of satisfying people's non-essential activities, coping with the uncertainty of the external environment, allowing users to participate in the design, and leaving room for long-term development. In this article, as a supplement to the design of ageing, it is defined that the space that has been adapted for aging should be flexible and can adapt to the various stages and situations of the elderly.

Flexible space, also known as variable space, refers to considering the extension and expansion of space functions as far as possible in the design process, so as to maximize the space adjustment and make the space sustainable in the future. [1] It refers to the variable space that can be divided or used to a certain extent according to demand, and can also be opened, closed or moved at any time according to the needs of use. The design principle of flexible space is based on the need to use functions, so that the use of space can be maximized and can be used efficiently both now and in the future. [2]

3. Conceptual Definition

3.1. *Aging Situation*

In recent years, China's aging level continues to rise, the elderly population continues to grow. Since 2001, China has officially entered the stage of rapid aging. According to the demographic data released by The Ministry of Civil Affairs of China in 2010, the proportion of the elderly population reached about 8.5% at the end of 2009, and the number reached more than 113 million, an increase of about 3.22% over the same period in 2008. By the end of 2019, the national population over the age of 60 reached 253 million. [3] The large increase in the elderly population has created a large amount of demand. Compared with the elderly population in the past, the newly increased elderly population has a stronger demand for a better and safe old-age life, and the requirements are also constantly increasing.

At the same time, with the acceleration of the urbanization process, the scale of empty nesters has been expanding. The National Office on Aging disclosed that the empty nest elderly will reach 118 million in 2020, and it is expected that by 2030, the empty nest elderly will exceed 200 million. The "2021 Community Home Care Status and Future Trend Report" pointed out that as the family structure tends to be

miniaturized and core, the proportion of the elderly living with their children is gradually declining. According to randomly sampled survey data, 65.5% of the elderly choose to live independently (one person lives alone or with their wives), only 26.8% of the elderly currently live with their children, and even in the elderly group of 80 years and older, the proportion of the elderly living independently has also reached 48%. In addition, 44.5% of the elderly are more inclined to live in ordinary residential areas, most of them are young age groups of the elderly (60 to 80 years old), they think that they are still in good health, can take care of themselves, they can also participate in community activities to obtain psychological satisfaction; the elderly are more inclined to professional pension apartments, an important reason for which is that the elderly have a higher demand for pension conditions. [4]

In summary, the number of elderly people in China is large, and the proportion of the elderly living alone is gradually rising, and the transformation of pension housing is imminent.

3.2. Old residential situation

At present, domestic scholars do not have a clear definition of the concept of small apartments, small apartments generally refer to the construction area of one-bedroom rooms at about 60 square meters, the construction area of two-bedroom rooms is below 80 square meters, and the construction area of three bedrooms is below 100 square meters. [5] This day, small apartments are still one of the most widely used forms of apartment in China.

Influenced by Confucian culture, the Elderly in China have a stronger sense of dependence on the family, and they are more inclined to choose the familiar small-family house to stay at home than to the nursing home. However, under the development of the times, the old houses that the elderly are accustomed to living in are often difficult to meet the needs of today's elderly people to live at home due to their own insufficient design considerations or the disrepair of facilities. The lack of flexible design concepts in the design of old houses makes it impossible to adapt to different pension situations. For example, unreasonable apartment space adversely affects the physical and mental health of the elderly; ordinary dining tables and desks are not suitable for the elderly with reduced mobility; and the renovation of elevators in old houses brings benefits to the elderly on high floors and physical disabilities, but the corresponding barrier-free access The construction of the old house is still incomplete; the current width of the aisle of the old house cannot meet the needs of wheelchair access.... It can be seen that the introduction of the concept of flexible design, fully considering the different stages of the old-age, and achieving the sustainability of the design are the necessary links in the transformation of the current home-based old-age housing.

3.3. Relevant Policies

The Ministry of Civil Affairs, the National Development and Reform Commission and other nine departments jointly issued the "Guiding Opinions on Accelerating the Implementation of the Home Aging Renovation Project for the Elderly" [6], which proposes that it should comply with the willingness and trend of the elderly for home care, meet their needs for home life care, living and walking, rehabilitation and nursing as the core, improve home life care conditions, enhance the safety, convenience and comfort of home living facilities and equipment, and improve the quality of home care services. We should persist in adapting measures to local

conditions, proceed from the reality of unbalanced development between urban and rural areas and regions, speed up the work according to local conditions, and not engage in one-size-fits-all, and do not engage in increasing the number of layers, so as to put an end to “image projects” that are divorced from reality. [7]

4. Living Conditions of the Elderly

4.1. Three Stages of the Elderly

Theoretically, the old-age care of the elderly can be divided into three situations: independent old-age care, mutual assistance for the elderly, and nursing old-age care, corresponding to the three stages of the active elderly, the advanced ages elderly, and the disabled elderly (Figure 1). That is, in the period of energetic elderly (generally in 60 to 70 years old), the elderly have good physical function, have the ability to live independently, and can take care of their daily activities completely. At the stage of the elderly (generally 70 to 80 years old), the physical functions of the elderly gradually deteriorate, and independent living will be there. A certain degree of inconvenience requires the help of others; when it comes to the stage of the disabled elderly (generally 80+), it may be difficult for the elderly to take care of themselves at this time, and they must be cared for. At the same time, with the change of stage, the psychology of the elderly will also change.

The actual situation will be more complicated, the elderly may have a variety of chronic diseases, different physical conditions of different elderly people, and different personalities. Based on this theory, we will fully consider the adjustability of the design space and the sustainability of time, so that the pension housing can adapt to different pension situations and the multi-faceted needs of different elderly people.



Figure 1. Three stages of the elderly.

4.2. Pain Points in the Life of the Elderly

Lack of awareness of aging:

The deterioration of the physical functions of the elderly will bring many inconveniences to their daily lives. The old houses used to living by the elderly are less suitable for aging, and at the same time, the focus of life of families living with the elderly is often more inclined to young people. According to the survey, less than 30% of families believe that their homes need to be adapted to aging, most people have no concept of ageing transformation, and the frugality and nostalgia of the elderly also make them less willing to transform. It adds a lot of risk to their lives.

Injuries caused by falls and bumps:

In our team’s survey, at least 36% of the elderly who have had a fall at home in the past three years (Table 1) and at least 84% of the elderly who have experienced being

bumped (Table 2). Stairs and toilets (bathrooms) are the hardest hit areas for the elderly to fall, and the handrails and anti-slip facilities of these families are not perfect, and once they fall, they will cause great harm to the elderly. Bumps can happen anywhere, tables and chairs, cabinets, corners of beds, doors... All are at risk (Figure 2). Young people are light and energetic, but the elderly become clumsy after the deterioration of physical function, and the original warm house may no longer be suitable for the elderly, but become a dangerous place full of obstacles. A simple fall or bump can lead to serious injuries, turning an energetic elderly person who could take care of himself into an incapacitated elderly person who needs to accompany him.

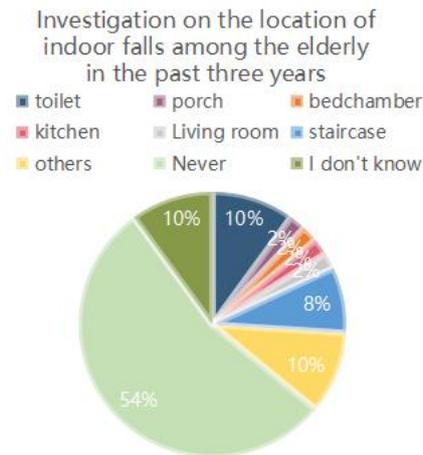


Table 1. Investigation on the location of indoor falls among the elderly in the past three years.

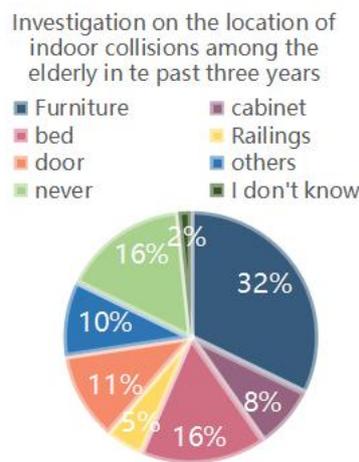


Table 2. Investigation On the past three years of home elderly bump situation.

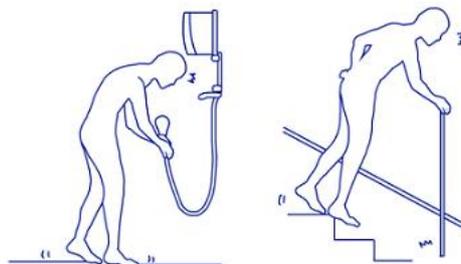


Figure 2. The elderly fall situation.

The home environment cannot meet the long-term care for the elderly needs:

The three stages of old-age care (the energetic elderly, the advanced ages elderly, and the disabled elderly) have different needs for the elderly, but the old houses are

difficult to achieve the sustainable development of the design due to the lack of flexible design considerations. At the beginning of the design, due to the principle of economic application, the old residence often gave priority to meeting the living needs of the time, and the long-term pension was not considered enough. For example, many elderly people can easily complete a variety of recreational activities or life behaviors at the beginning of retirement (the stage of the active elderly), but in the stage of needing wheelchairs or nursing services (the advanced ages elderly, the disabled elderly stage), due to the unreasonable home environment, the wheelchair driving or nursing difficulty is increased.

Emotional needs are not being noticed:

Changes in the physiology of the elderly will also lead to changes in their psychology, the degradation of physical functions leads to the sense of disparity caused by the inconvenience of life, the decline of memory, the torment of illness, and the loneliness that is gradually disconnected from the times. These are all psychological changes that older people may experience. Through the survey, it was found that only 30% of the elderly are willing to actively contact new things, and about 40% of the elderly people focus their lives on taking care of the younger generations, which has played a positive role in regulating emotions. But there are still some elderly people who often feel lonely and tired, it is difficult to self-control, and it is necessary to pay attention to the psychological changes and emotional needs of the elderly.

4.3. The Purpose of the Aging Renovation of the old House

On the premise of controlling a certain cost, the aging transformation of the old house is to make the elderly participate in the design, use flexible design concepts and design methods to improve the living environment of the elderly, so that it adapts to the various situations and stages of home care and makes the life of the elderly safer and more comfortable.

5. Ageing Adaptation Measures Based on Flexible Design Concepts

5.1. Layout Modification

Ageing residential layouts should be transparent and concise. During our field visits, we found that for the sake of maximizing the number of users, the living rooms of old residences are often dark and narrow, and many rooms are arranged around them, and the lighting and ventilation conditions are not conducive to the physical and mental health of the elderly. The layout of the living space of the elderly in the house should be transparent and direct, ensuring adequate ventilation and lighting.

Streamlines should be simple and effective. From entering the household to work, entertainment, rest, diet, living, and aging layout should fully consider the life flow of the elderly and respect the living habits of the elderly.

In the transformation, the layout of the aging should also take into account the whole life cycle of the elderly, as far as possible the layout is open and flexible, in order to achieve spatial compatibility, such as setting up an open bedroom and guest room to adapt to the elderly need nursing care or the need to use a wheelchair; set up an independent bathroom for the elderly, to accommodate the elderly and other family members of the different living habits. From a safety perspective, the adapting aging residential layout should also avoid sharp angles that may lead to bumps, and do not

set up too small paths as much as possible to ensure sufficient use space under different circumstances.

5.2. Suitable for Aging Furniture

Due to the changes in the body functions and life scenes of the elderly, according to ergonomics and consideration of the behavior habits of the elderly, aging furniture based on the concept of elastic design should still pay attention to the sustainability of time and space, mainly from the three aspects of scale, shape and material.

Wheelchairs on the market are less than 650mm wide, the seat height does not exceed 500mm, and the board surface is at least 50mm off the ground. Therefore, the height of the drawer under the dining table and desk used by the elderly should be appropriately raised. In the elderly's weekday work and rest, due to the decline in sleep quality leading to frequent night up, in order to reduce the difficulty of getting up and the possibility of falling, it must be noted that the height of the bed should not exceed 500mm, and for the elderly to use the wheelchair situation, the height of the bed is most suitable at 450mm. (Figure 3).

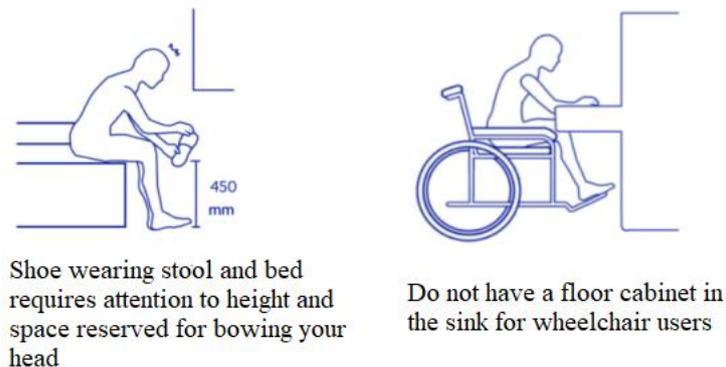


Figure 3. The height of the bed.

From the styling point of view, the edge of furniture suitable for the elderly must be chamfered to avoid sharpness; the aging dining table and desk can make a desktop that can be concave inward, so that the elderly can get closer to the items on the table and improve safety; the handle of the floor cabinet is built-in as much as possible to avoid bumping by the elderly; the cabinet handle is reasonably set to save the elderly (Figure 4); Higher furniture (such as wardrobes, bookcases, etc.) is best fixed. Reduces the risk of possible collapse.

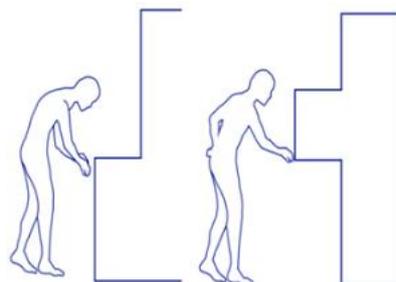


Figure 4. Location of cabinet hand.

From the material point of view, the solid wood is suitable for making furniture because of its simple texture, environmental protection and stability, and easy processing properties. The material of the mattress is preferably natural latex mattress,

which is made of natural and organic materials, moderate hardness, and the smell emitted by latex also helps to drive away mosquitoes and alleviate insomnia symptoms, which is suitable for the elderly. [8] In addition, fabric sofas and cushions are more suitable as furniture materials that touch the skin because of their comfortable touch, strong breathability, safety and environmental protection.

5.3. Street Design

The setting of the width of the road should be based on the principle of flexible design, and the design should be based on the size of pedestrians and general wheelchairs to meet the needs of the user at different stages of the road. Most of the total width of wheelchairs on the market does not exceed 650mm, and the size of the indoor sidewalk width is controlled at more than 750mm due to space limitations in small houses (Figure 5). The whole house should not be set with a threshold, on the settlement of the bathroom and kitchen, it can be treated into a slope to reduce obstacles, while laying a non-slip floor on the ground, further Reduce the possibility of slipping in the elderly. In addition, in some key activity spaces (such as bedside, bathroom, walkway, etc.), handrails must be set up to provide assistance for the elderly's movements.

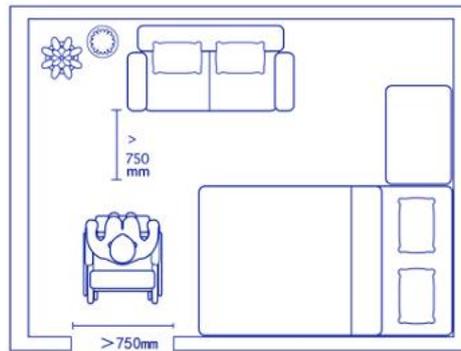


Figure 5. The size of the indoor sidewalk.

5.4. Mood Creation

In the process of transformation, the overall color configuration should pay attention to avoid large areas of cool colors and colors with high saturation. Cool colors can burden the psychology of the elderly, making them more likely to feel dull and depressed; a large number of high-saturation colors or strong contrast colors can easily stimulate the vision of the elderly and make their eyes more likely to fatigue. [9] The lighting arrangement in the house should be as soft as possible and not dazzling, and more natural light in warm colors should be selected to meet the needs of life and learning while making the elderly feel calm and relaxed. In addition, the good use of green plants and ornaments can not only be used to flexibly divide the space, which is conducive to increasing the elasticity of space, but also easier to create a warm and harmonious atmosphere of ageing.

5.5. Suitable Aging Kitchen

Manipulate the active space:

In the aging kitchen design, based on the analysis of different use behaviors (Figure 6), the kitchen operation space should be moderate, and priority is given to countertop forms suitable for wheelchair elderly and easy to continue.”

Behavior patterns

space	Behavior patterns	Activity splitting	Functional partitioning	Time and frequency	Requirements analysis
kitchen	cook	Materials taken from the refrigerator ↓ Ingredient cleaning, tool cleaning, operator hand washing ↓ Cutting of cutting board, pressing and stirring, and blending of accessories ↓ Blanched/ open heating / steaming / baking / microwave heating ↓ Plate and serve rice	Storage area Cleaning area Preparation area Cooking area Storage area	Breakfast, lunch, dinner, supper	Take the ingredients safely and conveniently The water flow and the temperature are suitable, the lotion and tools are easy to get The body is comfortable, the meat and vegetables are separated from the raw and cooked, and the dishes are clearly arranged Ventilated, well lit, easy to operate, condiments within easy reach Dishes and chopsticks are easy to pick up
	After a meal	Dish washing, kitchenware washing, table cleaning, countertop cleaning ↓ Leftovers are stored in the refrigerator, utensils are stored, and tools are stored ↓ Dirt and waste are put into the bin	Cleaning area Storage area Cleaning area		The cleaning tool is easy to pick up and drains after cleaning Place items conveniently and safely, keeping them dry and hygienic All sorted into bins

Figure 6. Kitchen behavior analysis in the elderly.

For example, the U-shaped and L-shaped layout can enable the wheelchair to complete a variety of operations with a small rotation amplitude. It is advisable to set up high and low countertops. At the same time, in order to facilitate rotation, the width between the operating tables on both sides should not be less than 900mm. We can use the local empty design under the washing sink and stove, which not only to ensure the space of wheelchair rotation, but also to facilitate the wheelchair close to the equipment, improve the safety and comfort of operation. The bin should be close to the cleaning table and opened and closed by a switch to ensure that the food waste is hygienically and conveniently disposed of. [10]

The design of the storage space:

The function of kitchen storage is more complex, and in actual operation, the storage space is often arranged to meet the functionality of different operating areas (see Figure 7).

In the locker, the hanging cabinet handle can be placed on the lower edge of the cabinet door, and the floor cabinet handle is placed on the upper edge of the cabinet door, and it is recommended to use the lifting basket, which make the elderly easy to take things. Detachable storage devices such as storage racks or hooks shall be readily accessible. In addition, full use of space storage should be made, which is also the embodiment of maximum efficiency in the principle of elastic design. For example, the corner parts of the countertop are difficult to reach, but create a stable, convenient storage space. [11]

Lighting and ventilation:

The washing tank is the longest and most boring to operate, and the washing pool should be arranged in a windowed and well-lit area as much as possible. The heavy oil and fume cooking method of Chinese kitchen makes ventilation and fire fighting particularly important. For the elderly, in addition to the natural ventilation of the kitchen window should be guaranteed, the mechanical exhaust should also be strengthened to ensure that the smell of oil smoke is dissipated in time. In addition to the range hood, the aging kitchen should also be equipped with an exhaust fan and intelligent smoke alarm device.

Consider multiple use cases:

Traditional elderly people are mostly not accustomed to eating out. In the design of residential buildings suitable for aging, the kitchen should be fully valued because of its highest risk and great impact on the quality of life. So, we should still take into account the possible changes in the living conditions of the elderly, respect the living habits of them, and carry out flexible design of space and time for the size of the kitchen and the layout of household equipment to adapt to the needs of kitchen use in different situations. We should still design the kitchen size and equipment layout in space and time to meet the needs of different situations.

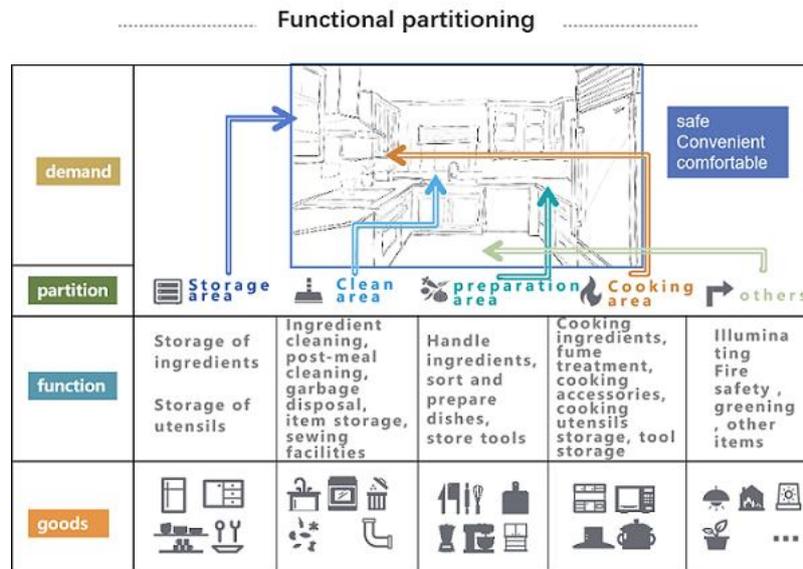


Figure 7. Kitchen Item Partition Analysis.

5.6. Details

For other design details that can increase the happiness of the elderly, the author has the following summary:

a. Add photo walls or works walls. The position that photo wall puts should not be too high or too low, can be put in the background wall of sofa, dining room, study, bedroom or stair side commonly, facilitate the old man to show and recall.

b. Set up suitable plant greening landscaping. It can be combined with the interior decoration style, choose bamboo, mint, orchid and other suitable indoor green plants, indoor green area at most should not exceed 10% of the living area, otherwise it will make the space feel depressed and not easy to be remade flexibly.

c. Make good use of interior decoration paintings. Interior decoration paintings need to be matched with the interior decoration style in order to achieve the visual effect of “icing on the cake” and “harmony and unity”.

d. Cooperate with smart home. In the setting of the entrance door, the use of smart locks, the use of fingerprints to unlock the way, the elderly forget to bring the key can also enter the house; in the whole house to install an alarm system, to ensure the safety of the elderly, to enhance the sense of happiness of the elderly; The whole house adopts an intelligent ventilation system to control the temperature and humidity of the whole house, so that the whole house can maintain a comfortable environment.

6. Case Studies

6.1. Background of the Case

This case is located in the Staff Dormitory Area of West Courtyard, Wuhan University of Technology, Wuhan City, Hubei Province. The resident is a retired teacher who lives alone, with a daughter and three adopted children, both in other places, only on holidays to visit, the resident home also need to entertain the occasional visit of friends and students.

The resident is a retired teacher living alone, with a daughter and three adopted sons, all of whom are out of town, only visiting on holidays, and the residents also need to entertain occasional friends and students. The old man's hobby is to paint oil paintings, cheerful personality, good health, and basic self-care ability.

The case is located on the 7th floor of the old residential unit building, the facilities are old, there is no elevator, and it is inconvenient to go up and down the stairs. The total area of the residence is about 114 square meters, with four bedrooms, one living room, two bathrooms and three balconies, of which one large room has been transformed into two small rooms. The living room is located in the middle of the house, with steps between it and the entrance, and both are seriously insufficient in ventilation and lighting, and There is no restaurant; due to the lack of storage space, the study is used to store debris, resulting in waste of space; the bathroom space is small and poorly ventilated, there is no anti-slip measures; the dynamic streamline of the kitchen is unreasonable; Indoors lack of activity space and safety facilities, insufficient storage space, and chaotic placement of items.

6.2. Transformation Analysis

Spatial and streamlined transformations:

In the spatial streamline design, it is presented in the form of the living room as the center and the rest of the rooms diverging distributed. The living room is the common area, and the other rooms are private spaces (Figure 7 and Figure 8).

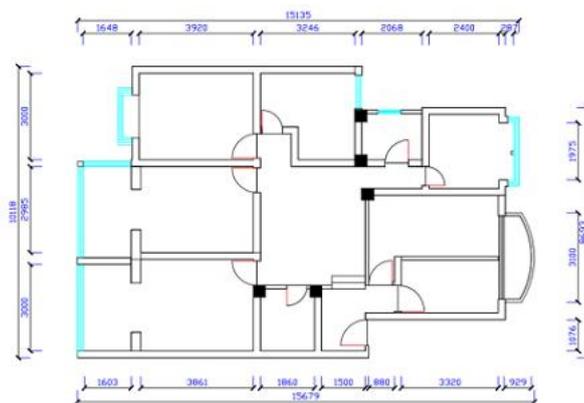


Figure 7. Before the renovation of the old house in the west courtyard of Wuhan University of Technology.

also can bring people excellent foot feeling, and in the elderly alone when accidentally falling, cork flooring can provide a great degree of cushioning effect. In the bathroom, kitchen is more humid to consider the use of anti-slip bricks in the waterproof place, it is added to the corundum structure of alumina in the firing, so that the flat brick surface after cooling, the formation of a uniform, fine dot-like concave and convex glaze, so that the friction will be greater, play a better anti-slip effect, can greatly ensure the safety of the elderly.

Furniture design:

In this case, based on the concept of flexible design, a series of furniture suitable for the elderly are designed to take into account the living conditions of the elderly living alone, children visiting, wheelchair use, and need for care.

The living room uses simple wooden furniture with sleek edges that ensure safety. A simple lounge chair is set up on the balcony, and a washing machine and automatic hanger are set up on the other side to reduce the inconvenience of washing and drying clothes for the elderly. The restaurant's integrated sideboard and retractable folding table not only meet the needs of the elderly living alone for easy cleaning, but also open the table when guests visit, it will become a six-person table for many people to use.

The master bedroom mainly has the function of resting and changing clothes. The height of the bed is 450mm, and the head of the bed is equipped with an armrest, so that the elderly can borrow power when they get up from the bed. And equipped with a four-wheel steering bed table, which can not only provide the elderly to work in bed, read books and eat, but also facilitate nursing care when the elderly need to be bedridden. The concave edge shape is conducive to the elderly closer to the desktop, more secure. In addition to the wardrobe set up next to the master bedroom bathroom to facilitate the elderly to change clothes after washing, the rest of the part is also set up as a suitable size of the locker. Considering that the elderly still have the habit of watching TV in the bedroom, the master bedroom is also placed with a TV set, and the supporting TV cabinet is only 300mm wide, which does not hinder the wheelchair from passing after satisfying the simple storage function.

The arrangement of the master bedroom supporting bathroom furniture also pays attention to the use habits of the elderly and flexible design. The washing table does not have a floor cabinet, and the space under the stage is abundant, which can be used to facilitate the use of wheelchairs, and can also be used to place tools such as water basins and foot washing buckets. There is also a bathroom cabinet for other toiletries. In addition, the washstand, toilet, shower are set up with armrests, and bath chairs are also set up in the bathing area to ensure the comfort and safety of the elderly during use.

A smart refrigerator is set up at the entrance of the kitchen to facilitate the elderly to pick up the food. U-shaped floor cabinet is convenient for wheelchair turning, high and low countertops make the elderly can be more adapted to the different heights of stir-frying and washing dishes, cooking mesa contains rice cooker and oven, the streamline is smooth, in the limited space, the elderly can take the most convenient to take the required items and a variety of cooking operations; the washing table is set at the window, so that the elderly in the boring washing, processing at the same time, can also be happy mood. The drawer-type trash can next to the washing table is convenient for discarding waste and also ensures hygiene. Other moderately high-

profile one-line hanging cabinets and various storage devices also expand the storage space in the kitchen. (Figure 9).

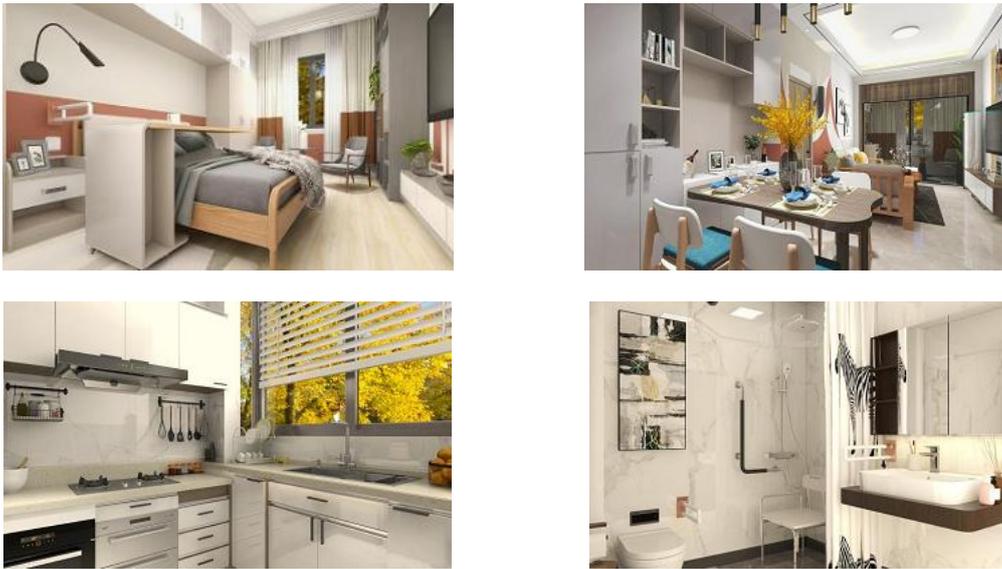


Figure 9. Renderings of the master bedroom, dining room, kitchen and bathroom after the renovation.

Considering that the elderly as intellectuals and artists have the need to read and write, the furniture arrangement of the study room is also designed with a desk suitable for the elderly, the edge of the desktop extends inward by 5cm, and the net height under the table is about 65cm, which can help the elderly get closer to the desktop. (Figure 10)



Figure 10. Renderings of the desk design.

In addition to the main activity space for the elderly, the furniture of other second bedrooms and bathrooms is also safe, harmonious, concise and practical, and the size is suitable for cleaning. (Figure 11).

Mood creation:



Figure 11. Renderings of the study.

Lighting plays a very key role in the aging of the residence, reasonable lighting design can not only play a role in separating different functional spaces, creating different atmospheres, but also make the elderly's life more convenient, the mood is more comfortable. In the choice of lamps and lanterns, this scheme selects lamps with uniform color and brightness without glare, so as to avoid causing the elderly to make wrong visual judgments and lead to unnecessary bumps. In terms of the brightness of the light, the bedroom light illumination is about 200Lx, the study light illumination is 1000Lx, and the illumination of the corridor night light is 10Lx. On the color temperature of the light source, adjustable yellow and white light is selected to meet the needs of different lighting. (Figure 12, Figure 13)



Figure 12. Living Room Renderings.



Figure 13. Photo Wall Renderings.

Combined with the case of this house, considering that the occupants are old people who are art practitioners, the walls are painted with geometric patterns in comfortable and gentle colors, and beautiful vision of "mountains are high and the water is long" and "the moon is clear", we add a photo background wall in the study room, carry the good memories of the elderly, and soothe the lonely mood of the elderly living alone. Green plants are placed in windows, balconies, living rooms, etc., adding a little fun to the life of the elderly, and it is to relax. The interior of the house is also mostly round and rectangular, on the one hand, it is used to enrich the space, giving a soft and warm visual effect, on the other hand, it is also contrasted with the hard decoration to achieve a unified and harmonious effect.

7. Conclusions

According to the current situation of aging in China, the author believes that it is necessary to start from the housing to create a more livable environment for the elderly. It is of great significance to pay attention to the suitable aging design and its elastic space transformation. The majority of designers should be based on the concept of flexible design, from the physical and mental health of the elderly, more safe, comfortable, convenient, harmonious design and transformation of the residence, to create high-quality, high-level living space for the elderly.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding

This work was supported by the Independent Innovation Fund Project of Wuhan University of Technology, grant number 216616003.

Acknowledgments

The authors would like to acknowledge Wuhan University of Technology, teacher Zhongwen Yu for their guidance, the members for their efforts, and sincere gratitude for the Independent Innovation Fund Project of Wuhan University of Technology for their strong support of the funds.

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