Research on Individualized Design of Residential Space under the Background of Population Aging

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Abstract: Under the background of the increasingly serious aging population, how to create a comfortable, safe and personalized living space for the elderly has become the focus of social attention. Based on the in-depth analysis of the living needs and behavior characteristics of the elderly, this paper discusses the basic principles and strategies of the design of the elderly living space, and puts forward the concept and method of personalized design on this basis. According to the research, personalized design should be based on the individual differences of the elderly, combined with multi-disciplinary knowledge such as psychology and ergonomics, and realized by intelligent means. The paper also shows the practical application and effect of personalized elderly living space design through case analysis, and builds the corresponding evaluation system. Finally, this paper summarizes the main views and conclusions of the research, and prospects the future research direction.

Keywords: Population Aging, Aged Living Space, Personalized Design

1. Introduction

Worldwide, population aging has become an irreversible trend. With the improvement of living standards and medical technology, people's life expectancy is generally extended, resulting in the proportion of elderly people in the total population continues to rise. Not only in the Western developed countries, but also in some developing countries, the aging phenomenon is becoming increasingly serious.

In our country, the speed and scale of population aging exceeds that of most countries. Decades of family planning policies, coupled with rising living standards and improved medical conditions, have led to a rapid increase in the proportion of elderly people. At the same time, with the acceleration of urbanization and the increase of young labor flow, the traditional family pension model is challenged, and the demand for old-age living space is more urgent. With the increase of the elderly population, it is particularly important to create a safe, comfortable and convenient living environment for the elderly. The design of living Spaces traditionally dominated by young people or families cannot meet the special needs of the elderly, such as barrier-free access, easy-to-use equipment and homes. This brings challenges to the design of age-appropriate living space.

2. Residential Needs and Behavioral Characteristics of the Elderly

With the decline of physiological function, the elderly need more convenient and safe living environment, such as barrier-free design, non-slip floor tiles and so on. At the same time, the changes in the psychological level of the elderly require that the living space can provide emotional support and security, and enhance the psychological satisfaction of the elderly. Understanding and respecting the habits of the elderly is the key to creating a comfortable living space, taking into account their daily activities and preferences. Therefore, the design of age-friendly living space should comprehensively consider the needs of the elderly in terms of physiology, psychology and living habits [1].

2.1 Physiological Changes and Housing Needs of the Elderly

With the growth of age, the physiological functions of the elderly gradually decline, such as vision, hearing and mobility decline. This makes them need to pay special attention to some design details in the living space, such as sufficient lighting, clear sound, convenient access, etc. In addition, some

auxiliary facilities such as handrails and non-slip floor tiles are also the focus of consideration [2].

2.2 Psychological Changes and Housing Needs of the Elderly

In addition to physical changes, the psychological state of the elderly can also change. They may feel lonely, anxious or depressed and therefore need more space to socialize and communicate. A warm, comfortable and safe space design can help the elderly build self-confidence and increase social activities, thereby reducing psychological stress.

2.3 The Relationship between Old People's Living Habits and Living Space

Different elderly people have different living habits and daily activity patterns. For example, some elderly people like to get up early and walk, while others like to read or watch TV indoors. Therefore, understanding and respecting the living habits of the elderly is crucial to creating a living space suitable for them. For example, provide them with easy to use kitchen facilities, easy to read lighting and easy to clean toilet design, etc.

3. The Basic Principles and Strategies of the Design of Age-Appropriate Living Space

The design of age-appropriate living space is committed to creating a safe, comfortable and convenient living environment for the elderly. The design should fully consider the physiological and psychological changes and behavioral habits of the elderly, ensure barrier-free access to the space, provide sufficient natural light and appropriate temperature, reduce noise interference, and maintain air circulation [3]. At the same time, pay attention to safety, prevent accidental injuries, and set up an emergency call system. A comfortable environment helps to improve the quality of life of the elderly.

3.1 Barrier-free Design

In the aged living space, barrier-free design is very important. The entrance and exit should be flat, avoid the height difference, and ensure that the elderly with wheelchair or walking difficulties can pass smoothly. Walkways and toilets should also be wide enough for the elderly to pass and turn around [4]. In addition, the layout of the furniture should avoid the formation of barriers to passage and keep the space unimpeded.

3.2 Security Design

Security is a core element in the design of living space for the elderly. Since the elderly may have mobility difficulties or problems such as vision and hearing loss, special attention needs to be paid to preventing accidental injuries. This includes the use of non-slip, fire-resistant materials, the installation of necessary guardrails and anti-collision angles, and the installation of emergency call systems. In addition, the lighting should be sufficient to avoid dark corners and dead corners of sight to improve the overall safety.

3.3 Comfort Design

A comfortable environment helps to improve the quality of life of the elderly. In terms of lighting, adequate natural light and artificial lighting should be ensured, while avoiding direct sunlight and strong reflection. In terms of temperature regulation, the indoor temperature should be kept appropriate to avoid too cold or too hot. In sound design, noise interference should be reduced, such as the use of sound insulation materials, reasonable layout of doors and Windows [5]. In addition, air quality is also very important, and indoor air circulation should be ensured to avoid air pollution.

3.4 Health Design

The elderly living space should pay attention to the health needs of the elderly. The interior can be appropriately arranged with green plants to provide fresh air and pleasant visual effects. The proper setting of fitness facilities can help the elderly stay physically active and prevent muscle atrophy and osteoporosis. In addition, you can also consider introducing design elements of a healthy eating environment, such as setting up healthy food storage areas, providing nutritionally balanced meals, etc.

3.5 Convenience Design

The convenience design is designed to facilitate the daily life of the elderly. Electrical equipment should be easy to operate and labels should be clear and easy to read. In order to facilitate the elderly to take commonly used items, the layout of the furniture should be reasonable and easy to access. At the same time, consider setting up easy-to-use storage facilities and amenities such as bedside lamps, night lighting, non-slip carpets, etc. These details will greatly improve the convenience and independence of the elderly [6].

Through the implementation of the above principles and strategies, we can create a suitable living space for the elderly that truly meets their needs. This space will fully consider the physical and psychological needs and living habits of the elderly to ensure that they can enjoy a high quality of life in this warm and comfortable environment.

4. The Theoretical Basis and Practical Method of Personalized Design

Older people's need for security grows stronger as they age. They hope that the living space can provide a stable and safe environment to ensure their life security and psychological peace. Older people often want their living space to be a source of belonging. They are eager to be able to integrate into the community, family, and establish a deep emotional connection with the people around them, and spend a good time together, so personalized design of elderly living space is particularly important.

4.1 Personality Psychology and Residential Space Design

Personality psychology focuses on individual differences and behavior patterns and provides a theoretical basis for personalized design. According to the personality characteristics of the elderly, such as extroverted or introverted, active or quiet, they can be provided with matching living space design [7]. For example, for seniors who prefer quiet, a space that focuses more on reading and meditation can be designed to avoid noisy environments.

4.2 User Portrait and Living Space Design

By creating user portraits, designers can more accurately understand the living habits, preferences and needs of the elderly. User profiles can be constructed based on the elderly's age, occupation, interests, family status and other information. For example, some elderly people may have a strong interest in gardening, so the design can consider providing them with a living area near the outdoor garden to meet their gardening needs.

4.3 Design Psychology and Residential Space Design

Design psychology is a bridge connecting design and psychology. It emphasizes that design should pay attention to people's emotions and cognition, and create a living space for the elderly that meets both functional needs and emotional satisfaction [8]. For example, for older people who feel lonely, it is possible to reduce loneliness by designing an open and social space to help them increase social interaction.

4.4 Application of Intelligent Means in Personalized Design

With the progress of science and technology, intelligent means provide more possibilities for personalized design. Through smart home systems and data analysis, the living habits and needs of the elderly can be understood in real time, and more customized living space can be provided for them [9]. For example, through the intelligent lighting system, the brightness of the light can be automatically adjusted according to the rest time of the elderly, creating a light environment suitable for rest. In addition, smart home devices can also assist the elderly in daily life self-care and self-care.

5. Case study of Individualized Age-Appropriate Living Space Design

The design of personalized age-appropriate living Spaces is designed to meet the unique needs and preferences of the elderly and improve their quality of life. The following are some excellent

personalized aging living space design cases at home and abroad:

5.1 Domestic Case

Shanghai Jinshan Yiheyuan Apartment for the Elderly: The apartment adopts barrier-free design to ensure safe passage for the elderly. At the same time, considering the living habits of the elderly, the multi-functional activity room and rehabilitation area are designed for them to carry out daily exercise and rehabilitation training. In addition, there are convenient storage facilities in the apartment for the elderly to access their belongings (Figure 1) [10].

Figure 1: Shanghai Jinshan Yiheyuan Apartment for the elderly

Beijing Everbright Huicheng Guta Retirement Community: This community offers a variety of apartment types for seniors to choose from, including detached homes, co-living apartments and care centers. Each unit has been individually designed to meet the needs of the elderly, such as non-slip floors, night lighting and emergency call systems. There are also a wealth of social facilities and activities within the community to promote social interaction among the elderly (Figure 2).

Figure 2: Beijing Everbright Huicheng Guta retirement community

5.2 Foreign Case

Solar City Apartment for the Elderly: This apartment focuses on natural lighting and ventilation to ensure plenty of light and fresh air inside. The design fully considers the safety of the elderly, such as the use of rounded corner furniture, non-slip floor tiles and so on. In addition, the apartment offers various amenities and services such as day care, medical care, etc (Figure 3) [11].
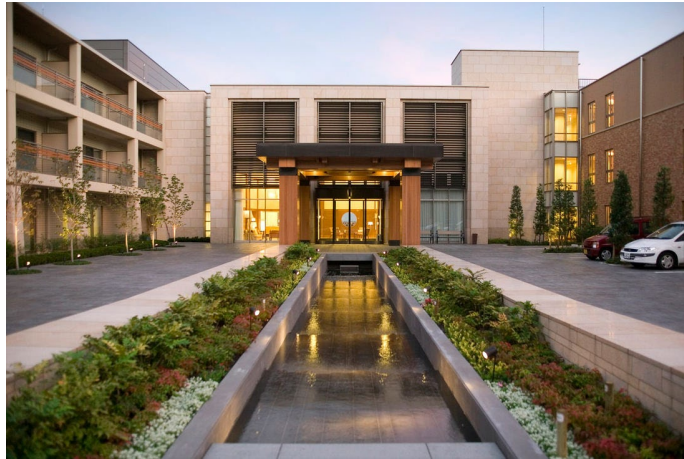
Figure 3: Elderly apartment in Sun City, Japan

Dr. Davis Senior Community in the United States: This community offers a customized selection of residences, each individually designed according to the preferences and needs of seniors [12]. The community is fully equipped with facilities, including fitness center, swimming pool, library and more. In addition, the community also provides a wealth of social activities and volunteer services to promote social participation and physical and mental health of the elderly (Figure 4).

Figure 4: Dr. Davis Senior Community in the United States

Through the analysis of these successful cases, the following experiences can be summarized (Table 1).

Table 1: Advantages analysis of the case

Measure	Effect
Personalized design	Personalized design according to the needs and preferences of the elderly to meet their living habits and preferences.
Safety design	Pay attention to safety design, prevent accidental injury, and ensure the safety of the elderly.
Amenities	Provide convenient facilities and services to facilitate the daily life and daily activities of the elderly [13].
Social interaction	Promote social interaction and engagement among older adults and meet their emotional needs.
Natural environment	Natural lighting, ventilation and landscape design are used to create a comfortable and pleasant living environment.

6. Conclusion

Personalized design is very important for aging living space. Due to the individual differences in the needs and preferences of the elderly, the living habits, preferences and needs of the elderly should be

fully considered in the design, and customized living space should be provided for them. Personalized design can not only improve the living quality of the elderly, but also enhance their life satisfaction and happiness. The design of old-age living space should also pay attention to the social needs of the elderly. Older adults need to communicate and interact with family, neighbors, etc., to stay socially connected and emotionally fulfilled. Therefore, social interaction between the elderly should be promoted in the design, providing social places and facilities, such as activity rooms, cafes, etc. The personalized design of the elderly living space should consider the individual needs of the elderly, safety, comfort and social aspects. Through personalized design, we can create a safe, comfortable and warm living space for the elderly, meet their physical, psychological and social needs, and improve their quality of life.

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