Research on the Architectural Space and Environment of Health Care Community Based on Optimal Aging Design

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Abstract: The aging of the world population has become a feature of the 21st century, and China has officially entered the aging society in 2003. Under such a background, the construction environment and facilities of the traditional aging communities have been unable to meet the increasing demands of life and spiritual pursuits. Therefore, with the goal of being suitable for aging, it has essential practical significance to provide the elderly with suitable architectural space and social environments and continue to retain the necessary connection between them and society. In this article, we sorted out the practical problems under aging and carried out humanized design research of the health care community to satisfy the demands of the elderly diversification as the target. At the same time, we combined with excellent examples at home and abroad to sum up the optimal aging design key points to provide a reference for optimizing community services and improving the construction of health care communities.

1. Trend of Aging Population in the World

According to the United Nations statistics and forecasts, the average age of the world's population reached the standard of aging in 2010, and the proportion of elderly population in economically underdeveloped developing countries and regions also exceeded 7% in 2020, thus entering the ranks of aging countries. In recent years, the aging of the world population has become increasingly serious. By 2050, the population of the elderly over 60 years old in the world will reach 2 billion, which will also exceed the population of children (0-14 years old) in the world [1].

China is not only the most populous country in the world, but also the country with the largest elderly population. Compared with the aging process of population in other countries, the aging process in China has the characteristics of late start, strong momentum, and rapid development. Experts predict that by 2030, the proportion of China's population aged 60 and over will be 22.34 percent and 15.21 percent, respectively, and by 2040, 25 percent and 20 percent. Thus, it can be seen that by 2030, China will enter a "super-aged" society [1].

2. Development Status of China's Aging Cause

The Chinese government attaches great importance and strives to solve the problem of population aging, actively developing undertakings for the aged. According to the basic national conditions of rapid aging, as well as the characteristics of Chinese traditional residential culture, China's current endowment living policy established a basic pension policy of "on the basis of family endowment, on the backing of community endowment, and on the supplement of institution endowment", namely "9073", meaning 90% of elderly people are cared by family upon the social service assistance, 7% of the elderly buy community service pension for their old age, and 3% of the elderly in endowment service agencies concentrated endowment. In addition, the Chinese government has revised relevant regulations, such as the Code for the Design of Buildings for the Elderly and the Code for the Design of Urban Roads and Building Barriers, to make it easier for the elderly to live and travel. Service facilities for the elderly, such as community health stations, nurseries, activity centers for the elderly, schools for the elderly, leisure squares for the elderly, are gradually increasing, and the volunteer team serving the elderly is also growing [2]. It can be seen that China's pension model is in the stage of continuous exploration, and the pension system is also constantly improving.

3. Basic Characteristics and Needs of the Elderly

The elderly belong to a special social group. For all people, getting older means adapting to a series of sensitive and critical changes, such as the sensitivity and weakness of physical senses, and changing social roles. Only when we understand the basic characteristics of the elderly and the needs of all aspects, can we work out a design strategy that meets the needs of the elderly. The basic characteristics and needs of the elderly are summarized in the table below (Table 1).

Table 1: Basic characteristics and needs of the elderly

Basic characteristics	Common obstacles in living	Behavioral demand
Physiological characteristics	Physical activity and metabolism decline, suffering from chronic conditions.	Requirements in the acoustic environment and barrier-free environment.
Psychological characteristics	Feelings of loss, loneliness and even depression for being away from work and family.	Requirements for security, belonging, and comfort.
Behavioral characteristics	Stubborn, not good at contacting with new things, afraid of communication at the same time, anxious to communicate with others.	Requirements for the spirit and culture that adapt to the time development and have a positive attitude towards life.

4. Key Points of Architectural Space and Landscape Design in Health Care Community

According to the above analysis of the physical and mental characteristics and needs of the elderly, we summarize five principles of the optimal aging design, namely, (1) the principle of accessibility, (2) the principle of security, (3) the principle of easy identification, (4) the principle of easy control and selection, and (5) the principle of easy access [3]. According to different activity places in the health care community, the space is divided into three categories -- architecture and facilities, road, and environmental greening. The following will be discussed, respectively, in combination with specific cases and design principles.

4.1. Architecture and Facility Design

Architecture and structure mainly includes the gate buildings, gallery frames, and sculptures of the activity place, and the facilities mainly include the rest facilities and service facilities of the place. They are important parts of the activity places for the elderly in the health care community, which can not only improve the landmark and functionality of the site, but also enhance the internal artistic aesthetic sense [4].

4.1.1. Site Entrance and Exit Design

As the first stop of the whole site sequence, the entrances and exits have functions such as marking the space and guiding pedestrians and vehicles to enter and exit. In the site planning, the marking and orientation of entrances and exits should be considered, which can help the elderly and other visitors to confirm the site and find the entrances and exits more quickly (Figure 1). At the same time, due to the weak awareness and slow response of the elderly to things around, some buffer space should be set as far as possible at the entrances and exit to ensure the safety of traffic (Figure 2).

Figure 1: Entry identification

Figure 2: Buffer space

4.1.2. Landscape Sketch Design

Landscape sketch is the "active element" in the landscape space, which has both practical value and spiritual meaning. The following points should be paid attention to in the design of the healthy care community.

(1) The theme selection of the sketch. Whether the landscape sketch can be coordinated and unified with the surrounding environment is one of the standards to measure whether the sketch meets the aesthetic standards.

(2) The reasonable size, material, and quantity of the sketches, and whether they conform to the

scale and behavior habits of the elderly. In view of the physical function characteristics of the elderly, the fitness and entertainment sketch should be used in the details of the application of some soft and anti-slip materials, the identification sketches should be relatively enlarged, and the color should also be more bright.

(3) The site selection of landscape sketch. It should be considered whether there are natural landscape elements such as water features and rocks that can be borrowed from the site, and whether the setting of the sketch meets the requirements of the site. For example, the design of the rest sketch is mostly arranged in a quiet and comfortable place with a beautiful landscape, while the signage sketch should be in the places that need to be described, such as entrances and turning points.

4.2. Road Landscape Design -- Take Footpath as an Example

Roads can not only divide the space and realize functional partitions, but also organize all parts of the whole environment into an organic whole, which is an important part of the activity site. Because of the declining physical functions of the elderly, walking has become a major way for them to stay healthy and fight off disease. Therefore, the landscape planning and design of the activity space for the elderly should be fully centered on the footpath space.

To meet the demand and attract pedestrians. The limitation of the activity range of the elderly determines that their travel mode is mainly walking. The purpose is sometimes to carry out necessary activities, and sometimes to walk for pleasure. Therefore, the walking system should not only meet the purpose of the old people's activities, but also be attractive. In terms of physical strength, the walking fatigue limit of healthy elderly people is generally 10 minutes and the walking distance is about 450 meters, so the setting of the trail should be controlled within this range [1]. When the route is too long, a rest space should be considered in the route (Figure 3). A flat, monotonous, and unprotected walking space will bring a boring and lengthy feeling. If the designer adds some midpoint and recreation service facilities to form a changeable walking network along the sidewalk, so that the distance is naturally divided into several parts. Such a design can play the role of active exercise and effective control, and guide the elderly to exercise and entertainment [1].

Figure 3: Open space facilities in the healthy care community

Strengthen details and enhance the sense of experience. The physical function of the elderly decreases with the change of age, their walking activities are slow and sensitive, and their gait is unstable and moving with the flow of people. At the same time, their sight angle range is limited, and they have a strong feeling for the details of the walking environment. In terms of height difference, gentle ramps should be preferred, and handrails should be set within the range of two arms when height difference is inevitable [5]. Setting appropriate slopes in different sections can also increase the pleasure of exercise for the elderly. In terms of material, to ensure the overall

flatness, non-skid and not dazzling materials shall be chosen, such as concrete with spots. In addition, the consistency of accessibility design should be maintained in the road planning of the health care community. Some specific requirements and data are shown in the table below (Table 2).

Table 2: Barrier-free design data of outdoor roads in the health care community

Detail design	Distance	Notice
Public corridor	≥1.2m	Consider wheelchair and pedestrian passing in parallel.
Continuous handrail	0.9m and 0.75m	Double layer handrail is 40-50mm away from the wall.
Road gradient	0.3% -- 1.0%	When the slope of the road is more than 2.5%, it is not suitable for the wheelchair to travel. If the slope is more than 4%, it needs to use handrails when going up, which is not conducive to the travel of the elderly [6].

4.3. Green Space Planning and Design

Due to the gradual decline of the physical function of the elderly, their resistance continues to decline, so they have higher requirements for the comfort of their surrounding environment. In activity places, the quality of green space design often directly affects their sense of use. Reasonable planning of green space can not only purify air, regulate the regional microclimate, but also provide leisure space for the elderly and beautify the landscape environment. In addition, ginkgo (Ginkgo biloba L.), locust (Robinia pseudoacacia L.) and other plants, in addition to ornamental value, have a certain fireproof ability, planted in the green space can play a role in disaster prevention and refuge.

4.3.1. Design Principles of Green Space

(1) The principle of people oriented. Due to the physical debilitation of the elderly, many facilities that can be used by normal people may become obstacles or even cause harm to them. Therefore, the needs of the elderly must be considered in various aspects in the design, and the environment must influence people, create people, and improve people's level and taste [1].

(2) Plant configuration. The site design makes full use of the original terrain and landform, and the selection of tree species is mainly local plants. The plants are selected according to the preferences and health characteristics of the elderly, to create the best greening effect with the best ecological benefit at the minimum cost.

4.3.2. Plant Design of Green Space

(1) Plant selection. First of all, the appropriate land and trees should be considered. Local tree species are easier to grow than other tree species, and the greening effect can be achieved faster through extensive management. Secondly, considering the needs of elderly users to enjoy green space, plants with large leaf area coefficient and strong release of beneficial ions should be selected as far as possible to form artificial ecological plant communities [7]. For example, using the active substances of aromatic plants to treat the elderly in need can achieve the effect of promoting blood circulation and removing blood stasis, resuscitating and refreshing [4]. Finally, attention should be paid to reflect the seasonal characteristics. The obvious seasonal changes can make the elderly feel the beauty of the change and get pleasure from the landscape.

(2) Plant configuration. On the one hand, measures should be taken according to local conditions. The greening design of the activity site should not affect the use of site buildings and equipment.

Generally, the trees should be 5-8m away from the building. Too close distance will affect indoor lighting and ventilation. Some beautiful and brightly colored plants can be planted on the garden wall or at the corners of the road to decorate, guide, and transform the space [8]. On the other hand, attention should be paid to the landscape effect of plant configuration, and the species should strive to be rich and varied [9]. The combination of trees and shrubs, evergreen and deciduous, fast growing, and slow growing shall be considered, which not only meets the requirements of ecological benefits, but also achieves a beautiful ornamental effect. For example, the Zonnehuis retirement home in Amstelfen (Netherlands), connects buildings, squares, and green spaces by creating a public green pedestrian area, and the hard paved boundaries are softened with shrubs and flowers (Figure 4). In the square of the nursing center on the east side, a garden with perennial plants is also designed for the elderly to engage in gardening activities, so that the elderly can support themselves and participate in it (Figure 5).

Figure 4: Public green pedestrian area

Figure 5: Sunshine house

5. Conclusion

As a vulnerable group in society, the elderly deserve special care. Nowadays, aging is becoming increasingly serious, it is necessary to implement architectural space and landscape design according to the special body psychology and behavior of the elderly, with scientific and rational use of barrier-free, environmental protection materials, intelligent buildings, and environmental behavior psychology theory. The goal of the design is to let old people live in the community, have a warm, comfortable, and at home with the feeling [10]. The optimal aging design we want is to convey a kind of concern about aging. Through the space interaction of buildings and facilities, we will explore more reasonable, comfortable, and strengthened places for activity communication, so

as to promote the socialized behavior and activity efficiency of the elderly group, improve their life quality, which will make effort to the development of the health care industry [11].

Acknowledgments

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