Design Strategy of Friendly and Healthy Environment for Urban Aging Community

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Abstract. How to achieve the local benefits of the elderly in urban aging communities has become an urgent problem for China's active aging construction, and the construction of a friendly and healthy environment for aging community provides a new way to solve the problem. This paper conducts an empirical investigation on the Jiangsu smart elderly community, collects and analyzes the phenomenon based on the relationship between the daily activities of the elderly and the community environment, discusses the elderly's adaptation to the community's outdoor environment and the behavioral characteristics of the elderly. Based on the safety and friendliness of the community's pedestrian traffic environment, the cognitive friendliness of the community's public facility environment, and the perceived friendliness of the community's landscape environment, this paper proposes strategies for the design of an aging community's friendly and healthy environment, and those are expected to provide some inspiration to the environmental construction of Chinese aging communities.

Keywords: Aging community, Friendly and healthy environment, Suitable for aging, Localization

1. Introduction
According to the world population statistics of the United States, In 2000, the number of Americans over 65 accounted for 12.4% of the total population of the United States; In 2000, the number of Chinese over 65 accounted for 6.8% of the total population of China; In 2050, the number of Americans over 65 would account for 22.1% of the total population of the United States; In 2050, the number of Chinese over 65 would account for 26.7% of the total population of China, reaching 348.1 million; In 2050, China would become the world population the fastest aging country [1].
Most of the elderly people in China live in a large number of old communities. As cognitive perception, nervous system, and disease resistance degenerate, the elderly's ability to adapt to the environment also declines, and since they live alone for a long time, most elderly people are lonely and depressed, and these mental states directly affect the physical and mental health and quality of their life. The concept of the famous American Eden Alternative project emphasizes that loneliness, helplessness, and boredom are the three hidden dangers of the healthy life of the elderly; The suitable living environment of the elderly should provide the elderly with a place for close and continuous interaction with other people, plants, animals and children; it can have a positive stimulation and promotion effect on the elderly's physical, psychological, emotional and social interactions [2].

Therefore, in addition to the basic activity space, the outdoor environment of an aging community must have autonomous traffic, safety and convenience, barrier-free activity space, and barrier-free environmental facilities. At present, a large number of aging communities in China have obsolete environmental facilities, lack of care, and many hidden safety hazards. The improvement of the quality of life of the elderly and the aging development of the community environment need urgent attention. Localized, suitable, and humanized homes for the elderly have become the goal of the development of a friendly and healthy environment for the aging community.

2. Investigation on the Relationship between Community Environment and Behaviour Characteristics of the Elderly

Susan Rodiek, an American expert in the field of outdoor environment for the elderly, innovatively proposed the “Seniors' Outdoor Survey” for the community outdoor environment of the elderly care institutions, to study the support of outdoor environment to the preference and utilization rate of the elderly, to provide a reliable way for the research, evaluation and comparison of outdoor space in the elderly community [3]. Based on the professional experience and behavior research, this paper puts it forward suggestions for improving the outdoor environment of the elderly community.

Environmental behavior theory believes that human behavior is related to the outdoor environment [4]. Therefore, it is necessary to study the relationship between the community environment and the behavior characteristics of the elderly. This paper takes Jiangsu smart elderly community as the research object, from the perspective of environmental behavior, conducting empirical research on the relationship between the community site environment and the behavior characteristics of the elderly, in order to explore the impact of the outdoor environment of the aging community on the physical and mental health of the elderly.

The respondents are sub-healthy elderly who can carry out outdoor activities, self-care elderly, and device-aided elderly. Although the sub-healthy elderly in the community are better than those who need help, but some of them have psychological problems, such as loneliness, rarely communication with people. But through investigation we can find their hobbies. Some old people often play chess, gardening, browse information and other high-frequency activities in the community. Research shows that horticultural activities and community recreational activities can improve the social ability and hands-on ability of the
elderly, and have significant effect on delaying the potential Alzheimer's disease and Parkinson's disease of the sub-health elderly [5]. Some old people can take care of themselves, but because of their physical illness, the places of their activities are mostly in community parks, houses and so on. Device-aided elderly need to use tools such as handrails and crutches to do outdoor activities. So the main activities of them are indoors, but occasionally they go out to relax.

The survey found that the frequency of the elderly's participation in activities and access to places changed significantly in different environments and times, which shows the selection and preference of the elderly in the community's outdoor environment. The attraction of the place is an important factor. Old people appear more frequently in community places such as small squares, activity centers, newsstands, parks, and convenience stores, which proves that the elderly's living behavior is closely related to community environmental factors. Therefore, the environment elements that are convenient for the elderly to recognize and reach safely can help the elderly to achieve the independent life in the community environment.

3. Analysis of the Elderly's Behavioral Activities and the Use of Community Environmental Elements

It is found that the community outdoor environment plays an important role in guiding the healthy behaviors of the elderly. Elderly people will choose where to stay and move when they walk outdoors. Most elderly people choose to stay in a familiar environment. Device-aided elderly need to rely on some community service facilities to achieve autonomous activities. Therefore, the outdoor environmental elements of the community, such as easily identifiable information signs, open squares, comfortable rest facilities, and a green environment with positive sensory stimulation, have positive meaning for outdoor social activities for the elderly.

The survey also found that the elderly stay and appear more frequently in community square, green space, supermarket, service center and other community outdoor places. The survey also found that elderly people stay and appear more frequently in community outdoor places such as community squares, green spaces, supermarkets, and service centers. The elderly are close to nature at the community garden, chatting with people at the community square, and participating in some recreational activities at the community service center with the neighbors. The familiar community environment can reduce the elderly's defensiveness, and the pleasant activities are helpful for the elderly's physical and mental health. It shows that the community environmental factors with the characteristics of easy to identify, easy to use and suitable for aging are closely related to the healthy life behaviors of the elderly.

![Behavior map of the elderly in the outdoor environment of the community at different times](image)

**Figure 2.** Behavior map of the elderly in the outdoor environment of the community at different times

In addition, this survey also found that the characteristics of safe and barrier-free environment of community sites are also important factors that influencing the elderly to carry out autonomous behavior activities. It plays an important role in supporting and guiding the behaviors of elderly people of different health types. Elderly people with cognitive impairments can find their own home through the easy-to-identify identification system combined with pictures and texts. Elderly people with mobility problems can walk around the community gardens with the help of Safety handrail suitable for aging group.
American scholar Clare Cooper Marcus proposed that the design of outdoor spaces for elderly should meet the needs of different levels at the same venue, and provide an "auxiliary environment" with appropriate challenges and helps [6]. Encourage the elderly to use necessary auxiliary facilities to participate in daily activities and activities with certain challenges, promote social interactions among the elderly, and enhance their self-confidence.

The “Barrier free design” for the elderly group emphasizes meeting the needs of the elderly group in both material and spiritual use. The living space and outdoor environment created by UK Belong Villages are connected with each other, the road is safe and smooth, so the elderly can reach various facilities in the village smoothly and safely. It created a sense of belonging, security, satisfaction and achievement [7]. It has reference significance. The outdoor environment design for the elderly should not only meet their use needs, but also take into account the layout location, scale, material, color and other elements of barrier free facilities. It should also be harmonious with the environment, with aesthetic characteristics. and strive to achieve the independent and healthy life of the elderly with easy-identification and easy-use fuctions.

4. Design Strategy for Friendly and Healthy Environment in China’s Aging Community
The construction of community environment should be based on the optimization of the barrier-free environment of the aging community, reap greater environmental and social benefits with the limited resources and input, and make the environment of urban aging community safe, accessible and recognizable.

4.1. Improve the safety and friendliness of the community pedestrian traffic environment
Community pedestrian traffic environment is a place for the elderly to walk. Studies have shown that the construction of “safe streets for the elderly” of urban communities can reduce the travel risks for the elderly [8]. The design of the walking space for the aging community needs to strengthen the safety and convenience of the site traffic. People and vehicles on community roads should be separated so that the elderly won’t be disturbed by vehicles during community activities, and the intersection should have a clear vision to ensure the safety of walking for the elderly within the visible range.

Obstacles affecting travel on the surface of community pedestrian roads should be removed, the road surface should be flat with sufficient walk width, and the ladder-type ground height difference should be replaced with suitable aging slope terrace. The road pavement shall choose antiskid, permeable and glare proof materials with simple patterns, so as to prevent the elderly from falling and producing illusion during walking. In addition, the stop brick and guide brick made of tactile-type materials should be set up at the turning and end of the road for the elderly blind patients.

Since the walking fatigue limit for healthy elderly is 10 minutes and the walking distance is about four hundred and fifty meters, a public rest area should be set within the radius of the walking fatigue limit for elderly in the design of community traffic environment. Sufficient rest facilities should be provided in community streets, as well as eye catching landscape of information indication system, emphasizing the landmark and directional of the site space, so as to facilitate the elderly to effectively identify the direction and location, and avoid the psychological pressure caused by lost.

The design of the auxiliary path inside the community site can adopt a variety of forms to increase the walking interest of the elderly. The whole pedestrian path system should be simple and clear to avoid complex detours and excessive intersection design, and take into account the elements of community living environment, such as community square, park, activity center, barber shop, convenience store, so as to enable the elderly to complete travel activities independently.

4.2. Give community public facilities a cognitive friendliness
The community public facilities environment includes community public service facilities, public activity facilities, cultural facilities, commercial facilities and other public buildings. Community public facilities with high utilization rate among the elderly are mainly community health service centers, community elderly care institutions, community activity centers, banks, supermarkets, barber shops, etc. It should combine the health status of the elderly in the community to maximize the elderly’s effective understanding of the community public facilities environment. The identification of the design of the community public activity
center and the community health service center, the comfort of the indoor space of the facility and the ease of use of the functional space should be paid attention to. Rodiek. Susan, an American scholar, thought that, one of the main obstacles to the indoor and outdoor environment of the elderly’s activity building was the high threshold of the entrance and exit [9]. Both the visually open and transparent design of the indoor and outdoor entrances of the building, safe accessibility of barrier free design are conducive to the effective cognitive and safe arrival of the elderly.

At the same time, optimizing the functional attribute identification design of the facade form of community commercial building facilities is conductive to the effectively identify and use of the elderly. In addition, the unified style and similar elements related to the new and old building facilities of the community can increase the familiarity of the elderly and relieve their anxiety of being lost. Retaining facilities with local cultural characteristics in the community can increase the elderly’s sense of belonging to their places and delay the development of cognitive impairment symptoms.

4.3. Optimize the perceived friendliness of community landscape environment

Community landscape environment design should combine with the stimulation rehabilitation training of the sensory system of the elderly, create a healthy landscape environment with high frequency of staying for activities among the elderly such as community outdoor garden, square and vegetable garden.

According to the visual acuity, color discrimination, as well as light adaptation of the elderly, it shall adopt non-toxic and harmless flowers and plants, colorful green vegetation, beautiful and comfortable landscape pieces, etc. to effectively stimulate the visual sensory function of the elderly, to delay the degradation of the perception system of the elderly, and to achieve the healing experience effect.

For hearing disorders such as hearing loss and impaired auditory intelligibility of the elderly, it shall create a “moving” environment where the elderly can exercise and dance, such as the distribution square, and the “quiet” environment which can ensure that the elderly can rest and communicate, such as tree-lined square. Plant appropriate trees, shrubs, herbs, and play the transition space green sound proof effect to prevent noise interference. The green space on the street group can isolate the environment inside and outside the community, and provide security. Optimize the ecological environment of the site, and create soft sound scenery of birds, flowers, wind and water to delay the degradation of hearing and olfactory sensory functions of the elderly.

For the decline of the elderly’s physical function, small horticultural activity venues that promote exercise in the limbs of the elderly can be added in the design of green space between outdoor houses in the community to carry out planting activities such as planting vegetables and flowers, and set up appropriate operating platforms and rest seats. The elderly can use gardening tools for planting, sprinkler, fertilization, maintenance and carry out a series of body exercises to promote their perception and re-cognition of the natural environment, improve the tactile function of the elderly, and delay the degradation of their tactile senses and cognitive ability.

Enriching the community green environment can add harmless, non-stingy aromatic flower plants, plant fruity trees, edible fruits and vegetables, stimulate the sensory experience of the elderly to smell and taste in activities, and give full play to its rehabilitation and cure effect of improving sensory system degeneration of the elderly.

Creating social activities spaces such as gathering, communication and exercise for the elderly, and providing enclosed space and rest space suitable for the interaction of the elderly allow them to carry out their own collective activities, old and young exchanges and interactive activities to meet their spiritual needs. Bring positive spiritual and sensory experience to the elderly when they are in outdoor social rest by combining seasonal changes and plants to show different seasonal features, so as to relieve depression and loneliness of the elderly.

5. Conclusion

In summary, there is an important correlation between the optimization of the elderly community environment and study of the elderly behavior characteristics. Based on the analysis of the behavior characteristics of the elderly, it is found that the safety, direction, sensory stimulation and environmental
recognition and control of the elderly using community environmental factors are important parts of the research on the construction of a friendly and healthy environment for the elderly community. The comfort, safety and accessibility of the community environment are main purposes for the elderly to conduct activities in the community environment, the design must combine the behaviors of different elderly with the characteristics of the community itself, on the basis of relevant policies, effectively use existing conditions of community environment to carry out local and diversity research on the construction of a friendly and healthy environment of aging community.

Burton, an American scholar, once stressed that the elements of environmental resources such as familiarity, understandability and safety should be strengthened in urban environmental design [10]. In the future urban aging community friendly and healthy environment construction, the different levels of the real needs of the elderly can’t be ignored. It should provide a variety of outdoor spaces according to the behavior activities of the elderly, meet the elderly’s desire to live independently, promote their physical and mental health and improve their quality of life in later life.

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