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Research on Aging-Friendly Landscape

-- Research on aging-friendly landscape driven by silver hair

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Abstract: With the acceleration of global aging, aging-friendly landscapes have become an important carrier for improving the quality of life of the elderly. This paper explores the design principles and practical strategies for aging-friendly landscapes from three dimensions: physiological needs, psychological needs and social participation, and proposes a design path for the coordinated development of safety, inclusiveness and interaction based on domestic and foreign cases, providing theoretical reference for the optimization of public space in an aging society.

Keywords: Elderly care space; Aging-friendly landscape; Gardening therapy.

1. Introduction

According to data from the National Bureau of Statistics of China, as of 2023, the population over 60 years old in my country reached 297 million, accounting for 21.1% of the total population, and the social characteristics of aging are significant. However, traditional public spaces generally have problems such as insufficient accessibility facilities and prominent intergenerational contradictions. WHO research shows that 30% of the elderly's fall cases are directly related to site design defects. The aging-friendly landscape promotes the physical and mental health and social integration of the elderly through spatial reconstruction, which is of great practical significance.

2. The Core Demand Dimension of Aging-Friendly Landscape

2.1. Physiological Needs-Oriented Design

Anti-slip treatment on the ground (coefficient of friction ≥0.6), continuous handrail system (height 65-85cm), night lighting (illuminance ≥50lx)

Case: The circular trail in Toyosu Park, Tokyo, Japan uses EPDM elastic floor mats to reduce joint impact

2.1.1. Accessibility optimization

Walking path slope ≤1:12, rest nodes are set at intervals of 50m, wheelchair rotation space ≥150cm diameter

2.1.2. Improve comfort

Sunshade facilities coverage rate ≥60%, and shelter seat layout in winter

2.2. Psychological Demand Response Strategy

2.2.1. Natural interaction mechanism

Introducing gardens in horticulture therapy, such as the "Health Garden" at Brooklyn Botanical Garden in New York, has proven to reduce anxiety levels in the elderly by 27% (Marcus, 2015)

2.2.2. Cultural identity construction

The traditional pavilion and corridor shape is retained in the renovation of Suzhou Liuyuan, integrating modern barrier-free slopes.

2.2.3. Balance between privacy and openness

Use semi-enclosed flower stand (transmissiveness 40-60%) to create a sense of domain

3. Contradictions and Countermeasures in Design Practicethe Balance Between Standardization and Personalization

Establish a hierarchical design system: basic layer (mandatory specification) + expansion layer (regional feature module).

3.1. Maintenance Cost Control

Choose self-sustaining plants (such as Bermuda grass, crape myrtle), smart irrigation system (water savings of more than 30%)

3.2. Technology Empowerment Path

Aging-friendly technology products such as AR navigation, intelligent health monitoring seats, etc.

4. The Significance of The Age-Friendly Landscape

4.1. Strategic Choices to Respond to the Aging Society

According to the World Health Organization's forecast, the proportion of the global population over 60 years old will exceed 22% by 2050. As a concrete expression of the concept of "active aging", aging-friendly landscapes can alleviate the pressure of aging through the following methods. Compensation mechanism and social bonding in mental health

The natural environment has a unique healing value to the mental health of the aged. The Japanese Environmental Psychology Research Institute has confirmed that exposure to landscape Spaces with more than 40 percent vegetation coverage can reduce cortisol levels by 17 percent and Alzheimer's disease incidence by 23 percent in older adults. The Intergenerational Exchange Zone at the High Line Park in New York has successfully increased the social frequency of the elderly in the community to 3.2 times per week through

horticultural therapy workshops and cross-age activity platforms. This spatial intervention not only alleviates the social alienation of the elderly, but also reconstructs the interpersonal network of the traditional community, making the public landscape an important carrier to maintain social emotions. Ethical expression and value reconstruction of urban civilization

The construction of age-friendly landscape is essentially a practical response to the justice of urban space. According to the United Nations Principles for Older Persons, inclusive environmental design should ensure that older persons have equal access to urban resources. In the renovation of the Tempelhof Park in Berlin, the decision-makers invested 28% of the budget into barrier-free facilities and established a participatory design mechanism for the elderly, which broke the hidden barriers of age discrimination. When the city begins to pay attention to the micro-scale such as the curvature of the handrail of the bench and the planting height of the flower bed, it reflects the respect of the society for the course of life, marking the transformation of urban planning from efficiency priority to humanistic care.

At present, with the double process of aging and urbanization superimposed, the construction of age-friendly landscape has gone beyond the simple scope of environmental transformation and become an important yardstick to measure the degree of social civilization. It builds an age-friendly social environment through the realization of space justice. Reshape the quality of life of the elderly with the help of ecological healing function; More humanized design language, writing the city's tender commitment to each stage of life. This design philosophy, which infuses humanistic care into physical space, will eventually lead the city to a more inclusive future.

(1) Reduce public health costs: Reduce accidental damage to the elderly through fall-proof designs (such as elastic floors, continuous handrails). Research by the US CDC shows that age-friendly transformation can reduce the fall rate of elderly people in the community by 35%-40%.

(2) Delaying the process of disability: Practice of aging-friendly fitness paths in Singapore's HDB areas shows that the decline in physical mobility in the elderly who continue to use aging-friendly fitness facilities has slowed down by 23%.

(3) Release care resources: The "Self-Support Landscape" project in Tokyo, Japan has increased the home-based pension rate of mildly disabled elderly people by 18% through self-service rehabilitation gardens.

(4) Technology empowerment: the construction of a smart elderly care ecosystem.

The Internet of Things and artificial intelligence technology are reshaping the elderly care service system. Singapore's Smart Silver Initiative has reduced the emergency response time of elderly people living alone to eight minutes by deploying 250,000 home monitoring devices. Wuzhen Internet elderly Care Center uses wearable devices to monitor the vital signs of the elderly in real time, combined with AI diagnosis system, to improve the efficiency of chronic disease management by 40%. It is suggested to establish a national big data platform for elderly care, integrate 12 types of data sources such as medical care, social security, and community services, and use machine learning to predict the gap in regional elderly care resources. The practice of Futian District in Shenzhen shows that data-driven decision-making can improve the accuracy of elderly care facility layout by 52% and reduce resource allocation waste by 29%.

(5) Model breakthrough: the collaborative evolution of multiple supply mechanism

The introduction of market and social forces can effectively expand the supply of elderly care services. The PACE program integrates Medicare and Medicaid resources to provide all-inclusive care through the private sector, reducing the hospitalization rate of elderly people with dementia by 35 percent. The British "community microinstitution" model takes 500 meters as a service radius to establish an embedded elderly care site, and the operating cost is 57% lower than that of traditional institutions. China should cultivate the innovation of old-age service, and develop the integration model of "property + pension" and "finance + pension". Beijing Taikang Home combines insurance products with CCRC community to achieve the whole life cycle management of customers, and the policy renewal rate is as high as 91%.

(6) Cultural reconstruction: Value reconstruction of intergenerational integration.

The modern transformation of traditional filial piety culture has deep significance to reduce the pressure of the aged care. South Korea introduced the "intergenerational cohousing points system" to provide interest rates and tax breaks for families living with the elderly, so that the proportion of multigenerational living back up to 24%. It is suggested to establish a "family support ability evaluation system", including soft indicators such as the frequency of children's visits to relatives and spiritual support into the credit evaluation system. Hangzhou's pilot "filial loan" product gives differentiated credit support according to the performance of family pension, and successfully guides 32% of borrowers to increase their investment in pension.

4.2. The Spatial Media for Reconstructing Social Relations

Aging-friendly landscapes carry special functions of breaking through intergenerational isolation and rebuilding social connections:

(1) Promoting intergenerational integration: In the design of "multi-generation parks" in Berlin, Germany, through shared planting areas and cross-age recreation facilities, the interaction frequency of users of different age groups is increased by 60%.

(2) Activate Yinfa Human Resources: Beijing Longtan Lake Park's "Senior Horticulturalist Program" allows retired gardeners to participate in landscape maintenance, which not only improves the quality of space, but also realizes the recreation of social value for the elderly.

(3) Eliminate age discrimination: Through all-age friendly designs (such as fitness equipment that can adjust heights), break the stereotype of "exclusive space for the elderly" and establish an inclusive public sphere.

(4) Economically empowered silver productivity activation

The aging landscape can be transformed into a new driving force of the silver economy. In Singapore, the Silver Market Project has embedded modular stallholder systems in community parks, with 79% of elderly women running them, generating an economic value of S $32,000 per day. The Yuyuan Road historic District in Shanghai transforms the weaving and gardening skills of elderly women into landscape elements through a movable float system, which not only improves spatial vitality but also creates an increase of 1,670 yuan per capita per month. This productive landscape model transforms elderly women from space consumers to

value creators, providing new solutions for an aging society.

(5) The construction of elderly women-friendly landscape goes beyond the traditional technical scope of age-appropriate transformation, and is essentially a redistribution movement of spatial power. Through embodied design language, it responds to the unique life experience of elderly women; With the reconstruction of spatial production relations, the value cognition of the silver age is reshaped. When the city begins to contain the slow pace with curved paths, wrap the brittle bones with warm materials, and activate the sedimented wisdom with inclusive places, it shows not only the progress of design ethics, but also the deep care of civilized society for the whole process of life. This kind of spatial change promoted from the perspective of gender will eventually lead the city to a more humanistic future.

5. Necessity and Feasibility of Renovating Elderly Care Spaces

The design of community elderly care space renovation is based on reconstructing the spatial planning process of nursing homes. Its core is not simply introducing new technologies to optimize the environment, but deeply combining the daily activity patterns and physiological rhythm characteristics of the elderly group. At the specific implementation level, indoor space focuses on humanized design elements such as layout optimization, selection of age-friendly materials, barrier-free lighting systems, emotional furnishing configuration, and accurately matches the functional needs and psychological demands of the elderly. Outdoor landscape transformation builds an aging-friendly landscape system with rehabilitation functions and social value by integrating healing vegetation space and participatory planting areas. This indoor and outdoor linkage transformation strategy has substantially improved the living quality and happiness of the elderly, demonstrating the core value of the transformation of aging-friendly space in the contemporary elderly care service system.

To ensure smooth access to wheelchairs, it is recommended to give priority to the addition of barrier-free access systems. In response to the rest needs of the elderly, rest seats with sunshade and rain shelter facilities need to be equipped, and the night lighting system must be upgraded simultaneously to ensure safety of activities. It is recommended to establish a clear and easy-to-read guiding logo system, adopt large font sizes and high contrast designs to facilitate the identification of the directions of the elderly. According to the diverse needs of the elderly, it is recommended to divide the space into functional modules with clear movement and stillness: set up a quiet rest area, a health and fitness area and a cultural and entertainment social area. Special activity facilities such as goal courts and elderly-friendly fitness trails can be added according to local conditions to stimulate the enthusiasm of the elderly to participate outdoors. In addition, it is necessary to reasonably plan a coherent slow-moving system, organically connect various functional areas through barrier-free corridors, and build an all-age friendly accessibility space network. In terms of ecological quality improvement, it is recommended to increase the coverage rate of green space and form a multi-layer greening structure through the combination of trees and shrubs, which not only enhances carbon sink capacity but also enriches the landscape level. Priority is given to ornamental plants with distinct seasonal and low maintenance to create an ecological picture with flowers in three seasons and evergreen in all seasons. Ecological waterscape elements can be embellished, such as fog forest system or circulating water purification landscape, and a rainwater garden system can be built in combination with the concept of sponge city to achieve a coordinated improvement of ecological efficiency and aesthetic value.

6. Conclusion

Aging-friendly landscape design needs to break through the traditional simple paradigm of "accessibility + greening" and build a composite spatial system with physiological safety, psychological comfort and social inclusion. Through modular design, community participation and technological innovation, we can achieve a functional leap from "supportive to the elderly" to "helpful" and provide sustainable spatial solutions for an aging society.

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