Optimisation Strategies for Public Spaces in Old Residential Communities to Promote Elderly Health

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Abstract: In the context of a transition from incremental expansion to stock renewal in urban development, the upgrading of public spaces in old residential communities has emerged as a matter of significant concern. It is evident that the demographic of primary users of these spaces is composed predominantly of elderly residents. Consequently, the creation of age-friendly environments is a crucial element in promoting community health. It is evident that elderly populations exhibit distinctive physical, psychological and social characteristics, thus giving rise to specific spatial requirements. The present study undertakes an evaluation of the health performance of public spaces in three old communities in Chaoyang District, Beijing, with a view to identifying existing issues. The study's findings are based on the prioritisation of environmental elements for public space improvement by elderly residents, and it proposes renewal strategies in four key areas: road traffic, green space, activity areas, public service facilities, and environmental comfort. The objective of the present study is to provide practical guidance for the renewal of public spaces in old communities within the context of healthy city development, with a focus on the concept of age-friendliness.

Keywords: Elderly Health Promotion; Old Residential Communities; Public Space Renewal; Healthy City

1. Introduction

In the context of accelerating urbanisation, China's urban development has transitioned to a new phase, characterised by a shift from incremental expansion to stock renewal. Concurrently, social issues such as population ageing have become increasingly prominent, and the growing density of urban populations has posed significant challenges to the urban living environment and to residents' health, particularly that of elderly residents [1]. The utilisation of the built environment to promote health, particularly among older adults, has emerged as a pivotal subject in scholarly research.

From 2015 to 2019, the Chinese government and the relevant departments demonstrated a consistent commitment to the development of "Healthy Cities" as a strategic urban planning and development initiative. A series of policy documents were issued, including the Healthy China 2030 Planning Outline, the National Healthy City Evaluation Index System (2018 Edition), and so on. These events served to underscore the necessity of developing sustainable urban centres. In 2020, the Healthy Community Evaluation Standard was formulated and released. This new standard defines the community as the basic unit for healthy city construction and provides a standardised reference framework for related research.

The community, as the smallest unit of urban social space, serves as the foundation for stock renewal and the primary arena for addressing grassroots social issues [2]. However, as many domestic communities were constructed in the early 21st century, their design concepts are now outdated, often characterised by limited public space, functions and inadequate supporting facilities. However, such communities are no longer able to meet the growing and diversifying needs of their residents. This necessitates a reassessment of their renewal from the perspective of health promotion [3-4].

Elderly residents constitute the primary demographic of many old residential communities, and their needs merit particular consideration. A plethora of extant studies have indicated that, in addition to indoor spaces, elderly residents place considerable reliance on community public spaces for the execution of their daily activities. It has been demonstrated

that the presence of high-quality public space environments can exert a significant positive effect on the health of said residents [5-6].

The present paper thus focuses on public spaces in old residential communities as the target for renewal, with elderly residents constituting the core study group. This study is based on a health evaluation of these spaces, the results of which are used to construct a perception-based measurement system for health-related spatial elements for the elderly. In addition, the study explores renewal strategies for public spaces in old residential communities from the perspective of promoting elderly health. The aim of this is to contribute to the construction of healthy cities and communities.

2. Literature Review

2.1 Research on Health Promotion

According to the World Health Organization (1986), health promotion is defined as the process through which individuals enhance their control over the determinants of health, thereby improving their overall well-being. This concept encompasses not only the enhancement of individual skills and capacity for action, but also collective efforts to transform social and natural environments into healthier settings [7].

Internationally, there has been an evolution in the thematic focus of health promotion over the course of the ten Global Conferences on Health Promotion held since 1986. The initial focus of research was on the domains of medical services and social welfare. However, as time has passed, the focus has shifted to include the role of the built environment in health promotion (Table 1).

Table 1. Overview and Major Outcomes of the Ten Global Conferences on Health Promotion (1986–2021)

Year	Session	Location	Main Content	Major Outcome
1986	First	Ottawa, Canada	Proposed the concept of health promotion and identified five key areas of action	Ottawa Charter
1988	Second	Adelaide, Australia	Further refined public policies for health promotion	Adelaide Statement
1991	Third	Sundsvall, Sweden	Focused on healthy urban environments	Sundsvall Statement
1997	Fourth	Jakarta, Indonesia	Defined directions and strategies to meet health promotion challenges in the new century	Jakarta Declaration
2000	Fifth	Mexico City, Mexico	Emphasised moving “from awareness to action” in global health promotion	Mexico Statement
2005	Sixth	Bangkok, Thailand	Committed to making health promotion a central responsibility of governments and communities at all levels	Bangkok Charter
2009	Seventh	Nairobi, Kenya	Addressed diverse and widespread needs in health promotion	Nairobi Call to Action
2013	Eighth	Helsinki, Finland	Advocated integrating health into all policies	Helsinki Statement
2014	Ninth	Shanghai, China	Emphasised the link between health and sustainable development, and improving urban environmental management	Shanghai Declaration; Shanghai Consensus on Healthy Cities
2021	Tenth	Online	Promoted building a sustainable well-being society and achieving health equity for present and future generations	Geneva Charter for Well-being

In the context of China, the research in this field commenced at a comparatively late juncture, with an initial focus on the synthesis of foreign theories and practices. As an increasing number of Chinese cities have initiated the development of healthy cities, theoretical research has undergone a transition towards localised empirical studies. Significant outcomes include various design guidelines, construction standards, and health evaluation indicators [8-9]. It is important to note that the 2021 Healthy Community Evaluation Standard clarified the assessment criteria for different components of the urban built environment, thereby providing a reference model for developing healthy communities on a nationwide basis.

Nevertheless, although current evaluation methods exist, there remains a need for in-depth

exploration of renewal approaches and refined governance strategies that can effectively promote health — particularly in addressing the health needs of different population groups. Research focusing on targeted health promotion for specific user groups is still limited.

2.2 Research on Age-Friendly Renewal of Old Residential Communities

Research conducted to date on the age-friendly evaluation and renewal of public spaces in old residential communities has focused predominantly on the following areas:

Internationally, the earliest documented discourse on elderly residential patterns dates back to 1956, when Lewis Mumford published an article titled "For the Elderly - Integration Rather Than Segregation," which initiated a widespread debate regarding living models for older adults. Subsequent research has progressively shifted the focus towards the social participation, mental health, and social connections of the elderly, emphasising the concept of "active ageing". This approach incorporated principles such as "shared use," "inclusiveness," and "cultural belonging" into spatial design goals, forming a relatively systematic age-friendly design framework that values community culture construction. For instance, Kim MY and colleagues evaluated overall resident satisfaction in old neighborhoods from five perspectives: safety, health, convenience, comfort, and sustainability. This study offers accurate perspectives for environmental improvement [10].

Domestically, research is primarily concentrated in three areas. Firstly, studies commence with an analysis of the daily behaviours and activity needs of older adults, subsequently investigating their spatial usage characteristics. For instance, Xue Huicong and others explored environmental design suited to the physiological and psychological needs of elderly residents in public spaces [11]. Secondly, the implementation of field surveys facilitates the identification of problems and the proposal of spatial optimisation strategies. Dou Yongjia conducted a field investigation in the Maigaoqiao community in Nanjing, analysing literature and combining the characteristics of the elderly with the current state of age-friendly adaptation in existing residential public spaces. The investigation resulted in a summary of issues and the proposal of targeted renovation strategies [12]. Thirdly, evaluation indicator systems are constructed with the purpose of assessing the age-friendliness of public spaces in old neighborhoods and suggesting measures for their renewal. For instance, Xie Bo and colleagues established secondary indicators related to location conditions, public facilities, road traffic, and public space environments to evaluate the residential environment of aging communities [13].

However, with the rise of the healthy city concept, relatively few studies have focused on how the renewal of the built environment can promote the health of elderly residents from the perspective of healthy cities. This represents an under-explored direction in current age-friendly research.

3. Sample Selection and Research Data Analysis

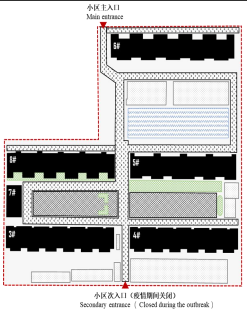
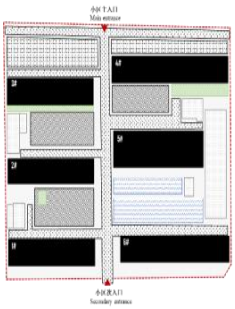
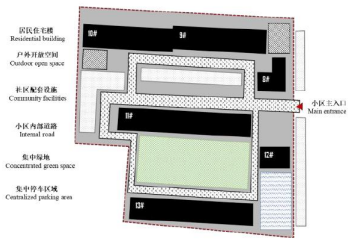
3.1 Research Area

As a megacity, Beijing has a large number of old residential communities, which are highly representative. Of these, the old residential communities in the six central urban districts account for a significant proportion. Specifically, Chaoyang District contains 1,746 old communities, accounting for 17% of the total number in Beijing. The present study focuses on Chaoyang District, selecting three representative communities for investigation. The three communities in question were constructed in the 1980s, 1990s, and early 21st century, respectively. They are distinguished by their relatively large area and population scales, and by significant differences in floor area ratio (FAR). The challenges they face are representative of the common problems encountered in old residential communities from different periods and FAR levels. Detailed information is shown in Table 2.

3.2 Health Rating Results of Sample Communities

This study uses the "Healthy Community Evaluation Standards" (T/CECS 650-2020, T/CSUS 01-2020) (hereinafter referred to as the "Standards") as the main criterion to assess whether Beijing’s old residential communities meet health requirements. The three sample communities were evaluated and scored according to the specific evaluation index system shown in Figure 1.

Table 2. Overview of Research Communities

Name of the neighborhood	No. 45, Xiaoguan Beili	No. 8, Xiaoguan Dongli	Hong Song Yuan Grocery Store Community
Year of construction	2000	1980	1986
Floor plan			
Area	15,300 square metres	12,000 square metres	13,700 square metres
Population	966	1038	840
Floor area ratio	2.8	3.5	1.1
Green space ratio	31%	20%	30%

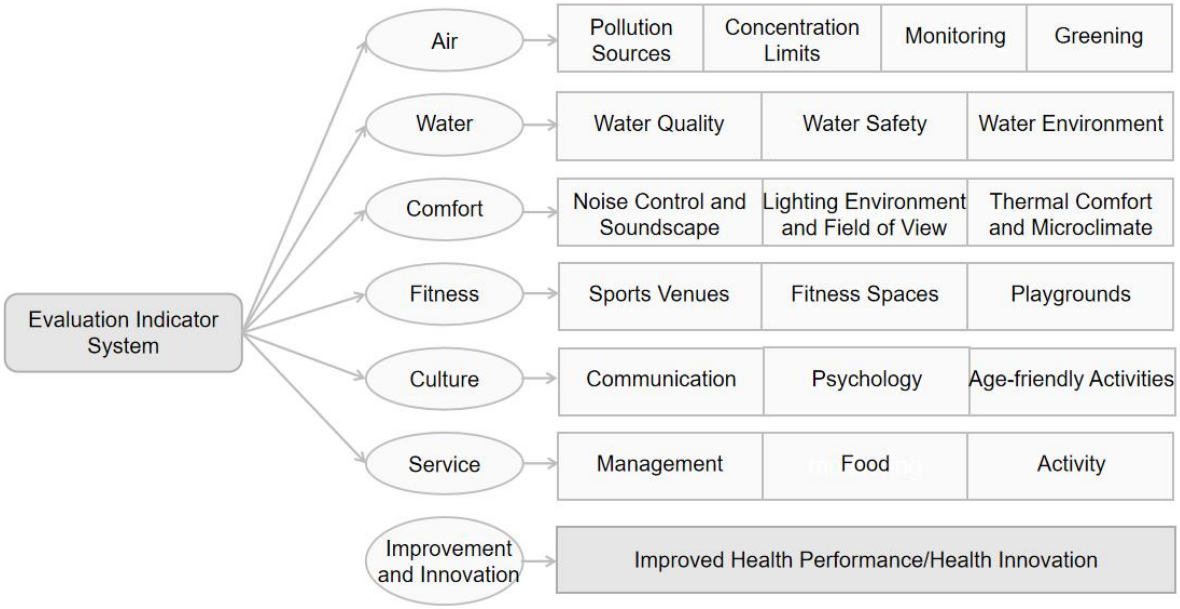


Figure 1. Healthy Community Evaluation Index System

A series of on-site surveys was carried out in the sample communities with the objective of collecting a range of environmental data. This included air quality, water quality, noise, and light environment, as well as other specific information. The data were meticulously recorded. Concurrently, offline surveys were conducted to gather residents' satisfaction and feedback regarding their living environment. In addition, a comprehensive evaluation was conducted by collating online reviews and scores from second-hand housing and rental websites, including Anjuke, 58.com, and Wo Ai Wo Jia. The scoring system is meticulously aligned with the stipulated criteria outlined in the "Standards"; all mandatory and prohibited items were scrupulously adhered to for each piece of data and detail, while items designated as "should," "should not," "must not," or "preferable" were evaluated based on the specific research conditions and constraints. The results of the scoring process are presented in Table 3.

Table 3. Health Evaluation Results of Sample Communities

Name of the neighborhood	Air quality	Water quality	Comfort	Fitness	Culture	Innovation	Total score
No. 45, Xiaoguan Beili	34	19	32	7	16	0	21.51
No. 45, Xiaoguan Beili	40	24	30	7	25	0	25.23
No. 45, Xiaoguan Beili	23	10	22	6	13	0	14.77

According to the "Standards," when a community meets all basic and control

requirements, total scores of 40, 50, 60, and 80 correspond to Bronze, Silver, Gold, and Platinum levels of healthy communities, respectively. From the evaluation results, none of the three communities reached the minimum score of 40, indicating a certain gap between the current old communities and healthy community standards, necessitating further renovation.

Among them, Xiaoguan Beili No. 45 Community scored 21.51 overall, with only 7 points in the "Fitness" spatial element. Residents reported that the fitness spaces are poorly designed and urgently need a rational spatial layout and planning. Xiaoguan Dongli No. 8 Community scored 25.23, slightly higher than No. 45 but still below the minimum healthy community threshold. The "Fitness" element again only scored 7 points, highlighting significant outdoor spatial issues requiring focused attention. Hong Songyuan Fushi Community, due to its relatively remote location and lack of facilities, had the lowest score at 14.77, the lowest among the samples. Its fitness space scored the lowest at 6 points, demanding priority renovation. Additionally, its "Cultural" and "Water Quality" elements were also low at 23 and 10 points, respectively, indicating a need not only to optimize cultural space design but also to strengthen management to ensure water safety.

3.3 Analysis of Elderly Residents' Health Perception Measurement

In addition, the study surveyed elderly residents' health perception regarding environmental factors.

The health community evaluation standards focus on two main aspects influencing residents' health: natural environment (air, water, comfort) and cultural environment (fitness, culture, innovation). Corresponding to the psychological needs of elderly residents in urban design, these can be summarized as accessibility (ease of quick and convenient access), aesthetics (visual appeal), walkability (safe pedestrian environment), and practicality (meeting actual needs). Combining the health community evaluation factors with the current state of public space in old communities, the built environment elements affecting health in old communities are summarized into five categories: road traffic, green space, activity venues, public service facilities, and environmental comfort, as shown in Figure 2.

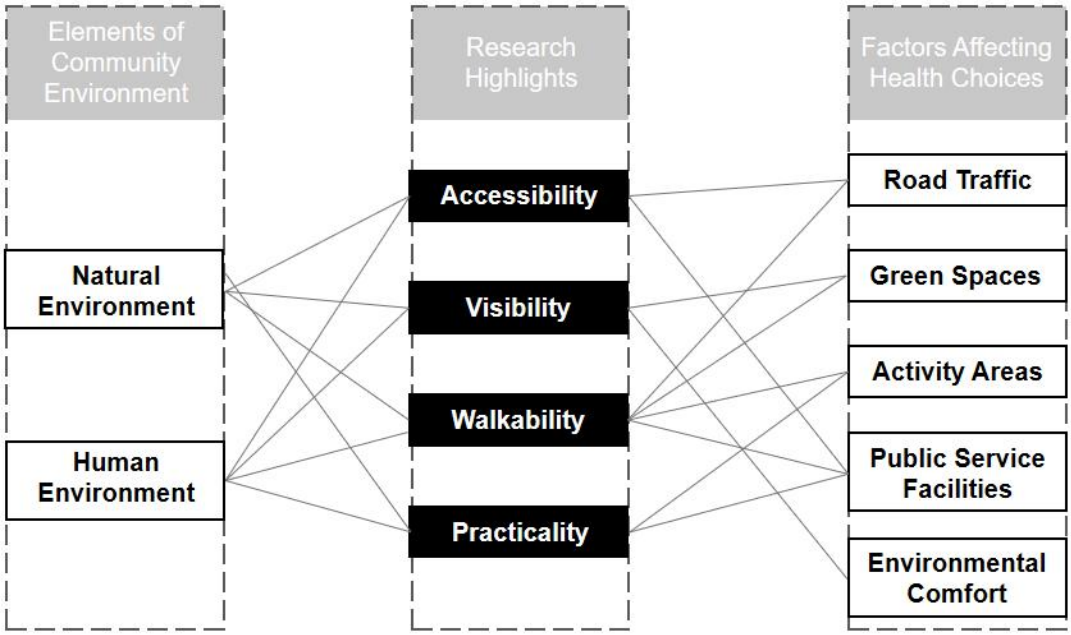


Figure 2. Selection of Built Environment Factors Affecting Health in Old Communities

The study employed a combination of subjective and objective methods to analyze the relationship between these indicators and residents' health perception. Subjectively, the questionnaire refined the five major built environment factors into 18 environmental factors to form an indicator system. Referring to related studies [14], a five-point Likert scale was used, with residents rating each factor from 5 to 1. Higher scores indicate a stronger perceived health relevance of the factor. Objectively, residents' self-assessed health status was collected, and correlation and multiple linear regression analyses were conducted to clarify the

specific influence mechanism of each environmental factor on residents' health perception.

A total of 75 questionnaires were distributed across the three sample communities, with 72 valid responses after excluding invalid ones, yielding a 96% valid response rate. The data were analyzed using SPSS with the Analytic Hierarchy Process (AHP) to calculate the weights of the 18 specific indicators. The results are shown in Table 4.

Table 4. AHP Results of Built Environment Indicators Affecting Health in Old Communities

	Primary indicators	Secondary indicators	Weighting values
The Built Environment Indicator System of Public Spaces in Aging Residential Communities Affecting Health (X)	Road Environment (X_1)	Pedestrian and Vehicle Separation (X_{11})	5.86%
		Road Quality (X_{12})	5.88%
		Parking Spaces (X_{13})	6.02%
	Green Space (X_2)	Variety of Flower and Plant Species (X_{21})	5.33%
		Mature Trees (X_{22})	5.27%
		Green Lawns (X_{23})	5.33%
	Activity Areas (X_3)	Social Interaction Spaces (X_{31})	5.24%
		Outdoor Fitness Areas (X_{32})	5.30%
		Activity Spaces for Older Adults (X_{33})	5.58%
	Public Service Facilities (X_4)	Seating Facilities (X_{41})	5.86%
		Shelter Structures (X_{42})	5.69%
		Waste Sorting Facilities (X_{43})	5.33%
		Shared Bicycles (X_{44})	4.85%
		Cultural Promotion Facilities (X_{45})	5.52%
		Lighting Sources (X_{46})	5.86%
	Environmental Comfort (X_5)	Ventilation Corridors (X_{51})	5.69%
		Noise Pollution (X_{52})	5.72%
		Adequate Sunlight (X_{53})	5.69%

The survey results show that elderly residents' health perception of public space built environment mainly focuses on "standardized parking spaces within communities," "smooth roads," "increased rest facilities," "pedestrian-vehicle separation," and "adequate outdoor lighting," with an emphasis on safety in public space use. Additionally, most respondents believe reducing noise pollution helps reduce daily irritability; placing open rest spaces and facilities in sunlit areas can increase physical activity frequency during winter; adding rain shelters, windbreaks, and elderly activity venues can increase outdoor activity times. Notably, most elderly residents do not support shared bicycle parking or riding facilities inside communities, mainly due to their older age, preference for walking, low ability to use shared bikes, and concerns about traffic safety risks introduced by shared bicycles.

Correlation analysis further examined relationships between various scale dimensions [15]. To verify if the constructed environment factors are correlated with residents' self-rated health status, Pearson correlation coefficients were used. The coefficient R ranges from [-1,1]. Correlation analysis results between sample community environment factors and residents' self-rated health are shown in Table 5.

Table 5. Correlation Analysis between Environmental Factors and Residents' Self-rated Health

		Road Environment	Green Space	Activity Areas	Public Service Facilities	Environmental Comfort
Residents' self-assessment of health	correlation coefficient	0.342**	0.193*	0.364**	0.360**	0.383**
	p-value	0.000	0.018	0.000	0.000	0.000
*p <0.05 **p <0.01						

The table shows that the five environmental dimensions—road environment, activity venues, public service facilities, environmental comfort, and green space—all have significance levels $p < 0.05$, indicating significant positive correlations with residents' self-rated health.

Since correlation only reflects the closeness of relationships but not the specific effects of each factor on health perception, the study further conducted multiple linear regression analysis to

explore the degree of influence of these evaluation indicators on residents' self-rated health. The dependent variable was residents' self-rated health (y), and the independent variables were road traffic (X1), green space (X2), activity venues (X3), public service facilities (X4), and environmental comfort (X5). Stepwise regression was performed.

Table 6. Multiple Linear Regression Analysis Results

	Non-standardised coefficient		Standardised coefficient	t	p	VIF	R-squared	Adjusted R-Square	F
	B	Standard error	Beta						
	-2.740	1.587	-	-1.727	0.092	-	0.354	0.275	F (5.41) =4.496, p=0.002
Road Environment	0.462	0.325	0.209	1.421	0.163	1.370			
Green Space	-0.482	0.308	-0.255	-1.564	0.125	1.683			
Activity Areas	0.745		0.310	0.421	2.407	0.021*	1.943		
Public Service Facilities	0.235		0.345	0.109	0.680	0.501	1.647		
Environmental Comfort	0.557		0.288	0.288	1.931	0.060	1.415		
*p <0.05 **p <0.01									

From Table 6, the regression model has $p < 0.05$, indicating overall significance and the existence of linear relationships. The five environmental dimensions affect residents' self-rated health. The regression formula is:

$$y = -2.740 + 0.462X_1 - 0.482X_2 + 0.745X_3 + 0.235X_4 + 0.557X_5 \quad (1)$$

Among these, activity venues and public service facilities are the main factors affecting residents' health perception (standardized partial regression coefficients of 0.310 and 0.345, respectively). Renovating these two elements can most significantly improve residents' health perception, while the other three also exert some influence, but to a lesser degree.

3.4 Summary

A health assessment of public spaces in three sample old communities was undertaken, the results of which indicate that the health scores are generally low, averaging around 20 points. This is far below the 40-point standard for healthy communities, suggesting a high potential for renovation. The elements of air quality and comfort received relatively high scores, while fitness received the lowest score. This is indicative of a lack of fitness facilities configuration and selection in current old communities, resulting in public spaces lacking attraction. In view of the substantial renovation workload and constrained financial resources, priority should be given to optimising fitness aspects in public spaces of older communities. Thereafter, other environmental elements should be systematically considered to maximise the health-promoting effect of built environment renovation.

The results of the health perception measurement of elderly residents in the three sample communities are summarised in Table 7. The findings of this study indicate that all five environmental factors significantly affect the self-rated health of elderly residents, with public service facilities and activity venues having the most significant positive impacts. In circumstances where resources are constrained, these objectives should be accorded a higher priority. A more detailed analysis of environmental concerns expressed by elderly residents identified a number of key issues, including road quality, parking provisions, access to sunlight, the availability of rest facilities, suitable venues for elderly activity, and the existence of social spaces. Consequently, renovations targeting elderly residents' public spaces should prioritise safety, analyse sunlight and wind to arrange sufficient seating and rest facilities in sunny, wind-sheltered locations, and improve and maintain elderly activity venues' quality and safety. Subsequently, the optimisation and regulation of parking spaces, in conjunction with the enhancement of road surface quality, is imperative to ensure safe and convenient daily travel for elderly residents. Subsequent phases of development have the potential to incrementally enhance green spaces through the strategic planting of tall trees and the enrichment of other fundamental facilities.

Table 7. Analysis of Elderly Residents' Health Perception of Environmental Factors

	Road Environment (X_1)	Green Space (X_2)	Activity Areas (X_3)	Public Service Facilities (X_4)	Environmental Comfort(X_5)	Key Focus Factors (Based on AHP Hierarchical Analysis)
Relevance (Based on correlation analysis)	E	E	E	E	E	Road quality + Parking spaces + Adequate sunlight + Rest facilities + Activity areas for the elderly + Communication spaces
Priority (Based on linear regression analysis)	X4>X3>X5>X2>X1					
*E, significant effect; N.S, no significant effect						

4. Public Space Renewal Strategies for Old Residential Communities Based on Elderly Health Promotion

This study is a development of the preceding evaluation of the health status of public spaces in old residential communities and the assessment of elderly residents' health perceptions. The study summarises four types of measures according to the five built environment factors affecting health in old communities: road traffic, green space, activity venues, public service facilities, and environmental comfort.

4.1 Road Traffic

Road traffic represents a significant and persistent problem in older residential communities. Problems such as road defects and parking that occupy road space cause significant inconvenience and safety hazards for elderly residents using public spaces. From a health promotion standpoint, road traffic renovation in old communities should focus on two main aspects:

4.1.1 Separation of pedestrians and vehicles

The creation of continuous paths for both pedestrians and vehicles should be facilitated by the use of road markings, changes in pavement materials, and physical barriers. It is of particular importance to minimize the number of intersections between these flow lines, especially in areas frequented by elderly residents. In order to ensure safe and uninterrupted passage, it is essential to incorporate barrier-free facilities and partitions. It is imperative to emphasise the anti-slip properties and durability of road materials in order to ensure optimal drainage and safety under various weather conditions. In order to provide adequate protection from the sun, it is recommended that tall shade trees be planted along roadsides wherever possible.

4.2.2 Reasonable planning of parking spaces

In order to optimise parking, it is recommended that space be reallocated or that boundary areas be utilised in order to increase parking capacity, whilst minimising impact on residents. This includes the analysis of current spatial forms and layouts for the purpose of simple reallocation, or planning to free up more parking space, or the location of parking along road edges that do not interfere with pedestrian activities. In the case of communities with sufficient space, multi-level parking structures should be considered, with the proviso that parking and activity spaces do not interfere with each other.

4.2 Green Space

It has been demonstrated that elderly residents tend to have minimal demands for green space; their primary concerns are plant diversity and regular maintenance. In the arrangement of vegetation, the selection of plants should be guided by criteria of aesthetic appeal, non-toxicity, harmlessness, and ease of management. Simultaneously, the needs of elderly residents should be given due consideration through the strategic planting of species that offer both aesthetic appeal and the potential for close observation. The addition of seating to create a natural atmosphere is also recommended.

A study of field investigations revealed that elderly residents expressed dissatisfaction with the abundance of shrubs in communal areas. This dissatisfaction was attributed to the fact that shrubs can engender a sense of distance from the landscape, and they have been observed to harbour mosquitoes during the summer months. This phenomenon has a detrimental effect on the quality of life of affected individuals. Consequently, tall trees should be favoured over low shrubs in landscaping, and taller trees should be planted in sun-exposed summer areas to provide shade and cooling.

It is argued that green space planning should extend beyond mere plant arrangement, incorporating place-based and cultural elements.

This approach would enable green spaces to fulfil memory and cultural transmission functions. For instance, the placement of diminutive sculptures on residential lawns has been demonstrated to have a beneficial psychological effect on local residents.

4.3 Activity Venues

The findings of this study demonstrate that activity venues have a significant positive influence on the health perceptions of elderly residents. It is evident that appropriate design has the capacity to significantly enhance both physical and mental well-being. In the event of the community possessing extensive public activity areas, it is recommended that venues intended for diverse functions be distributed and separated, thus ensuring the needs of various groups are met. It was proposed by certain senior residents that the location of activity spaces for the elderly be situated in close proximity to those designated for children. This would facilitate mutual visibility and interaction, thereby enhancing psychological well-being and a sense of community belonging.

In circumstances where the available space for public activity is constrained, it is recommended that a central location be selected, equidistant from residential buildings, as the primary activity area. This approach is intended to ensure equitable opportunities for fitness, activity, and social interaction among elderly residents. In the context of urban planning and design, it is imperative to address the organisation and linkage of fragmented, discontinuous, and diminutive spaces. This approach should be informed by residential proximity and demographics, thereby facilitating a differentiated design approach.

The integration of activity venues with health trails or analogous initiatives is recommended to enhance continuity and connectivity within the community, thereby facilitating resident interaction and physical activity through social engagement.

4.4 Public Service Facilities and Environmental Comfort

The renewal of public service facilities and environmental comfort has been shown to have a more positive impact than other factors. The following points are emphasised in the strategies:

In the context of older or unit-dormitory-type communities, it is recommended that public facilities incorporate elements to promote community cultural heritage. This approach is intended to enhance the sense of belonging and mental well-being of the original residents.

The placement of facilities should be integrated with microenvironment characteristics, favouring sunlit, wind-protected locations to arrange resting seats for increased time spent in public space by elderly residents.

It is recommended that information and promotional facilities be situated in areas of high population density, or in proximity to designated resting areas, with a view to optimising visibility and mitigating potential safety hazards in the vicinity of residential buildings (e.g., electrical boxes).

The current lighting system is frequently solar-powered, yet residents have expressed concerns regarding the perceived inadequacy of the illumination. In the context of renovations, the primacy of adequate brightness and illumination levels is paramount, ensuring the assurance of night safety. In areas of high pedestrian traffic, it is recommended that the spacing between lighting fixtures be increased to a range of 10-15 metres.

5. Conclusion

With urban development, improving the health of the living environment has become a societal focus. Old residential communities face many challenges in building healthy communities due to their age. Elderly residents, as the main active population, rely heavily on internal public spaces for daily activities. This study focuses on promoting elderly health through the renewal of the built environment. Based on the "Healthy Community Evaluation Standards," three old communities in Chaoyang District were surveyed and objectively scored. Elderly residents' health perceptions of the built environment factors were also surveyed. Finally, strategies were proposed in four areas: road traffic, green space, activity venues, and public service facilities & environmental comfort, providing theoretical support and strategic references for the health-oriented renovation of public spaces in old residential communities.

However, healthy community standards extend beyond physical public spaces to include community management and emergency response systems, which require further research. Additionally, this study's limited sample size restricts the generalizability of its findings.

Future research will continue to improve representativeness and reliability.

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References

[1] Hu, X., & Huang, J. (2021). Creating elderly-friendly healthy communities: International experiences and insights. Shanghai Urban Planning, 156(1), 1-7.

[2] Zhong, Y., & Luo, Z. (2021). Optimization strategies for public spaces in old communities based on elderly health promotion. Chinese Landscape Architecture, 37(S2), 56-61.

[3] Yang, J. (2020). Renovation of old communities from the perspective of public health and safety. Beijing Planning and Construction, 191(2), 36-39.

[4] Zhou, Q., Wang, G., & Zhang, Y. (2023). Study on the renewal of public space in old communities for elderly health promotion—A case study of Huanghe Xincun, Xuzhou. Industrial Design, (05), 78-80.

[5] Villanueva, K., Badland, H., Hooper, P., et al. (2015). Developing indicators of public open space to promote health and well-being in communities. Applied Geography, 57, 112-119.

[6] Silverstein, M., & Parker, M. G. (2002). Leisure activities and quality of life among the oldest old in Sweden. Research on Aging, 24(5), 528-547.

[7] Nutbeam, D. (1998). Health promotion glossary. Health Promotion International, 13(4), 349-364.

[8] Chen, J. (2023). Design research on outdoor sports space renewal in old communities of Chengdu based on health promotion concept (Doctoral dissertation, Southwest Jiaotong University).

[9] Yu, H., & Hu, Q. (2024). Renewal strategies for public spaces in old communities based on healthy community theory. Urban Architecture, 21(22), 33-37+43.

[10] Kim, M. Y., Oh, D. S., & Won, S. Y. (2019). Survey on residents' awareness of housing environment in old housing districts created by the land readjustment project in the modern age—Focused on Uam-Dong in Cheongju City. Journal of the Korean Institute of Rural Architecture, 21(1), 1-8.

[11] Xue, H., & Mao, J. (2009). Outdoor environment design suitable for the elderly in residential communities. Sichuan Architecture, 29(2), 13-15.

[12] Dou, Y. (2017). Research on sustainable renewal methods of age-friendly public spaces in existing residential areas (Doctoral dissertation, Southeast University).

[13] Xie, B., Wei, W., & Zhou, J. (2015). Evaluation of residential space environment and elderly care planning strategies in aging urban communities. Planner, 31(11), 5-11+33.

[14] Gao, Y. (2021). Research on outdoor environment renewal strategies of old communities based on health promotion (Master's thesis, North China University of Technology).

[15] Li, Y., & Zhang, R. (2023). The impact of large-scale renovation on social networks in old communities in Xiamen. In Proceedings of the 2023 China Urban Planning Conference: People's City, Planning Empowerment (Vol. 02 Urban Renewal, pp. 223-235). Xiamen University School of Architecture and Civil Engineering.

