Research on the Aging Evaluation System of Public Environment in Communities from the Perspective of Sustainability

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Abstract. The purpose of this study is to improve the quality of community-based care for the elderly, and to build an evaluation system for the aging of the community's public environment. The research is carried out in two phases: the first phase is the policy specification and the literature statistics, the preliminary sampling of the appropriate aging evaluation indicators; the second phase is the questionnaire survey and exploratory factor analysis, extracting important evaluation factors. The research results showed that the evaluation system of community public environment suitable for aging people is composed of 4 dimensions and 24 indicators, the study suggested that construction standards and decision-making basis for the community's public environment to be suitable for aging people when the community is under renewed and reconstructed situation.

1. Introduction
Since the 1990s, China has rapidly entered an aging society. Due to the huge population base, how to build a pension model in line with the Chinese people has become the focus of attention from all sectors of society [1]. At present, the pension mode of many cities in China is in the pattern of "9073", home care for 90% of the population, community care for 7%, and institutional care for 3%. In 2008, the Ministry of Civil Affairs required all parts of the country to carry out community home-based elderly care services with the goal of diversified investment subjects, public service objects, specialized service teams and diversified service modes. Relying on the community where the elderly live for a long time as the carrier, integrating various pension resources in the community and organically combining home-based pension and community pension is a new pension mode in line with traditional Chinese living habits and traditional pension culture [2]. According to the current situation of community construction in China, the community public environment where the elderly live is generally faced with problems such as lack of elderly service facilities and inadequate measures for aging, which make the construction of community home-based elderly care environment face great challenges. It is an important problem to promote the construction of community public environment suitable for aging. It is also the key linking to promote the sustainable development of social economy.
under the background of aging population [3]. Based upon the aforementioned descriptions, the study proposed three research purposes as followings:

1. To screen out the indicators related to community public environment through sorting out the national policy norms and the statistics of literature materials.
2. To extract the dimensions of the evaluation system and evaluation indexes of community public environment suitable for aging by using exploratory factor analysis method.
3. To provide the construction basis for the community environment suitable for aging project before implementation or provide the evaluation standard after the project facilities.

2. Research procedures and methods
The main purpose of this study is to establish an evaluation system of the public environment's suitability for aging people under the community home care model. Through the analysis of the national policy norms and the practical experience of the previous literature research, this paper puts forward the targeted and operable index for the community public environment suitable aging evaluation. The study was conducted in two phases. Firstly, this paper analyzes the viewpoint and index of the community public environment suitable for aging, which can be used as the quantitative basis for the next stage. Secondly, the questionnaire survey was conducted to extract the appropriate aging assessment factors of community public environment and define the dimensions for the relevant community home-based elderly care personnel.

3. Evaluation index sampling

3.1. Sorting out policy norms
Before setting up the evaluation index, this paper made a detailed reference to the old-age policy documents and standards related to community public environment issued by China since 2000 to ensure the standardization and integrity of the evaluation index selection. The Ministry of Civil Affairs (2001) issued the national starlight plan for community welfare services for the elderly, which proposed the community construction of "starlight house for the elderly" and provided corresponding activity venues [4]. The ministry of construction (2005) issued the notice on the demonstration activities of socialization of elderly care services, which proposed to improve community facilities, beautify the social environment, and provide elderly care services for community elderly in a diversified way [5]. The ministry of construction (2014) issued the "notice on strengthening the barrier-free transformation of public facilities in elderly families and residential areas", which put forward the construction requirements and key points of barrier-free transformation of public facilities in elderly families and residential areas [6].

3.2. Literature statistics
This paper aims at integrating the domestic research literature, especially the empirical research related to the aging of community environment. Li (2010) studied and discussed elderly living communities from four aspects: convenient walking transportation, convenient community public services, neighbourhood space full of affection, and comfortable living space. Lou (2014) elaborated the renovation and design method of "neighbor" community public space from three aspects, namely road environment, community entrance environment and community house environment.

3.3. Primary selection of evaluation indicators
According to the related content of the above statements, the basic evaluation index of the community public environment suitable for aging was explored which included 26 evaluation indicators: Public health facilities, Emergency relief facilities, Daily health care, Public lighting, Shopping facilities, Signage facilities, Provision rest seats, Road anti-skid, Road lighting, Accessibility of roads, The pedestrian path, Community ventilation, Science education, Social communication, Cultural entertainment, Fitness function, Road open space, Road orientation, Road landscape, Ground landscape, Public landscape, Landscape accessibility, Plant health, Water sculpture, Community sunshine, Community noiseless.
4. Research results and discussion
Performing the questionnaire survey, this study obtained 202 valid samples. By using SPSS, this study proposed the following results [7].

4.1. Mean of indicators
Based upon the means of 26 evaluation indicators, the results showed that “community road lighting” (mean = 4.564) and “community road anti-skid” (mean = 4.49) were the most important evaluation indicators. The reasons might be that community road lighting can meet the needs of the elderly in their daily activities to the greatest extent and community road anti-skid can effectively reduce the safety risk of the elderly when they are in the community environment. In comparison, the mean values of “Water sculpture landscape” (mean = 3.62) and “Landscape on the ground” (mean = 3.87) were a little bit lower, and 3.87. This indicated that these two indicators had less impact on the aging people in terms of community’s public environment.

4.2. Exploratory factor analysis (EFA)
According to the reliability analysis and statistics, the Cronbach's α coefficient of 26 indicators was 0.959 which meets the level of "very credible". By performing factor analysis, the statistics showed that 26 evaluation index samples have commonality. Other statistics such as Kaiser-Meyer-Olkin (0.934) and Bartlett (Sig. 0.000) also showed that the study data was suitable for performing factor analysis [8].

| Evaluation index                  | Factors1 | Factors2 | Factors3 | Factors4 |
|----------------------------------|----------|----------|----------|----------|
| Public health facilities         | 0.85     |          |          |          |
| Daily health care                | 0.846    |          |          |          |
| Emergency relief facilities      | 0.795    |          |          |          |
| Community public lighting        | 0.78     |          |          |          |
| Shopping facilities              | 0.755    |          |          |          |
| Signage facilities               | 0.696    |          |          |          |
| Provision rest seats             | 0.615    |          |          |          |
| Community road anti-skid         |          | 0.806    |          |          |
| Community road lighting          |          | 0.806    |          |          |
| Accessibility of roads           |          | 0.763    |          |          |
| The pedestrian path              |          | 0.712    |          |          |
| Community ventilation            |          | 0.572    |          |          |
| Science education                |          |          |          | 0.776    |
4.3. The results of factor analysis
In the process of factor analysis, the Principal Component and Varimax rotation were used to extract the evaluation factors. The study obtained four factors which the total variation of 72.101% could be explained. The Cronbach's $\alpha$ of each factor and the total Cronbach's $\alpha$ value were also high which showed the reliability of the study data was quite good (please see Table 1).

Based upon Table 1, Factor1 is related to "facilities" in the public environment of the community so that it can be named as "facilities". Factor 2 is important to include community road and community activity space so that it can be named as "physical space". Factor3 is related to the functions suitable for the elderly provided by the community’s public environment so that it can be named as "environmental functions". Factor 4 is related to landscape configuration of community’s public environment and community greening so that it can be named as "landscape greening".

4.4. Importance-performance Analysis(IPA)
Furthermore, the importance-performance analysis was used to examine the aging performance of community public environment. According to the IPA strategy map, there were 8 indices in the first quadrant (high in both importance and performance): Community road lighting, Community road anti-skid, Community space ventilation, Public greening landscape, Plant health, Public health facilities, Community public lighting, Signage facilities; 6 indices in the second quadrant (high in importance but low in performance): Accessibility of roads, Dedicated pedestrian channel, Community road orientation, Fitness function, Daily health care, Emergency relief facilities; 7 indices in the third

| Social communication | 0.744 |
|----------------------|-------|
| Cultural entertainment | 0.655 |
| Fitness function | 0.65 |
| Road open space | 0.64 |
| Road orientation | 0.594 |
| Road landscape | 0.827 |
| Ground landscape | 0.792 |
| Public landscape | 0.764 |
| Landscape accessibility | 0.654 |
| Plant health | 0.605 |
| Water sculpture | 0.535 |

| Eigenvalue | 5.429 | 4.213 | 3.912 | 3.750 |
| Total variation(%) | 72.101 |
| Cronbach's $\alpha$ | 0.931 | 0.890 | 0.899 | 0.905 |
| Total Cronbach's $\alpha$ | 0.957 |
quadrant (low in both importance and performance): Road open space, Cultural and entertainment function, Popular science education function, Social communication function, Landscape on the ground, Landscape accessibility, Water sculpture landscape: 3 indices in the fourth quadrant (high in performance but low in importance): Landscape on the road, Landscape on the road, Shopping facilities. From the quadrant where each indicator falls, people's awareness of each indicator can be obtained, which can establish the priority of improvement strategies.

5. Conclusions and recommendations
When establishing an appropriate aging evaluation system to assist community renewal and reconstruction, the selection and decision-making of construction projects with evaluation tools will be able to obtain the best mode of home-based care for the community and help the elderly in the community to age successfully. In this study, the community's public environment suitability aging evaluation system included a total of 4 dimensions and 24 indicators. The "Facilities" factor is the most important aspect because it is the most important guarantee for the elderly to carry out their daily life and health care in the community, it should also become the focus of the community’s public environment suitable for aging construction in the future. Although "Landscape greening" can beautify the environment and improve the comfort level of the community, it does not help the community to improve the degree of aging.

The analysis of importance and performance being implemented in this study involved the aging condition of community public environment at the present stage. The results revealed that in the first quadrant (containing 8 indicators) the respondents recognized their importance and rated them highly, which has met people's expectations. In the future, the public environment of the community for aging management should maintain the continuous development of these indicators. In the second quadrant (containing 6 indicators), it showed the important indicators that the community's public environment is suitable for aging, but the sense of identity experienced by the interviewees is relatively low. Therefore, it is urgent for relevant competent departments to discuss the crux of the problem, invest resources and actively improve it, so as to enhance people's recognition. In the third quadrant (containing 7 indicators), the respondents did not attach great importance to it and their recognition was also low. Although they were indicators needed to be improved, the priority of improvement was low. In the fourth quadrant (containing 3 indicators), respondents had a high degree of recognition of these indicators, which have reached the recognition of people. However, these indicators were not the most important attribute of people's intention to adapt to aging. Although these indicators can be retained, the input of resources should be reduced.

This study has constructed the evaluation system of community’s public environment suitable for aging people. The future research direction will carry out confirmatory analysis on this basis, quantify various indexes and dimensions of the evaluation system, calculate the weight of evaluation indexes at all levels, and conduct quantitative evaluation on the aging condition of community public environment.

6. References
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