

Development and validity of Chinese Neighborhood health-supportive environmental perceptions scale

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1 Abstract

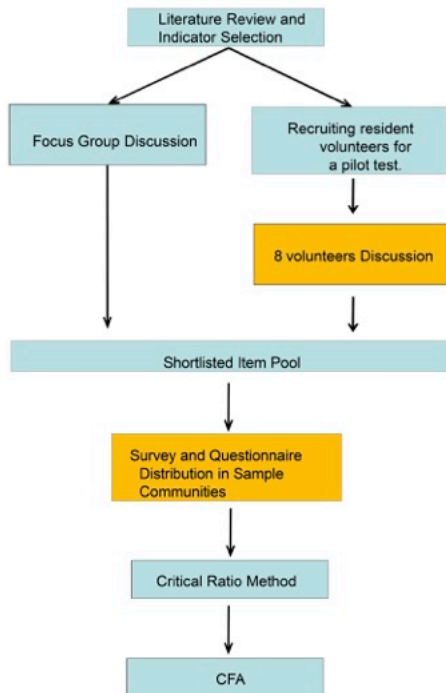
Objective: To develop and evaluate Chinese Neighborhood health-supportive environmental perceptions scale and to provide an effective subjective perception measurement tool for Chinese healthy neighborhood planning.

Method: The initial scale was developed by literature review and focus group discussion; An intercept convenient sample of 251 residents (21-75 years old) from 16 residential estates were interviewed; The critical ratio method was used to screen the initial scale for items and to divide the dimensions through exploratory factor analysis to form a formal scale. The internal consistent reliability, content validity, and construct validity of the scale were examined.

Result: The formal scale contains 22 items in 4 dimensions. The Cronbach's coefficient of the scale was 0.844, indicating the scale had a good reliability. The Pearson correlation coefficient of the individual dimension and the whole scale ranged from 0.518 to 0.778, which were all above 0.5 ($p < 0.01$), indicating a good content validity. The factor analysis results show that the eigenvalues of the four factors are 5.923 to 1.370; the contributing rate of cumulative sums of squares was 63.430%, indicating a good construct validity.

Conclusion: Chinese Neighborhood health-supportive environmental perceptions scale has good reliability and validity in the specific application, and can be used as a effective measurement tool to evaluate the potential of the neighborhood built environment that regulate the likelihood of residents' physical activity.

2 Method



3 Results

Content validity test

The Pearson correlation coefficients between the scores of the four dimensions—neighborhood accessibility, street safety and aesthetics, community comfort and livability, and facility completeness—and the total scale score were 0.518, 0.693, 0.778, and 0.560, respectively. All were greater than 0.5 and the differences were statistically significant ($p < 0.01$), indicating that the scale has good content validity.

Table 1: Distribution of Respondents' Demographic Characteristics

Demographic Characteristics	Number of people	Proportion
SEX	Male	109
	Female	142
Age	21-44	59
	45-59	77
	60-75	115
Education Level	Junior high school and below	63
	High school or technical school	93
	University or college	81
	Graduate school	14
Income	Less than 2000 yuan	12
	2000-3000 yuan	48
	3000-4500 yuan	94
	4500-6000 yuan	35
	6000-8000 yuan	32
	8000 yuan and above	29
		11.6%

Construct validity test

The results of the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity showed a KMO value of 0.851, and Bartlett's test was statistically significant ($\chi^2 = 3900.242$, $p < 0.001$). Principal component factor analysis was used to conduct factor analysis on the 22 items with a fixed number of four factors to verify the scale's construct validity. The results showed that the eigenvalues of the four common factors were 5.923, 4.816, 1.846, and 1.370; their variance contribution rates were 20.326%, 18.305%, 15.502%, and 9.297%, respectively. The four factors extracted could explain 63.430% of the total variance. The factor loadings of all 22 items were greater than 0.4, indicating that the scale has good construct validity.

Reliability test

This study used the internal consistency coefficient of the questionnaire as the reliability indicator. As shown in the table, the overall Cronbach's α coefficient was 0.844 (> 0.8), indicating good internal consistency. The Cronbach's α coefficients for the four dimensions—neighborhood accessibility, street safety and aesthetics, community comfort and livability, and facility completeness—were 0.855, 0.862, 0.840, and 0.675, respectively. According to the reliability evaluation criteria (Wu, 2010), the dimensions of neighborhood accessibility, street safety and aesthetics, and community comfort and livability, with Cronbach's $\alpha > 0.8$, demonstrated ideal reliability. The facility completeness dimension, with a Cronbach's α coefficient > 0.6 , showed acceptable reliability. The results indicate that all four dimensions and the overall scale have high internal consistency.

Table 2: The analysis results of the critical ratio method.

Item	Levene test	t(CR)	P
Distance to bus stop	F	P	
	13.588	0.000	2.055
			2.055

Table 3: Result of CFA

Item	common factor 1	common factor 2	common factor 3	common factor 4	common alities
1	0.838				0.725
2	0.809				0.717
3	0.519				0.438
4	0.685				0.603
5	0.736				0.727
6	0.669				0.498
7	0.757				0.623
8		0.692			0.621
9		0.752			0.718
10		0.579			0.550
11		0.676			0.575
12		0.701			0.675
13		0.686			0.579
14		0.658			0.589
15			0.797		0.794
16			0.808		0.760
17			0.561		0.478
18			0.785		0.759
19			0.647		0.501
20				0.584	0.647
21				0.876	0.608
22				0.710	0.771

Conclusion

The Neighborhood Health-Supportive Environment Perception Scale developed in this study consists of 22 items across four dimensions: Neighborhood Convenience and Accessibility (7 items), Street Safety and Aesthetics (7 items), Facility Completeness (3 items), and Community Comfort and Livability (5 items). The scale incorporates considerations for the community environment based on the characteristics of Chinese residential areas and identifies items with strong discriminative power through practical application and statistical analysis. Compared to foreign scales, this questionnaire is more concise and aligns with the response tolerance of Chinese residents. The reliability and validity results show that the overall Cronbach's coefficient is > 0.8 , indicating good homogeneity reliability. The original scale's four-factor structure was confirmed by extracting four common factors through exploratory factor analysis, with a cumulative variance contribution rate of 63.430%, which shows a strong fit and good construct validity. The findings of this study indicate that the scale has good reliability and validity in practical application and can be used as a measurement tool to evaluate the potential of the neighborhood built environment in supporting residents' physical activity.

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