Psychology Research and Behavior Management

Dovepress

open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

The Impact of Multi-Quality Renewal Elements of Residence on the Subjective Well-Being of the Older Adults - A Case Study of Dalian

Minling Teng, Jian Suo, Haojie Zhong, Ningbo Kou, Bingwen Song, Guopeng Li

School of Architecture and Fine Art, Dalian University of Technology, Dalian, 116000, People's Republic of China

Correspondence: Jian Suo, School of Architecture and Fine Art, Dalian University of Technology, Dalian, Liaoning Province, People's Republic of China, Tel +86-138-4090-7234, Fax +86 411-84707504, Email suojian727@dlut.edu.cn

Background: With the expansion of comprehensive renovation projects in China's old residential areas, residents' actual sense of access and well-being has become a source of concern. As the population in old residential areas ages, the results of old renovation will have a significant impact on the older adults quality of life and subjective well-being.

Purpose: To date, most relevant studies have focused on urban and community scales, with little discussion of the impact of neighborhood-level renewal outcomes on the well-being of older adults. As a result, the purpose of this research is to optimize the quality renewal elements of existing old residential areas based on the results of their renovation in order to create a more livable living environment for older adults in existing old residential areas.

Methods: Based on a survey of old neighborhoods in Dalian, the study examines the mediating effect of psychological resilience between multi-quality renewal elements and the subjective well-being of the older adults, and it discusses the influence of multi-quality renewal elements on the subjective well-being of the older adults in different residential types.

Results: According to the findings, multi-quality renewal elements of residence positively predicted the subjective well-being of the older adults; there was a significant mediating effect of psychological resilience between the renewal elements and subjective well-being of the older adults. The study confirms that multiple quality renewal elements can contribute to older people's subjective well-being, and that psychological resilience plays an important role in the selection of multiple quality renewal elements and older people's subjective well-being.

Conclusion: The research provides guidance for the establishment of health-oriented approaches to environmental restoration in residential areas for the sustainable development of communities and cities.

Keywords: existing old residential areas, multi-quality renewal elements, older adults, subjective well-being, impact

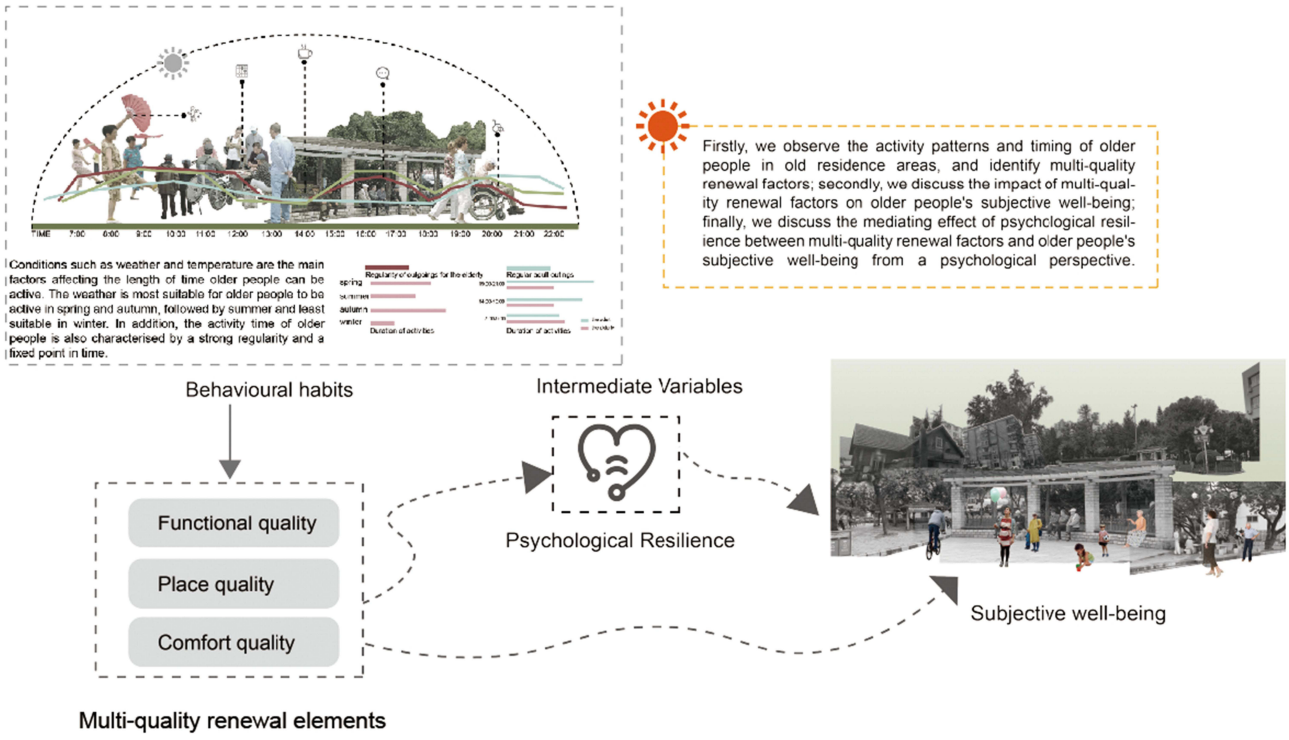
Introduction

The country's rapid urbanization has created a slew of new issues for cities. The interaction between a large number of new homes and the serious deterioration of the quality of existing residences has resulted in increasing social inequality in housing, which has a negative impact on residents' health and impedes sustainable urban development. China's low-income older adults are mostly concentrated in old residences with severe quality degradation. Because the elderly population's daily travel range is limited, the community becomes the primary location for their daily activities.[1] In recent years, multi-quality renewal of residences in domestic cities has positively improved residents' living environment. Multi-quality enhancement refers to the comprehensive renewal of residential buildings and environments in three dimensions: functionality, comfort, and place.[2]

By the end of 2021, the national population of older adults aged 60 and above would have reached 267 million, accounting for 18.9% of the total population; the proportion of older adults aged 60 and above in Dalian's total population is 24.71%, indicating that the city has entered the moderate aging stage.[3] In order to reconcile sustainable urban development with housing and the health of the older adults, increase the residents' actual sense of access and

Received: 22 December 2022
Accepted: 25 February 2023
Published: 13 March 2023

Graphical Abstract



well-being, and allow more groups to share the fruits of urban development, China has been implementing the comprehensive renew-al of buildings in existing residences since 2011,[4] intending to address challenges in urban living and future development on social, environmental, and economic levels.

The study of older people's well-being spans multiple scales, including urban eco-nomic development, density, diversity, design, transportation accessibility, and destination accessibility,[5–27] as well as studies on the effects of intercity differences and urban built environment differences on residents' well-being.[5] The general consensus was that residents' subjective well-being is strongly related to their living environment. At present, using the mediating moderating role of psychological resilience to test or validate the influences on well-being has recently become an important re-search trend.[26,28–53] According to the description of the intermediary model proposed by Zhonglin: M is referred to as a mediator variable when the independent variable X influences the dependent variable Y by influencing M.[28] According to Gao Fengjian, reducing loneliness is an important way to improve older adults' subjective well-being, while mental activities such as psychological resilience and self-efficacy older adults also play a role in improving their subjective well-being.[34] Tian Feng'e discovered that psychological counseling for the older adults has a better effect on improving the subjective well-being of the older adults.[35] Many foreign scholars have used psychological resilience as a mediator to improve the impact of external events on individuals' subjective well-being. de Vries revealed a close relation-ship between well-being and psychological resilience, finding a bidirectional causal effect between them.[52] Many researchers have used psychological resilience as a mediator to enhance the effect of external events on an individual's subjective well-being.[31] As a result, mental activity and emotional affect are often used as a manifestation or moderator of well-being, as well as ways to express well-being.[53] Some studies have also found a strong link between the residential environment, housing, and health,[54–64] and Li Shuran and Chen Changhui argue that paying attention to the special needs of the older adults for their living environment is beneficial to their physical and mental health;[54] Zhang and Lin et al proactive spatial interventions in residential environmental factors can have a positive impact on residents' health and promote China's health.[55]

Currently, there has been little research on the impact of built environment quality elements on the subjective well-being of older people following environmental quality improvements (Figure 1). As a result, the study chose five typical types of residential areas in Dalian City 2–3 years after comprehensive multi-quality renewal to investigate the influence of the built environment on the subjective well-being of the older adults in old residential areas, as well as to discuss the relationship between psychological resilience in multi-quality renewal and the subjective well-being of the older adults. Two hypotheses are proposed in the study, Hypothesis 1: multi-quality renewal elements can contribute to older people's subjective well-being; Hypothesis 2: Psychological resilience is important in the relationship between the selection of multi-quality renewal elements and older people's subjective well-being. The study seeks to uncover the mechanisms by which multiple quality factors of the living environment influence the subjective well-being of older people, as well as to guide the development of health-oriented approaches to environmental rehabilitation in settlements, thereby contributing to the long-term development of communities and cities.

The research starts with a review of the literature on the close relationship between subjective well-being, psychological resilience, and subjective well-being, as well as the relationship between living environment, housing, and health. As described in sections 1 and 2, two research hypotheses are developed, research objectives are established, and a research scope and research population are defined. Sections 3 and 4 explain the methodology of the research and the results of the study, respectively. Section 5 dis-cusses the outcomes and the limitations of this study, and Section 6 concludes the pa-per with recommendations for practice and further research.

Materials and Methods

The effect of psychological resilience on the subjective well-being of the older adults in Dalian's existing old residential areas is discussed in this study, with psychological resilience serving as a moderating variable. The study area is located within Dalian's core administrative region. The old residential areas were classified into five different topographic environmental areas chosen based on Dalian's hilly terrain: flatland in rows, mountainous, slope, valley, and flatland enclosed, and the older adults aged 60 and above were chosen for each type of survey. The study was conducted offline and non-randomly to ensure that respondents had lived in the study area for at least six months and could understand the questionnaire and provide responses to be eligible to participate. The questionnaire was administered anonymously, and each participant provided informed consent. Questionnaires with a high number of omitted questions, contradictory responses, ticking the same box multiple times, and a high frequency of ticked boxes were excluded.

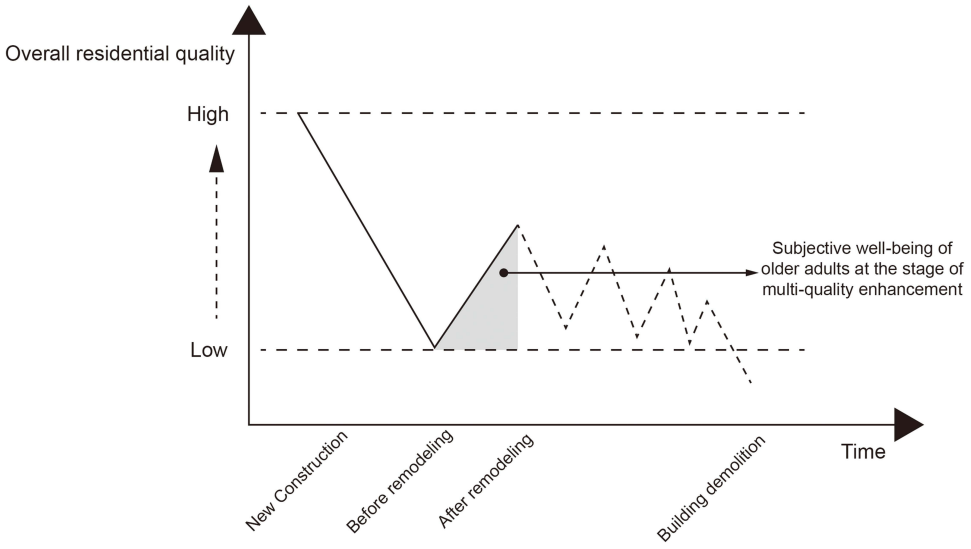


Figure 1 Multiple quality renewal and quality degradation time-related concepts.

Study Variables

Mediating Variable: Psychological Resilience

The study selected the Connor-Davidson resilience scale (CD-RISC), developed by Connor and Davidson (2003), a questionnaire containing 25 entries such as "I can adapt to change", with scores ranging from 0 to 4 indicating Not at all, rarely, some-times, frequently, and almost always. The internal consistency coefficient was 0.878, indicating that the scale's reliability was good, and the higher the scale's total score, the greater the level of mental toughness.

Dependent Variable: Subjective Well-Being of the Older Adults

Many scholars have chosen hope, self-control, self-esteem, gratitude, and psycho-logical resilience as moderating variables in the role of well-being.[31] The Campbell Happiness Scale is used to assess the subject's current level of well-being. The overall effective index scale and the life satisfaction questionnaire comprise this scale. The former contains eight items that describe the content of emotions to varying degrees, whereas the latter contains only one item. The mean score of the overall effective index scale and the score of the life satisfaction questionnaire (with a weight of 1.1) were added together to calculate the total score. The scale ran from 2.1 (least happy) to 14.7 (most happy). As a result, the Campbell Happiness Scale was chosen for this study, and with a Cronbach's Alpha of 0.923, the questionnaire is reliable.

Dependent Variable: Subjective Well-Being of the Older Adults

The selection of multi-quality elements of the residential environment is primarily based on the local authorities' environmental and architectural quality improvement work on existing problems in old residential areas, as well as the relevant domestic policies and standards, which include 14 quality elements of residential architecture and 14 quality elements of the environment. Based on: 1) WHO's "Four Health Criteria", which proposes Safety, Health, Convenience, and Amenity; and 2) "Assessment standard for healthy retrofitting of existing residential quarters", which includes Comfort, Exercise, Humanity, and Service. The four WHO health standards of Safety, Convenience, Amenity, and Convenience cover a total of 14 multi-quality renewal elements, corresponding to 50% of the multi-quality renewal projects; "Assessment standard for healthy retrofitting of existing residential quarters" corresponds to a total of 13 multi-quality renewal elements in terms of Comfort, Exercise, Humanities, and Services, which are more concentrated in the quality of place and comfort, corresponding to a total of 13 multi-quality renewal elements in terms of 3.7% of the factors do not correspond to the evaluation criteria. The 3.7% of renewal items that did not correspond to were primarily concentrated in functional renovation, which was later supplemented according to the actual renewal situation with reference to the "Assessment standard for green retrofitting of existing buildings", specifically wall roofing, door, and window renovation, and facade renovation renewal items. Each variable is explained descriptively to the subjects in order to be easily understood, ranging from "strongly disagree", "relatively disagree", "average", and "agree" to "strongly agree", as shown in Figure 2.

Variables and Definitions

The definitions of the variables are shown in Table 1.

Intermediary Effect Analysis Model

The study investigated the mediating moderating effect of psychological resilience on the subjective well-being of the older adults in multi-quality renewal in comparison to the general regression analysis. Based on the quality renewal projects of existing residences in Dalian, the mediating moderating effect of psychological resilience between multi-quality renewal and well-being of the older adults was investigated, and the relevant renovation contents of buildings and environments were divided into three major aspects: functionality, place, and comfort, as shown in Figure 3. related studies discovered that health, culture, life experience, and age all have an impact on subjective well-being.[65–69] As a result, in this study, demographic variables such as gender, age, occupation, and length of residence were used as control variables. On this basis, the study focused on the relationship between multi-quality renewal elements and older adults' subjective well-being.

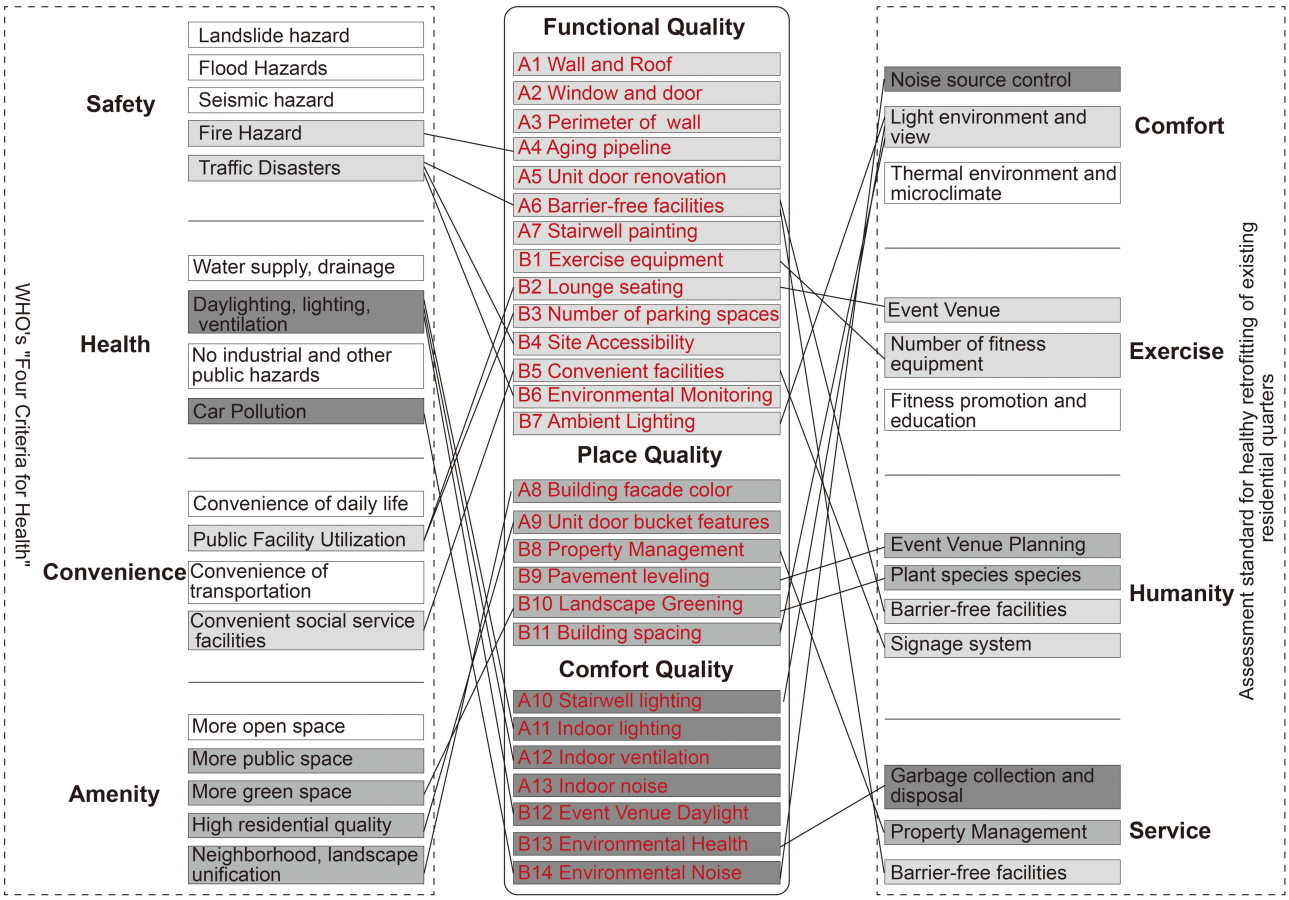


Figure 2 Diagram of multi-quality renewal elements selection.

Results

Data Acquisition and Analysis

Data Source

Data collection began in Data collection begins 27 December 2021 to 15 June 2022. The study used quota samples, firstly, the research set 60–70 data sampled for each environmental area. Second, because the study was designed for people aged 60 and up, the control variables were divided into three age groups: 60–64 years old, 65–74 years old, and

Table 1 Variables & Definitions

Category	Variables	Definition
Explained variables	Subjective well-being	Satisfaction (7 levels, assign 1 = Very dissatisfied~7 = very satisfied)
Explanatory variables	Building Multi-Quality	
	Build functionality	Functional quality of residential buildings
	Build Placemaking	Building façade colors, door hopper features, etc.
	Build comfort	Indoor lighting, ventilation, noise, and other physical factors
	Environment Multi-Quality	
	Environmental functionality	Activity venue equipment, cleanliness, convenience, safety, etc.
	Environmental Placemaking	Environmental landscape greening, road and property management
	Environmental comfort	Hygiene, sunlight, noise, and other factors in the environment

(*Continued*)

Table 1 (Continued).

Category	Variables	Definition
Intermediate variables	Psychological Resilience	Change frequency (7 levels, assign 0 = Never~4 = Always)
Individual property variables	Gender	2 Categories (1 = male; 2 = female)
	Age	3 Levels (60–64 years old, 65–74 years old, Over 75 years old)
	Education level	4 Levels (Junior high school or below, Secondary School/High School, College, Undergraduate or above)
	Length of residence	4 Levels (Under 1 year, 1–3 years, 3–5 years, Over 5 years)
	Always living in the district	2 Categories (assign Yes=1, No=2)

over 75 years old. This study distributed 324 questionnaires, with 317 valid questionnaires obtained (62 on flatland in rows type, 65 on mountainous type, 61 on slope type, 69 on valley type, 60 on flatland enclosed type) (Table 2).

Analysis Process

Based on the fact that most domestic and international studies on subjective well-being use multiple linear regression for testing,[5–23] which has been shown to be a generally effective method, this study used a statistical approach, analyzing data with SPSS 25.0 and KANO 25.0 software and analyzing mediating effects with Boot-strap software. The specific approach is as follows: in the first step, the correlation be-tween multi-quality renewal elements, psychological resilience, and subjective well-being of older people is tested; in the second step, the direct effect of integrated multi-quality renewal elements on the subjective well-being of older people in Dalian's older residential areas is tested, as is the mediating effect of psychological resilience. In the third step, data from various residential types were categorized and analyzed to test the direct effect of control variables on the subjective well-being of the older adults (Model I); the direct effect of multi-quality renewal on the subjective well-being of the older adults was tested by adding the (Model II). The fourth step investigated the mediating effect of psychological resilience in different residential types, between multi-quality renewal elements and the subjective well-being of the older adults. (Model III).

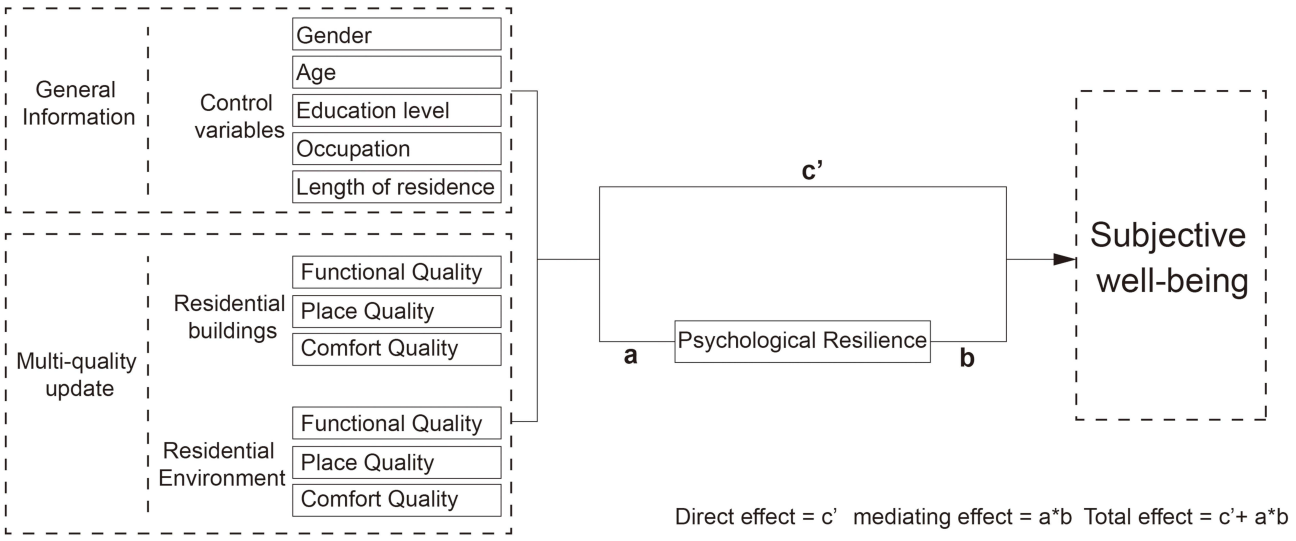


Figure 3 A model for analyzing the mediating effects of multi-quality renewal elements on well-being.

Table 2 Five Typical Residence Types in Dalian

Xingxin Residence			**Wencui Xuan Residence**		
Remodeling time 2020–2021	Type of Residence Flat-Land in Rows Type	Number of households 2136	Remodeling time 2018–2019	Type of Residence Slope Type	Number of households 984
Wuchang Residence			Shidaojie Residence		
Remodeling time 2019–2021	Type of Residence Mountainous Type	Number of households 2055	Remodeling time 2018–2019	Type of Residence Mountainous Type	Number of households 3665
Xishan Seven Lane Residence			Xigou Residence		
Remodeling time 2020–2021	Type of Residence Valley Type	Number of households 1001	Remodeling time 2018–2019	Type of Residence Valley Type	Number of households 672
Huodayuan Residence			Jixianjie Residence		
Remodeling time 2017–2018	Type of Residence Flat-Land Enclosed Type	Number of households 2797	Remodeling time 2019–2020	Type of Residence Flat-Land Enclosed Type	Number of households 2367

Sample Characteristics

Table 3 discusses the participants' individual attribute characteristics and satisfaction characteristics with the settlement's current multi-quality environment. The gender split was 42.4% male and 57.6% female. 60–64 years old (22.5%), 65–74 years old (37.7%), and 75 years old or older (39.9%) were the age groups. Only 5.1% of them had a bachelor's degree, the highest level of education. The vast majority of older adults (88.7%) were retired and had lived in the area for more than 5 years (85.8%). Participants were generally satisfied with the functional quality of the multi-quality renewal (3.15),

Table 3 Basic Information of the Interviewed Older Adults

Characteristic	**Category**	**N (%)**
Gender	Male	134 (42.4%)
	Female	182 (57.6%)
Age	60–64	71(22.5%)
	65–74	119(37.7%)
	≥75	126(39.9%)
Education level	Junior high school or below	138(32.8%)
	Secondary School/High School	113(35.8%)
	College	49(15.5%)
	Undergraduate or above	16(5.1%)
Occupation	Work	23(11.3%)
	Retirement	181(88.7%)
Length of residence	Under 1 year	10 (3.2%)
	1–3 years	10 (3.2%)
	3–5 years	7 (2.2%)
	Over 5 years	289 (91.4%)
		Mean (standard deviation)
Multi-quality renewal	Functionality of the building	3.16 (0.73)
	Placemaking of the building	3.91 (0.94)
	Comfort of the building	3.90 (0.70)
	Environmental functionality	3.14 (0.63)
	Environmental Placemaking	3.60 (0.73)
	Environmental comfort	3.79 (0.76)

while satisfaction with the comfort quality (3.85) was relatively higher. The average value of the participant's subjective well-being index was 10.358 (if the scores for the eight entries of the overall effective index and one entry of life satisfaction were averaged, the average scores for all residents were 4.934 and 5.930), indicating that residents' overall level of well-being in life was higher than the national average.[70]

The Impact of Multiple Quality Renewal Elements on Older Adults' Subjective Well-Being

First, the correlation test among variables was performed on the selected data of Dalian old residential areas renewal and renovation, and the results of Pearson correlation analysis method were used (Table 4), which revealed that there was a significant positive relationship between multi-quality renewal elements, psychological resilience, and subjective well-being ($P<0.01$), and the correlation coefficients for the three variables ranged from 0.4 to 0.7, indicating a strong relationship between the variables, and the relationship between the multiple quality renewal elements, psychological resilience, and subjective well-being could be explored further in a linear model.

Table 5 summarizes the findings of the Dalian old residential areas quality study using a linear regression model. According to the regression model's covariance and independent residual tests, the tolerance of all independent variables is greater than 0.2 and the variance inflation factor (VIF) is less than 5, indicating that no covariance exists between the model's independent variables. The Durbin-Watson converges to 2, indicating that the residuals are independent and meet statistical criteria.

The results of the analysis show that the linear regression model fit $R^2=0.372>0.3$, indicating that the present multiple quality renewal elements of the functionality of the building, placemaking of the building, the comfort of the building,

Table 4 Pearson Coefficients for the Multi-Quality Renewal, Psychological Resilience, and Subjective Well-Being

	Multi-Quality Renewal	Psychological Resilience	Subjective Well-Being
Multi-quality renewal	1		
Psychological Resilience	0.589**	1	
Subjective well-being	0.566**	0.697**	1

Note: **Indicates significance at the level of 0.01.

Table 5 A Multi-Factor Hierarchical Regression Analysis of Older Adults' Subjective Well-Being

Model	Non-Standardized Coefficient		Standard Coefficient	t	Significance	VIF
	B	Standard Error	β			
(Constants)	0.235	0.673		0.281	0.000	
Functionality of the building	0.754	0.187	0.270	4.029	***	2.135
Placemaking of the building	0.083	0.122	0.038	0.675	0.500	1.529
Comfort of the building	0.239	0.190	0.028	1.255	0.210	2.049
Environmental functionality	0.552	0.186	0.170	2.969	***	1.570
Environmental Placemaking	0.011	0.156	0.004	0.070	0.944	1.776
Environmental comfort	0.628	0.173	0.234	3.637	***	1.978
R^2	0.372					
F	10.440					
Dependent variable: subjective well-being						

Note: ***Indicate significant at the level of 0.01 respectively.

environmental functionality, environmental placemaking, and environmental comfort are capable of 37.2% of the change in the subjective well-being of the older adults. Functionality of the building can have a significant and positive impact on the subjective well-being of the older adults (β=0.270, p<0.01); environmental functionality can have a significant and positive impact on the subjective well-being of the older adults (β=0.170, p<0.01); and environ-mental comfort can have a significant impact on the subjective well-being of the older adults (β=0.234, p<0.05), as shown in Table 5.

A Test of Psychological Resilience's Mediating Effect

The above analysis of the effects of multi-quality renewal elements on the subjective well-being of older adults in Dalian's old residential areas revealed that multi-quality renewal elements can significantly affect the subjective well-being of older adults. As a result, the bias-corrected percentile Bootstrap mediating effect test was used to investigate the role of psychological resilience in mediating the relationship between multi-quality renewal elements and subjective well-being in the older adults. The 95% confidence interval (CI) of the mediation effect was estimated by 5000 repetitions with the multi-quality elements of residence (functionality, place, and comfort) as independent variables and subjective well-being as dependent variables, and if the interval did not contain 0, the mediation effect was significant, as shown in Figure 4.

Table 6 shows that there is a significant mediating effect of psychological resilience (a*b=28.313, SE=2.300, 95% CI=[15.843, 50.879]) between multi-quality renewal elements and the subjective well-being of older adults.

The Impact of Multi-Quality Renewal Elements on Subjective Well-Being of Older Adults in Various Residential Types

According to the type of residence for the analysis, the participants were divided into five multilevel regression models and mediated models. Based on the covariance tests and independent residuals of the regression models, the tolerance of all independent variables was greater than 0.1 and the variance inflation factor (VIF) was less than 10, indicating that there was no covariance between the models' independent variables. As shown in Table 7 and Table 8, the Durbin-Watson converged to 2, indicating that the residuals were independent and met statistical requirements.

Based on the results of the calculations in the flatland in rows type, Model II has R^2=0.571 (Sig.=0.000), an increase of 0.438 units over Model I, indicating that the effect of Model II with the multi-quality renewal element has 43.8% more explanatory power on the subjective well-being of the older adults. The operational results revealed that: the functional quality of building had a significant positive correlation with subjective well-being of the older adults (β=0.367, P<0.05); environmental comfort quality had a significant positive correlation with subjective well-being of the older adults

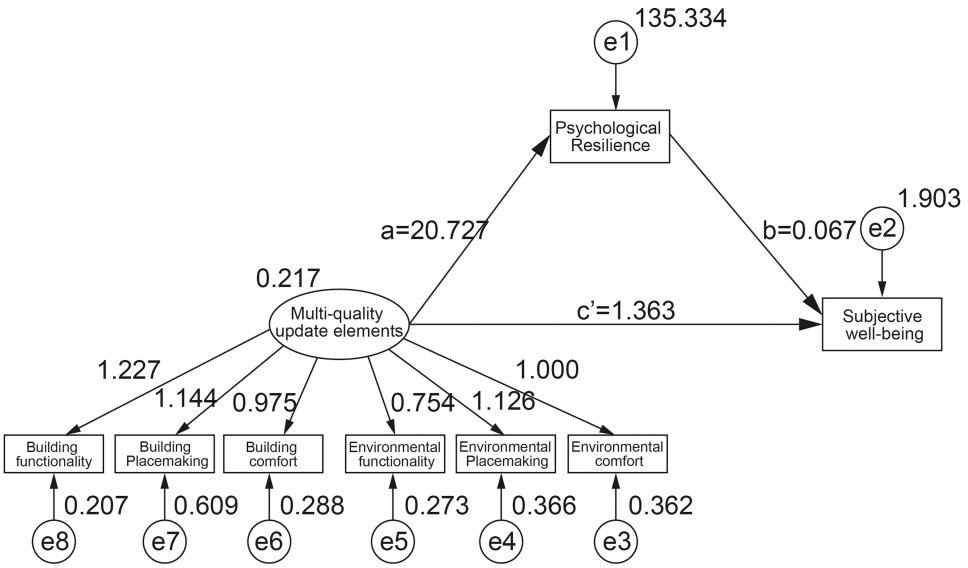


Figure 4 Path analysis of the mediating effect of psychological resilience.

Table 6 The Mediating Effect of Psychological Resilience Between Multi-Quality Renewal Elements and Subjective Well-Being in Older Adults

Multi-Quality Renewal Elements - Subjective Well-Being	Point Estimate	Product of Coefficients		Bootstrap 5000 Time	
				Bias Corrected	
		SE	P	Lower	Upper
Indirect effects (Multi-quality renewal elements - Subjective well-being)	28.313	2.300	***	15.843	50.879
Direct effect (Multi-quality renewal elements - Subjective well-being)	1.366	0.281	***	0.809	2.083
Total effect	29.679	2.581	***	16.678	52.739

Note: ***Indicates significance at the level of 0.01.

(β=0.651, P<0.01); and environmental placemaking quality had a significant negative correlation with subjective well-being of older adults (β=−0.388, P<0.1). At the individual level, older adults with a college degree had higher subjective well-being than older adults with a bachelor's degree (β=0.368, P<0.1) (Table 7).

When the multi-quality renewal elements (independent variables) and psycho-logical resilience (mediating variables) are combined in Model III, the results showed that psychological resilience played a partially mediating role between environmental comfort (a*b=0.767, 95% CI=[0.359, 1.306]) and subjective well-being of older people in flat-land type, and a fully mediating role between functionality of building (a*b=0.645, 95% CI=[0.145, 1.232]) and comfort of building (a*b=0.815, 95% CI=[0.322, 1.4]). 0.322, 1.413]) (Table 8).

Model II in mountainous type analysis results showed that after adding the multi-quality renewal element, R^2=0.550 (Sig.=0.000), which is 0.292 units more than Model I. This means that the multi-quality renewal element's explanatory power on the subjective well-being of the older adults in Model II in mountainous residences increased by 29.2%, highlighting the influence of multi-quality renewal elements on the subjective well-being of the older adults. In Model II, the functional quality of the building demonstrated a significant positive correlation with the subjective well-being of the older adults (β=0.433, P<0.01); similarly, the environmental functional quality demonstrated a significant positive correlation with the subjective well-being of the older adults (β=0.353, P<0.05). Individually, subjective well-being was significantly higher among the older adults aged 65–74 (β=0.371, P<0.05), indicating that the older adults aged 65–74 are easily satisfied with their lives and more likely to feel happy in mountain type (Table 7).

According to the results of the analysis of Model III, psychological resilience in mountainous types in the relationship between the functionality of the building (a*b=0.072, 95% CI=[0.036, 0.118]) and subjective well-being plays a partially mediating role, and psychological resilience in the relationship between the comfort of the building (a*b=0.166, 95% CI=[0.063, 0.298]) and the environmental functionality (a*b=0.098, 95% CI=[0.048, 0.208]) fully mediated the relationship between subjective well-being of older people. Contrasting Model II increased the effect of environmental comfort on older people's subjective well-being, indicating a mediating moderating role of psychological resilience between multi-quality renewal elements and older people's subjective well-being in mountainous type (Table 8).

In the slope type, after adding the multi-quality renewal elements, Model II has an R^2=0.682 (Sig.=0.000), and the R^2 increases by 0.559 units, indicating that the explanatory power of the multi-quality factor in Model II on the subjective well-being of the older adults is 68.2%, up from 55.9% more than Model I. In terms of specific influencing factors, in terms of residential buildings, the functional quality of the building showed a significant positive correlation with the subjective well-being of the older adults (β=0.295, p<0.1); in terms of environmental quality, the environmental functional quality showed a significant negative correlation with the subjective well-being of the older adults (β=−0.351, p<0.05), and the environmental placemaking quality showed a significant positive correlation with the subjective well-being of the older adults (β=0.561, P<0.01), and environmental comfort quality was significantly and positively correlated with subjective well-being (β=0.350, P<0.1). Individually, the length of residence between 3–5 years was inversely related to the subjective well-being of the older adults when compared to those who had resided for more than 5 years (β=−0.205, P<0.1) (Table 7).

Table 7 Comparison of Model Estimation Results of Multi-Quality Renewal Elements on the Subjective Well-Being of the Older Adults in Different Residential Types

Factors	Flat-Land in Rows Type		Mountainous Type		Slope Type		Valley Type		Flat-Land Enclosed Type	
	Model I	Model II	Model I	Model II	Model I	Model II	Model I	Model II	Model I	Model II
Multi-quality renewal elements										
Build functionality		0.367**		0.433***		0.295*		0.103		0.268
Build Placemaking		0.004		−0.086		−0.065		0.034		0.120
Build comfort		0.047		0.104		0.165		0.026		−0.141
Environmental functionality		0.187		0.353***		−0.351**		0.327**		0.340**
Environmental Placemaking		−0.388*		−0.137		0.561***		0.342**		−0.057
Environmental comfort		0.651***		0.056		0.305*		0.033		0.171
Individual Properties										
Age (Reference group: Over 75 years old)										
60–64 years old	−0.103	0.180	−0.110	0.016	−0.025	0.074	0.091	−0.006	−0.60	−0.155
65–74 years old	−0.091	0.061	0.316**	0.317**	0.096	0.099	0.022	−0.107	−0.209	−0.173
Gender (Reference group: female)										
Male	0.062	0.058	−0.165	−0.223	−0.020	−0.025	−0.194	−0.139	0.034	0.091
Education level (Reference group: Undergraduate or above)										
Junior high school or below	0.199	0.485	−0.215	−0.232	−0.138	−0.008	0.596	0.025	0.226	0.278
Secondary School/High School	0.239	0.453	−0.105	−0.149	−0.085	−0.057	0.633	0.075	0.194	0.101
College	0.238	0.368*	−0.251	−0.311	−0.124	−0.121	0.501	0.144		−0.088
Length of residence (Reference group: Over 5 years)										
Under 1 year	——	——	0.024	−0.090	0.431*	0.196	——	——	−0.383*	−0.316
1–3 year	0.021	0.037	0.086	0.091	0.302	−0.001	0.112	0.126	−0.055	−0.227
3–5 year	−0.038	−0.079	−0.057	−0.081	0.104	−0.205*	0.057	0.095	−0.001	0.010
Occupation (Reference group: Retirement)										
Work	−0.308*	−0.222	0.165		−0.176	0.200	−0.156	−0.226	0.207	0.113
Always living in the district (Reference group: No)										
Yes	−0.190	−0.011	−0.011	−0.078	0.431	0.149	−0.061	0.036	−0.019	−0.015
R^2	0.133	0.571	0.258	0.550	0.123	0.682	0.094	0.532	0.223	0.552
F	0.785	3.750	1.678	3.383	0.625	2.741	0.615	3.763	1.228	2.977
P	0.000									
Size of sample	62		65		61		59		60	

Note: *, **, ***In the model I and model III indicate significance at the levels of 0.1, 0.05, and 0.01 respectively.

https://doi.org/10.2147/PRBM.S401082

Table 8 Comparison of the Results of the Relationship Between Psychological Resilience of Different Residential Types in Multi-Quality Renewal Elements and Subjective Well-Being of the Older Adults

Variables	Flat-Land in Rows Type			Mountainous Type			Slope Type			Valley Type			Flat-Land Enclosed Type		
	Model III			Model III			Model III			Model III			Model III		
	Point Estimate	Lower	Upper	Point Estimate	Lower	Upper	Point Estimate	Lower	Upper	Point Estimate	Lower	Upper	Point Estimate	Lower	Upper
Multi-quality renewal elements															
Building															
Functional Quality	0.645*	0.145	1.232	0.072*	0.036	0.118	1.041*	0.409	1.856	0.679*	0.058	1.447	0.709*	0.269	1.233
Place Quality	0.338	−0.368	0.871	0.336	0.181	0.598	0.495	−0.001	1.061	0.151	−0.084	0.587	0.316	−0.082	0.841
Comfort Quality	0.815*	0.322	1.413	0.166*	0.063	0.298	1.515*	0.905	2.294	0.534*	0.181	1.063	0.582*	0.008	1.432
Environment															
Functional Quality	0.915	0.420	1.581	0.098*	0.048	0.208	1.297*	0.060	2.471	0.537*	0.018	1.361	0.787*	0.273	1.435
Place Quality	0.715	0.374	1.286	0.109	0.003	0.252	1.363*	0.697	2.141	0.434*	0.033	1.019	−0.015	−0.359	0.909
Comfort Quality	0.767*	0.359	1.306	0.175	0.011	0.337	1.879*	1.180	2.684	0.556*	0.127	1.125	0.379	−0.054	0.923

Note: *In Model III indicates significance at the 95% confidence interval.

In slope type, The results of Model III showed that psychological resilience in all three qualities of the functionality of the building (a*b=1.041, 95% CI=[0.409, 1.856]), the comfort of the building (a*b=1.515, 95% CI=[0.905, 2.294]) and environmental placemaking (a*b=1.363, 95% CI=[0.697, 2.141]) was associated with older people's Subjective well-being was partially mediated; psychological resilience was fully mediated between environmental functionality and environmental comfort and subjective well-being of older people, while there was no significant mediating effect in the placemaking of building (Table 8).

In valley type, R^2=0.532 (Sig.=0.000), R^2 increased by 0.438 units, indicating that the multi-quality renewal of model II was able to explain 53.2% of the factors affecting the subjective well-being of the older adults, an increase of 43.8% over the model I. In terms of the residential environment, the environmental functional quality was found to be positively related to the subjective well-being of the older adults (β=0.327, P<0.05); environmental placemaking quality was found to be significantly related to the subjective well-being of the older adults (β=0.342, P<0.05) (Table 7).

In the valley type, psychological resilience partially mediated the relationship with subjective well-being of older adults across all three qualities of functionality of building (a*b=0.679, 95% CI=[0.058, 1.447]), environmental functionality (a*b=0.537, 95% CI=[0.018, 1.361]) and environmental placemaking (a*b=0.434, 95% CI=[0.033, 1.019]); psychological resilience fully mediated the relationship between comfort of building (a*b=0.534, 95% CI=[0.181, 1.063]) and environmental comfort (a*b=0.556, 95% CI=[0.127, 1.125]) and subjective well-being of older people, while it did not significantly mediate the relationship in the placemaking of building (Table 8).

The arithmetic results of model II in the flatland enclosed type revealed that R^2=0.552 (Sig.=0.000), with an increase of 0.329 units in R^2, indicating that multi-quality renewal in the flatland enclosed type could explain 55.2% of the factors affecting the subjective well-being of the older adults, a 32.9% increase over the model I. There was a significant positive relationship between environmental functionality quality in the flatland enclosed type and the subjective well-being of the older adults (β=0.340, p<0.05) in terms of the residential environment. Individually, results of Model I revealed that the subjective well-being of older adults who had lived in the residence for less than one year was negatively related to the subjective well-being of older adults who had lived in the residence for more than five years (β=−0.383, P<0.1) (Table 7).

In the flat-land enclosed type, The results of Model III showed that psychological resilience partially mediates the relationship between functionality of building (a*b=0.709, 95% CI=[0.269, 1.233]) and environmental functionality (a*b=0.787, 95% CI=[0.273, 1.435]) and subjective well-being of older people, and psychological resilience between functionality of building (a*b=0.582, 95% CI=[0.008, 1.432]) and subjective well-being of older people played a fully mediating role (Table 8).

Discussion

The old residential areas chosen for the study have all suffered from severe quality degradation, though environmental and build quality has improved to some extent following the implementation of a multi-quality upgrading program. Despite the different types of environmental spaces in the residential neighborhoods, renewal measures were largely similar. This is quite different from the research objectives and issues addressed by most recent studies, such as Liu Ye and others, who investigated the impact of the built environment on residents' subjective well-being using a 15-minute walkable range as a research object.[6] Dang Yunxiao, who chose different urban built environments as the object of study,[8] and Suhong et al, who chose the daily life environment as the object of study.[9] Because the environmental characteristics of residential areas differ from place to place,[5–27] the studies examined various residential types.

The Old Residential Renewal Program in Dalian began in 2013, and the total financial investment is expected to be around RMB 5.148 billion by 2022.[71] Dalian's expenditure on hygiene and health rises by approximately 30% in 2022 compared to 2019, while public health expenditure rises by more than 250% over the same period, from RMB 116 million in 2019 to RMB 351 million in 2022.[71,72] Although expenditure on hygiene and health in Dalian is still increasing, investments in improving housing quality indirectly increase investment in public health in Dalian,[73,74] contributing significantly to the city's urban health and sustainable development.

The Impact of Multi-Quality Renewal Elements on Older Adults' Subjective Well-Being

It was discovered that there was a significant correlation between the functional quality of the building, environmental functional quality, and environmental comfort quality on the subjective well-being of the older adults among the multi-quality renewal elements. Higher levels of concern about factors such as building insulation and heating, accessible design, resting seating, and noise may have an impact on older people's subjective well-being. And improving these facilities that are significant to older people contributes to the health of the residential areas. This is consistent with the findings of Mouratidis, who concluded that addressing the salient issues of safety, noise, and Cleanliness in the built environment can contribute to residents' subjective well-being;[75] and Ottoni, who concluded that benches in public spaces facilitate the mobility of older adults and improve psychological perceptions during use, contributing to the activity experience and well-being of older adults.[76] According to Roberts and Zatural,[37,39] psychological resilience has a significant mediating effect between residential multi-quality renewal elements and the subjective well-being of older adults, and a good level of psychological resilience can make it easier for older adults to achieve a sense of well-being. As a result, improving the mental health status of the older adults by promoting a higher level of psychological resilience while enhancing the multi-quality renewal of residential areas is of positive significance from the perspective of sustainable development of residential areas.

The Relationship Between the Multi-Quality Renewal of Various Existing Residential Types and Subjective Well-Being of Older Adults

Depending on the type of residence, different factors influence residential multi-quality renewal. This is more in line with previous research findings. Ettema, for example, discovered significant differences in cognitive well-being, emotional well-being, and mental health levels among residents of various communities;[77] and Lin and Sun, discovered that the effects of the built environment (density, diversity, design, public transportation accessibility, and destination accessibility) on individual subjective well-being differed significantly across social groups.[7] Among the five residential types studied, the environmental functional quality had a direct effect on the subjective well-being of the older adults in mountainous type, slope type, valley type, and flatland enclosed type, whereas the comfort quality of building did not differ significantly between the three residential types (mountainous type, valley type, and flatland enclosed type), implying that comfort qualities such as indoor lighting and ventilation have a small impact on happiness, probably due to the negligible difference in space between residential units. Older people are more concerned with features such as fitness equipment, the number of leisure seats, and accessibility facilities in the environment, which is consistent with the findings of Padeiro, who discovered that variables in the urban environment such as transportation and urban furniture have an impact on the well-being of older people.[48] While the most influential factors in slope type include the place quality of the building, the environmental functional quality, and the environmental comfort quality. It may be that the quality of road grading, accessibility facilities, and insulation measures in residential stair-wells in slope type affect the subjective well-being of older people, which is similar to Arifwidodo's study that concluded that the quality of the community environment affects the comfort and convenience of residents' lives.[78]

The Mediating Role of Psychological Resilience

Table 9 shows that the impact of psychological resilience on the impact of multiple quality renewal elements and subjective well-being of older people varies by residential area. The mediating effect of psychological resilience is visible in flat-land in rows type and valley type, and it is more visible in the mediating effect between the functionality of the building and environmental functionality, as well as between comfort of the building and subjective well-being than in placemaking quality.

In flat-land in rows type, the psychological resilience between the functional quality of the building and the impact on subjective well-being plays a fully mediating effect. The possibility is that older people have higher expectations of functional quality enhancement measures, that actual practice does not meet psychological expectations, and that the mediating utility of psychological resilience reduces older people's psychological expectations of functional quality modification. Confirming Zatural's view that the construction of resilience can alleviate people's and residences' ability

Table 9 The Mediating Effect of Psychological Resilience in Different Types of Residential Areas

	Flat-Land in Rows Type	Mountainous Type	Slope Type	Valley Type	Flat-Land Enclosed Type
Buildings					
Functional Quality	●	◎	◎	★	★
Place Quality		★			
Comfort Quality	★	★	★	★	★
Environment					
Functional Quality		●	●	◎	◎
Place Quality			◎	◎	
Comfort Quality	◎		●	★	

Notes: ◎Indicates partial mediation effect; ●Indicates full mediation effect; ★Indicates the quality term added to model III for significance in comparison to model II.

to remain healthy in stressful environments and help enhance personal well-being,[39] the mediating effect of psychological resilience increased the significance of the functional quality of buildings in the valley and flat-land enclosed types over Model II, possibly because functional measures such as building renewal and interior plumbing replacement practices are more important in valley and flat-land enclosed types. The effect is not statistically significant, but they clearly affect physical and mental health in real life, confirming Paredes' suggestion that resilience due to psychological resilience acts as a mediator to enhance individuals' subjective well-being in the face of external events.[51] The partial mediating effect of psychological resilience in mountainous and slope types may be because functional quality enhancement measures such as window and door replacement can directly affect people's subjective well-being, but because they have lived there for a long time and are used to the existing functional state of the home, they do not have high psychological expectations of local functional changes, and the mediating effect of psychological resilience may be due to this. This confirms that good living quality can contribute to older people's subjective well-being through psychological resilience.[78]

It is worth noting that the mediating effect of psychological resilience increased the importance of building comfort quality over Model II in all five residential areas, possibly because, while the effect of energy efficiency measures in the building envelope system could not be judged visually, the renewal significantly improved people's living comfort and had a long-term impact on the health of the older adults.

In slope and mountainous types, psychological resilience fully mediates the functional quality of the environment and subjective well-being. This could be because both types of residential areas must deal with accessibility issues, which are not adequately addressed in practice, this supports Zatural's conclusion.[39] The partial mediating effect of psychological resilience in valley and flat-land enclosed types maybe cause that the more enclosed environmental space limits the availability of functional facilities, causing older people to have low expectations of the functional quality of the environment. This is more in line with Su Lingling's study which concluded that the quality of the residential environment is also an important factor influencing their level of psychological resilience.[5]

In several residential areas, there is no mediating effect of psychological resilience between the quality of placemaking of buildings and subjective well-being (except for the mountainous type). The reason for this could be that in mountainous residences, building façades are less obscured and façade forms are easier to see, whereas, in other residential types, façade forms are unnoticeable due to the mutual obscuring of dwellings. This also supports the findings that subjective perceptual characteristics of residential areas are more statistically significant than objective characteristics in interpreting subjective well-being.[76–79]

Research Value and Shortcomings

This research looks at the impact of multi-quality renewal elements on the subjective well-being of the older adults in various residential types, as well as the role of psycho-logical resilience in mediating the relationship between multi-quality renewal elements and the subjective well-being of the older adults. As a result, it aids in capturing the diverse

needs of the older adults in various types of established residential areas. The potential drawbacks of this study include: (1) The design of the study is a cross-sectional timeline comparison study with no longitudinal timeline validation to determine the causal relationship. (2) Study area limitations: there is little difference in environmental quality conditions between the residential types chosen for the study, but population attributes, wealth disparity,[8] and social status[12] can all have an impact on well-being deprivation; thus, the sample data size will be in-creased and settlement types will be added in future studies. (3) The general older adults are the study's target group. The impact of living environment improvements on the needs, quality of life, and psychological and spiritual well-being of older adults with various health conditions aging in place (Ageing in place is a semi-social way of aging in which the family is the core, the community is the backbone, and professional services are relied on to provide services such as living care and spiritual comfort to the older adults, and the internal living environment, the external living environment, and the aged care service facilities make up the majority of the physical space)[80] will be investigated further in future studies.

Conclusion

Previous research has found that residents' subjective well-being is highly correlated with their urban living environment and that there is a bidirectional causal effect between them.[52] Researchers have also discovered a link between living environment, housing, and health, and that valuing older people's specific needs for their living environment is beneficial to their physical and mental health. Proactive spatial interventions of environmental factors in residential areas can improve residents' health.[54–64] However, research on the impact of built environment quality elements on the subjective well-being of older people after the quality of the neighborhood environment in settlements has been improved is lacking. The study examines the current practice of multi-quality renewal in existing Dalian neighborhoods, examining the differences in the impact of multi-quality elements on the subjective well-being of the older adults in different neighborhood environment types, and observing the degree of change in the subjective well-being of the older adults from the standpoint of psychological resilience.

The study's findings indicate that the functional and environmental quality of buildings is significant in flat-land in rows type; functional quality has a significant impact on the subjective well-being of older people in mountainous type; environmental quality has a significant impact on the subjective well-being of older people in slope, valley, and flat-land enclosed types; and there are differences in the levels of subjective well-being of older people in the five residential types. Different elements of the built environment influence older people's subjective well-being. The preference of older people for flat-land types may be due to the flatness of the roads and the implementation of road accessibility patterns, and the structures are well-aligned, easily identifiable, and provide more opportunities for communication and interaction. The findings support Oluwagbemiga Paul Agboola's contention that there is a link between environment, resident interaction, and well-being.[59]

There was a mediating effect and different values of the mediating effect between psychological resilience and subjective well-being in older people. This finding is consistent with de Vries's finding that psychological resilience can potentially in-fluence subjective well-being,[52] possibly because psychological resilience moderates older people's satisfaction with multiple quality renewal factors, thereby indirectly improving subjective well-being. Furthermore, in the context of subjective well-being, more attention should be paid to the level of psychological resilience and other demo-graphic characteristics associated with subjective well-being.

The study confirms that multiple quality renewal elements promote subjective well-being in older people and that psychological resilience is important in the relationship between multiple quality renewal elements and subjective well-being in older people. The study's limitation is that the environmental quality conditions of the selected residential types were homogenized with little variation. Because different population characteristics, wealth disparities,[8] and social status[12] can have an impact on well-being deprivation, future studies will include older adults who are unable to adapt to new living spaces due to physical and mental changes caused by aging, while increasing the diversity of residence types.

The study's findings provide a more scientific foundation for the renovation of existing residences. To begin, it establishes a demand-led mechanism for improving environmental quality in residences in order to meet the needs of the aging population and promote health. Second, to personalize the residential area, a targeted combination of quality

enhancement elements based on the environmental and topographical characteristics of different residential areas is designed. In flat-land in rows type, for example, the humane design of public stairwells should be improved, as should the configuration of outdoor landscapes; in mountainous type, indoor and outdoor accessibility facilities should be increased, and targeted health facilities supplemented; and in slope, valley, and flat-land enclosed types, elements such as environmental health and landscape configuration and quality should be actively improved. Third, the residence sector should actively provide psychological counseling to the older adults in order to improve their psychological resilience and compensate for the negative impact of in-sufficient material resource investment on their residential well-being.

Data Sharing Statement

The data are not publicly available due to ongoing data analysis for subsequent research manuscripts.

Informed Consent Statement

The template of the Informed Consent Statement has been submitted as an Annexed Document.

Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of Dalian University of Technology Bio and Medical Ethics Committee (protocol code DLUTSAFA211220-01 and date of approval 2022. 12. 20).

Acknowledgments

We would like to thank Yiming Qiu for revision and Yiwei Li, Shuhan Li, Haojie Zhong, Xuefen Hu, Bingwen Song, Ningbo Kou, and Shiyu Wang for their help in undertaking the survey and collecting the data.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

This research was funded by The National Natural Science Foundation of China, grant number 51978118 and 51908102.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Huang Ling; Mou Yanchuan. Research on the associations between community built environment and health outcomes of the elderly: mechanism of action and empirical results. *New Architect*. 2018;02:46–49. doi:10.15937/j.cnki.issn1001-8263.2020.12.007
2. Yue F, Zhubin L, Li D. The environment quality connotation and regeneration mode for the existing community residential buildings of China. *Nanjing J Soc Sci*. 2022;12:51–58. doi:10.15937/j.cnki.issn1001-8263.2020.12.007
3. Urban aging in China by Province; 2021. Available from: https://new.qq.com/rain/a/20210822A0202X00. Accessed March 7, 2023.
4. Jian S, Dong W, Dan T. *Study on Sustainable Renovation of Urban Existing Housing in China*. 1rd ed. Beijing, China: China Architecture & Building Press; 2015.
5. Lingling S, Suhong Z, Xue Z, Lin Z. The influences of neighborhood environment on residents' subjective well-being: the effects of time dimension. *Urban Dev Stud*. 2019;26(09):26–34.
6. Ye L, Tong X, Yuqi L, et al. Impacts of urban built environments on residents' subjective well-being: an analysis based on 15-minute walking distance. *Progress Geography*. 2020;39(8):1270–1282. doi:10.18306/dlkxjz.2020.08.003
7. Jie L, Bingdong S. Impact of built environment on urban residents' subjective well-being: evidence from the china labor - force dynamics survey. *Urban Dev Stud*. 2017;24(12):69–75.
8. Yunxiao D, Wenzhong Z, Li C, Dongsheng Z. Inter-city different and influence factors of residents' subjective well-being: a study based on multilevel modelling. *Geograph Res*. 2018;37(03):539–550. doi:10.11821/dlyj201803007

9. Suhong Z, Yinong P, Lin L, Rongping L, Chunxia Z. The impact of built environment on well-being of older adults under different geographic contexts. *Geograph Res*. 2019;38(07):1625–1639. doi:10.11821/dlyj020180292
10. Yifan YU, Xuhui LIU. Behavioral variables and its mediating effects in the studies of the impact of the built environment on the health: case study of the healthy behavior of the older residents in Shanghai communities. *Sci Technol Rev*. 2021;39(08):94–101. doi:10.3981/j.issn.1000-7857.2021.08.011
11. Yifan YU. Health effect of the built environment on the older adults: fundamental understanding and research approach. *Urban Plan Int*. 2020;35(01):1–7. doi:10.19830/j.upi.2019.669
12. Lan W, Wen-yao S, Ying W. Study on the impact of subjective perception of urban environment on residents' health: based on a large sample survey of 60 counties and cities in China. *Human Geography*. 2020;35(02):55–64. doi:10.13959/j.issn.1003-2398.2020.02.007
13. Rajendran LP, Boyko CT, Coulton CJ, Hale JD, Cooper RFD. A socio-spatial approach to enable inclusive well-being in cities: a case study of Birmingham, UK. *Soc Sci*. 2020;9(6):109. doi:10.3390/socsci9060109
14. Padeiro M, de Sao Jose J, Amado C, et al. Neighborhood attributes and well-being among older adults in urban areas: a mixed-methods systematic review. *Res Aging*. 2021;016402752199998. doi:10.1016/j.paid.2020.110455
15. Mouratidis K. Urban planning and quality of life: a review of pathways linking the built environment to subjective well-being. *Cities*. 2021;115:103229. doi:10.1016/j.cities.2021.103229
16. Ram B, Limb ES, Shankar A, et al. Evaluating the effect of change in the built environment on mental health and subjective well-being: a natural experiment. *J Epidemiol Community Health*. 2020;jech-2019–213591. doi:10.1136/jech-2019-213591
17. Zhifeng W, Yin R. The influence of greenspace characteristics and building configuration on depression in the elderly. *Build Environ*. 2021;188. doi:10.1016/j.buildenv.2020.107477
18. Liyan W, Zhongqian D, Zhenpo W. Living environment, commuting time and subjective well-being of residents: an empirical analysis based on microscopic survey and big data of Tianjin. *Urban Dev Stud*. 2020;27(02):103–110.
19. Ye L, Jiayue T, Yuqi L, Zhigang L. The impact of neighbourhood ties on migrants' subject wellbeing in urban communities: a case study of Guangzhou. *Modern Urban Res*. 2019;(05):63–70. doi:10.3969/j.issn.1009-6000.2019.05.010
20. Lingling S, Suhong Z. Impacts of neighborhood environment on subjective well-being under the background of residential mobility: difference in people of different life course stages. *Progress Geography*. 2021;40(8):1344–1354. doi:10.18306/dlkxjz.2021.08.008
21. Lei K, Wenzhong Z. Influence of neighborhood social environment on residents' well-being: a case study of typical low-income communities in Beijing City. *Areal Res Dev*. 2021;40(03):50–55. doi:10.18306/dlkxjz.2021.08.008
22. Bingbing H, Hong L. Influence of community green space on subjective well-being of the elderly in cold regions: a case study of Changchun. *Landscape Architect*. 2022;29(01):115–121. doi:10.14085/j.fjyl.2022.01.0115.07
23. Wei D, Naidi W, Yu D, Yan L. Relationship between perception of green space and subjective well-being of residents in different venues of daily activities: a case study of Xiangfang old industrial area in Harbin. *Landscape Architect*. 2021;28(05):23–29. doi:10.14085/j.fjyl.2021.05.0023.07
24. Li S, Luo YF, Liu ZC, et al. Exploring strategies for improving green open spaces in old downtown residential communities from the perspective of public health to enhance the health and well-being of the aged. *J Healthc Eng*. 2021;2021. doi:10.1155/2021/5547749
25. Krefis A, Augustin M, Schlünzen K, et al. How does the urban environment affect health and well-being? A systematic review. *Urban Sci*. 2018;2(1):21. doi:10.3390/urbansci2010021
26. Kim SR, Park OL, Kim HY, et al. Factors influencing well-being in clinical nurses: a path analysis using a multi-mediation model. *J Clin Nurs*. 2019;28(23–24):4549–4559. doi:10.1111/jocn.15045
27. Dang Y, Dong G, Chen Y, Jones K, Zhang W. Residential environment and subjective well-being in Beijing: a fine-grained spatial scale analysis using a bivariate response binomial multilevel model. *Environ Plan B*. 2019;46(4):648–667. doi:10.1177/2399808317723012
28. Zhonglin W, Baojuan Y. Analyses of mediating effects: the development of methods and models. *Adv Psychol Sci*. 2014;22(05):731–745. doi:10.3724/SP.J.1042.2014.00731
29. Cocozza S, Sacco PL, Matarese G, et al. Participation to leisure activities and well-being in a group of residents of Naples-Italy: the role of resilience. *Int J Environ Res Public Health*. 2020;17(6):1895. doi:10.3390/ijerph17061895
30. Xing Z, Chen X, Ran G, et al. Older adults' attachment affects their subjective well-being: the mediating role of loneliness and self-esteem. *Psychol Dev Educ*. 2016;32(06):761–768. doi:10.16187/j.cnki.issn1001-4918.2016.06.15
31. Xudong N, Qinqin W. Research overview of psychological well-being: a bibliometric analysis based on CNKI database. *J Zhejiang Sci Tech Univ*. 2018;40(04):319–328. doi:10.3969/j.issn.1673-3851(S).2018.04.001
32. Yue-e LI, Shan LU. Mediating effects of physical health and mental health on relationship between social support and subjective well-being in elderly people. *Chin J Public Health*. 2018;34(09):1274–1276.
33. Ruosong Y, Mengshi G, Haosheng Y. The mediating effects of hope and loneliness on the relationship between social support and social well-being in the elderly. *Acta Psychologica Sinica*. 2018;50(10):1151–1158. doi:10.3724/SP.J.1041.2018.01151
34. Fengjian G, Youguo C, Peiduo L, et al. The dominance analysis of the prediction for the subjective well-being of the elderly made by their resilience, loneliness and self-efficacy. *Stud Psychol Behav*. 2017;15(02):227–232.
35. Feng-e T. Effect of psychological elasticity on subjective well-being of elderly patients with chronic diseases in community. *Occup Health*. 2018;34(24):3405–3408. doi:10.13329/j.cnki.zyyjk.2018.0952
36. Can J. Senior drifters' perception of social support on subjective well-being: a mediating role of resilience. *J Shenzhen Univ*. 2020;37(05):104–112.
37. Roberts L, Banyard V, Grych J, et al. Well-being in rural Appalachia: age and gender patterns across five indicators. *J Happiness Stud*. 2019;20(2):391–410. doi:10.1007/s10902-017-9951-1
38. Joe HM, Choi EJ. Effects of family burden, resilience and spiritual well-being on the quality of life of primary caregivers of people with mental illness. *J Korean Acad Psychiatr Ment Health Nurs*. 2017;26(3):226. doi:10.12934/jkpmhn.2017.26.3.226
39. Zatural AJ, Arewasikporn A, Davis MC. Resilience: promoting well-being through recovery, sustainability and growth. *Res Hum Dev*. 2010;7(3):221–238. doi:10.1080/15427609.2010.504431
40. Blanchflower DG, Oswald AJ. Well-being over time in Britain and the USA. *J Public Econ*. 2004;88(7–8):1359–1386. doi:10.1016/S0047-2727(02)00168-8
41. Buckner JC. The development of an instrument to measure neighborhood cohesion. *Am J Community Psychol*. 1988;16(6):771–791. doi:10.1007/BF00930892

42. Wei H, Xie ZY, Zhou LL, Xu HH, Hao SW. Effect of resilience on depression and anxiety symptoms in Chinese grassroots civil servants. *Chin J Clin Psychol*. 2015;23(05):795–798. doi:10.1080/15427609.2010.504431
43. Serrao C, Duarte I, Castro L, et al. Burnout and depression in Portuguese healthcare workers during the COVID-19 pandemic-the mediating role of psychological resilience. *Int J Environ Res Public Health*. 2021;18(2):636. doi:10.3390/ijerph18020636
44. Lorente L, Vera M, Peiro T. Nurse's stressors and psychological distress during the COVID-19 pandemic: the mediating role of coping and resilience. *J Adv Nurs*. 2021;77(3):1335–1344. doi:10.1111/jan.14695
45. Kocjan GZ, Kavcic T, Avsec Y. Resilience matters: explaining the association between personality and psychological functioning during the COVID-19 pandemic. *Int J Clin Health Psychol*. 2021;21(1). doi:10.1016/j.ijchp.2020.08.002
46. Kwon H, Shin HJ. The effect of family-strengths of people in their 20s and 30s on psychological well-being - the sequential mediating effects of active stress coping and resilience. *Korean J Family Soc Work*. 2021;68(3):5–38. doi:10.16975/kjfsw.68.3.1
47. Kalaitzaki AE, Pattakou-Parasiri V, Foukaki E. Depression, negative relating with the oldest child, and the mediating role of resilience in community elders' psychological well-being: a pilot study in Greece. *Psychogeriatrics*. 2020;20(1):70–78. doi:10.1111/psyg.12461
48. Sato S, Kinoshita K, Kim M, et al. The effect of Rugby World Cup 2019 on residents' psychological well-being: a mediating role of psychological capital. *Curr Issues Tour*. 2022;25(5):692–706. doi:10.1080/13683500.2020.1857713
49. Kong F, Yang K, Yan W, et al. How does trait gratitude relate to subjective well-being in chinese adolescents? The mediating role of resilience and social support. *J Happiness Stud*. 2021;22(4):1611–1622. doi:10.1007/s10902-020-00286-w
50. Qu D, Huang J, Yu NX, et al. Association between mother-adolescent relationship quality and subjective well-being: resilience resources as a mediating factor among Hong Kong Chinese adolescents. *J Child Fam Stud*. 2021;30(8):1990–2002. doi:10.1007/s10826-021-01987-3
51. Paredes MR, Apaolaza V, Fernandez-Robin C, et al. The impact of the COVID-19 pandemic on subjective mental well-being: the interplay of perceived threat, future anxiety and resilience. *Pers Individ Dif*. 2021;170:110455. doi:10.1016/j.paid.2020.110455
52. de Vries LP, Baselmans BML, Luykx JJ, et al. Genetic evidence for a large overlap and potential bidirectional causal effects between resilience and well-being. *Neurobiol Stress*. 2021;14:100315. doi:10.1016/j.ynstr.2021.100315
53. Windle G, Woods RT, Markland DA. Living with ill-health in older age: the role of a resilient personality. *J Happiness Stud*. 2010;11(6):763–777. doi:10.1007/s10902-009-9172-3
54. Yueqin H. Chinese-Swedish joint project on housing, environment and health (III): health conditions of elderly from various of dwelling. *Chin Ment Health J*. 1992;(01):20–22+46–47.
55. Zhang SY, Lin SN, Li ZG, Guo Y. Influence of neighborhood environmental perception on self-rated health of residents in cities of China: a case study of Wuhan. *Human Geography*. 2019;34(02):32–40. doi:10.13959/j.issn.1003-2398.2019.02.005
56. Chunfa Z, Hailong Z. Housing policies for the elderly: international experience and China's choice. *Popul Econ*. 2008;2008(02):45–49.
57. Shuyun C, Jiankun Y. Whether housing affects urban residents' health level? From an empirical analysis of Chinese general social survey. *J China Normal Univ*. 2018;57(05):55–64.
58. Chengdong Y, Jianyu R, Xuan G. Housing price, housing inequality and residents' happiness: an empirical research based on CGSS data in 2005 and 2015. *J Central Univ Finance Econ*. 2020;(06):105–117. doi:10.19681/j.cnki.jcufe.2020.06.010
59. Agboola OP, Rasidi MH, Said IB, Zakka SD, Shuaibu AW. Residents' social interactions in market square and its impact on community well-being. *Contemporary Urban Affairs*. 2017;2(2). doi:10.25034/ijcua.2018.3668
60. Akande OK. Urbanization, housing quality and health: towards a redirection for housing provision in Nigeria. *Contemporary Urban Affairs*. 2021;5 (1). doi:10.25034/ijcua.2021.v5n1-3
61. Akande OK. Urban acupuncture in large cities: filtering framework to select sensitive urban spots in Riyadh for effective urban renewal. *Contemporary Urban Affairs*. 2021;5(1). doi:10.25034/ijcua.2021.v5n1-1
62. Iwarsson S, Wahl H-W, Nygren C, et al. Importance of the home environment for healthy aging: conceptual and methodological background of the European ENABLE-AGE project. *Gerontologist*. 2007;47(1):78–84. doi:10.1093/geront/47.1.78
63. Iwarsson S, Wahl H, Nygren C. Challenges of cross-national housing research with older persons: lessons from the ENABLE-AGE project. *Eur J Aging*. 2004;1(1):79–88. doi:10.1007/s10433-004-0010-5
64. Iwarsson S, Nygren C, Oswald F, et al. Environmental barriers and housing accessibility problems over a one-year period in later life in three European countries. *J Hous Elderly*. 2006;20(3):23–43. doi:10.1300/J081v20n03_03
65. Lauwers L, Leone M, Guyot M, et al. Exploring how the urban neighborhood environment influences mental well-being using walking interviews. *Health Place*. 2021;67:102497. doi:10.1016/j.healthplace.2020.102497
66. Wang M, Lu X, Liu M. The mediating effect of psychological resilience on the level of mindfulness and general well-being in patients with inflammatory bowel disease. *Ann Palliat Med*. 2021;10(8):9215–9222. doi:10.21037/apm-21-2053
67. Ha SE, Kim S. Personality and subjective well-being: evidence from South Korea. *Soc Indic Res*. 2013;111(1):341–359. doi:10.1007/s11205-012-0009-9
68. Stutzer A, Frey BS. Stress that doesn't pay: the commuting paradox. *Scand J Econ*. 2008;110(2):339–366. doi:10.1111/j.1467-9442.2008.00542.x
69. Dolan P, Peasgood T, White M. Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *J Econ Psychol*. 2008;29(1):94–122. doi:10.1016/j.joep.2007.09.001
70. Bai X, Wu C, Zheng R, et al. The psychometric evaluation of the satisfaction with life scale using a nationally representative sample of China. *J Happiness Stud*. 2011;12(2):183–197. doi:10.1007/s10902-010-9186-x
71. Dalian Municipal Bureau of Finance. Available from: https://czj.dl.gov.cn/. Accessed September 6, 2022.
72. The People's Government of Dalian Municipality. Available from: https://czj.dl.gov.cn/art/2020/6/2/art_8488_1868107.html. Accessed September 6, 2022.
73. Haitao W, Xianghua F. Housing and health. *J Environ Health*. 2005;(04):309–311. doi:10.16241/j.cnki.1001-5914.2005.04.036
74. Longshun XU. Study on the relationship between health care, housing security and residents' life satisfaction: based on the empirical analysis of CGSS2013 data. *Northwest Popul*. 2017;38(04):87–95. doi:10.15884/j.cnki.issn.1007-0672.2017.04.012
75. Mouratidis K. Compact city, urban sprawl, and subjective well-being. *Cities*. 2019;92:261–272. doi:10.1016/j.cities.2019.04.013
76. Ottoni CA, Sims-Gould J, Winters M, et al. "Benches become like porches": built and social environment influences on older adults' experiences of mobility and well-being. *Soc Sci Med*. 2016;169:33–41. doi:10.1016/j.socscimed.2016.08.044

77. Ettema D, Schekkerman M. How do spatial characteristics influence well-being and mental health? Comparing the effect of objective and subjective characteristics at different spatial scales. *Travel Behav Soc*. 2016;5:56–67. doi:10.1016/j.tbs.2015.11.001
78. Arifwidodo SD, Perera R. Quality of life and compact development policies in Bandung, Indonesia. *Appl Res Qual Life*. 2011;6(2):159–179. doi:10.1007/s11482-010-9123-5
79. Hamersma M, Tillema T, Sussman J, et al. Residential satisfaction close to highways: the impact of accessibility, nuisances and highway adjustment projects. *Transport Res Part A*. 2014;59:106–121. doi:10.1016/j.tra.2013.11.004
80. Yifan YU, Shuying JIA. Study on the community's spatial basis in the framework of 'aging in place': a case study of shanghai. *Shanghai Urban Plan Rev*. 2015;5(2):96–100+117.