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Measuring residents' anxiety under urban redevelopment in China: An investigation of demographic variables

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Abstract Residents' concerns and feelings play pivotal roles in smoothly promoting urban redevelopment. Anxiety, as an intuitive feeling toward uncertainties, generally exists among residents who are confronted with redevelopment, and this feeling has gradually attracted scholars' attention. However, relatively few studies have focused on the multidimensional view of this concept and its influencing factors. Drawing upon a large-scale questionnaire survey conducted in 13 pilot areas in China, this study refines and verifies five prominent dimensions of anxiety, namely, housing conditions, monetary compensation, public services, life adaptation, and public participation level, through factor analysis and one-sample *t*-test. The finding contributes to achieving a complete understanding of anxiety, and the scales developed for measuring these dimensions lay the foundation for further empirical studies on anxiety. The individual and collective effects of age, job, and region variables on anxiety dimensions are demonstrated via independent-sample *t*-test and analysis of variance, which clarifies the formation process of anxiety and highlights the importance of these contextual variables. Tailored strategies for policymaking and engineering management, including establishing reasonable compensation standards, providing equal public services, and delivering high-quality housing, are proposed to relieve residents' anxiety. These strategies are expected to consider further the

sensitive group, such as the elderly, farmers, and casual workers.

Keywords urban redevelopment, anxiety dimension, influencing factors, ANOVA, policymaking

1 Introduction

Since the reform and opening up in 1978, China has experienced a rapid urban redevelopment process with the adoption of various modes, e.g., national new district construction, beautiful rural construction, and housing and supporting infrastructure improvement in urban villages, urban fringes, and rural villages (Hu et al., 2015; Chen et al., 2018). Residents are deeply affected in this process and play a vital role in the implementation of redevelopment (Yu et al., 2017). The 2019 Blue Book of China's Society indicated that the mass disturbance caused by residents' misunderstanding or dissatisfaction in urban redevelopment accounts for the largest proportion (50%) of all cases (Li et al., 2019), which has forced local governments to terminate some ongoing redevelopment projects. Particular attention should thus be paid to residents' concerns and feelings in the redevelopment process to gain their support and address the threat to social stability (Liu et al., 2016). Numerous studies have investigated residents' satisfaction after redevelopment (Chen et al., 2016; Cao and Zhang, 2018) and conflict mechanism (Yang and Liu, 2014; Yu et al., 2019), while only a few studies have focused on residents' concerns in the early preparation stage of redevelopment.

In the preparation stage, residents have little knowledge about the redevelopment plan and schedule due to the limited information released by the government (Zhai and Ng, 2013). Therefore, from residents' perspectives, some of the work involved in redevelopment remains uncertain with unknown risks. Under the conditions of uncertainty, residents tend to worry about the unfavorable outcomes of redevelopment that might happen in the future, especially

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for the aspects they care most about, such as low amount of compensation and unfair treatment from the government (Yu et al., 2017). This intuitive reaction toward future uncertain events can be regarded as anxiety, eventually leading to some negative behaviors (Grupe and Nitschke, 2013). In particular, urban redevelopment involves various complex aspects, including housing, public services, environment, and others (Hu et al., 2015). The anxiety caused by these aspects emerges accordingly and induces a challenge to the uni-dimensional view (Li et al., 2017; Jiang et al., 2018).

This study aims to measure various dimensions of anxiety and investigate the effects of different demographic variables on these dimensions to explore the causes of anxiety and manage this feeling. The remaining sections of this study are structured as follows. Section 2 reviews the literature related to the dimensions of residents' anxiety. Section 3 designs a questionnaire concerning anxiety dimensions and demographic variables, and summarizes the methodologies used in this study. Section 4 verifies the existence of anxiety dimensions and examines the influences of demographic variables. Section 5 indicates the conclusions and implications of this research.

2 Dimensions of residents' anxiety identified from literature

Anxiety is derived from the overwhelming consideration of anticipative uncertainty (Grupe and Nitschke, 2013). The uncertainty here contains the aspects changed in redevelopment, e.g., new apartment arrangements and compensation, which have been measured in the studies on satisfaction after redevelopment (Zhang and Lu, 2016). Although these studies are not directly associated with residents' anxiety, they do indicate the probable dimensions of anxiety. Anxiety is also triggered by concerns on perceived difficulties in similar situations (Grupe and Nitschke, 2013). Thus, the problems and challenges that happened in the previous redevelopment induce the fear and concern of residents when they experience redevelopment. Consequently, the anxiety dimensions can be refined from existing studies on satisfaction and reviews on urban redevelopment.

2.1 Compensation

Compensation is to compensate for residents' loss of crops, land-use right, and built assets (house and surrounding compound) on the basis of a thorough and fair appraisal of such assets. Two major approaches can be adopted to compensate, namely, monetary compensation and on- or off-site new apartment compensation, in which the apartment is provided at a lower price than the market price (Hu et al., 2015).

2.1.1 Monetary compensation

Monetary compensation is closely related to residents' interests and remarkably influences their future livelihoods (Huang et al., 2017). In fact, rural residents' houses are commonly compensated in accordance with the standards made by local governments rather than national-level policies for ensuring sufficient flexibility. However, residents usually obtain a lump sum of compensation lower than the value of land and property (Bai et al., 2014), leading to residents' serious concerns (Liu et al., 2016). In addition to compensation amount, the fairness and justice of standards and procedures increase residents' anxiety and cause discontent (Siciliano, 2014; Liu et al., 2016). Quite a few researchers have focused on the relationship between compensation standards and residents' satisfaction level in China. For example, Lian et al. (2016) stated that the ambiguous use of compensation for collective land and the lack of transparency lead to dissatisfaction and appeals. Cao and Zhang (2018) explored the effect on the satisfaction of compensation rules and procedures in the process of land appropriation.

2.1.2 Housing conditions

As another compensation approach, a house is to protect people from inclement weather, such as wind, rain, chill, and frost (Hong et al., 2012). Studies on satisfaction have applied many indicators to evaluate housing conditions in different urbanization types. For instance, Tao et al. (2014) examined the satisfaction of migrant workers in Shenzhen with redevelopment affected by housing characteristics, such as tenure, facilities, services, size, region, and type. Chen et al. (2016) regarded concentrated residential areas in Nanjing as an example to explore the effects of housing conditions and other indicators on farmer satisfaction by using a fuzzy approach. Some other researchers emphasized the influences of housing conditions in relocation, such as the number of bedrooms, presence of balcony, and building type (Li and Song, 2009; Oakley et al., 2013).

2.2 Infrastructure and public services

One of the objectives in redevelopment is to develop auxiliary infrastructure (such as transportation and waste treatment) and public services (such as education, vocational training, retirement insurance, and health insurance) equally within regions for narrowing the gap between developed and developing areas (Wang et al., 2015). With increasing population and urban sprawl in cities, residents in urban villages and fringes suffer from severe infrastructure deficiencies and unfair public service levels (Liu et al., 2010). In remote rural areas, infrastructure and public services have long been ignored due to the urban-rural dual structure (Zhang et al., 2015). Therefore,

the equal development of infrastructure and public services in cities and rural areas is urgently needed. Locals, however, doubt whether the surrounding facilities can meet their expectations (Tao et al., 2014; Zhan et al., 2018).

2.3 Environmental and cultural protection

In the past years, redevelopment has shown the potential to destroy the environment and the relationships between people and places (Guan et al., 2018). Many cities discard local characteristics and ignore cultural heritage in the progress of urban construction, leading the phenomenon of “landscape convergence” to become stronger than ever before (Guan et al., 2018). Moreover, urban growth and redevelopment signify the use of substantial ecological resources in the production and consumption processes, ultimately resulting in waste, biodiversity reduction, environmental pollution, and resource degradation (Vergragt et al., 2016). Consequently, the relationship between the city environment and human health and the preservation of historical sites and regional characteristics gradually raise locals’ attention and concern (Yang et al., 2017). Namely, the effectiveness of environmental and cultural protection exerts an influence on gaining residents’ support (Li et al., 2017) and positively contributes to their satisfaction with redevelopment and urban life (Lee et al., 2008; Zhan et al., 2018).

2.4 Living conditions

Residents are also concerned about their living conditions, such as the cost of living, job opportunity, and employment stability (Lin and Li, 2017; Jiang et al., 2018), which determine their attitudes toward the redevelopment according to previous work (Lo and Wang, 2018). Declining living conditions in updated regions revealed in several studies have made this demand urgent. In the case of demolition in the western suburb of Shanghai, residents complained of their loss in rental income because of losing land and their decreased level of consumption due to the high prices in the city (Jiang et al., 2018). Furthermore, the government provides low job security in the form of replacement jobs. Thus, not only the increase in the cost of living but also the passive effects on jobs and income worry residents (Li et al., 2017). In studies on satisfaction, Chen et al. (2016) provided a framework to evaluate satisfaction in concentrated residential areas that contains career conditions (job opportunity and employment stability) and economic situations (cost of living and daily income). Similarly, some other researchers concluded that economic efficiency (labor cost and income) influences farmers’ attitudes and satisfaction on land appropriation (Zhang et al., 2015; Yu et al., 2017; Cao and Zhang, 2018).

2.5 Life adaptation

Urban redevelopment entails changes in lifestyle and social relationships. Before redevelopment, residents live in self-built houses with their courtyards could enjoy rural scenery and communicate with one another based on familiarity and trust. Thus, they have a strong sense of belonging and attachment to their previous dwellings (Hummon, 1992). After redevelopment, they must live in high-rise apartment blocks surrounded by municipal afforestation and public facilities, losing the neighborhood cohesion and weakening the neighborhood ties (Liu et al., 2017). A long adaptive process is needed for this group of residents to change their lifestyles and rebuild the relationships with the land and neighborhood in psychology and physiology; hence, residents would concern life adaptation and social relationships in the preparation stage of redevelopment (Li et al., 2017).

2.6 Public participation level

Although whether redevelopment can be effectively implemented depends on the participation of the public (Chen et al., 2018), the reality is a lack of legislation that stipulates public participation in urban planning and development, except for the 2007 Urban and Rural Planning Law. The local government has control of the release of information in the background of China’s current top-down decision-making institution and executive-led government jurisdiction (Zhai and Ng, 2013). Critical information related to the interests of residents is not released until very late in the planning process or prior to the start of the project. The lack of advanced information and transparency leads to widespread dissatisfaction among residents (Siciliano, 2014; Mao et al., 2015). In the processes of policy implementation and handling of disputes, local governments’ indifference to legal requests or complaints from residents leads to conflict or protests more easily than the contents of policies do (Li et al., 2016). The public participation level is of particular concern to residents (Jiang et al., 2018).

3 Methodology

3.1 Sample and procedure

The content of the questionnaire was designed based on the comprehensive literature review in Section 2 and field-work. In the first stage, the research team collected qualitative data in Baoshan, Dalian, and Shanghai from October to November in 2018 through face-to-face interview with approximately 30 residents. Taking the redevelopment area in Baoshan, Yunnan Province as an instance, Fig. 1 shows the living environment before

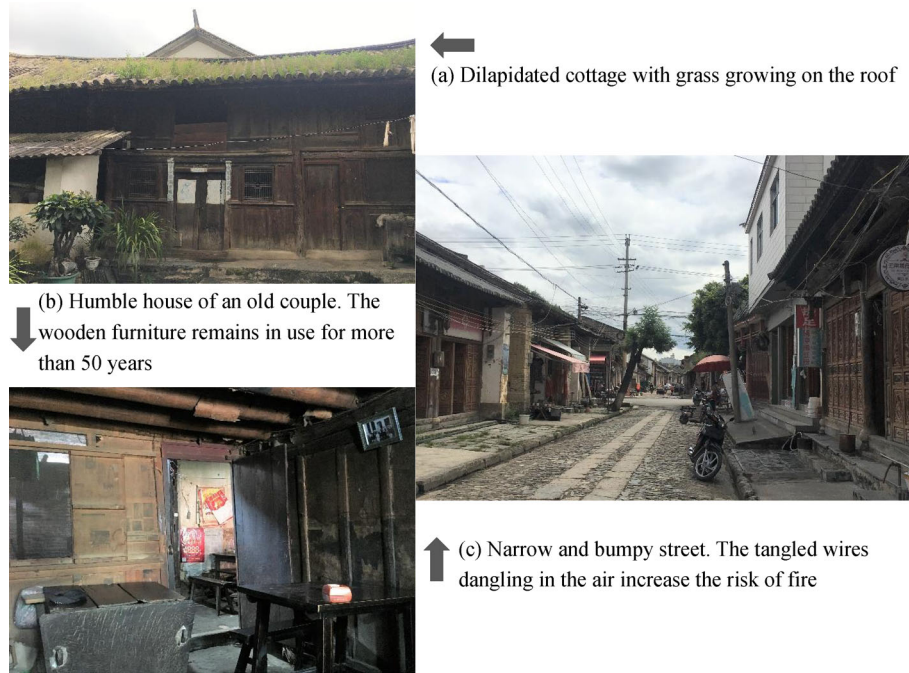


Fig. 1 Living environment before redevelopment in the redevelopment area of Baoshan (taken by Jinbo Song, the first author of the paper, in September 2018).

redemption. These data were used as a supplementary basis for the empirical study. After several rounds of discussion, a preliminary list concerning seven major dimensions and corresponding items was formed (Section 2).

In the second stage, we conducted an interview with a panel of experts to seek their opinions in validating and refining the items for fitting the local situation. The experts panel comprised seven professionals selected for their expertise in the fields of public administration, urban study, and sociology. According to the experts' opinions, we translated the items into accurate and elaborative statements in layman terms.

The final version of the questionnaire incorporated all feedback and comments from the aforementioned steps in two parts. The first part included questions about the demographic characteristics of respondents, such as gender, age, education, and job. The job variable was classified into groups 1 (farmers and casual workers whose work was affected in land expropriation and redevelopment) and 2 (people with stable jobs or income, including retired people with a pension) (Hu et al., 2015). The second part included 30 items about residents' anxiety measured on a five-point Likert scale (from 1 = strongly disagree to 5 = strongly agree), which were in the form of "worry about ..." (e.g., worry about the housing quality).

In the third stage, the research team conducted a questionnaire investigation from January to July in 2019. The random sampling technique was adopted to select study areas from three rounds of new-type urbanization pilot areas presented by the National Development and

Reform Commission of China from 2014 to 2016. Respondents were chosen randomly on the street or in the community. To ensure the validity of the questionnaire, we interpreted the meaning of the items one by one or even helped respondents fill out the questionnaire in accordance with their opinions when they had difficulties in understanding or writing. The questionnaire was collected immediately after a respondent have completed it.

Finally, the survey was conducted, covering five provinces in central and western regions (Heilongjiang, Inner Mongolia, Gansu, Guangxi, and Yunnan) and eight provinces and municipalities in the eastern region (Shanghai, Tianjin, Jiangsu, Zhejiang, Fujian, Hebei, Shandong, and Liaoning). A total of 500 questionnaires were issued, and 495 were returned. From the disqualification criterion of missing data representing more than 3% of all items or more than 8 consecutive items having the same value, 25 questionnaires were excluded from further analysis, leaving 470 (94% of total) to be analyzed.

3.2 Research design

As shown in Fig. 2, the overall research flow is divided into four steps. After the respondents' opinions were collected through questionnaire investigation and face-to-face interview, this study identified the dimensions of residents' anxiety by exploratory factor analysis (EFA) and *t*-test in Step 2. EFA is a widely utilized statistical technique for classifying a large number of variables into a small number of factors on the basis of the relationships among the variables (Hayton et al., 2004). EFA was adopted in this

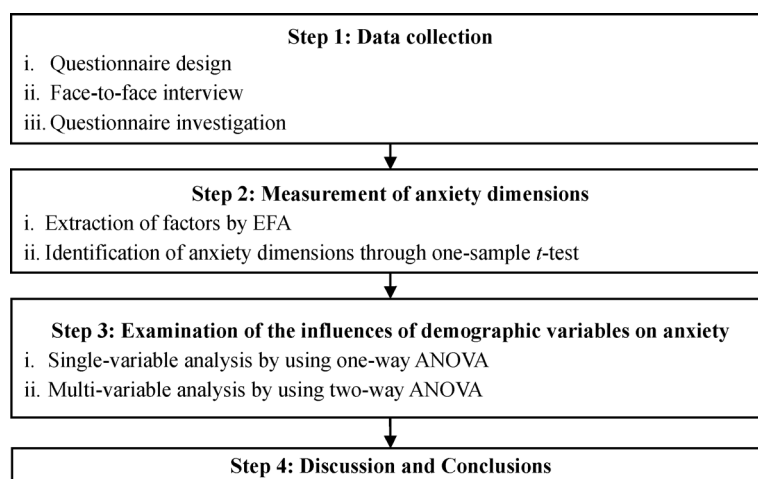


Fig. 2 Flow of the overall research.

study to select items in the questionnaire with the highest interpretative capability and combine them into one factor (Yung et al., 2017). One-sample *t*-test analysis was then applied to determine whether the respondents were deeply worried about these factors. The factor whose mean was significantly higher than the score of 3 (the neutral point) was regarded as the anxiety dimension and further discussed.

In Step 3, we synthesized commonly used variables in previous studies and features in the social context for selecting demographic variables. The elderly, farmers, and migrants could not enjoy equal public services as the other residents due to the uneven resource allocation and restriction of hukou, leading to their concerns about the effects of urban redevelopment. The socioeconomic gap among different regions also results in diverse requirements and expectations of locals regarding urban redevelopment. Consequently, age, job, and region were chosen as the variables to provide tailored suggestions for improving the efficiency of urban redevelopment. The analysis of variance (ANOVA) is regarded as a useful tool to verify the mean gap among more than two groups (Chen et al., 2009), while the independent-sample *t*-test is suitable for two groups. One- and two-way ANOVA were applied simultaneously for the reason that in one-way ANOVA, the difference among groups divided by a single variable might be hidden or offset by the influence of another variable; thus, two-way ANOVA was further conducted to explore the interaction of multiple variables and identify the sensitive groups. Moreover, Levene's test was used to determine the homogeneity of the data.

4 Results and discussion

4.1 Dimensions of anxiety

The IBM Statistical Package for the Social Sciences

(version 21) was used to conduct statistical analysis. Factor analysis and one-sample *t*-test were adopted to classify the items into several factors and determine the dimensions of anxiety, respectively. The results of Kaiser-Meyer-Olkin test ($KMO = 0.889$) and Bartell's test ($\chi^2 = 6357.296$, p value < 0.01) denoted that the data were appropriate for factor analysis. After principal component analysis with varimax rotation, items with all factor loadings less than 0.5 or with several factor loadings higher than 0.4 simultaneously should be removed to ensure discriminant validity. Hence, one item (worry about the community's location) was removed, and 29 items remained, as shown in Table 1.

Factor analysis extracted seven factors that accounted for 65.16% of the total variance. On the basis of the loaded items in each of the seven extracted factors and the studies reviewed in Section 2, the appropriate name for each factor was defined, such as housing conditions, monetary compensation, life adaptation, etc. Each factor was measured using the mean technique. The Cronbach's alpha values of factors were higher than 0.7, which was acceptable for exploratory research.

The one-sample *t*-test was used to verify whether the means of the seven factors were significantly over the neutral point. As shown in Table 1, five factors, namely, housing conditions, monetary compensation, life adaptation, public participation level, and public services, significantly passed the test and were regarded as the key dimensions of anxiety. The results demonstrated the existence of anxiety in various forms. The five dimensions can be classified into the material aspect, which represents the basic requirements for livelihood, including housing conditions, monetary compensation, and public services, and the nonmaterial aspect, including life adaptation and public participation level, to reflect the needs to pursue well-being in life and respect in politics.

The factor of living conditions did not pass the test with a mean of 3.018, showing that the recent redevelopment

Table 1 Results of factor analysis and one-sample *t*-test

Factors and items ^{a)}	Factor loading	% total variance	Cronbach's alpha	Mean (Sig. ^{b)} of <i>t</i> -test)
Housing conditions		13.46	0.882	3.661**
Housing structure	0.806			
Auxiliary facilities, such as water, gas, electricity supply	0.773			
Housing quality	0.761			
Floor of the new apartment	0.746			
Property service	0.687			
Community's security	0.500			
Monetary compensation		11.64	0.872	3.452**
Change in compensation standard	0.786			
Government breaking the promise in compensation	0.785			
Obtaining less money than other residents do	0.721			
Transparency and openness of the compensation standard	0.695			
Low sum of monetary compensation	0.594			
Life adaptation		9.08	0.765	3.134**
Difficulty in adapting to the future lifestyle	0.798			
Leaving the current dwelling	0.779			
Lack of social activities	0.664			
Difficulty in adapting to the new living environment	0.591			
Relationship with new neighborhood	0.537			
Environmental and cultural protection		8.58	0.788	2.858**
Damage to historical buildings	0.816			
Harm to the environment and landscape	0.749			
Rapid disappearance of culture	0.745			
Public participation level		7.68	0.787	3.089*
Delayed policies released by the government	0.763			
Bad attitudes of public servants	0.746			
Government disregarding residents' difficulties and thoughts	0.635			
Public services		7.40	0.708	3.281**
Convenience of transportation	0.783			
Health care and old-age security	0.690			
Education	0.554			
Public open space, such as parks and squares	0.506			
Living conditions		7.32	0.753	3.018 (ns)
Reduction in income	0.824			
Effect on employment	0.805			
Increase in living expenses	0.623			

Notes: a) For simplicity, the word "worry about" before each item was omitted. b) * *p* value < 0.05, ** *p* value < 0.01; ns: not significant.

did not change the income structure and consumption level of most residents. The low mean value of the environmental and cultural protection factor was possibly due to that the residents would worry about this aspect until they have an intuitive feeling in the implementation stage (Liu et al., 2016).

4.2 Differences among demographic groups

The influences of demographic variables on the five key anxiety dimensions were verified from individual and collective aspects. As mentioned before, independent-sample *t*-test and one-way ANOVA were conducted to

analyze the individual influence of a single variable, while two-way ANOVA was adopted to examine the collective influence of multiple variables.

4.2.1 Individual influence of demographic variables

Table 2 shows the different influences of single demographic variable on the five key anxiety dimensions. From the perspective of age, the differences among the three groups (young, middle-aged, elderly) were significant in three dimensions, namely, housing conditions, public services, and life adaptation. Young and middle-aged people were more concerned about housing conditions and public services because they tended to seek for a comfortable life. On the contrary, elderly people were more worried about life adaptation because they were inclined to move and were likely to stay in local areas and interact with their near neighbors more often (Yung et al., 2017).

For the job variable, farmers and casual workers were more afraid of losing the material aspect than people with stable occupations. This phenomenon was possibly caused by their lower earnings and the change in their lifestyle. Growing vegetables in a courtyard was common in counties to support a family; however, on account of the transformation from cottages to high-rise buildings, this activity would be terminated and replaced with purchasing food, which means an increase in living cost. The results in Table 2 also indicated the difference among geographic regions, i.e., people living in the eastern region were more anxious about compensation than those in other regions.

4.2.2 Collective influence of demographic variables

Two-way ANOVA method was applied to demonstrate the influences of multiple variables, namely, whether the difference among the means of groups divided by a pair of

variables was significant. The significantly different dimensions with corresponding p value are illustrated in Fig. 3.

(1) Interaction between age and region variables

Four dimensions were significantly influenced by the interaction between age and region variables, as shown in Fig. 3(a). First, the middle-aged residents showed almost the same degree of anxiety regardless of regions, whereas young ones in the eastern region evidently exhibited a higher degree of anxiety in housing conditions, monetary compensation, and public services than those in the central and western regions. The higher consumer price in the eastern region magnified the younger's economic burden. In this regard, reasonable compensation and high-quality public services will contribute to improving their life quality and enhancing their sense of happiness.

Second, elderly people over 65 in the central and western regions were more anxious than the other groups. For instance, in Yunnan Province, the current houses for the elderly were under the risk of collapse and fire due to exposed and tangled wires (Fig. 1). They indicated high expectations of receiving considerable compensation and moving to new apartments with necessary auxiliary facilities. As a vulnerable group, they were eager to receive attention from the local government, corresponding to the highest mean of 4.051 in the dimension of public participation level.

(2) Interaction between age and job variables

In consideration of the interaction between age and job variables, elderly farmers and casual workers were in deeper anxiety than the other groups in terms of the dimensions of housing conditions and life adaptation, as shown in Fig. 3(b). In the dimension of housing conditions, this group expected to enjoy comfortable and permanent dwellings to be updated in redevelopment. Otherwise, purchasing a new apartment would be a tough problem for them, who just relied on their low income and declining health. As an elderly farmer claimed in face-to-face

Table 2 Differences among groups divided by age, job, and region

Aspects	Dimensions	Age ^{a)}		Job		Region	
		F _(2,457) (Sig. ^{b)})	Results	T (Sig. ^{b)})	Results	T (Sig. ^{b)})	Results
Material aspect	Housing conditions	4.245*	Elderly < Middle-aged < Young	2.504*	People with stable jobs < Farmers and Casual workers	ns	–
	Monetary compensation	ns	–	2.089*	People with stable jobs < Farmers and Casual workers	2.690**	Central and Western < Eastern
	Public services	3.190*	Elderly, Middle-aged < Young	ns	–	ns	–
Nonmaterial aspect	Life adaptation	5.752**	Young, Middle-aged < Elderly	ns	–	ns	–
	Public participation level	ns	–	ns	–	ns	–

Notes: a) Young: < 44, Middle-aged: 45–64, Elderly: > 65. b) * p value < 0.05, ** p value < 0.01; ns: not significant.

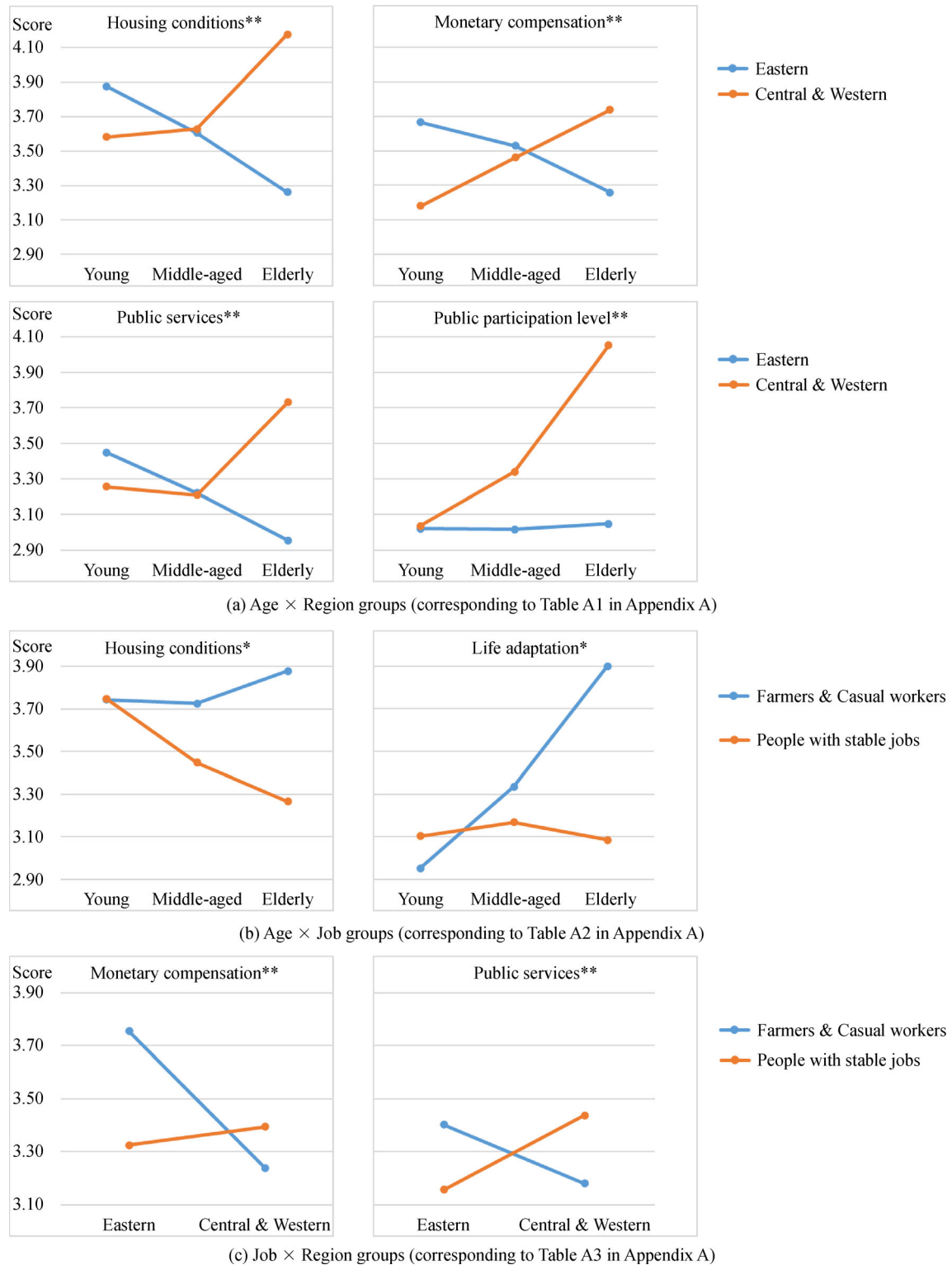


Fig. 3 Means of different groups divided by two demographic variables (the symbol \times connects two demographic variables; * p value < 0.05 , ** p value < 0.01).

interview, “my basic requirement is to live in a better apartment with reasonable structure and desired floor, which can compensate for my lost land and demolished house.” In addition, approximately 84% of the respondents in the study only had a primary education level with little knowledge about the facilities in high-rise buildings. This condition triggered their concerns over the change in lifestyle.

(3) Interaction between job and region variables

In the examination of the interaction between job and region variables, the means of the groups divided by these variables were significantly different in two dimensions, as shown in Fig. 3(c). For the monetary compensation dimension, farmers and casual workers in the eastern region were more worried than the other group. Their unstable work and low income made it difficult for them to afford the high housing and consumer prices in this region. They hoped to receive considerable compensation from house demolition to cope with the increasing prices and reach the average living standard of other citizens.

Regarding the dimension of public services, farmers and casual workers in the eastern region also showed deep concern. In the central and western regions, people in this group were busy working hard to seek enhanced living conditions. Only the people with stable jobs could invest increased energy and attention to public services, as verified by the significant deviation of means of living conditions factor (i.e., 0.445 with p value < 0.01) for farmers and casual workers versus the people with stable jobs.

4.3 Discussion

Based on the aforementioned results and the information collected from the face-to-face interview, four trends regarding residents’ demands in urban redevelopment were revealed as follows.

First, the fairness of compensation standards and the housing conditions were of particular concerns to residents. Nevertheless, the degrees of these concerns varied in different demographic groups. The results of two-way ANOVA showed that the young, and farmers and casual workers in the eastern region were more worried than those in the other regions. The most likely reason was that they desired to receive reasonable compensation from housing demolition to reduce their pressure from high living costs.

Second, the growing sense of public participation was embodied in the statistical results. That is, residents provided high scores in the dimension of public participation level. From the field investigation, interviewees deemed that the local government was in a prominent position by enacting top-down redevelopment policies, monitoring the implementation process of redevelopment,

and acting as the monopoly supplier of new urban land. By contrast, the roles of the public, especially the vulnerable groups, were marginalized. This unequal status led them to concern about the transparency of policies and the attention paid by the government to them, which calls for an open and service-oriented government.

Third, high-quality public services were pursued by the new generation of migrants, which comprised the young and farmers and casual workers. Compared with people from central and western regions, these groups in the eastern region cared more about public services, such as education, transportation, and health care. This trend conforms to Wu et al. (2018)’s opinion that the new generation of migrants has exhibited new and urgent demands for life quality in public services. This phenomenon encourages the government to advance public services via urban redevelopment projects.

Fourth, the necessity of constructing age-friendly redevelopment was emphasized in our study. The demands of the elderly, who play an indispensable role in urban redevelopment, were expected to receive sufficient attention from material and nonmaterial aspects. As mentioned before, the material aspect is about the needs for living, including housing conditions and medical services, whereas the nonmaterial aspect refers mostly to respect from the government and happiness in daily life. These demands were stronger among the elderly in central and western regions than those in the eastern region, which was mostly attributed to the worse living conditions of the former. Consequently, comprehensive measures should be taken to relieve the elderly’s anxiety, especially those in central and western regions.

5 Conclusions and implications

Anxiety generally exists among residents who are confronted with the upcoming urban redevelopment and has attracted scholars’ attention. This study develops a measurement scale for anxiety and investigates the effects of demographic variables via a large-scale questionnaire survey to clarify residents’ anxiety under urban redevelopment.

The theoretical contributions of this study are twofold. First, five prominent dimensions of residents’ anxiety, namely, housing conditions, monetary compensation, public services, life adaptation, and public participation level, are refined and verified in this study. The multi-dimensional view caters to the context of the increasing complexity of urban redevelopment in China. Meanwhile, this study reveals that the different mean values of these dimensions indicate their varying levels of intensity and urgency in residents’ anxiety. For instance, the dimension of housing conditions with the highest value is at the top of

residents' concerns, whereas the life adaptation dimension is less important. These findings contribute to achieving a comprehensive and accurate understanding of the complex perception of anxiety. In consideration of the commonly used case study approach in the existing literature on anxiety (Liu et al., 2016), the scales developed in the current study provide an accessible approach to measuring anxiety dimensions and lay the foundation for further empirical research. Second, four trends about anxiety in urban redevelopment are summarized, and in-depth reasons behind are revealed accordingly on the basis of the comparison and integration of the statistical results regarding age, job, and region variables. This study verifies that the diverse anxiety dimensions are influenced not only by residents' individual needs and interests but also by social context and interactions with other stakeholders, such as the local government. This finding clarifies the formation process of anxiety and highlights the significant effects of contextual variables on this process.

From a practical perspective, on the basis of the four trends identified in Section 4.3, this study sheds light on policymaking and engineering management to reduce residents' anxiety in the preparation stage of urban redevelopment. With respect to policymaking, the importance of fairness in compensation standards is emphasized to protect the public interest. In the aspect of public participation, accurate and detailed information on the redevelopment needs to be communicated with residents to eliminate their unnecessary worry and concern. The equalization of public services between migrants and

natives should also be addressed as one of the main objectives of urban redevelopment. Specifically, age-friendly redevelopment, such as high-quality housing, accessible medical services, and sufficient respect from government, for the elderly, especially for those in central and western regions, is beneficial to satisfying their requirements.

Apart from policymaking, effective engineering management is also crucial to the success of urban redevelopment, which can reinforce the work conducted by the government to some extent. The contractor is recommended to collect opinions from residents at the early planning stage; hence, residents can engage considerably in the decision-making process. Such communication between the public and contractor supplements traditional government-led engagement approaches to enhance public participation. Since the dimension of housing conditions is the most concerned issue of residents, the redevelopment plan associated with housing structure, quality, floor area ratio, and auxiliary facilities needs to consider residents' demands, rather than merely pursuing economic profits.

This research could be extended via several avenues. For instance, the effects of other demographic variables, such as hukou, could be further investigated and verified in the context of China. The coping behaviors triggered by anxiety in urban redevelopment could also be explored to depict the underlying relationship between the psychology and behavior of individuals.

Appendix A

Table A1 Statistics of the Age \times Region model

		Material aspect			Nonmaterial aspect	
		Housing conditions	Monetary compensation	Public services	Life adaptation	Public participation level
Modified model	F _(5,464)	6.369**	4.108**	3.836*	–	3.910*
Intercept	F _(1,464)	5481.844**	3318.559**	4025.015**	–	3151.337**
Age	F _(2,464)	0.875 (ns)	0.296 (ns)	1.220 (ns)	–	6.053*
Region	F _(1,464)	4.669*	0.044 (ns)	3.350 (ns)	–	14.892**
Age \times Region	F _(2,464)	10.954**	5.562**	6.192***	ns	5.522**

Notes: a) The symbol \times connects two demographic variables. b) * p value < 0.05, ** p value < 0.01; ns: not significant.

Table A2 Statistics of the Age \times Job model

		Material aspect			Nonmaterial aspect	
		Housing conditions	Monetary compensation	Public services	Life adaptation	Public participation level
Modified model	F _(5,464)	4.139**	–	–	5.550**	–
Intercept	F _(1,464)	6233.033**	–	–	4445.973**	–
Age	F _(2,464)	2.262 (ns)	–	–	8.009**	–
Job	F _(1,464)	10.242**	–	–	8.099**	–
Age \times Job	F _(2,464)	3.853*	ns	ns	7.613**	ns

Notes: a) The symbol \times connects two demographic variables. b) * p value < 0.05, ** p value < 0.01; ns: not significant.

Table A3 Statistics of the Job \times Region model

		Material aspect			Nonmaterial aspect	
		Housing conditions	Monetary compensation	Public services	Life adaptation	Public participation level
Modified model	$F_{(3,466)}$	–	7.762**	3.425*	–	–
Intercept	$F_{(1,466)}$	–	5486.903**	6626.179**	–	–
Job	$F_{(1,466)}$	–	2.181 (ns)	0.006 (ns)	–	–
Region	$F_{(1,466)}$	–	5.849*	0.131 (ns)	–	–
Job \times Region	$F_{(1,466)}$	ns	9.995**	9.655**	ns	ns

Notes: a) The symbol \times connects two demographic variables. b) * p value < 0.05, ** p value < 0.01; ns: not significant.

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