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Influencing Factors in Visual Preference Assessment of Redeveloped Urban Villages in China: A Case Study of Guangdong Province

Jiamin Shen, Chenping Han *, Guanjun Li and Xinyu Wang

School of Architecture and Design, China University of Mining and Technology, Xuzhou 221116, China
* Correspondence: hanchenping@cumt.edu.cn

Abstract: The urban village represents a particular problem in urban design and renewal in China. Many cities in China have started the redevelopment of urban villages. Based on the investigation of four urban village redevelopment projects in Guangdong Province, China from 2010 to 2020, building façades, plant landscape, roads, and municipal public facility variety were taken as physical factors in this study. Urban village residents with different demographic characteristics, such as gender, age, income, family size, and urban village-native status, were selected as respondents, and the influence of the considered village physical factors on the visual preference assessments performed by the respondents was analyzed by means of photo stimulation. The results show that all four village factors exerted a certain influence on the respondents' visual preference assessment. Redeveloped urban villages presenting repaired and decorated building façades, various species of plants, resurfaced roads, and medium municipal public facility variety were favored by the respondents. Urban village residents with different demographic characteristics also provided different visual preference assessments of different physical factors of the redeveloped urban villages.

Keywords: urban village; urban village redeveloped; visual preference assessment; demographic characteristics

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1. Introduction

1.1. Urban Village

The concept of "urban village" in China differs from that in the Western countries [1]. In the context of China's rapid urbanization, villages surrounded by expanded cities are called "urban villages" [2]. Due to its unique spatial form, the urban village is usually labeled as a marginal and isolated urban nodal point [3] or enclaves [4]. Urban villages in China prominently feature high building density, are densely populated [5], and lack control and order in terms of urban planning [6].

Due to the chronic problems of a poor living environment, chaotic traffic, and lack of publicly supported facilities in urban villages, China initiated urban village redevelopment in the late 1990s, focusing on building façade beautification, improvement of sanitation conditions, and urban infrastructure development [7]. The purpose of China's urban village redevelopment is to enhance the living standards of the local residents and promote the social–economic development, which is similar to the aims of slum upgrading, shantytown redevelopment, housing renewal, informal housing, and settlement upgrading in other countries [8–13]. Many studies have been conducted on urban village redevelopment from various perspectives [14,15].Yet, so far, no study has been conducted on residents' evaluation of redeveloped urban villages achieved by means of their participation and expression of visual perception.

1.2. Visual Preference Assessment

Visual perception is one of the important research methods for evaluating the quality and value of urban spaces [16,17]. Iverson defined visual preference assessment as a quantitative method for describing the visual quality of objects [18]. Visual preference is one of the best measurement criteria for human perception [19]. It is highly crucial to effective planning and design to determine the visual preference of observers for various landscape elements and the overall landscape [20–22]. Visual preference assessment is universally regarded as correct, effective, and acceptable [23]. It has been widely applied to the evaluation of buildings and structures, such as agricultural buildings [24], roads [25], squares [26], plants [22,27–29], and rivers [30–32]. Visual preference assessment has been used by many scholars to study the public preference for various factors in residential areas. Huang and Sherk studied the public preference for landscape elements in a residential environment with this method. Their study revealed that rain gardens, vegetables, and parking space exerted a remarkable impact on public visual preference [33]. Zhen et al. used this method to study detached housing in Jiangsu Province, China, and found that the architectural style, the height–width ratio, window–wall ratio, and the surrounding environment were the main influencing factors in the residents' visual preference [34]. Craun investigated people's preference for a residential public environment with the method of visual preference assessment. As revealed by the investigation, there was a clear preference for houses that were visually expensive, private, and highly complex [35]. Yuan et al. employed this method to study rural unified housing in Jiangsu Province, Zhejiang Province, and Shanghai. The results showed that the number of building floors, the roof type, the courtyard area, the window–wall ratio, and the residential landscape area were the main factors influencing the respondents' visual preference assessment of rural unified housing [36].

1.3. Demographic Characteristics

Planners, managers, and landscape experts should not overlook the demographic characteristics when conducting landscape assessment [37]. Yu asserted that people with different social backgrounds have different preferences for landscapes [38]. As proved by the existing studies, influencing factors include cultural background [38–40], education level [41–43], gender [37,44], age [45,46], professional knowledge [37,47,48], environmental value orientation [23,49], living environment [38,50,51], and occupation [42,52].

Many scholars believe that income is also a demographic characteristic that should be considered in visual preference assessment studies [53–55].

Familiarity with the environment also affects people's visual preference assessment [49,56]. Therefore, whether people are natives of urban villages can also be a demographic characteristic affecting their visual preference assessment.

From the perspective of residential correlation, Yuan et al. found that the age of householders, per capita income, and family members are demographic characteristics influencing rural householders' visual preference for the external spatial form of unified housing [36]. Jiang et al. discovered that age, education level, income, and household size influence people's satisfaction with housing and living environment in historic districts [57]. Dekker et al. found that age, income, education level, and household size are significant demographic characteristics that would affect resident satisfaction with housing and manors after World War II [58]. In this study, five demographic characteristics (namely, gender, age, income, household size, and urban village-native status) were selected as the target factors to be studied.

1.4. Physical Factors

The environment of the redeveloped urban village is composed of different village physical factors, which have a direct impact on visual preference assessment.

Building façades are the main urban spatial features of a city [59–61]. The public psychological impression of buildings is mainly based on the evaluation of building

façades [62]. For instance, Askari [60] and Utaberta et al. [63] identified the elements influencing the image of historic buildings façades through the public evaluation of building façades. The study conducted by Bu et al. indicated that the building height, roof type, and color of new high-rise buildings can influence people's visual preference assessment of the Xi 'an Bell Tower block [64]. As indicated by the study of Pan et al., the window–wall ratio and the height–width ratio of a building façade exerts some impact on people's visual preference assessment of court buildings [65].

Green spaces play a vital role in the health of cities [66]. Ulrich proposed the theoretical foundation for the relationship between the physical factors of plants and visual preference [67]. Many studies have shown that vegetation with different physical factors affect people's preference for vegetation landscape. As Lamb and Purcell observed, people believe that the structural characteristics of tall and dense plants are more natural than those of bushes [68]. Lee et al. discovered that in residential areas, residents prefer complex tree clusters to scattered ones in the community [69]. Larsen and Harlan concluded that people prefer dwellings with desert arrangements in the front yard and oasis arrangements in the back yard [70].

In addition, roads also affect people's visual preference assessment of urban villages. Appleyard asserted that roads can easily represent, in people's consciousness, the most important part of the urban environment [71]. Regarding roads in residential areas, Ewing found that residents prefer the spacious and peaceful residential roads of England and Australia to those of America, which are usually narrow and winding [72]. According to the study conducted by Yin et al., residents prefer pavements with fewer cars [73]. In addition to its influence on residents' preference, road safety is also a key habitability element for the community.

Moreover, municipal public facilities have a great impact on the daily life of residents. Perfect lighting facilities also affect the personal safety of residents [74]. Recreational facilities, and social and cultural service facilities are of great benefit to the well-being of residents [75]. The number and type of facilities in a residential area affect people's likelihood of performing certain activities. Specifically, the higher the proportion of facilities is, the more likely residents are to participate in social activities [76]. The convenience degree of community facilities is an important factor in comprehensive resident satisfaction [77]. Benches and other rest-dedicated facilities are among the most important features that affect the attractiveness of the community walking environment [78]. Infrastructures such as green open spaces [79], green infrastructures such as water reservoirs [80], and sports facilities [81] can increase the value of surrounding properties.

Based on existing studies, this study selected the main physical factors of urban village redevelopment as the research objects to study whether the urban village is generally loved by people after redevelopment. These village physical factors include building façades, plant landscape, roads, and municipal public facility variety.

1.5. Research Questions

This study aimed to answer the following questions:

1. What village physical factors affect the visual preference of urban village residents for redeveloped urban village?
2. Are there differences in the visual preference assessment of village physical factors of redeveloped urban villages conducted by urban village residents with different demographic characteristics?
3. Which physical factors do urban villages residents with different demographic characteristics pay more attention to when evaluating redeveloped urban villages?

2. Research Method

2.1. Research Site

Urban villages in China first appeared in Guangdong Province. Shipai Village in Guangzhou, Guangdong Province, was the first urban village in China to be redeveloped.

Therefore, it is highly representative to conduct research on the redeveloped urban villages in Guangdong Province (Figure 1). This study selected four urban villages which were redeveloped from 2010 to 2020 in Guangdong Province, namely, Dameisha Village (Shenzhen), Nantou Ancient City (Shenzhen), Shajing Street (Shenzhen), and Yongqingfang (Guangzhou).



Figure 1. Study area.

2.2. Physical Factors of Research Sites

Based on the literature review and the analysis of the physical factors of redeveloped urban villages, four village physical factors were selected as the research objects to explore their impact on the urban village: building façades, plant landscape, roads, and municipal public facility variety. Using the control variable method, the four village physical factors were quantified as explained below (as shown in Table 1):

1. Building façades: In the redevelopment of urban villages, there are three redevelopment degrees of building façades, as they can remain intact, be repaired or decorated, or be rebuilt after complete demolition. Repairing or decorating refer to repair strategies such as replacing doors and windows, and adding components, and to decoration strategies such as painting murals on external walls, respectively.
2. Plant landscape: According to the number of existing plant species after urban village redevelopment, the plant landscape can be divided into three levels: poor, medium, and rich. Specifically, if the number of plant species is not greater than one, the plant landscape is considered poor; with two plant species, the landscape is considered medium; and with no less than three plant species, the landscape is considered rich.
3. Roads: According to the three common redevelopment degrees of road renovation in redeveloped urban villages, roads can remain intact, be repaired, or be resurfaced. Repairing refers to the strategy of simply repairing a dilapidated road surface or removing debris that affects traffic.
4. Municipal public facility variety: Municipal public facilities, in this study, are a series of ground facilities in urban villages excluding buildings, greenery, and roads, including auxiliary facilities such as guardrails and signs, public entertainment facilities, drainage facilities, road lighting facilities and household garbage disposal facilities. According to the existing types of municipal public facilities in redeveloped urban villages, the variety of municipal public facilities is distinguished according to three levels, namely poor, medium, and rich. Specifically, if there is no more than one type of municipal public facilities, the variety of municipal public facilities is considered poor; with two types, the variety of municipal public facilities is considered medium; and with no less than three types, the variety of municipal public facilities is considered rich.

Table 1. Physical factors.

Physical Factors	Factor Value
Building Façade	Intact = 1; repaired or decorated = 2; rebuilt = 3
Plant Landscape	Poor = 1; medium = 2; rich = 3
Roads	Intact = 1; repaired = 2; resurfaced = 3
Municipal Public Facility Variety	Poor = 1; medium = 2; rich = 3

2.3. Demographic Characteristics of the Respondents

In this study, residents of urban villages that have not been redeveloped were selected as the respondents, and five respondent demographic characteristics of the respondents were selected as variables that might affect the visual preference assessment of urban villages. The first variable is gender, which is divided into male or female. The second variable is age; according to the age composition of Guangdong Province, the residents were classified into three age groups, namely, 18–34, 35–59, and 60 years of age and above. The third variable is income. As shown by the income and consumption expenditure data of residents in Guangdong Province in 2020, the per capita disposable income was RMB 41,029, approximately RMB 3.420/month; accordingly, the income was divided into two levels: less than RMB 3.420/month and no less than RMB 3.420/month. The fourth variable is household size. As the data from China Statistical Yearbook 2021 show, the household sizes of Guangdong Province in 2020 can be mainly classified in the following four levels: one-person households (33.2%), two-person households (24.2%), three-person households (16.5%), and four-or-more-person households (26.1%). For research convenience, the household sizes were divided into three levels, namely one-person households, two–three-person households, and four-or-more-person households. The last variable indicated the urban village-native status of respondents. Cheap accommodation in urban villages has attracted a large number of migrants, and the permanent population of urban villages mainly includes local natives and non-native tenants; therefore, this variable was divided into "yes" and "no" categories. The classification of these five demographic characteristics was based on the data obtained from the sixth national population census (see Table 2).

Table 2. Classification of the demographic characteristics of urban village residents.

Demographic Characteristics	Variable	Set Value
Gender	Male	1
	Female	2
Age	18–34	1
	35–59	2
	≥60	3
Monthly Income	<RMB 3420	1
	≥RMB 3420	2
Household Size	1 person	1
	2–3 persons	2
	≥4 persons	3
Urban Village-Native Status	Yes	1
	No	2

2.4. Selection of Photos of Redeveloped Urban Villages

In total, 48 photos of redeveloped urban villages were sent to five architectural experts who were asked to rate the photos according to the above four variables. After the average score of each photo was then calculated, the 9 photos with the highest average score and the corresponding 9 photos taken before redevelopment were selected for further study (see Figures 2–10). The purpose of providing the photos taken before redevelopment was to let respondents be familiarized with the physical factors of redevelopment.



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Figure 2. Comparison of Dameisha Village after and before redevelopment in Shenzhen, Guangdong Province.



Photo Copyright: Zhang Chao Photo Copyright: URBANUS Architecture and Design Inc

Figure 3. Comparison of Nantou Ancient City after and before redevelopment in Shenzhen, Guangdong Province 1.



Photo Copyright: nsaaa Photo Copyright: nsaaa

Figure 4. Comparison of Nantou Ancient City after and before redevelopment in Shenzhen, Guangdong Province 2.



Photo Copyright: Zhang Chao Photo Copyright: BWA

Figure 5. Comparison of Nantou Ancient City after and before redevelopment in Shenzhen, Guangdong Province 3.



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Figure 6. Comparison of Shajing Street after and before redevelopment in Shenzhen, Guangdong Province 1.



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Figure 7. Comparison of Shajing Street after and before redevelopment in Shenzhen, Guangdong Province 2.



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Figure 8. Comparison of Yongqingfang after and before redevelopment in Guangzhou, Guangdong Province 1.



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Figure 9. Comparison of Yongqingfang after and before redevelopment in Guangzhou, Guangdong Province 2.



Photo Copyright: cnS Photo Copyright: cnS

Figure 10. Comparison of Yongqingfang after and before redevelopment in Guangzhou, Guangdong Province 3.

2.5. Questionnaire Survey

The nine photos of redeveloped urban villages and the corresponding nine photos taken before redevelopment were printed on A4 paper and bound into a book in random order. Questionnaires were distributed to residents of some urban villages that have not been redeveloped to ensure that they could perform an objective assessment of the redeveloped urban villages. In total, 15 residents were selected from urban villages that have not yet been redeveloped, that is Gishan Village, Tanwei Village, and Lujiang Village, (Guangzhou, Guangdong Province), to carry out the questionnaire survey, which was helpful to better collect suggestions on the questionnaire and modify the questionnaire accordingly. After the adjustment of the questionnaire, residents were randomly selected from these urban villages and were showed these nine groups of photos to determine their visual preferences for the redeveloped urban villages in the photos. Based on the comparison of the photos taken after and before redevelopment, the respondents needed to score the nine photos of the redeveloped urban villages in the range of 0–5, where 0 denotes "strongly dislike", whereas 5 denotes "strongly like" (as shown in Table 3). Previous research has proved that photos can be adopted as effective media for landscape assessment [82]. Photos are also widely used to replace actual landscapes in academic research [83–86].

The questionnaire survey was conducted at 9–11 a.m. and 14–17 p.m. on 2nd, 3rd, 9th, and 10th May 2020. The survey time coincided with the time that residents of urban villages spent by performing outdoor activities on rest days. This ensured that the data of the demographic characteristics of the randomly selected residents were comprehensive. A total of 298 residents were surveyed, and 273 valid questionnaires were received, with an effectiveness rate of 91.6%. The respondent demographic characteristics are shown in Table 4. As the statistical data show, the demographic characteristics of the respondents were consistent with those of the sixth national population census, thus being highly representative.

Table 3. Score range and denotation.

Score	Denotation
0	Strongly dislike
1	Dislike
2	Mildly dislike
3	Mildly like
4	Like
5	Strongly like

Table 4. Statistical data of demographic characteristics of urban village residents.

Demographic Characteristics	Variable	Number of Urban Village Residents	Proportion
Gender	Male	134	48.92%
	Female	139	52.08%
Age	18–34	90	33.09%
	35–59	130	47.71%
	≥60	53	19.20%
Monthly Income	<RMB 3420	147	53.85%
	≥RMB 3420	126	46.15%
Household Size	1 person	59	33.36%
	2–3 persons	103	40.91%
	≥4 persons	111	25.73%
Urban Village-Native Status	Yes	97	35.53%
	No	176	64.47%

2.6. Data Analysis

The collected data were analyzed using SPSS 22.0. One-way ANOVA was used to test the influence of demographic characteristics on the preference for redeveloped urban villages. Stepwise multiple linear regression analysis was conducted to explore the quantitative relationships between the five demographic characteristics (gender, age, income, family size, and urban village-native status) and preferences for redeveloped urban villages, as well as between the four physical factors (building façades, plant landscape, roads, and municipal public facility variety) and preference scores provided by groups of residents with different demographic characteristics.

3. Results

3.1. Overall Assessment of Photos

The intergroup reliability of the nine photos taken after redevelopment was tested with SPSS 22.0, and the result was 0.715, displaying relatively high internal reliability. Accordingly, it was concluded that the questionnaire survey was reliable and that the data collected could be competently used for further detailed analysis.

The average score of each photo provided by the respondents is denoted with S. Among the scores of the nine photos, the highest average score was 4.63 while the lowest was 3.15. The average score of all the photos was 3.97.

In experiments where photos are used to replace actual scenes, the average scores of photos can be taken as valid data of respondents' visual preference assessment [87].

3.2. Correlation between Physical Factors and Visual Preference Assessment

To study the correlation between the four physical factors and visual preference assessment, the stepwise multiple linear regression analysis was conducted. Building façades (A), plant landscape (L), roads (R), and municipal public facility variety (M) were

taken as the independent variables, and the average score (S) of each photo was taken as the dependent variable. The analysis results are shown in Table 5.

Table 5. Stepwise multiple linear regression analysis results.

	Unstandardized Coefficients		Standardized Coefficient	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Constant	2.684	0.693		3.872	0.018		
A	0.133	0.156	0.359	1.250	0.043	0.911	1.098
L	−0.145	0.137	−0.464	−0.856	0.050	0.840	1.191
R	−0.049	0.196	−0.120	−3.250	0.015	0.705	1.418
M	0.057	0.157	0.163	2.961	0.036	0.797	1.255

As is indicated by the stepwise multiple linear regression analysis, the four factors (A, L, R, and M) had a significant impact on the scores. When the four factors were analyzed separately, the following statistical results were obtained: A (F = 1.250, p = 0.043), L (F = −0.856, p = 0.050), R (F = −3.250, p = 0.015), and M (F = 2.961, p = 0.036).

Consequently, it can be concluded from the stepwise multiple linear regression analysis results that when the average score was set as the dependent variable, significant differences existed in all the four physical factors. In other words, the four physical factors influenced the average scores of photos.

3.3. Correlation between Demographic Characteristics and Visual Preference Assessment

One-way ANOVA was conducted to study the correlation between demographic characteristics and visual preference assessment. The results indicate that there were significant differences in the average scores of the photos assigned by the respondents according to different demographic characteristics. Specifically, the following results were obtained: gender (F = 7.324, p = 0.012), age (F = 4.342, p = 0.001), income (F = 6.353, p = 0.005), household size (F = 3.555, p = 0.005), and urban village-native status (F = 9.342, p = 0.024).

Using the Kendall rank correlation analysis, the correlations between demographic characteristics and visual preference assessment were tested. Specifically, the correlation between average score (S) and gender, age or income was positive, while the correlation between average score (S) and household size or urban village-native status was negative. The results are shown in Table 6.

Table 6. Kendall rank correlation analysis results.

		Age	Income	Household Size	Urban Village-Native Status	S
Gender	Correlation Coefficient	0.207	−0.073	0.183	0.254	0.388 **
	Sig. (2-tailed)	0.146	0.630	0.197	0.092	0.002
	N	45	45	45	45	45
Age	Correlation Coefficient		−0.083	−0.060	0.252	0.378 **
	Sig. (2-tailed)		0.559	0.655	0.078	0.002
.	N		45	45	45	45
Income	Correlation Coefficient			−0.276	−0.200	−0.279 *
	Sig. (2-tailed)			0.052	0.185	0.027
	N			45	45	45
Household Size	Correlation Coefficient				0.123	0.246 *
	Sig. (2-tailed)				0.386	0.040
	N				45	45

Table 6. *Cont.*

		Age	Income	Household Size	Urban Village-Native Status	S
Urban Village-Native Status	Correlation Coefficient					
	Sig. (2-tailed)					
	N					
S	Correlation Coefficient					
	Sig. (2-tailed)					
	N					

**. Correlation significant at the 0.01 level (2-tailed). *. Correlation significant at the 0.05 level (2-tailed).

The data collected were further analyzed using stepwise multiple linear regression analysis. In this analysis, gender, age, income, household size, and urban village-native status were taken as independent variables, and the average score of photos (S) was set as the dependent variable (Table 7). As the results show, all the five independent variables exerted significant influence on the average score of photos.

Table 7. Stepwise multiple linear regression analysis results.

	Unstandardized Coefficients		Standardized Coefficient	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Constant	1.566	0.414		3.786	0.001		
Gender	0.325	0.153	0.276	2.125	0.040	0.789	1.267
Age	0.309	0.097	0.398	3.192	0.003	0.853	1.172
Income	−0.222	0.141	−0.192	−1.572	0.124	0.889	1.125
Household Size	0.159	0.088	0.228	1.807	0.038	0.836	1.196
Urban Village-Native Status	0.080	0.158	0.069	1.506	0.015	0.708	1.412

The next step was to examine whether there existed any interaction among the demographic characteristics. Co-linear analysis of independent variables was carried out based on the conclusion of the stepwise multiple linear regression analysis. The tolerance for gender was 0.789, with VIF = 1.267; that for age was 0.853, with VIF = 1.172; that for income was 0.889, with VIF = 1.125; the tolerance for household size was 0.836, with VIF = 1.196; and the tolerance with 0.708, with VIF = 1.412. The VIF values of the independent variables calculated using SPSS were all smaller than 10, and their tolerances values were all greater than 0.2; additionally, the residuals were normally distributed. Therefore, it was concluded that the model had no collinearity problem [88].

3.4. Respondents' Gender and Physical Factors

The average score of each photo provided by the male and female respondents was set as the dependent variable, and the four physical factors (A, L, R, and M) were set as independent variables. As shown in the stepwise multiple linear regression analysis, the significant predictors for male respondents were different from those for female respondents (as shown in Table 8). For male respondents, building façades (A), roads (R), and municipal public facility variety (M) were reliable predictors. They preferred redeveloped urban villages with rebuilt building façades, resurfaced roads, and medium municipal public facility variety. For female respondents, building façades (A) and plant landscape (L) were reliable predictors. They preferred redeveloped urban villages with repaired or decorated building façades and rich plant landscapes.

Table 8. Results of stepwise multiple linear regression analysis of the photos-based physical factors according to different gender groups.

Dependent		Unstandardized Coefficients		Standardized Coefficient	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
Scores for Male	Constant	3.554	0.488		7.279	0.000		
	A	0.591	0.147	0.770	4.030	0.001	0.719	1.390
	R	−0.366	0.153	−0.426	−2.389	0.033	0.825	1.212
	M	−0.429	0.134	−0.606	−3.206	0.007	0.736	1.358
Scores for Female	Constant	3.289	0.401		8.196	0.001		
	A	−0.367	0.089	−0.874	−4.147	0.014	0.924	1.082
	L	−0.130	0.098	−0.342	−2.325	0.036	0.615	1.627

K-S was used to test whether there existed any collinearity between these two models. As the calculation results show, the residuals conformed to the normal distribution (male, K-S Z = 0.734, p = 0.237; female, K-S Z = 0.638, p = 0.372), which indicated that there was no collinearity between these two models.

3.5. Respondent Age and Physical Factors

The average score of each photo provided by respondents of different age groups was set as the dependent variable, and the four physical factors (A, L, R, and M) were set as independent variables. As is shown in the stepwise multiple linear regression analysis, the significant predictors were different for different age groups (as shown in Table 9). For respondents of 18–34 years of age, roads (R) and municipal public facility variety (M) were reliable predictors. They preferred redeveloped urban villages with resurfaced roads and rich municipal public facility variety. For respondents of 35–59 years of age, building façades (A), roads (R), and plant landscape (L) were reliable predictors. They preferred redeveloped urban villages with rebuilt building façades, resurfaced roads, and rich plant landscapes. For respondents 60 years of age and above, roads (R) and municipal public facility variety (M) were reliable predictors. They preferred redeveloped urban villages with resurfaced roads and rich municipal public facility variety.

Table 9. Results of stepwise multiple linear regression analysis of the photo-based physical factors according to different age groups.

Dependent		Unstandardized Coefficients		Standardized Coefficient	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
18–35 Years of Age	Constant	3.593	0.625		5.745	0.005		
	R	−0.158	0.177	−0.236	−1.893	0.042	0.705	1.418
	M	−0.517	0.141	−0.907	−3.658	0.022	0.797	1.255
36–59 Years of Age	Constant	1.860	0.273		6.804	0.002		
	A	0.059	0.062	0.306	1.953	0.034	0.911	1.098
	L	0.023	0.054	0.140	1.420	0.026	0.840	1.191
	R	0.133	0.077	0.624	2.711	0.012	0.705	1.418
60 Years of Age or Older	Constant	2.214	0.739		2.997	0.040		
	R	−0.080	0.209	−0.155	−2.180	0.023	0.705	1.418
	M	0.178	0.167	0.410	3.866	0.046	0.797	1.255

K-S was used to test whether there existed any collinearity among these three models. As the calculation results show, the residuals conformed to the normal distribution (18–34 years of age, K-S Z = 0.535, p = 0.632; 35–59 years of age, K-S Z = 0.732, p = 0.437; 60 years

of age and above, K-S Z = 0.356, p = 0.245), which indicated that there was no collinearity among these three models.

3.6. Respondents' Income and Physical Factors

The average score of each photo provided by respondents of different income groups was set as the dependent variable, and the four physical factors (A, L, R, and M) were set as independent variables. As shown in the stepwise multiple linear regression analysis, the significant predictors were different for different income groups (see Table 10). For respondents whose monthly disposable income was less than RMB 3.420, plant landscape (L) and municipal public facility variety (M) were reliable predictors. They preferred redeveloped urban villages with rich plant landscapes and rich municipal public facility variety. For respondents whose monthly disposable income was no less than RMB 3.420, building façades (A), plant landscape (L), and municipal public facility variety (M) were reliable predictors. They preferred redeveloped urban villages with rebuilt building façades, medium plant landscapes, and medium municipal public facility variety.

K-S was used to test whether there existed any collinearity between these two models. As the calculation results show, the residuals conformed to the normal distribution (<RMB 3.420, K-S Z = 0.724, p = 0.246; ≥RMB 3.420, K-S Z = 0.614, p = 0.141), which indicated that there was no collinearity between these two models.

Table 10. Results of stepwise multiple linear regression analysis of the photo-based physical factors according to different income groups.

Dependent		Unstandardized Coefficients		Standardized Coefficient	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
<RMB 3420/M	Constant	2.402	0.228		10.551	0.000		
	L	0.164	0.045	0.669	3.649	0.022	0.840	1.191
	M	−0.124	0.051	−0.452	−2.702	0.044	0.797	1.255
≥RMB 3420/M	Constant	2.866	0.595		4.815	0.009		
	A	−0.017	0.134	−0.061	−4.123	0.008	0.911	1.098
	L	−0.050	0.118	−0.219	−2.425	0.042	0.840	1.191
	M	−0.038	0.135	−0.149	−2.281	0.039	0.797	1.255

3.7. Respondents' Household Size and Physical Factors

The average score of each photo provided by respondents with different household sizes was set as the dependent variable, and the four physical factors (A, L, R, and M) were set as independent variables. As shown in the stepwise multiple linear regression analysis, the significant predictors differed as the household size changed (as shown in Table 11). For respondents from one-person households, plant landscape (L) and municipal public facility variety (M) were reliable predictors. They preferred redeveloped urban villages with rich plants landscapes and rich municipal public facility variety. For respondents from two–three-person households, plant landscape (L), roads (R), and municipal public facility variety (M) were reliable predictors. They preferred redeveloped urban villages with medium plant landscapes, resurfaced roads, and medium municipal public facility variety. For the respondents from four-or-more-person households, building façades (A), plant landscape (L), roads (R), and municipal public facility variety (M) were all reliable predictors. They preferred redeveloped urban villages with rebuilt building façades, poor plants landscapes, resurfaced roads, and rich municipal public facility variety.

K-S was used to test whether there existed any collinearity among these three models. As the calculation results show, the residuals conformed to the normal distribution (one-person households: K-S Z = 0.567, p = 0.342; two–three-person households: K-S Z = 0.326, p = 0.262; four-or-more-person households: K-S Z = 0.743, p = 0.246), which indicated that there was no collinearity among these three models.

Table 11. Results of stepwise multiple linear regression analysis of the photo-based physical factors for different household sizes.

Dependent		Unstandardized Coefficients		Standardized Coefficient	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
one-person households	Constant	4.712	0.687		6.862	0.002		
	L	−0.527	0.155	−0.847	−3.406	0.027	0.911	1.098
	M	−0.022	0.155	−0.038	−0.142	0.894	0.797	1.255
two–three-person households	Constant	0.734	0.429		1.709	.163		
	L	0.467	0.097	0.709	4.825	0.008	0.911	1.098
	R	0.083	0.122	0.114	3.680	0.034	0.705	1.418
	M	−0.060	0.097	−0.098	−2.921	0.048	0.797	1.255
four-or-more-person households	Constant	3.285	0.844		3.890	0.018		
	A	−0.258	0.167	−0.608	−3.543	0.018	0.840	1.191
	R	−0.083	0.239	−0.150	−1.349	0.045	0.705	1.418
	M	−0.097	0.191	−0.205	−2.508	0.038	0.797	1.255

3.8. Urban Village-Native Status and Physical Factors

The average score of each photo provided by natives and non-natives of urban villages was set as the dependent variable, and the four physical factors (A, L, R, and M) were set as independent variables. As shown in the stepwise multiple linear regression analysis, the significant predictors were different for natives of urban villages and the non-native population (as shown in Table 12). For natives of urban villages, building façades (A) and municipal public facility variety (M) were reliable predictors. They preferred redeveloped urban villages with repaired or decorated building façades and rich municipal facility variety. For non-natives, building façades (A) and roads (R) were reliable predictors. They preferred redeveloped urban villages with repaired or decorated building façades and resurfaced roads.

K-S was used to test whether there existed any collinearity between these two models. As the calculation results show, the residuals conformed to the normal distribution (the aborigines, K-S Z = 0.724, $p = 0.345$; the non-aborigines, K-S Z = 0.246, $p = 0.235$), which indicated that there was no collinearity between these two models.

Table 12. Results of stepwise multiple linear regression analysis of the photo-based physical factors for natives and non-natives of urban villages.

Dependent		Unstandardized Coefficients		Standardized Coefficient	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
Yes	Constant	3.239	1.353		2.395	0.075		
	A	0.123	0.305	0.197	4.405	0.006	0.911	1.098
	M	−0.119	0.306	−0.202	−2.389	0.017	0.797	1.255
No	Constant	2.114	0.475		4.451	0.011		
	A	0.166	0.107	0.505	4.653	0.005	0.911	1.098
	R	−0.112	0.135	−0.306	−2.829	0.045	0.705	1.418

4. Discussion

4.1. Influence of Different Physical Factors on Visual Preference Assessment

The redevelopment of building façades exerted great influence on the visual preference assessment of the redeveloped urban villages. Specifically, the building façades that had been repaired or decorated scored the most points, while façades that were intact scored the least points. A large number of rental houses in urban villages meet the demand of large-scale rural population migration for cheap and accessible housing in urban areas, which has led to a thriving low-income housing market in urban villages [89–91]. The repair and decoration of building façades improves the environment of urban villages and enhance the life quality of residents without causing large economic costs.

The plant landscapes exerted some influence on the visual preference assessment of the redeveloped urban villages. Photos showing rich plant landscapes scored the most points, while photos showing poor plant landscapes scored the least points. In other words, in residential areas, plants may affect people's perceived value of housing; additionally, the complexity of the plant landscape has a great impact on the perceived value [92]. Bernasconi et al. proposed, in their study on automated transport, that lawns, shrubs, and especially trees have a positive effect on visual preferences [93]. It was also suggested that vegetation structures that are considered beautiful landscapes usually contain a large number of plants [94,95]. These results are in line with the result obtained in this study.

Road resurfacing also exerts some influence on the visual preference assessment of the redeveloped urban villages. Roads that were repaired scored the most points, whereas roads that had been kept intact usually scored the least points. This is because the repair of roads can improve traffic safety. Traffic safety influences resident satisfaction in the community [96]. After resurfacing, the walkability of roads is improved. Therefore, residents' preference is naturally for resurfaced roads.

Similarly, municipal public facility variety also exerted some influence on the assessment of the redeveloped urban villages. Specifically, photos showing medium municipal public facility variety scored the most points, whereas photos showing poor kinds of municipal public facility variety scored the least points. This can be justified by the fact that municipal public facilities can offer great convenience and benefits to the residents. For instance, facilities that can improve traffic safety promote the possibility for the elderly to spend their rest of life at home rather than in nursing homes [97]; further, recreational facilities are an important factor in promoting physical activity in people [98].

4.2. Influence of the Demographic Characteristics on Visual Preference Assessment

People with different demographic characteristics perform different visual preference assessments [49]. This difference results from the joint action of many factors, such as living environment and life experience. This is also consistent with the findings of this study.

Gender difference may lead to different visual preference assessments of redeveloped urban villages. As revealed, female respondents provided higher average scores than male ones. This may be because mothers are responsible for purchasing daily necessities in about 70% of families [99], and redeveloped urban villages bring convenience to housewives. In contrast, Ayuga-Téllez et al. discovered that males display a slightly stronger preference for rural landscapes than females in Spain [43]. Their finding is not consistent with the findings obtained in this study. This is likely because Spanish rural building practices attach great importance to close contact with nature, while there is almost no arable land, grassland, forest land, or other land but high-density housing and roads in Chinese urban villages. In a way, Chinese urban villages are parts of the cities.

Different age groups also assess redeveloped urban villages differently. In our study, the average scores of photos were positively correlated with the age of the respondents. This is probably related to their living environment and life experience [49]. The older residents are, the longer they are affected by living environment problems in urban villages. The redevelopment of urban villages can improve their living environment to some extent.

Accordingly, they perform more positive visual preference assessments of the redeveloped urban villages.

Resident income exerts a certain influence on their visual preference assessment of the environment of redeveloped urban villages. Here, respondents with different income levels performed different visual preference assessments [53]. As revealed by this study, the average score provided by the respondents whose disposal monthly income was no less than RMB 3.420 was higher than that provided by those who earned less than that amount. This may be because residents may be required to pay certain fees for redevelopment and maintenance, and people with higher income are more willing to pay more for urban construction and development [100].

Similarly, household size also influences the public visual preference assessment of the environment of redeveloped urban villages. Yuan et al. asserted that people with different household sizes perform different visual preference assessments, which is in line with the findings of this study [36]. As revealed by this study, respondents from one-person households provided the highest scores. This may be because redeveloped urban villages can provide solitary residents with more opportunities and possibilities for neighborhood interactions.

Natives of urban villages and non-native populations produce different visual preference assessments of the environment of redeveloped urban villages. As our results show, natives provided higher scores to the photos of redeveloped urban villages than non-native tenants. This may be because redeveloped urban villages offer natives more comfortable experiences that are different from those before redevelopment. The results obtained in this study are consistent with Peter Howley's research results (2012).

4.3. Correlations between Demographic Characteristics and Physical Factors

Respondents of different genders showed different visual preference assessments of redeveloped urban village environment. Male respondents mainly considered building façades, roads, and municipal public facility variety when assessing the environment of the urban villages, and the building façades represented the most important factor in their assessment. The photos of rebuilt building façades, resurfaced roads, and medium municipal public facility variety scored the most points, as male respondents are comparatively more rational, preferring orderly and organized beauty. When assessing redeveloped urban villages, female respondents mainly paid attention to the building façades and plant landscape, and plant landscape was the main factor influencing their assessment. The photos of repaired or decorated building façades and rich plant landscapes scored the most points, because female respondents are more sensitive, careful, and detail-oriented [34].

Respondents of different age groups performed different visual preference assessments of redeveloped urban villages. When the respondents of 18–34 years of age assessed the urban villages, their focus was usually on roads and municipal public facility variety. The photos of resurfaced roads and rich municipal public facility variety scored the most points, because residents belonging to this age group mainly pay attention to road safety in daily commuting on weekdays, and leisure activities on rest days. When the respondents of 35–59 years of age assessed the redeveloped urban villages, their focus was usually on building façades, plant landscape, and roads. The photos of rebuilt building façades, resurfaced roads, and rich plant landscape scored the most points. Due to a certain amount of wealth accumulation, the respondents of this age group mainly pay attention to the quality of daily life. When respondents of 60 years of age and above assessed the redeveloped urban villages, roads become the key element, followed by municipal public facility variety. The photos of resurfaced roads and rich municipal public facility variety scored the most points. Older people prefer a safe and walkable community environment, which is consistent with the result of a Jingjing Li's study, namely, respondent age is positively correlated with preference for community safety and walkable convenience [101]. Sports and fitness facilities, and leisure and entertainment facilities can meet the elderly's

needs for community activities. Studies have shown that community activities offer exercise opportunities to older adults, which helps them maintain their physical functions [102].

Respondents of different income groups performed different visual preference assessments of redeveloped urban villages. The respondents whose disposable monthly disposable income was less than RMB 3.420 prioritized plant landscape and municipal public facility variety when assessing redeveloped urban villages. The photos of rich plant landscape and rich municipal public facility variety scored the most points. This may be because low-income people have a stronger preference for compact, walkable neighborhoods [101]. Municipal public facilities such as rest-dedicated facilities [78] and plants [103] are important factors for improving street walkability. For respondents whose monthly disposable income was no less than RMB 3.420, the photos of rebuilt building façades, medium plant landscapes, and medium municipal public facility variety scored the most points. This is because people in this category have already accumulated a certain economic strength and have a strong preference for attractive neighborhoods [104].

Respondents of different family household groups performed different visual preference assessments of redeveloped urban villages. Respondents from one-person households mainly paid attention to plant landscape and municipal public facility variety when assessing redeveloped urban villages. Photos of rich plant landscapes and rich municipal public facility variety scored the most points. Most of these respondents were elderly people living alone and young, single workers. People in this category are more eager to communicate with their neighbors. Moreover, a living environment with rich municipal public facility variety and a rich plant landscape can promote resident social interactions to a certain extent. For the elderly living alone, the loss of a spouse can lead to a decline in their physical function, but social contact can mitigate this effect [105]. The respondents from two–three-person households prioritized medium plant landscapes, resurfaced roads, and medium municipal public facility variety when assessing redeveloped urban villages. This may be because families of this size tend to have one child, and this environment helps ensure children's safety and access to outdoor activities. Regarding respondents from four-or-more-person households, they preferred rebuilt building façades, poor plant landscapes, resurfaced roads, and rich municipal public facility variety when assessing redeveloped urban villages. This is probably because families with four or more members are concerned about the convenience in daily life, and the flow and safety of traffic when going out. This is consistent with the empirical conclusion that family size is positively correlated with preference for transportation convenience and municipal utility facility accessibility [106].

Whether the respondents were natives of villages in the city or not also affected their visual preference for redeveloped urban villages. Natives of urban villages displayed a clear preference for repaired or decorated building façades and rich municipal public facility variety when assessing redeveloped urban villages. In contrast, non-native tenants provided priority to the repaired or decorated building façades and resurfaced roads. They all preferred the robustness and aesthetic effect of repairing and decorating building façades, which do not entail significant expenditure. Urban villages are a source of accommodation for low-income rural migrants [107,108], and building façades that have been rebuilt generate high rents. As non-native tenants are more sensitive to price than natives [104], they tend not to like rebuilt building façades.

4.4. Limitations

This study explored the visual preference assessment of redeveloped urban villages performed by residents of urban villages that have not yet been redeveloped. Only five demographic characteristics were selected, namely gender, age, income, household size, and urban village-native status. However, besides these five factors, other factors, such as occupation and education level, also exert a certain influence on the visual preference assessment of redeveloped urban villages. Yet, these demographic characteristics were not included in this study for research convenience.

5. Conclusions

Urban villages in China have obvious location advantages and high land economic value, but many problems exist in the inner space environment of urban villages. Urban village redevelopment is a very important way to alleviate the existing problems and improve the living standard of residents in urban villages. Compared with the demolition of urban villages, the redevelopment of urban villages is a relatively simple and effective measure with little government investment. This research studied the correlations between the physical factors of redeveloped urban villages and the visual preference assessment performed by residents of urban villages that have not been redeveloped. The results show that building façades, plant landscape, roads, and municipal public facility variety all exert a certain influence on the visual preference assessment of redeveloped urban villages. Redeveloped urban villages presenting repaired and decorated building façades, various species of plants, resurfaced roads, and medium municipal public facility variety were favored by the respondents.

There are limitations to this study; however, the experiments conducted and the results obtained in this study can be of some help to architects and planners in the redevelopment activities of urban villages. To some extent, this study reveals the possible changing trend of visual assessment of urban villages performed by Chinese groups in the future.

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