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Blending Bottom-Up and Top-Down Urban Village Redevelopment Modes: Comparing Multidimensional Welfare Changes of Resettled Households in Wuhan, China

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Abstract: Urban village redevelopment has multidimensional impacts on resettled households. These impacts can reflect the sustainability of urban village redevelopment. This study empirically compares the gains and losses of the welfare in economic conditions, living conditions, natural environment, psychological conditions, and social security in bottom-up and top-down urban village redevelopment cases in Wuhan, China. The results show that a bottom-up redevelopment mode with participative residents caused negative effects in economic welfare but positive effects on living conditions, natural environment, and psychological condition, thus promoting higher comprehensive welfare and satisfaction. Top-down redevelopment led by the government provides villagers with shared dividends through collective economic reform and thus, contributes to gains in economic conditions and social security. However, top-down redevelopment with less participation of residents leads to welfare losses in living conditions, natural environment, and psychological conditions, which results in lower welfare and satisfaction levels overall. Therefore, a middle-out redevelopment mode with a combination of government efforts and public participation are proposed as a solution for sustainable urban redevelopment.

Keywords: urban village renewal; redevelopment modes; welfare changes; resettled households; China

1. Introduction

The concept of urban redevelopment originated in a specific strategy for the economic revival of old industrial cities in developed countries and has subsequently been expanded to slum-upgrading and informal housing redevelopment in developing countries [1–3]. Nowadays, redevelopment is a complex system used to achieve economic, environment, and social improvements for residents. Urban redevelopment has been the subject of wide-ranging debate regarding its positive or negative influence, which has become a greater concern in sustainable redevelopment [4–6].

In fact, the influence of urban redevelopment is dominated by the social system, leading roles of government or market, natural conditions, and regulations of the city itself [7–10]. Social systems such as value systems, decision-making tendencies, and uncertainty have significant impacts on urban renewal [11]. For instance, different urban renewal modes led by the government or market also caused various, differing impacts, such as distinct social welfare equilibrium and satisfaction [12–14]. Therefore, a comparative study between different modes is not only helpful in terms of strengthening

the theoretical explanation to shift in mode, but it also offers more effective and sustainable urban renewal paths [15] (Kuyucu & Danis, 2014).

China, as one of the fastest developing countries in the world, has practiced the redevelopment of “three old’s”—old towns, old factories, and old villages—in order to promote sustainable redevelopment [16]. The country’s urban renewal policy has experienced a shift away from government-funded public housing renewal to self-organized redevelopment [17]. Our article focuses on the redevelopment impacts of urban villages, a unique product of China’s urbanization and land reform [18]. Indeed, the redevelopment of urban villages has important impacts on the welfare of residents, these impacts can reflect the sustainability of the redevelopment policy [19,20]. These impacts are not completely sustainable for residents, according to the concept of sustainability as a blending of economic, social and environmental factors [21,22]. For instance, some scholars have emphasized that local villagers always receive significant financial or housing compensation [23,24]. Others contend that urban village redevelopment indirectly brings imperceptible negative changes to the natural environment, psychological conditions, and social capital of local villagers [25–27]. That is to say, urban village redevelopment might affect welfare positively in certain dimensions but negatively in others. However, research that is focusing on multidimensional sustainable impacts of urban village redevelopment on household welfare is rare.

The shift in the urban village redevelopment in China, which involves more complex property rights, has attracted the interest of numerous scholars. Moreover, the different hierarchical ordering of urban governance in China has an undeniable impact on the urban village redevelopment [14]. Urban village redevelopment is divided into top-down and bottom-up modes, according to the decision-making difference [3,28–30]. Top-down redevelopment mode is a hierarchical governing approach characterized by strong government and weak public participation [22]. The bottom-up redevelopment mode is self-organized by developers, village villagers or other third-party organizations without strong government involvement, which means more public participation and effectiveness [13,15]. Numerous studies have analyzed the role, action, and benefit distribution of stakeholders in urban village redevelopment. However, only a few empirical studies focus on the comparative evaluation on the sustainable impacts of redevelopment modes, especially from the perspective of household welfare [31].

This paper intends to bridge the gap on sustainable impacts of top-down and bottom-up redevelopment modes from the perspective of household welfare, and fill the research gap concerning the relationship between redevelopment mode and satisfaction with urban village redevelopment. Therefore, this study attempts to evaluate the effects of different redevelopment modes on welfare changes in multiple dimensions and on satisfaction of resettled households. With theoretical analysis on different redevelopment modes, we conduct a survey in two urban villages representing different redevelopment modes. We do this to compare the differences in the multidimensional welfare of resettled households between these two modes and to test their relationship with residents’ satisfaction with urban village redevelopment. This study is not only an experiment for sustainable effects of different redevelopment modes on multidimensional welfare in China, but also aims to develop a more sustainable redevelopment mode to remedy the shortages of both bottom-up and top-down redevelopment. The research result sheds light on sustainable redevelopment strategies for developing countries that face the same challenges.

2. Modes Shift of Urban Village Redevelopment in China

Under the dual-track land ownership system in China, urban villages have emerged from the top-down urbanization led by the government to operate according to the spontaneous bottom-up urbanization with villagers [26,29,32]. China has embarked on top-down government-led redevelopment of urban villages to meet the dual needs of improving the effective use of land construction and urban governance [3,28,33]. With a strong socialist ideology and the economic

oriented development in China, top-down redevelopment for urban villages has become the major redevelopment mode for a long time [34].

Top-down redevelopment led by the government in China is a powerful and legal means of unleashing de-commodified properties and redistributing housing wealth, comparing to systems in Western countries [35]. The government is not only responsible for policy making and project selection, but also for land use distribution and housing property compensation. In this mode, the government obtains land value-added income through the sale of acquired land. However, public participation was rarely found in the top-down redevelopment mode. Because the grassroots participants are unable to get their voices heard, they could even become victims, evidenced by the conflicts in the redevelopment process [22]. Furthermore, government failures and other political interference factors can inevitably cause prominent problems, such as low efficiency, excessive time consumption, resource mismatching, and fund shortages [23,30]. For example, with the limited scope of negotiations with residents, local governments are more likely to ignore the needs of residents for redevelopment; and instead, focus on economic growth and the image of modern urban reconstruction [36]. Governments always set a compensation baseline to close the housing property gaps. Thus, redevelopment in this mode may face a wide range of social resistance, since the interest of some urban villagers have been negatively affected [33].

Urban redevelopment policies are adjusted to be adaptive to a series of unique multiscale political and economic changes in different countries and regions [37]. Under the background of globalization with fierce competition and extensive cooperation, China has implemented national institutions and system reforms in various forms [16,30]. In order to distribute the benefits from urban renewal, local governments, villages, and developers formed different relationships to promote urban redevelopment [31]. Urban renewal has also been explored in diversified modes, some led by the villagers or the developers in a bottom-up spatial governance [28,29,38].

“Bottom-up” mode is a new, apparently spontaneous urban development approach pursued by market-enabled participants (developer or villager, etc.) and different from the existing “top-down” planning apparatus [39]. Nowadays, the bottom-up self-organized path has been implemented for urban village redevelopment in China. In this mode, residents and other third-party organizations jointly negotiated the transformation scheme, which includes compensation, infrastructure construction, environmental impact, etc. Then, approval is obtained from applicable government departments [23]. An advantage of a bottom-up redevelopment mode is that the devotion and the initiative of residents to contribute in the design and implementation of redevelopment projects are fully granted [32]. Compared with the top-down mode, the stakeholders in the bottom-up mode have relatively equal influence over the redevelopment process [40]. This approach is conducive to improving the operation efficiency and satisfaction of redevelopment projects [3]. Some scholars hold misconceptions about these two complementary redevelopment modes, often predetermining the negative results of the top-down approach and supporting the bottom-up mode [14]. Therefore, there is a decision-making tendency towards the bottom-up approach to urban redevelopment in suburban China [41]. However, redevelopment programs in this mode may increase the inequality in the redistribution of wealth and welfare through Elite capture. This is especially true in regions with serious information asymmetry, imperfect supervision mechanisms, and low levels of democracy [30].

The shift in modes of urban village redevelopment is the inevitable way to perfect institutional arrangements. Top-down and bottom-up redevelopment strategies have spread throughout China’s urban policies, influencing benefit of developers, government and residents [14]. Some studies have analyzed the institutional change from state-dominant to bottom-up redevelopment, but they mainly focus on distribution of economic benefits among stakeholders rather than the difference in multidimensional impacts on local villagers between different modes [31]. Yuan, et al., compared the difference in duration of top-down and bottom-up urban village redevelopment projects, to explore the effectiveness of different redevelopment modes under the framework of institutional arrangement [38].

These studies mainly focus on housing and monetary compensation of resettled household and ignore their non-economic welfare.

Under this context, this study contributes to the following improvements. Firstly, one redevelopment mode might perform better in certain dimensions but not others. This determines that our research focuses on gains and losses in multidimensional welfare of urban villagers from urban village redevelopment through the lens of sustainability. Secondly, this study adds to the empirical research on comparative analysis between different redevelopment modes with priorities between equity and efficiency. Thirdly, based on empirical results, we could suggest a middle-out and more sustainable mode which performs better in each dimension of welfare, which covers the shortages of both bottom-up and top-down redevelopment.

3. Conceptual Framework

This study chooses the feasible capacity method to evaluate welfare, based on other studies that provide a comprehensive review of welfare theories and urban village redevelopment policies [7,8,42]. In addition, combining the three factors of sustainability: economy, society and environment, an index system was chosen from five dimensions of welfare: economic conditions, living conditions, natural environment, psychological conditions and social security as shown in in the conceptual framework (Figure 1). Social factors include the dimensions of psychological conditions and social security. Environmental factors refer to the dimensions of living conditions and natural environment.

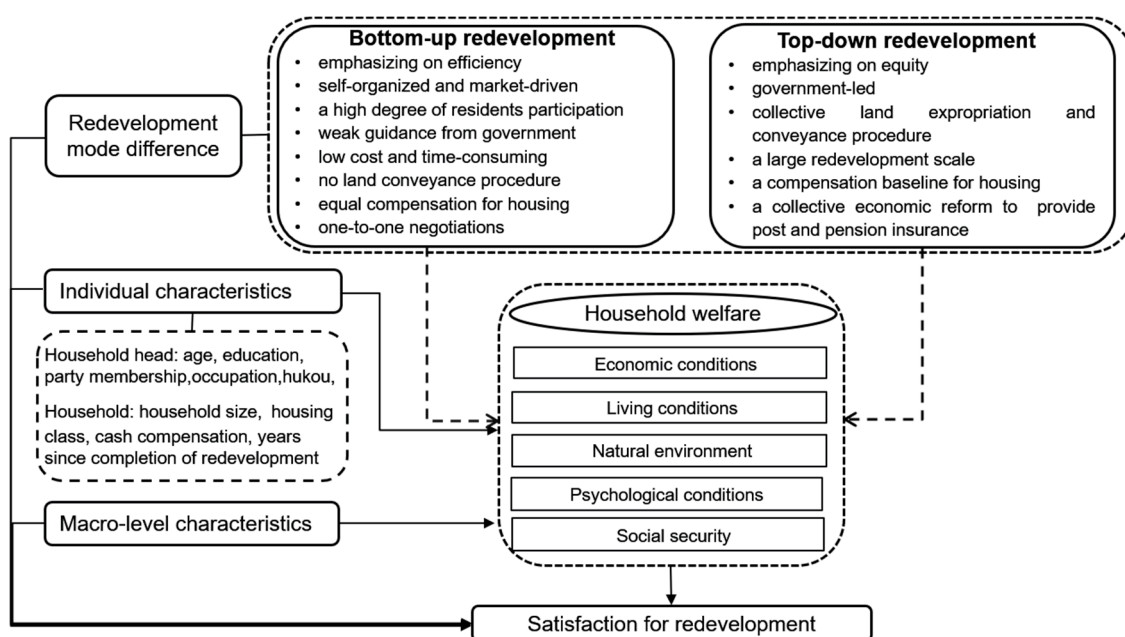


Figure 1. Conceptual framework of the study. Source: the picture was drawn by the authors.

There are three parts to the empirical analysis of this study: firstly, welfare changes were calculated and compared, and the reasons for the differences in welfare change were explored. Secondly, a regression model was utilized to verify the impacts of differences in modes on welfare change in urban village redevelopment. Lastly, a mediating effect model was used to test the relationship between welfare and satisfaction with redevelopment.

As shown in the conceptual framework, the welfare change of local villagers is affected by the redevelopment modes, individual characteristics, and macro-level characteristics. In this study, we focus on the impacts of different modes on welfare and satisfaction.

3.1. Welfare Difference between Bottom-Up and Top-Down Redevelopment Modes

The consideration in balancing efficiency and equity is a very meaningful factor in urban village redevelopment outcomes. Different redevelopment modes have their own priorities between equity and efficiency. The preference for equity or efficiency is the fundamental difference between top-down and bottom-up redevelopment modes. Self-organized bottom-up redevelopment stresses efficiency while top-down, government-led redevelopment focuses particularly on equity [3,23,29].

Social equity refers to fair access to resources and opportunities, and full participation in the social and cultural life of a community. It serves as a central dimension for promoting livability and viability, which is one of the main goals of sustainable development [43,44]. Top-down redevelopment emphasizes social equity, so the government adopts some special policies to improve the welfare of the local villagers, especially the most vulnerable groups [45]. For instance, the government provides share dividends, household registration changes and social security, but also innovates a baseline method of housing compensation, in order to ensure the social equity. In the top-down mode emphasizing social equity, redevelopment led by the government always includes urban household registration, collective economic reform, and social security supply, etc. Social security measures like job positions, employment training, pension, medical insurance and the shared dividends of a collective economy may have more positive effects on the economic conditions and social security of residents than the changes that may occur in the bottom-up mode [44,45]. However, the size ceiling for housing area compensation, as well as the government's behavior of obtaining income through land acquisition, may cause damage to residents' living welfare in this mode [46]. In China's top-down hierarchical governance system, the boundaries and land use of redeveloped regions are determined by the government, with consideration of the social-economic conditions and potential benefits [22]. Therefore, the top-down mode often develops on a large scale and largely ignores the demand of residents and markets. This method may result in the low efficiency of land resources allocation and negative impacts on the environment [28]. Furthermore, change in life style, lack of participation and decline of living conditions of residents affected by the redevelopment may lead to a deterioration of psychological conditions [47,48].

Hypothesis 1 (H1). *Top-down redevelopment may contribute to the improvement of economic conditions and social security, but results in the decline of psychological conditions, living conditions and the natural environment.*

Efficiency refers to the best land units to target in accordance with an exogenous objective function and exogenous constraints on natural endowments or institutional operations [49]. This paper stressed the meaning of resources allocation, demand matching and economic efficiency. With regard to bottom-up self-organized mode, many studies support that this mode makes the greatest progress in efficiency [32,33]. For instance, the allocation of land resources can effectively integrate the needs of stakeholders to achieve more efficiency with strong participation of villagers in the redevelopment plan [37]. In the bottom-up, self-organized mode focusing on the efficiency, local villagers can better adapt or even react to redevelopment with strong participation [50]. This mode can cause residents to be more self-reliant, thus adapting more easily to the circumstances. Moreover, studies have shown that participation from residents helps to make settlements more sustainable and resilient [47,51]. Therefore, there are the additional positive psychological welfare effects of having more trust and a sense of belonging in this mode. In the bottom-up redevelopment mode, public participation in scheme design and compensation packages through one-to-one negotiation both contribute to better living conditions and environmental welfare [52,53]. Although redevelopment has been strongly self-organized, the comprehensive objectives of social and economic restructuring have not been achieved as with the top-down mode, without special measures being taken. For instance, changes in livelihood dependence may lead to decline in economic conditions in this mode without government intervention, such as by offering job positions, or employment training [54].

Hypothesis 2 (H2). *Bottom-up redevelopment may have positive effects on psychological conditions, living conditions and the natural environment but negative effects on economic conditions and social security.*

3.2. Other Control Factors which Affect Welfare Change of Resettled Households in the Redevelopment

In terms of individual-level characteristics, household welfare is related to the household characteristics as well as the characteristics of household head. As the decision-makers regarding various choices, a household head occupies an important position in the household. Characteristics of household heads such as age, education, employment, might affect the household welfare [55]. Many studies have shown that residents with higher education, Party member status and those working in enterprises and institutions are more likely to have better welfare [56,57]. A discrepancy exists in the abilities of household heads with different jobs, education levels, and Party member statuses to obtain household welfare. With regard to the household characteristics, economic welfare of resettled households varies with their household sizes due to the allocation rules of share dividends and other incomes. Household's housing area not only represents their level of wealth accumulation, but is also a symbol of social status in China, which in turn is closely related to welfare. Monetary compensation is included in these two projects, reflecting choice preferences of residents between housing and cash instead of discrepancy of redevelopment policies. The amount and use of monetary compensation may have impacts on residents' welfare [46]. In addition, years since completion of redevelopment has an effect on welfare, due to differences in the completion progress of infrastructure and residents' psychological adaptation at different stages of the redevelopment.

With regard to macro-level characteristics, welfare of the villagers is likely to vary with factors like geographic location [58] and resource endowment at the village-level [59] and political environment at the district-level [60]. For instance, geographic location greatly influenced housing value and commuting convenience of villagers, which are important components of welfare. Residents of the villages closer to the city center may share more housing value-added dividends in the redevelopment [23,24]. It is easier to develop economically for those villages with better endowment of land resources [59]. Political environment is a critical factor to be considered in solving environmental problems, enhancing management and delivering public services in urban village redevelopment [61]. Various redevelopment policies typically emerge within political environments in different administrative districts. Therefore, macro-level characteristics are considered as an influence on multidimensional welfare.

3.3. Relation between Different Redevelopment Modes and Satisfaction with Urban Village Redevelopment

The large-scale urban village redevelopment in China has had profound impacts on the livelihood and welfare of resettled households, which also affected the residents' satisfaction and the stability of society [62]. Satisfaction with urban village redevelopment is based on the subjective feelings of the fairness process and evaluations on redevelopment results of resettled households, of which, the latter is completely independent of residents' satisfaction in general [48]. The evaluation standard is ultimately attributed to their perception of the implementation performance of the specific urban village redevelopment.

On the one hand, satisfaction with redevelopment is directly influenced by the residents' compensation negotiation and participation in urban village redevelopment process [40]. In general, the same residents have distinct satisfaction levels with different urban village redevelopment modes [63]. The greater the public participation, the more the public satisfaction. Resettled households have been given the opportunity to make decisions and express their interests in the bottom-up redevelopment mode. Thus, sustainability of redevelopment is achieved in this mode [52], and a relatively satisfactory agreement will be reached with shorter negotiation times in this mode [3].

On the other hand, there is reference-dependency in the perception evaluation on the redevelopment results, meaning residents could choose different things as references for comparison [64]. In this situation, residents always consider their welfare level (before redevelopment) as a reference

and evaluate the policy's implementation performance by comparing welfare change [65]. Empirical studies indicate that the impacts of urban renewal on residents can be reflected in the satisfaction of residents with urban renewal, such as with housing conditions and neighborhood environment (neighborhood relations, greening level, community infrastructure, surrounding infrastructure, etc.) [66,67] and household socioeconomic status (psychological condition, economic condition, social security, etc.) [65,68,69]. According to the above analysis on the difference in welfare change between top-down and bottom-up redevelopment, improvements in welfare levels in different dimensions may contribute to higher satisfaction with urban village redevelopment. Therefore, different modes indirectly affect the satisfaction with urban village redevelopment through the change of household welfare, which is the mediating effect. The mediating effect refers to the phenomenon wherein the independent variable can not only directly affect the dependent variable, but also affects the dependent variable through a mediating variable [70].

H3: Bottom-up urban village redevelopment mode can lead to higher comprehensive satisfaction with urban village redevelopment both directly, through strong public participation, and indirectly, through improvements in welfare.

4. Study Area, Data and Methodology

4.1. Introduction of Urban Village Redevelopment in Wuhan

Wuhan, the largest metropolitan area in Central China, is the capital city of the Hubei Province. Overall, Wuhan is a typical city with certain achievements in the urban village redevelopment, regardless of the time, scale, or mode of redevelopment. In 2003, it had been ranked first in terms of the number and scale of urban villages with 162 urban villages in official data. In 2004, urban village redevelopment projects had been initiated after the government issued the document "*Opinions of the Wuhan Municipal People's Government on Actively Promoting the Comprehensive Reconstruction of Urban Villages*". By the end of 2013, the redevelopment of 83 urban villages, with a total demolished housing area of 40.3 km² and 90,000 displaced households, had been completed.

Unlike only the government-led model in Beijing or only the market-oriented model in Shenzhen, the redevelopment of urban villages in Wuhan adopts both the top-down government-led mode and bottom-up self-organized mode [3,23,32,45].

One mode is a top-down mode and mainly based on collective land expropriation by the government. This redevelopment is carried out in various forms, such as property exchange, reforms of collective economic organizations (villagers become shareholders), change of household registrations (rural household to urban household) and the handling of social security. The livelihoods and welfare of resettled households are not ignored in the process of housing reconstruction. The top-down redevelopment mode of urban villages in Wuhan provided a typical experience for the rest of the country [45].

The other mode is autonomous redevelopment. This bottom-up mode of village redevelopment project is put forward through direct coordination and negotiation between land users and the villagers. For example, urban villages around universities have been completely transformed by local and market forces, such as villagers and universities. The transformation scheme is jointly negotiated by residents and approved by government departments [46].

4.2. Data Source

We conducted a questionnaire-based survey pertaining to resettled residents. It is important to note that, ideally, we would have elected a number of villages by each development mode to control for macro-level effects. However, in Wuhan there is no sufficient sample of urban villages redeveloped in completion due to the complexity of the redevelopment process. To control for macro-level effects, our research design approach is to select two urban village projects that represent each of these two redevelopment modes in Wuhan, viz. Guanggu Youth Town Community (GYTC) and Xiyuan

Community (XC) (Figure 2), and that are quite similar in geographic location, resource endowment at the village-level, and political environment at the district-level. Firstly, both projects are located in the same administrative district and involve large numbers of residents. Second, they are two of the earliest urban village redevelopment projects to have been completed within the Third Ring Road. Third, these two communities are spatially proximate and are rebuilt at the original location. The influence of the macro-level characteristics is not eliminated in other cases rebuilt off-site.

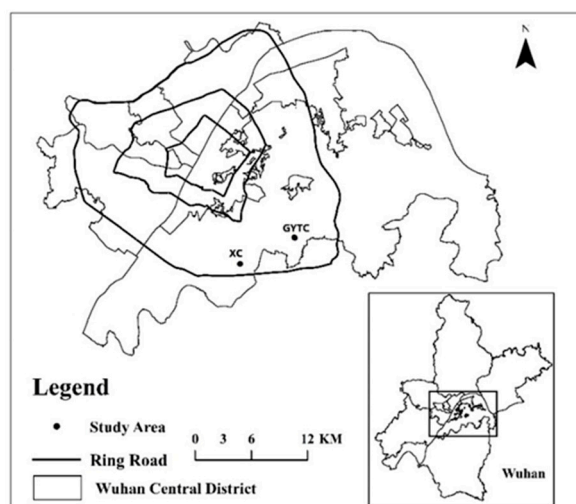


Figure 2. Location of the study area (Note: the two survey sites of our study are marked as Xiyuan Community (XC), Guanggu Youth Town Community (GYTC), respectively, by the author).

More specifically, the GYTC redevelopment project is a traditional top-down mode. Whether and how to implement the redevelopment is completely led and decided by the government in this mode. According to the regulations regarding house demolitions and compensation for collective land in Wuhan, the property exchange area of each household cannot be more than 300 m². Any surplus area can qualify for monetary compensation based on the set construction cost of 600 CNY/m². More importantly, there is only weak public participation in the top-down mode. Some villagers are not satisfied with compensation offered by the government, but they cannot participate in the decision-making process, due to the mandatory nature of the project, to some extent.

The XC redevelopment project lies on the campus of Huazhong Agricultural University. In the 1950s, Huazhong Agricultural University moved to Shizishan Street, Hongshan District, which covers six natural villages. These villages have become experimental farms, with state-owned property rights based on the needs of teaching and research in this university. Villagers take advantage of the location to run some low-cost businesses, such as internet bars and restaurants. Furthermore, some scattered buildings have been built at will and without planning, in an effort to get more benefits. After a feasibility study was approved by the Ministry of Education, and land planning permission was issued by the Wuhan Natural Resources and Planning Bureau, the university started the redevelopment of these villages. Considering the resistance of the local villagers to redevelopment, the bottom-up mode of university participation and villager autonomy was adopted to weaken the conflict between government and villagers. Stakeholders can participate in the redevelopment process, thus increasing the villagers' incentive to participate in the improvement of their own living environment.

We then adopted a two-stage sampling method. First, we chose the two representative cases of each development type of XC and GYTC in Wuhan, controlling for the macro level influences. Then, we selected respondents who resettled in these two redeveloped communities. The survey was given by well-trained members of the research team. When completing the questionnaire, interviewers explained the options to make sure that the respondents could understand and respond accurately. The survey was conducted from November of 2016, to January of 2017. The research time ranged from 8 a.m. to 8 p.m. for an entire week to obtain information about people with varying work schedules.

Most residents refused the interview over certain sensitive and private questionnaire content on their doorstep. Therefore, respondents were interviewed in person and at random, at the community public space, using standardized questionnaires, each for 40 to 60 min. Random means that we chose the last one out of every five people we meet in the doorway, main roads, etc. Only those who were familiar with the various details of local redevelopment or had a strong voice in their decision-making process of redevelopment were eligible to be our respondents.

We randomly chose approximately 10% of the total resettled households in these communities. The GYTC was developed on a larger scale and has a larger number of the resettled households, which results in the different sample size between these two cases. Ultimately, 327 resettled households were randomly interviewed, including 126 households in XC and 201 in GYTC. Certain prolonged interviews were interrupted for various reasons, so in the end, 296 questionnaires were completed, for a response rate of 90.52%, once invalid questionnaires were removed.

The survey questionnaire includes three sections. First, we collected the social and economic characteristics, including gender, age, education, occupation, income, housing conditions, etc. Information about the individual's welfare was collected in the second part, including questions regarding the natural environment, psychological conditions and social security. The last portion of the survey deals with the respondent's satisfaction, including comprehensive satisfaction with the redevelopment of urban villages and satisfaction with housing, economic conditions, life, family relations, etc. Summary statistics of the interviewed household are shown in Table 1. The "hukou" (household registration) of most villagers were urban hukou before redevelopment, which accounted for 79.05% of the total. Especially noteworthy is that almost all of the respondents had been transferred to urban households before redevelopment in XC. Generally, residents living in the urban villages and rebuilt communities are mainly less educated, older people [23]. Indeed, as a result of this population structure there is a large proportion of older household heads, who may have been middle-aged at the start of redevelopment, due to the long implementation time of the project. As stated above, the survey samples and contents are highly representative and credible, which ensures that our empirical analysis can effectively reflect the welfare of and satisfaction with urban village redevelopment.

Table 1. Survey results in two urban village redevelopment projects.

Variables before Redevelopment		Observation	Percentage (%)	Observation in XC	Observation in GYTC
Education of household head (years)	≤6	105	35.47	31	74
	6–9	76	25.68	29	47
	9–12	82	27.7	35	47
	>12	33	11.15	12	21
Age of household head at the time of survey (years)	30–45	22	7.43	9	13
	45–60	127	42.91	50	77
	>60	147	49.66	48	99
Hukou of household head	Rural	62	20.95	2	60
	Urban	234	79.05	105	129
Communist Party membership of household head	Yes	72	24.32	38	34
	No	224	75.68	69	155
Total household income (10 ⁴ CNY)	0–3	50	16.89	17	33
	3–5	39	13.18	16	23
	5–10	82	27.7	27	55
	10–15	71	23.99	24	47
	>15	54	18.24	23	31

Source: the above data were processed based on 2017 survey data.

4.3. Variables

4.3.1. Welfare Index

As mentioned in the conceptual framework, welfare is being measured in five dimensions and these are the dependent variables in the following ordinary least squares regression model.

The following section presents the detailed indicators and statistics description of different welfare dimensions (Table 2).

Table 2. Description of welfare indicators.

Variables/Mean	Mentioned in Literature	GYTC		XC	
		Before	After	Before	After
a1 Total expenditure level	[19]	3.28	2.87	3.31	2.45
a2 Housing property income (10 ⁴ CNY)	[7]	2.25	4.14	3.69	3.88
a3 Total household income level	[19]	3.11	3.77	3.19	3.73
b1 Housing area (m ²)	[19]	464.39	290.29	200.81	234.57
b2 Housing quality	[19]	3.55	3.18	2.90	3.59
b3 Housing structure	[71]	3.52	2.93	2.66	3.81
b4 Infrastructure	[8]	3.02	3.92	2.79	3.88
b5 Supporting facilities	[67]	3.23	3.94	2.78	3.84
b6 Public security	[8]	3.13	3.35	2.73	3.74
c1 Hygienic conditions	[46]	3.14	3.39	2.83	3.70
c2 Ecological environment	[46]	3.44	3.01	2.93	3.62
c3 Air quality	[42]	3.44	2.76	2.96	3.53
c4 Noise pollution	[42]	3.43	2.74	3.07	3.26
c5 Afforestation degree	[8]	3.42	2.97	2.91	3.68
d1 Trust in others	[51]	3.44	2.84	3.74	3.04
d2 Neighborhood relationships	[51]	3.77	3.40	3.81	3.37
d3 Social identity	[72]	3.09	3.22	3.21	3.38
d4 Sense of community belonging	[73]	2.93	3.09	2.75	3.44
e1 Medical insurance	[8]	0.96	0.94	0.60	0.62
e2 Endowment insurance	[8]	0.96	0.97	0.67	0.68
e3 Employment security	[7]	3.49	3.57	3.70	3.62
e4 Satisfaction of insurance system	[71]	3.47	3.54	3.38	3.48

Note: housing property income and housing area are continuous; medica insurance and endowment insurance are the binary, equal to 1 if resettled households have the insurance and 0 otherwise; the other indicators are discrete, the five options about these indicators in the questionnaire are coded from 1 to 5, according to the positive impact on welfare. Namely, the code “5” denotes the best status or highest level of the five options and the code “1” refers to the worst status or lowest level of the five options. For instance, option A “>CNY 150,000” of the total household income level is replaced with “5”, and “1” represents the option E “CNY 0–30,000”. Detailed options of these discrete indicators are showed in the appendix.

A. Economic conditions: economic conditions are considered to be one of the most important factors of a person’s welfare [74]. Income has an important influence on the process and efficiency of other factors that produce or transform into welfare. Housing property income is the main economic source of the urban villages [23,54]. Furthermore, a shift of lifestyle after redevelopment leads to changes in the consumption structure and level of consumption. Total household income, housing property income, and household expenditure levels were the three key indicators used to gauge economic welfare in urban village redevelopment.

B. Living conditions: living conditions not only relate to the basic function of a house, but also depend on the surrounding facilities and social environment [8]. Better living conditions have brought about higher welfare. In the redevelopment of urban villages, the government increased the investment and provided sufficient infrastructure, such as water and electricity supplies [67]. These all directly affect the living welfare of resettled households. Apart from the renewal of physical forms (such as buildings) and the improvement of infrastructure, redevelopment also directly affects the well-being of residents by providing a sense of security, due to the improvements in public security conditions [75,76]. Therefore, the second-level indicators of living conditions include housing area, housing quality, housing structure, infrastructure, supporting facilities, and public security.

C. Natural environment: urban village redevelopment has an inevitable impact on the natural environment [8]. The original, messy environment of many urban villages has been improved, and domestic sewage and garbage pollution are now treated [54]. Overdevelopment, however, also brings about

air, noise and other types of pollution [42]. Therefore, hygienic conditions, the ecological environment, air quality, noise pollution, and degree of afforestation were included in this regard [74].

D. Psychological conditions: the transformation process of household registration, identity and lifestyle changes that accompany urban village redevelopment probably brought about the deterioration of neighborhood relations and negative psychological problems. Some scholars considered that trust in others and relationships with neighborhoods support the well-being [51]. Strengthening identities, which include the sense of belonging and social identity, can increase welfare on the individual and household level [73,76]. We outlined four major factors in this dimension, including trust, social identity, sense of belonging and neighborhood relationships [25,77].

E. Social security: homesteads and houses have both a property and a security function for urban villagers. In order to protect the rights and interests of urban villagers, the government provides social insurance, job positions, employment training, and collective economic reform [45]. Pension, medical insurance and employment are the main social security policies related to resettled households. Second-level indicators of social security welfare include endowment insurance, medical insurance, employment security and satisfaction with the insurance system.

The welfare of resettled households is assumed as a fuzzy set X . Welfare before and after redevelopment is the subset W of X . Then, the welfare function of the n th household is expressed as: $w(n) = \{x, \mu(x)\}$, where $x \in X$. $\mu(x)$ represents the membership degree of x , $\mu(x) \in (0,1)$. The higher the membership value is, the better the welfare will be. An appropriate membership function is selected according to the different types of variables, including the virtual dichotomy variable, continuous variable, and virtual qualitative variable. More detail can be seen in the reference [78,79]. The welfare weight is calculated by Equation (1), as proposed by Cheli and Lemmi [80]. Also, each dimension of welfare is summarized based on Equation (2), where $\overline{u(x_{ij})}$ represents the mean value of the j th welfare's primary index in the i th welfare subset of the n th household. Then, comprehensive welfare is summarized from each dimension of welfare based on Equation (2).

$$w_{ij} = Ln \left[\frac{1}{u(x_{ij})} \right] \quad (1)$$

$$f(x_i) = \sum_{j=1}^k \overline{u(x_{ij})} \times w_{ij} / \sum_{j=1}^k w_{ij} \quad (2)$$

4.3.2. Control Variables

This study chooses characteristics of household head such as age, education, household, occupation, Party membership, and characteristics of household such as household size, housing class, cash compensation, and years since completion of redevelopment as the control variables, according to the analysis in the conceptual framework (Figure 1). Descriptions of these variables are listed in the Table 3.

Table 3. Description of variables in OLS model and mediating effect model.

Variables	Variable Descriptions	Variable Type	Mean
Welfare change	The degree of welfare gains or losses of resettled households in urban village redevelopment	Continuous variable	0.0123
Satisfaction	Comprehensive satisfaction with urban village redevelopment of resettled households: 1 = very dissatisfied; 2 = dissatisfied; 3 = neutral; 4 = satisfied; 5 = very satisfied	Ordinal variables	2.98
Controlled Variables			
Characteristics of household head			
Age	Age of household head (years)	Continuous variable	62.20
Education	Education of household head (years)	Continuous variable	8.35
Party membership	Party membership of household head: 0 = non-Communist Party member, 1 = Communist Party member	Dummy variable	0.24
Occupation	Occupation of household head: 1 = government and public institution staff; 2 = enterprise staff; 3 = leading cadre of enterprise; 4 = freelance; 5 = service staff; 6 = farmer; 7 = short-term hired; 8 = unemployed; 9 = retiree	Categorical variable	6.18
Hukou	Household registration type of household head, 0 = rural hukou; 1 = urban hukou	Dummy variable	0.79
Characteristics of Household			
Household size	Population of the household before redevelopment (persons)	Continuous variable	4.49
Housing class	Initial housing area holding level: 1 = (0–100 m ²) 2 = (100–200 m ²) ... , 7 = (600 m ² , +)	Ordinal variables	3.70
Cash compensation	Cash compensation of household (10 ⁴ CNY)	Continuous variable	5.59
Years since completion of redevelopment	Years from completion of redevelopment to survey, years = 2017-year of resettlement	Continuous variable	5.91
Kernel variable			
Mode	Redevelopment mode: 0 = top-down mode (GYTC); 1 = bottom-up mode (XC)	Dummy variable	0.36

Source: the above data were processed based on the data of a 2017 survey.

4.4. Methodology

4.4.1. OLS Model

The variables in Table 3 are used to establish a regression model, which is then used to explore the effect of these factors on the residents' welfare change Equation (3). In the regression model, as one of the most important factors, the redevelopment mode reflects a great deal of comparable factors, such as transaction costs, participation, compensation basis, development degree, capital, land ownership, etc. These factors are considered as representing the difference in content of the two redevelopment modes, and should not be ignored.

$$\Delta y_i = c_0 + c_1 mode_i + c_2 X_i + \delta_i \quad (3)$$

where, Δy_i means the welfare change; $mode_i$ is the virtual variable of redevelopment modes, which sets XC as the "1" and GYTC as the "0"; X_i denotes a series of control variables, such as the characteristics of individuals or households (Table 2).

4.4.2. Mediating Effect Model

We assume that redevelopment modes will affect satisfaction with urban village redevelopment through a welfare effect. In other words, different redevelopment modes will affect the satisfaction levels through the mediating effect of welfare change. In this study, the following mediating effect mode was set up to test the assumption:

$$S_i = \alpha_0 + \alpha_1 mode_i + \alpha_2 X_i + \delta_i \quad (4)$$

$$S_i = d_0 + d_1 mode_i + d_2 X_i + b_1 \Delta y_i + \delta_i \quad (5)$$

where, S_i represents the comprehensive satisfaction with urban village redevelopment of the i th resettled households, which is classified into five levels coded from 1 to 5, meaning increasing satisfaction; Δy_i is the mediating variable, and X_i is the same as the above multiple regression model (Table 2). Equation (4) indicates the total effect of different redevelopment modes on satisfaction. Equation (3) shows the effect of different modes on welfare change of mediating variables. In addition, Equation (5) reveals the effect on satisfaction of the different modes after adding the mediating variables. In terms of coefficients, b_1 refers to the direct effect of a mediating variable on satisfaction; $b_1 c_1$, which is derived from a combination of Equations (3) and (5), represents the mediating effect of the bottom-up mode on satisfaction through welfare change.

5. Research Results

5.1. Description Results of Welfare Change in Different Dimensions

Indicators involve the local weight and global weight due to the two-level index. Table 4 lists the local weight and global weight of all indicators. Local weight is derived from judgments with respect to a single criterion that expresses the relative impact of the set of elements on an element in the level. Global weight is derived from multiplication by the weight of the criteria. "Economic conditions" has the largest weight of 0.297 in the first level of welfare. The largest weight, of housing property income to welfare, is consistent with the livelihood characteristics of villagers.

Table 5 lists the welfare changes in different dimensions. Almost all dimensions of welfare before and after the redevelopment in the two communities passed the connotation of the paired t -test. The statistical description of the heterogeneous effects based on the difference-in-difference method passed the top 1% of the significance test. These findings show that there is significant difference in the welfare change of different dimensions in these two different modes.

Table 4. Index and weight of welfare evaluation systems.

First Level of Welfare	Weight	Second Level of Welfare	Local Weight	Global Weight
Economic conditions	0.297	a1 Total expenditure level	0.153	0.046
		a2 Housing property income (CNY)	0.737	0.219
		a3 Total household income level	0.109	0.032
Living conditions	0.278	b1 Housing area (m ²)	0.357	0.099
		b2 Housing quality	0.129	0.036
		b3 Housing structure	0.138	0.039
		b4 Infrastructure	0.119	0.033
		b5 Supporting facilities	0.119	0.033
		b6 Public security	0.138	0.038
Natural environment	0.197	c1 Hygienic conditions	0.190	0.037
		c2 Ecological environment	0.193	0.038
		c3 Air quality	0.207	0.041
		c4 Noise pollution	0.214	0.042
		c5 Afforestation degree	0.195	0.038
Psychological conditions	0.144	d1 Trust in others	0.267	0.039
		d2 Neighborhood relationships	0.199	0.029
		d3 Social identity	0.272	0.039
		d4 Sense of community belonging	0.262	0.038
Social security	0.083	e1 Medical insurance	0.152	0.013
		e2 Endowment insurance	0.120	0.010
		e3 Employment security	0.348	0.029
		e4 Satisfaction of insurance system	0.379	0.032

Source: the above data were processed based on the data of survey of 2017.

Table 5. Welfare differences between two different redevelopment modes, before and after redevelopment.

Welfare	Cases	Before	After	Diff	Change Rate (%)
Economic conditions	GYTC	0.1723	0.1976	0.0253 ***	14.70
	XC	0.1534	0.1355	−0.0179 ***	−11.67
	Diff	−0.0190 **	−0.0622 ***	−0.0432 ***	/
Living conditions	GYTC	0.4831	0.4636	−0.0195*	−4.05
	XC	0.3298	0.5004	0.1706 ***	51.73
	Diff	−0.1533 ***	0.0368 ***	0.1901 ***	/
Natural environment	GYTC	0.5943	0.4906	−0.1037 ***	−17.45
	XC	0.4858	0.6380	0.1522 ***	31.32
	Diff	−0.1085 ***	0.1474 ***	0.2559 ***	/
Psychological conditions	GYTC	0.5813	0.5409	−0.0404 ***	−6.95
	XC	0.5921	0.6082	0.0161	2.73
	Diff	0.0108	0.0673 ***	0.0565 ***	/
Social security	GYTC	0.7124	0.7242	0.0118 *	1.65
	XC	0.6330	0.6385	0.0055	0.87
	Diff	−0.0794 ***	−0.0857 ***	−0.0063 ***	/
Comprehensive welfare	GYTC	0.4459	0.4227	−0.0232 ***	−5.20
	XC	0.3712	0.4462	0.0749 ***	20.20
	Diff	−0.0747 ***	0.0234 ***	0.0981 ***	/

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; same below.

For economic conditions with the largest weight, the change of economic indices after redevelopment in GYTC increased by 14.7%, whereas in XC, the economic welfare of residents decreased by 11.67%. Due to the changes in housing patterns, resettled households in XC had to close down businesses such as small hotels and restaurants to start a new job. Such dramatic transformation in livelihood increased expenses in commuting and property management, which resulted in a corresponding decline in economic conditions. There are two main reasons for the improvement in economic conditions of the residents in GYTC. On the one hand, there are idle houses to rent and an increasing income for residents, due to the improved environment and multiple resettlement

apartments. On the other hand, residents receive a certain degree of share dividends every year as members of the economic joint-stock group. With the sustainable use of industrial land and the improving development of the reformed economy in Guanshan Village, each quinquagenarian holds 100,000 shares and receives a dividend of approximately CNY 5000 each year. Every young adult has 200,000 shares, with an annual dividend of approximately CNY 9000. The dividend has gradually become one of the major sources of income for resettled households. In conclusion, collective economic reform is the main reason for an increase in positive economic benefits being brought about in the top-down and government-led redevelopment mode.

As we know, the demolition of old houses and the construction of new houses in redevelopment probably brings direct changes in living conditions. Residents' living conditions in XC improved significantly, with an increase of 51.73%. In contrast, there has been a slight decrease of 4.5% in GYTC. Most of the houses in XC before redevelopment were old structures, built in the 1980s and 1990s (Figure 3). There are incomplete infrastructures and supporting facilities, due to the previous lack of proper planning. After redevelopment, most residents' housing areas had increased slightly, due to the one-to-one negotiation which operates on the basis of an equal exchange for housing property. The effectiveness of public participation also ensures that housing conditions meet the humanized needs for living, through unified planning. At the same time, infrastructures such as water and electricity supply, and networks have been improved. Supporting facilities, such as parking spaces and fitness centers, have been provided, as well as property centers, supermarkets, and community medical service centers (Figure 3). Therefore, living conditions in XC have been significantly improved, compared to the conditions before redevelopment. Similarly, there has been improvement in infrastructure and supporting facilities in GYTC since redevelopment. Public security has been improved in both communities. However, the housing area of most resettled residents has still decreased dramatically, due to the ceiling set in terms of compensation area. In addition, the government sold a large portion of the land to developers, who engaged in commercial development to obtain land revenue. These developers only left a small portion of land for the construction of resettlement houses, which has caused a high housing density and a high plot ratio, with more than 30 floors in most buildings (Figure 4). In the survey, most respondents in GYTC complained about the unreasonable layout and the poor lighting of apartments. These shortcomings were caused by the lower public participation in redevelopment and land revenue.



Figure 3. XC before and after redevelopment (housing form and various community facilities were implemented with the demand-based bottom-up approach). Note: the pictures were taken by the authors.



Figure 4. GYTC before and after redevelopment (modern housing form and the community facilities were implemented with the top-down approach). Note: the pictures were taken by the authors.

In terms of the natural environment, the change rates of resettled households in XC and GYTC after redevelopment are 31.32% and -17.45% , respectively. The main reason for this significant difference lies in the fact that the bottom-up redevelopment scheme was jointly negotiated by villagers and the university. Not only did villagers pursue a comfortable living environment, but the university also aimed to improve the campus environment, because the promotion of ecological values can be transformed into comprehensive competitiveness for the university. Redevelopment of industrial land and development land in the top-down and government-led mode increased the commercial prosperity and traffic convenience of the community, but also brought some negative effects to the natural environment, such as noise and air pollution.

The psychological welfare of residents in XC improved slightly, whereas that of residents in GYTC was worse than before redevelopment. The changes in psychological indices show that trust in others and neighborhood relationships both declined after the implementation of these two projects. This negative effect was mainly caused by changes in living arrangements and lifestyles. After redevelopment, living in a closed multistory residential building can distort the previously harmonious neighborhood relationship, as well as the mutual trust relationship of resettled households that existed before redevelopment [24]. These relationships need to be rebuilt and adapted to the point where they move from unfamiliarity to familiarity. The sense of community of local villagers in terms of household registration, lifestyle, psychology, etc. increased the social identity of individuals as urban residents in both scenarios. The main factor that contributes to the diversity of psychological conditions between these two modes is the significant difference in the sense of community belonging. This is directly caused by the different degrees of residents' participation in redevelopment. Resettled households in the bottom-up and self-organized mode participated in the entire process of redevelopment and had a stronger sense of self-management and community belonging [51]. However, the original system of rural grass-roots self-government was broken, and the governance and sense of belonging to the new community were not well established in top-down and government-led mode. Redevelopment modes may affect the welfare differences of resettled households through different forms of participation and differences in community governance.

The difference of social security before and after redevelopment passed the significance of the paired *t*-test in the top-down mode. In this mode, the government provided certain job positions, employment training, pension, and medical etc. Changes of social security in top-down mode are slightly better than that in the bottom-up mode. However, resettled households in the top-down before demolition have almost covered the endowment and medical insurance. Therefore, degree of welfare gains in social security in this mode is not high. In the bottom-up mode, a lack of the employment security measures meant that the slight increase in social security did not pass the paired *t*-test.

Changes in the comprehensive welfare after redevelopment also show opposite trends in these two modes. The comprehensive welfare of residents in XC improved significantly after redevelopment, from 0.3712 to 0.4462, representing an increase rate of 20.2%. However, the comprehensive welfare of residents in GYTC slightly declined, from 0.4459 to 0.4227, or a decrease rate of 5.2%.

5.2. Results of OLS Model for Welfare Change

The regression results of the factors that influenced differences in welfare change are shown in Table 6. In terms of the characteristics of the household head, Party membership has a significantly positive impact on living conditions and comprehensive welfare, owing to Party members' strong adaptability and high support for the redevelopment policy. With regard to household characteristics, housing class has a significantly negative impact on welfare, especially living conditions, due to the ceiling set for housing compensation. In addition, household size, age, education, and occupation all have an influence on different dimensions of welfare change to different degrees. Although most residents only choose the property exchange option because of the huge gap between housing value and monetary compensation, some residents still choose to receive a portion of the monetary compensation for housing decoration, investment, etc. The higher the monetary compensation is, the higher the level of living and psychological welfare will be. Therefore, monetary compensation has a positive impact on living conditions, psychological conditions, and comprehensive welfare. Moreover, results show that welfare in living conditions, natural environment and comprehensive welfare haven been gradually increasing over the time. In other words, with the adaptation to their new environment and new identity, the welfare of resettled household will be increased.

Table 6. Results of influence factors of welfare change with OLS model.

Variables	Comprehensive Welfare	Economic Conditions	Living Conditions	Natural Environment	Psychological Conditions	Social Security
Mode	0.430 ***	−0.227 ***	0.337 ***	0.447 ***	0.311 ***	−0.049
Characteristics of Household Head						
Age	0.030	−0.008	−0.045	0.149 **	−0.105	−0.111
Education	0.061	−0.106	0.050	0.130 *	−0.014	−0.076
Party membership	0.119 **	0.017	0.129 ***	0.049	0.103 **	−0.003
Hukou	0.009	0.009	0.023	0.031	−0.076	−0.041
Occupation	0.017	−0.163 **	0.044	0.005	0.162 **	−0.021
Characteristics of Household						
Household size	−0.004	−0.078	0.125 ***	0.019	−0.165 ***	−0.084
Housing class	−0.148 **	0.037	−0.41 ***	0.066	0.000	−0.178 **
Cash compensation	0.113 **	−0.098	0.135 ***	0.019	0.240 ***	0.084
Years since completion of redevelopment	0.226 ***	0.033	0.153 ***	0.226 ***	0.030	0.085
Adjusted R2	0.254	0.053	0.414	0.197	0.094	0.016
Value of F	11.028	2.662	21.863	8.228	4.072	1.476

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; same below.

The influence of Mode on welfare change is consistent with the analysis of the results above. Specifically, the bottom-up and self-organized redevelopment mode has more positive effects on living conditions, natural environment, and psychological conditions but more negative effects on economic conditions and social security, compared to the top-down mode. The overall effect on welfare is positive in this bottom-up mode. More importantly, the difference of redevelopment modes has a more obvious impact on welfare than that of individuals and household characteristics.

5.3. Mediating Effect of Welfare Change on Satisfaction with the Redevelopment

Stakeholders' satisfaction with the redevelopment policy reflects the implementation effect of a public policy, and further affects the future implementation and improvement of that policy. The results of the survey on the comprehensive satisfaction with urban village redevelopment showed that the

average satisfaction in XC and GYTC are 3.26 and 2.83, respectively. Satisfaction with the redevelopment of XC is significantly higher than that of GYTC. In order to increase the stability of the difference in satisfaction between the two modes, an independent *t*-test for satisfaction was conducted, and this passed the significance test of the top 1% level with a *t*-value of 4.288. Residents have played a valuable role in the determination and implementation plans of bottom-up redevelopment. As such, residents have been frequently organized to negotiate compensation plans for redevelopment, so as to achieve a win-win situation in multiple aspects. As a result, there is a higher satisfaction with the redevelopment in XC. However, the top-down redevelopment directly follows the compensation scheme and procedure formulated by the government, which seldomly accepts suggestions from the public in GYTC. The housing property values of most residents who had a high level of original housing area were severely diminished, due to the ceiling placed on housing compensation. Therefore, this policy for this top-down mode received the lower satisfaction rate.

The Sobel model is used to test the mediating effect of welfare changes in this study. With the control of other independent variables, the mediating variable passed the significance test. Table 7 lists the results related to the impact of redevelopment modes on welfare change, and the impact of welfare change on residents' satisfaction with urban village redevelopment. Both passed the significance test of the top 1% level. Compared with the traditional top-down mode, the bottom-up mode has a more positive role in increasing welfare; then, the increase in welfare improves the level of satisfaction. In other words, redevelopment in the bottom-up mode enhances the residents' satisfaction through the improvement of welfare for villagers. The results of the mediating effect of welfare in different dimensions confirm that a bottom-up redevelopment obtains higher satisfaction, mainly through the improvement of the living welfare and psychological welfare of resettled residents.

Table 7. Results of mediating effect on satisfaction with urban village redevelopment.

Variable	<i>c1</i>	<i>b1</i>	<i>b1c1</i>	Sobel Test (Z/P)	Proportion of Mediating Effect
Comprehensive welfare	0.0932 ***	2.5572 ***	0.2544 *	3.845/0.0001	48.37%
Living conditions	0.1185 ***	1.8345 ***	0.2754 **	3.725/0.0002	44.12%
Psychological conditions	0.1223 ***	1.7987 ***	0.2728 **	3.554/0.0004	44.64%

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; same below.

6. Discussion and Conclusions

6.1. Discussion

Sustainability does make a positive difference on urban redevelopment projects, even if it is not always the intended one [21]. The flexibility of “sustainability” made it possible for stakeholders to support the policy that fits best with their own interests. This paper contributes an understanding of the different sustainable goals of the stronger stakeholders in the top-down and bottom-up redevelopment mode. The sustainability of top-down urban redevelopment mode is embodied in two aspects that emphasize equity: on one hand, share dividends and social security help protect the basic lives of vulnerable residents in urban villages. On the other hand, the compensation baseline plays a role in reducing inequality. Urban villagers who hold more housing property are prone to gain more value-added income without labor or investment, according to the equal compensation. Setting a compensation baseline can weaken the top-level advantages of these people and narrow the wealth gap with others to achieve equality [46]. In the bottom-up model, residents can participate in dialogue with the redevelopment organization, which acts as a basis for achieving sustainable development. The key issue of sustainable urban renewal programs is how to effectively communicate between different stakeholders.

The research examines the multidimensional effects of urban village redevelopment based on questionnaire surveys of resettled households, and it attempts to explain the heterogeneous effects and contribution to sustainable development by the different understandings with the top-down and

bottom-up modes. This work will fill the gap in literature regarding test the indirect effects of different modes on the satisfaction with urban village redevelopment as a result of welfare change.

We discuss and suggest how the analysis encourages more diverse programs through the comparison of the two case studies and future policy interventions. There are separate pros and cons in each of the two redevelopment modes. The objective, therefore, is not to abandon top-down or bottom-up approaches, but to adopt a mixed approach, one which combines the advantages of these two modes, to balance fairness and efficiency [13,22,81]. We recommend that in the middle-out redevelopment, measures to promote livelihood sustainability and social security, such as employment training and sustainable dividends of land, should be included. Meanwhile, equity should be adjusted through a progressive property tax based on the equal compensation method in this mode. This way, the range of dividends can be reasonably shared by relocated residents who have been affected by urban construction, and the captured value can be given due attention. Furthermore, the government should strengthen public participation and psychological guidance, so that urban villagers can participate, adapt and integrate into the identity and life of urban residents.

Urban renewal has been implemented for a long time in Western countries going through different phases of urbanization [1]. It has been proved that a policy that aims at coordinating state resources with market forces and public participation in these Western countries performs better [12,13,34,51]. China also undergoes the various forms of urban redevelopment in the unique context of land institutions, government branches, and the current urbanization stage. This paper points out that a middle-out approach should be adopted to multidimensional welfare gains in China. Commonly, other developing countries will experience similar phases of urbanization and urban redevelopment. Therefore, these conclusions and suggestions of this paper will be a reference for urban and rural renewal in the rest of China as well as other developing countries.

6.2. Conclusions

Rather than adopting the methodology of previous studies to evaluate the sustainability of urban village redevelopment policies based on the balance of different stakeholders, this paper establishes a welfare index to test whether the multi-dimensional welfare changes of resettled household have reached the three goals of sustainable development: economic sustainability, social sustainability and environmental sustainability. Our results reveal the heterogeneous impacts of different urban village redevelopment modes on the sustainability of household welfare, which need to develop a middle-out approach to sustainable urban redevelopment with fairness and efficiency in mind.

The results show that top-down and bottom-up approaches both fail to achieve the triple bottom line of sustainable development to resettled household in urban renewal projects. The bottom-up redevelopment does not improve the economic condition and social security, but this mode does have significant positive effects on living welfare, natural environment, and psychological conditions. As such, this mode of redevelopment ultimately results in higher comprehensive welfare and satisfaction with redevelopment. Conversely, low public participation, land revenue, and the ceiling set with regard to compensation area in the top-down mode ultimately caused a decline of living welfare, natural environment, and psychological conditions, leading to a negative effect on comprehensive welfare and a lower satisfaction with redevelopment.

Policy differences between redevelopment modes has more obvious impact on welfare than that of individual characteristics. Therefore, there are theoretical and practical contributions to sustainable urban regeneration that arise from comparing the welfare difference and exploring its causes in top-down and bottom-up redevelopment modes in terms of policy improvement. Furthermore, the increase in resettled household welfare level in different dimensions reflects the sustainable impacts of the urban village redevelopment, and the contributions to increase comprehensive satisfaction within urban village redevelopment and promote social stability.

6.3. Limitations

There are certain limitations which can be improved in several ways in the future.

Firstly, we have made some efforts to adopt a more reasonable survey approach to achieve a more representative sample due to the sensitive and private questionnaire content. However, there are certain problems with regard to homogeneity and representativeness of respondents. We will try to contact community managers to obtain more information, then choose more representative samples to control deviations in future.

Secondly, we have to admit that surveying only two sites imposes a certain limit to the universality of our research. In addition, small sample size and the differences in size between the two sites in this research are also acknowledged. Therefore, more cases with different villages in Wuhan, or even other cities, should be considered to extend our research when enough urban village reconstruction projects are completed in the future. We will ideally elect a number of villages by development mode and choose the same number of respondents in each village.

Thirdly, welfare changes of resettled household are mainly influenced by urban village redevelopment, and the comparison of the two modes eliminates the influence of time to a certain extent. However, there is no comparison between the groups whose housing have not been demolished, and it is difficult to rigorously prove that the changes in welfare are completely caused by urban village redevelopment. Thus, adding a control group who have not been demolished will make the results more credible in future study.

Finally, this study focused on the difference in the decision-making direction of top-down and bottom-up redevelopment. However, different decision-making redevelopment mode may be intertwined with various funding sources [38]. Therefore, we should pay more attention to the differences in the same decision-making redevelopment mode and their implementation effects in the future. For instance, we may examine whether there are differences in the welfare effect on resettled household of bottom-up modes with developer funding and bottom-up modes with villager funding.

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