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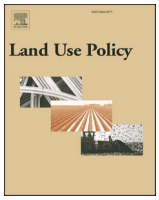

Multi-level social capital effects on residents: Residents' cooperative behavior in neighborhood renewal in China

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ABSTRACT

China has recently shown great enthusiasm for developing neighborhood renewal, and good cooperation within resident groups is the key to successful implementation. Residents' cooperative behavior is easily influenced by social relationships among residents, which are referred to as resident-level social capital. Further, resident-level social capital is influenced by the neighborhood effects, known as neighborhood-level social capital. However, few studies examined the impact of social capital on residents' behavior from the perspective of both resident-level and neighborhood-level. This paper aims to examine the multilevel social capital that influence residents' cooperative behavior in China. Using social capital theory and the theory of planned behavior, this study collects questionnaire survey data from 1039 residents in 98 neighborhood renewal projects in China. The results from multilevel structural equation modeling suggest that residents' social capital can directly influence residents' cooperative behavioral intention. The variability of neighborhood-level social capital and the impact of multi-dimensional social capital were examined. The findings of this study have strengthened the explanatory power of the theory of planned behavior and expanded the application scope of social capital theory. The results provide a more cultural and historical perspective, that is, resident relationships, for promoting cooperation among residents in neighborhood renewal.

1. Introduction

Neighborhood renewal is one of the most common urban sustainable development strategies and has been adopted in numerous cities worldwide. In Northern Ireland, a strategic plan called "People and Place" has been implemented in 36 deprived areas, with neighborhood renewal at the heart of this strategy (People and Place Review, 2022). In Russia, Moscow's mayor announced a neighborhood renewal plan involving the renewal of the so-called Khrushchev apartment buildings (Mikhaylyuk, 2017). Similarly, in China, neighborhood renewal is in full swing. The Chinese State Council proposed that neighborhood renewal should target neighborhoods built early in a city's development (normally earlier than the year 2000). In China, neighborhood renewal mainly aims to maintain and replace old equipment in the neighborhood, optimize the organization and management structure of the neighborhood, and improve the quality of the public environment (Chinese State Council, 2020). According to an analysis of data from official Chinese institutions, approximately 170,000 old neighborhoods require renewal in China. As in many developing countries, stock renewal with neighborhood renewal as the core is the main theme of China's urban development strategy (Fu et al., 2024; Shen et al., 2021a).

In China, cooperative behavior among residents is of utmost importance during the process of neighborhood renewal. This is largely due to various city policies that require a certain proportion of residents to agree and perform cooperative behavior before renewal projects can be implemented (Regulations for the Installation of Additional Lifts in Existing Residential Buildings in Shantou, 2014; Regulations for the Installation of Additional Lifts in Existing Residential Buildings in Guangzhou, 2016). The degree of cooperation among residents thus becomes a prerequisite for renewal projects. Moreover, renewal projects have a significant impact on the social relationships between residents (H. W. Zheng et al., 2014). Conflicts arising from cooperative and

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uncooperative behavior among residents during the renewal process may also have impact on neighborhood relationships post-project completion (Huang, Liu, Li, Liu, et al., 2023; Huang, Liu, Li, Shrestha, et al., 2023; Huang, Xie, et al., 2023). Therefore, it is imperative to pay close attention to residents' cooperative behavior in neighborhood renewal projects.

Cooperative behavior among residents is easily influenced by their social relationships. Residents are not professional project managers and lack professional knowledge about renewal projects. Therefore, when making decisions during the renewal process, residents are more susceptible to the influence of those around them (B. Liu et al., 2019). In other words, residents' social relationships may affect their behavior (resident-level) (T. Du et al., 2020). Furthermore, it is a common phenomenon that the same neighborhood renewal policies may lead to different renewal outcomes in different neighborhoods. This is because different neighborhoods have different social network structures (Ha, 2010). In China, most neighborhoods are gated communities, which makes the social network structure of residents relatively independent within the neighborhoods. Combined with the role of residents' relationships on their behavior as described earlier, this may be a possible explanation for why different neighborhoods have different renewal outcomes under the same policy (neighborhood-level). In other words, the influence of social relationships among residents on cooperative behavior manifests at both the resident and neighborhood levels.

Analyzing the impact of resident and neighborhood level social factors on resident cooperative behavior requires consideration of two aspects. The first aspect is how to measure social relationships. As mentioned earlier, resident cooperation behavior may be influenced by resident-level social factors as well as neighborhood-level social factors. Therefore, a theoretical framework that can analyze multi-level social relationships is needed. This study will introduce social capital theory, which views social relationships as resources embedded in social relationships that are frequently used to study multi-dimensional and multi-level social relationships (Castiglione et al., 2008; Meng et al., 2018; T. Du et al., 2020; López-Contreras et al., 2021). Thus, this study will categorize resident social relationships into resident-level social capital and neighborhood-level social capital. The second aspect is how to examine the influence of social relationships on behavior. As mentioned earlier, social relationships may affect resident behavior, but internal psychological factors of residents, such as attitudes, and perceived ability, may also affect their behavior. Therefore, when analyzing residents' cooperative behavior, it is necessary to distinguish whether the behavior is influenced by other neighbors or is driven by their own internal interests. To clarify the factors that influence resident behavior, this study draws on previous research on cooperative behavior and distinguishes the factors that influence resident cooperation behavior as internal and external factors (S. Zhang et al., 2018). Internal factors refer to residents' psychological factors toward cooperative behavior. External factors describe the social factors that may influence residents' cooperative behavior, which includes resident-level social capital and neighborhood-level social capital (Takagi and Shimada, 2019). While social capital can effectively examine external factors, i.e., residents' social relationships, it is difficult to explore residents' internal factors. Therefore, based on previous research on residents' behavior, this study adopts the theory of planned behavior (TPB) as the theoretical foundation for investigating internal factors (Lili et al., 2021; Nunkoo and Ramkissoon, 2010). The selection of the theory of planned behavior for this study is rooted in its emphasis on the impact of social factors on individual behavior (Ajzen, 2002). According to this theory, an individual's attitude, subjective norm, and perceived behavior control play crucial roles in shaping their behavioral intentions and actions (Ajzen, 2011). In simpler terms, TPB not only delves into internal elements like attitude and perceived behavior control but also takes into account external factors such as the subjective norm of residents (Huang, Liu, Li, Shrestha, et al., 2023). In the context of this theoretical framework, the relationship between residents' social capital and cooperative behavior is developed, analyzed, and explained.

In conclusion, this study aims to comprehensively explore the dynamics of residents' cooperative behavior within the context of neighborhood renewal, focusing on the dual perspectives of resident-level and neighborhood-level social relationships. Drawing upon social capital theory and the theory of planned behavior, this study seeks to elucidate the intricate mechanisms through which social relationships influence cooperative behaviors among residents involved in or impacted by neighborhood renewal projects in China. Specifically, two questions were addressed:

1) Do residents' social relationships affect their cooperative behavior, and in what ways do they influence such behavior?

2) How variations in social factors among different neighborhoods have varying impacts on residents' cooperative behavior?

The primary purpose of this study is to examine the influence of both resident-level and neighborhood-level social capital on cooperative behavior within the context of Chinese neighborhood renewal projects. Specifically, this study aims to integrate social capital theory with the theory of planned behavior (TPB) to create a more comprehensive framework for understanding how social capital at multiple levels shapes residents' cooperative actions. By doing so, this study seeks to expand the theoretical understanding of individual behavior, particularly in culturally specific settings, and to fill a gap in the existing literature, which has often focused on either individual-level or neighborhood-level factors in isolation. Furthermore, this study advances current knowledge by exploring how multidimensional aspects of social capital contribute to cooperative behavior, thereby enhancing the explanatory power of TPB when accounting for social influences. Additionally, by emphasizing the nested structure of social relationships and the contextual influences inherent in Chinese neighborhood renewal projects, this research provides a culturally and historically informed perspective on resident interactions. The insights gained from this study are intended to inform more effective community development strategies, particularly in the context of neighborhood renewal efforts in China.

The remaining sections of this study are structured as follows. The next section presents a literature review and lists the study's hypotheses. In Section 3, data collection and analysis results and the research method are detailed. Section 4 analyzes the research results, followed by a discussion of the results in Section 5. The final section concludes this study.

2. Literature review and hypothesis development

2.1. The internal and external factors of residents' cooperative behavior in neighborhood renewal

The concept of neighborhood renewal cannot be sorted out without defining the concept of urban renewal. There are various meanings of urban renewal in previous studies, including Urban renewal (focusing on improvement and reconstruction of poor residential areas under the consideration of historical and cultural background) (H. W. Zheng et al., 2014; G. Liu et al., 2020), Urban regeneration (focusing on solving the problems of poor urban areas in terms of physical, social and environmental aspects) (Fu et al., 2023; Liu et al., 2021; Shen et al., 2021a), Urban redevelopment (focusing on redevelopment of land with relevant functions being improved) (Fainstein and Fainstein, 2012), and Urban rehabilitation (focusing on restoring buildings to a good operating condition) (H. W. Zheng et al., 2014). On this basis, this study uses "renewal" because only Urban renewal emphasizes the quality improvement of residential areas (González-Pampillón et al., 2020; Borough Council, 2023). In this study, neighborhood renewal refers to various types of renewal of buildings, environments, social relations, and governance systems in older neighborhoods (Zhao et al., 2021).

Cooperative behavior refers to behavior that promotes shared project goals among all parties (S. Zhang et al., 2018). Nevertheless, the

definition of cooperative behaviors among residents in the context of neighborhood renewal remains ambiguous. Jia et al. (2021) have previously delineated cooperative behaviors exhibited by residents during housing energy transition, encompassing the extent of acceptance towards renewal proposals, the degree of collaboration in construction processes, and the post-renewal building maintenance convenience. This research posits that the definition of cooperative behaviors among Chinese residents in neighborhood renewal necessitates grounding in the policy context of China. Several cities in China have enacted corresponding regulatory measures, mandating a requisite proportion of resident agreement as a foundational precondition for the execution of renewal projects. However, unilaterally categorizing the behavior of consenting to proposed renewal program as indicative of cooperative resident behavior may erroneously encompass residents who maintain steadfast attitudes towards their own perspectives. Illustratively, within the context of elevator installation, certain high-rise residents may disregard the interests and appeals of their counterparts on lower floors, forgo collaborative negotiation to amend renewal plans, and steadfastly endorse their initial proposals. Although such residents may accord their approval to the renewal plan, their behaviors do not necessarily denote cooperative behaviors. Consequently, this study posits that cooperative resident behaviors in the context of neighborhood renewal can be defined as behaviors undertaken by residents throughout the course of the renewal project. These behaviors are predicated upon factors such as social communication, individual interest compromise, contributions to the neighborhood, and a sense of community belonging. Their cooperative behavior encompasses negotiations on public affairs germane to the renewal project, acceptance of the proposed renewal plan, and collaboration in construction processes.

Previous research on cooperative behavior can be classified into two categories: internal and external factors (S. Zhang et al., 2018). With regard to external factors, previous research has mainly focused on the effect of social interaction and environmental attitudes on behavior (Boone et al., 2010; Xu et al., 2015; Kaiser et al., 2021). These studies proposed that mechanisms such as reciprocity, reputation, and punishment may influence the evolution of cooperation (Fowler and Christakis, 2010). However, it is important to note that previous research on cooperative behavior has primarily focused on subjects from organizational contexts in firms or recruited volunteers for experiments (Montalvo Corral, 2003; Fowler and Christakis, 2010; Dodoiu, 2015). These social relationships in research have been either work-related or formed on an ad hoc basis. Additionally, the studied individuals often have a clear understanding of the goals they aim to achieve through cooperation. In other words, previous research on cooperative behavior has tended to exhibit characteristics such as: external factors originating from formal organizational relationship, clear internal factors, and a simple association between external and internal factors. However, the cooperative behavior of residents is quite different (Jia et al., 2021; X. Wang et al., 2022). Firstly, resident relationships precede renewal projects and are often in the form of informal organizational relationships (Huang, Liu, Li, Liu, et al., 2023). This means that their external factors stem from long-term informal organizations. Secondly, residents often lack professional knowledge regarding construction projects like renewal projects and are therefore more easily influenced by the opinions of those around them. This also results in complex relationships between internal and external factors in resident cooperative behaviors (Ruffle and Sosis, 2006; Hauge et al., 2013). Therefore, relying solely on social capital theory is insufficient for studying residents' cooperative behavior. It is also necessary to have a theory that can be used to study individual cooperative behavior of residents on one hand, and on the other hand, can be integrated with social capital theory to explore the complex relationship between internal and external factors of residents. In previous research, the TPB, which has been widely used in analyzing individual behavior, has been applied to discuss the generation of cooperative behavior (Montalvo Corral, 2003; Dodoiu, 2015). The reason for combining the Theory of Planned Behavior (TPB) with social capital theory in this study lies in the fact that TPB, in addition to focusing on internal attributes (attitudes, perceived behavioral control), also considers external attributes of individuals (subjective norms). This provides a basis for the integration of social capital theory with TPB. Furthermore, subjective norms can be used to measure the connection between internal and external factors influencing residents' cooperative behavior. However, previous research in the field of neighborhood renewal has lacked attempts to integrate these theories. Therefore, the theoretical frameworks previously used to study cooperative behavior may not be applicable to the cooperative behavior of residents in neighborhood renewal projects. A suitable, comprehensive theoretical framework is urgently needed to analyze the internal and external factors of resident cooperative behavior. Given this background, a conceptual framework consisting of internal and external factors is necessary to analyze residents' cooperative behavior in neighborhood renewal. However, complex the internal and external factors may be for residents, based on previous research, this study can at least propose a first hypothesis:

H1a. . Internal factors have a positive influence on residents' cooperative behavior.

H1b. . External factors have a positive influence on residents' cooperative behavior.

In the following sections, this study will explore the composition of internal and external factors for residents by reviewing past research findings.

In consideration of internal factors, given the wide usage of the Theory of Planned Behavior (TPB) in previous research to investigate cooperative behavior (Holmes et al., 2012; Shukri et al., 2016) and residents' behavior (Nunkoo and Ramkissoon, 2010; Lili et al., 2021), this study will employ TPB to analyze the internal factors that influence residents' cooperative behavior (Ajzen, 1985, 2002, 2011; Davis et al., 2015). Drawing upon prior research that categorizes and defines TPB factors in studies related to urban renewal and neighborhood renewal, this study will classify internal factors into the following three categories (Y. Zhang et al., 2021; Gu et al., 2022; X. Wang et al., 2022):

Attitude (ATT) refers to a negative or positive opinion of a given object or behavior;

Subjective norms (SBNs) are the social pressures that people perceive that may influence their behavior;

Perceived behavioral control (PBC) can be defined as the difficulty with which a person performs a particular behavior.

In consideration of external factors, social capital theory is applied. Since Hanifan introduced the concept of social capital in 1916, studies have defined social capital from multiple perspectives, such as a structural perspective (Hanifan, 1916; Renzaho et al., 2012; Damyanovic and Reinwald, 2014), a functional perspective (Putnam, 2015; K. Li et al., 2022), and a resource input perspective (Rupasingha et al., 2006; Lukasiewicz et al., 2019). Consistent with previous research framework, this study posits that social capital should be initially categorized as individual and collective (Castiglione et al., 2008). Moreover, different levels of social capital should be defined distinctively, leading to the distinction between individual (resident-level) and collective (neighborhood-level) external factors that influence residents' behavior. For resident-level social capital, consistent with Zhai et al. (2013), this paper defines resident-level social capital as a form of human relationships or *guanxi* that can contribute to realizing self-interest. For neighborhood-level social capital, consistent with Brunie (2009), this paper defines neighborhood-level as the neighborhood social resources that can foster residents' collaboration.

In this study, the composition of social capital at both the resident and neighborhood levels should be based on existing theories and the Chinese context. Social capital theory typically categorizes individual-level social capital into bonding (social relationship within homogeneous group), bridging (social relationship between heterogeneous

group), and linking social capital (social relationship between different power level) (Guo et al., 2018; Anuradha et al., 2021). In the context of neighborhood renewal, it is relatively easy to understand the concepts of bonding and bridging social capital at the resident level. This is because renewal projects may cause unequal distribution of benefits among residents, leading to cooperative and non-cooperative behaviors among them. Residents who exhibit similar cooperative or non-cooperative behaviors with regard to the renewal project have bonding social capital, while those with different behaviors have bridging social capital (K. Li et al., 2022). However, in the context of China, the role of linking social capital for residents is different. As Jiang and Wang (2020) pointed out, Chinese residents have been influenced by Confucian culture, which has formed a dependence on and reverence for public authority. This dependence and reverence have attracted a lot of scholars' attention in terms of the conflicts and resolutions between residents and the government (Fayong, 2008). In the renewal project, while the grassroots government in China holds power, conflicts occur within the residents. The government then plays the role of a bystander and mediator. In this context, although the definition of linking social capital for residents has not changed, their roles have changed. This change will have an impact on residents' cooperative behavior, which has not been analyzed or discussed in previous research. Consistent with the conceptions and classifications proposed by Putnam (2015), and Szreter et al. (2004), the resident-level social capital of residents in neighborhood renewal can be divided as follows:

Bonding social capital (BOSC): The relationship within a group of residents who share the same interests regarding neighborhood renewal.

Bridging social capital (BRSC): The interconnection within the different groups of residents with different interests toward neighborhood renewal.

Linking social capital (LISC): Vertical social connections crossing both formal and systematic power structures, such as the relationship between residents and grassroots government.

Unlike resident-level social capital, neighborhood-level social capital in Chinese neighborhoods has unique attributes. Firstly, due to the market-oriented reform and the decline of socialist Danwei system, the relationships between Chinese residents have changed (D. Wang and Chai, 2009). In the past, neighbors could be colleagues, or even friends, due to the overlap of neighborhood, work, and friendship relationships. However, as real estate became more popular, these relationships gradually weakened and became purely neighborly. This has led to the estrangement of social relationships among residents and a decrease in the effectiveness of social norms (Peiling, 2014). However, there is currently no suitable grassroots governance system in China to respond to these changes in resident relationships, which further accelerates the estrangement of residents' social relationships. Therefore, the estrangement of resident relationships, the weakening of social norms, and the absence of grassroots systems have become the main characteristics of neighborhood-level social capital in China. Drawing on previous research, this study divides neighborhood-level social capital into general trust, social norm, and system control to investigate these three characteristics respectively (Castiglione et al., 2008):

General trust (GT): General trust refers to the trust that someone else is trustworthy and will not seek to take advantage of or hurt the people around them.

Social norm (SON): Social norms can be defined as implicit rules that are understood by residents and that guide behavior without the force of laws to engender proper behavior toward community harmony.

System control (STC): System control can be defined as the process proposed by the local government that improves information flow among different stakeholders.

The conceptual framework of the social capital of residents in neighborhood renewal is summarized in Table 1.

Table 1
Social capital of residents in neighborhood renewal.

Level	Social capital category	Indicators	References
Resident-level	Bonding social capital	■ Personal connections and relationships; ■ Participation in activities; ■ Unity; ■ Homogeneity.	(Chen et al., 2015; R. Leonard and Bellamy, 2015; Chen et al., 2015; Carbone, 2019; Dressel et al., 2020)
	Bridging social capital	■ Outward-looking; ■ A view of oneself as part of a broader group; ■ Diffuse reciprocity with a broader community.	(Williams, 2006; McMahon and Skytt-Larsen, 2021)
	Linking social capital	■ Political efficacy; ■ Trust in grassroots government; ■ Trust in the residents' self-organization; ■ Political participation.	(Szreter and Woolcock, 2004; Poortinga, 2012; R. Leonard and Bellamy, 2015; Taruvinga et al., 2017)
Neighborhood-level	General trust	■ Trust in others; ■ The comfort of socializing; ■ Being taken advantage of; ■ Good faith from neighbors.	(Parés et al., 2012; Glackin and Dionisio, 2016; Son and Feng, 2019; J. Jiang and Wang, 2020)
	Social norm	■ The responsibility of neighborhood harmony; ■ Collaborative problem solving; ■ Community cohesion.	(Zhai and Ng, 2013; Sepe, 2014; Hindhede, 2016)
	System control	■ Procedural justice; ■ Organizational factors; ■ Feedback quality.	(Castiglione et al., 2008; Hartmann and Slapničar, 2009; Chenhall et al., 2010; Tavano Blessi et al., 2012; Klein et al., 2019; Izadi et al., 2020)

2.2. The relationships between neighborhood-level and resident-level external factors

The relationship between neighborhood-level social capital and resident-level social capital has long been a hot topic of debate. Prior research suggests that variations in the dimensions of collective social capital can influence the individual dimensions of social capital (Scheffler et al., 2008; Lee, 2018; Meng et al., 2018). For general trust (GT), there is a significant debate surrounding the extent to which an increase in general trust can foster the development of individual social capital. For example, Parés et al. (2012) and Glackin et al. (2016) proposed that higher general trust among neighborhoods can facilitate social cooperation and increase support for neighborhood renewal, while Son and Feng (2019) argued that the positive association between general trust and individual social capital exists only in the United States and not in China. For social norm (SON), the current debate surrounding social norms centers on whether they foster solidarity among residents (Mathers et al., 2008; Sepe, 2014; Kleinhans, 2017) or lead to exclusion of outsiders in the neighborhood (Zhai and Ng, 2013; Hindhede, 2016). For system control (STC), previous research has generally agreed that a sound policy and regulatory system can contribute to the enhancement

of residents' social capital (Chenhall et al., 2010; Tavano Blessi et al., 2012; Izadi et al., 2020). However, as for the neighborhood renewal projects that may disrupt residents' social relationships, whether the system control will help repair or deteriorate residents' relationships has not yet been studied (Zhai and Ng, 2013). Therefore, based on the above discussion, the second hypothesis is proposed as follows:

H2. . Neighborhood-level external factors have a positive association with resident-level social external factors.

Another point that needs to be noted is that the impact of differences in neighborhood-level social capital between different neighborhoods on resident-level social capital has been rarely studied (Neutens et al., 2013; Subramanian et al., 2003). Neighborhood-level social capital, which can be seen as a public good, is generated mainly in resident groups and organizations, such as civic associations and communal organizations (Goddard, 2003; Menahem, 2011). Policy objectives in neighborhood renewal cannot be obtained directly by improving resident-level social capital but by creating neighborhood-level social capital through political tools. The differences in policies, civic associations, and communal organizations between neighborhoods, as well as the differences in historical and cultural context, contribute to the differences in neighborhood-level social capital (Ha, 2010). Such differences in social capital can also lead to differences in resident-level social capital among residents. However, research on the impact of these differences is still relatively scarce. One reason for this is the complexity of the multi-dimension and multi-level residents' social capital, making it difficult to apply traditional methods such as linear regression and multilevel linear regression. Multilevel structural equation modeling can integrate factor analysis, structural modeling, and multilevel structural modeling into one, aiding in the analysis of complex theoretical framework models (Rappaport et al., 2020). Therefore, this study will apply multilevel structural equation modeling to explore the impact of external factors on residents' behavior at multiple levels.

2.3. The relationships between internal and external factors

As mentioned above, the TPB will be applied to analyze internal factors of residents' cooperative behavior. However, previous studies have found that TPB models cannot provide complete insights into behavior (Klöckner, 2013). Furthermore, previous studies have highlighted the shortcomings of the TPB because of its focus on cognitive factors only and the exclusion of the role of individuals' interaction with the community, which can influence people's decision-making and final behavior (Chatzisarantis et al., 2009). Although subjective norms, which are an internal factor, can be used to measure the influence of social factors on an individual, residents who interact less with others in their community have a lower probability of being influenced by others. Two points need to be explained. First, residents with more social connections in the neighborhood can easily become opinion leaders (S. Zheng et al., 2023). Therefore, those residents may not generate cooperative behavioral intentions from themselves but from the collective. Second, residents with more relationships in the neighborhood may easily change their behavior because of perceived social pressure (Temeljotov Salaj et al., 2020). Therefore, previous studies have applied social capital to the TPB to enrich the study of social factors on individual behavior (Castillo et al., 2021; Liao and Xing, 2022). However, previous studies have lacked focus on the role of social capital in the relationship between subjective norms and behavioral intentions. Hence, the following hypothesis is proposed in this study:

H3. . Resident-level social factors have a positive association with subjective norms.

Based on the hypotheses proposed above, the theoretical framework of the cooperative behavior of residents in neighborhood renewal is shown in Fig. 1.

This study seeks to enhance and refine the social capital theory and the theory of planned behavior by synthesizing their respective frameworks. One salient issue with the theory of planned behavior concerns its potential overemphasis on internal, individual factors at the expense of individual social attributes (Cheng and Chu, 2014; C. Jiang et al., 2016). The introduction of social capital theory thus serves to enrich the explanatory power of the theory of planned behavior in relation to individual behavior. Furthermore, by applying social capital theory to the investigation of the association of "relationship-behavior", this study expands the potential scope of social capital theory. Additionally, through a thorough examination of social relationships at both resident and neighborhood levels, this study offers a multi-level perspective for analyzing individual behavior, while also providing a theoretical framework and research support for future integration of these two theories.

3. Method

3.1. Procedures

SPSS (version 20.0) and Mplus (version 8.3) were applied for data management, preliminary descriptive analysis, and hypothesis testing.

This study's research data and questions incorporated a multilevel structure consisting of residents nested within neighborhoods. Considering the non-independent nature of hierarchically nested data, multilevel structural equation modeling (MSEM) was used. MSEM is a relatively new methodology that can help to analyze both within-group

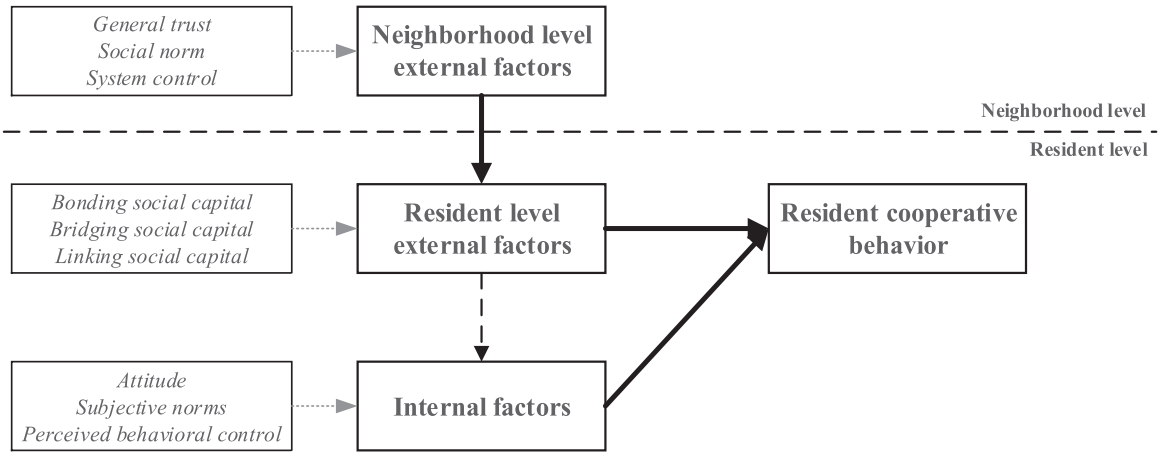

Fig. 1. The proposed theoretical framework. Note: Dashed line represents resident-level external factors that are only positively associated with subjective norms. The variables in the dashed boxes are the latent variables contained in each type of factors. See Appendix A for the measured variables for each latent variable.

and between-group covariance matrices simultaneously. In other words, MSEM can help to analyze the impact of within-group dependency and between-group differences concurrently. MSEM is particularly apt for studying cooperative behaviors among residents in the context of neighborhood renewal. This method excels in addressing the inherent hierarchical nature of data in such studies, allowing for a simultaneous examination of individual-level and neighborhood-level factors. By accommodating dependencies within neighborhood clusters and exploring cross-level interactions, MSEM enables a nuanced analysis of how individual factors and contextual factors influence cooperative behaviors during neighborhood renewal. Furthermore, MSEM's ability to incorporate both micro-level and macro-level variables makes it well-suited for disentangling the complex dynamics that characterize residents' cooperative in the context of neighborhood renewal. This study first discusses the descriptive and correlational statistics of the data collected. Muthén's five-step procedure was conducted to assess the multilevel structure step (Muthén, 1994). First, a confirmatory factor analysis (CFA) at the within level was performed. Second, an estimation of between-group variation was performed by calculating the intraclass correlation coefficient (ICC). Third and fourth, within-level and between-level covariance matrices were analyzed, respectively. Next, both within and between level factor structures were analyzed using multilevel analysis. Finally, the multilevel structural relationships were tested.

3.2. Participants

The investigation was conducted between June 2021 and March 2022. For the survey, the target population was residents in neighborhoods that were currently undergoing renewal, about to begin renewal, or had completed renewal. The questionnaire was administered in three cities in China: Chongqing, Nanjing, and Xuzhou. The selection of Chongqing, Nanjing, and Xuzhou as sample cities for this study on the neighborhood renewal is based on their geographic and economic diversity, social capital variations, and distinct policy practices. Chongqing, as a major city in western China, represents large urban populations and rapid economic growth with significant urban renewal challenges. Nanjing, a historically and culturally rich provincial capital, exemplifies the balance between preserving historical features and modernizing residential environments in economically advanced regions. Xuzhou, a traditional industrial city with moderate economic development, offers insights into the transformation of industrial areas and the implementation of policies at the municipal level. These cities collectively provide a comprehensive and representative sample for examining the multifaceted aspects of neighborhood renewal in China. Further, all three cities have published their own city policies for neighborhood renewal and developed pilot project lists. Questionnaires were delivered to the residents of the pilot program based on these lists. In addition, the urban planning of these three cities designates some districts within the city as the main city zone. In China, the main city zone of a city generally refers to the more developed and densely populated areas within the city. Due to time and budget constraints, we were unable to conduct on-site investigations in every district of these three cities. Therefore, we selected several districts in each main city zone for on-site investigations (as shown in Fig. 2). The reason for choosing these districts is that they are the most densely populated areas in each city's main city zone (accounting for 67.42 % of the population in the main city zone of Chongqing, 63.98 % in the main city zone of Nanjing, and 52.88 % in the main city zone of Xuzhou) (Chongqing Bureau of Statistics, 2023; Nanjing Bureau of Statistics, 2023; Xuzhou Bureau of Statistics, 2023). According to the policy details in Chongqing, Nanjing, and Xuzhou, this study identified a total of 831 pilot projects for the neighborhood renewal project in Chongqing, 108 pilot projects in Nanjing, and 55 renewal projects in Xuzhou. The research initially employed probability sampling to select sample neighborhood renewal projects. With a 10 % probability, a total of 98 sample neighborhood renewal projects were chosen, including 83 from Chongqing, 10 from Nanjing, and 5 from Xuzhou. In this way, we are more likely to reach representative residents of old residential neighborhoods.

Taking into account the varied education levels and ages of residents in older neighborhoods, this study employed a method of distributing questionnaires through field visits. According to McNeish et al. (2016), for MSEM, twenty clusters may be sufficient with five or more observations per cluster. Accordingly, this study endeavors to procure a minimum of five valid questionnaires from each neighborhood under scrutiny. In light of this, the researchers of this study have taken into consideration the diverse dimensions of the neighborhoods and opted to distribute the questionnaires in public areas of one or two renewal buildings in each pilot neighborhoods. It is worth noting that, to ensure the sample's representativeness, only one questionnaire was provided per household member. To address any potential biases caused by differing building sizes, the questionnaire distribution was adjusted

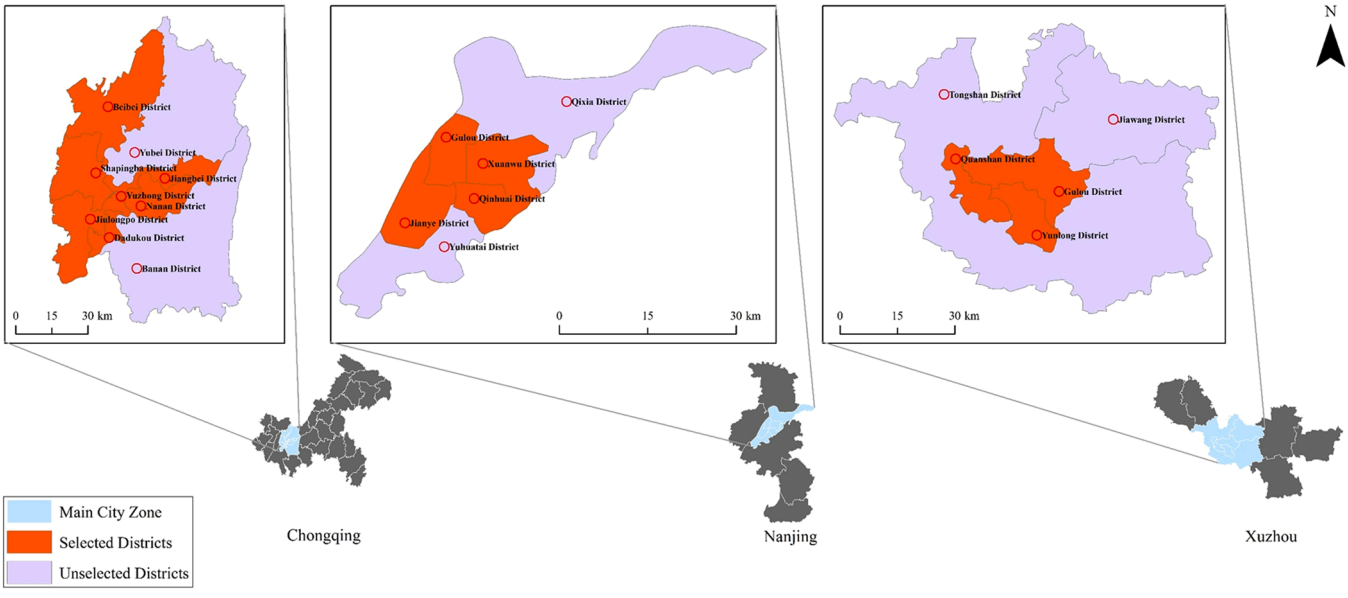

Fig. 2. Administrative districts of Xuzhou, Nanjing, and Chongqing and survey sites.

proportionally to each building's total number of households. Furthermore, this survey was performed with control measures to minimize selection bias. To ensure that participants had ongoing or past experience in neighborhood renewal projects, this study was conducted in the field to deliver the questionnaires. First, the surveyors asked an initial question to test whether the respondent was a resident of the target neighborhood. Second, this research examined the random response pattern (straight lines) of the completed questionnaire to exclude respondents who repeatedly selected the same answer. Third, those respondents giving conflicting responses were also excluded. This study employs a probability sampling approach. Considering the varying sizes of neighborhoods and the fact that not all neighborhoods have undergone renewal projects for all buildings, this study accounts for the total number of households of the renewed residents. Each neighborhood is sampled at a rate of 5 % based on the total number of households of the renewed residents. However, the study also takes into consideration the cost and practicality of the survey. This study initially establish contact with the grassroots government of the target neighborhoods. With the cooperation of the grassroots government, the study conducts surveys and interviews with the targeted households. In more common scenarios, the grassroots government allows researchers to distribute questionnaires but does not actively participate in the distribution process. Therefore, this study predominantly employs a method of random encounter sampling in most neighborhoods. Researchers randomly encounter renewed residents in public spaces within the neighborhoods and distribute questionnaires. Once the required number of questionnaires is obtained for a particular neighborhood, the researchers proceed to distribute questionnaires in the next neighborhood. It should be noticed that, due to the limited capacity of some residents in the older neighborhoods to complete the questionnaires or the lack of trust among certain community members towards the researchers, this study encountered challenges in achieving full questionnaire dissemination to all households in each renewed building. However, a total of 1232 residents in 98 neighborhoods participated in the survey, of whom 1039 completed the questionnaire and provided valid questionnaires (valid response rate: 84.33 %), which meets the requirement of the total sample size for multilevel structural equation modeling (McNeish and Stapleton, 2016).

When analyzing social capital, including social demographic variables that may influence cooperative behavior and behavioral intentions can be crucial. Based on Yamamura (2011), Nisic and Petermann (2013), Addae (2020), Shui et al. (2021), and Collischon et al. (2021), social capital may be affected by several demographic factors, such as age, gender, income, and length of residence. Firstly, concerning gender variables, Pippa's (2005) study suggests that women tend to have more social relationships within the social structure compared to men. Previous research has also indicated significant differences in social capital between different genders (Collischon and Eberl, 2021; X. Wang et al., 2022). Huang et al.'s (2023) study proposes that in the context of neighborhood renewal, residents of different genders exhibit significant differences in social capital, further impacting cooperative behavior. Secondly, for age variables, this study chooses 30 and 50 as the dividing boundaries. The selection of 50 as a boundary is based on the official retirement age in China, which is 50. The choice of 30 as a boundary is informed by previous research showing the average marriage age of Chinese youth is around 29 (State Council of China, 2019). This implies that more young individuals form families after the age of 30, and family formation can influence individual social relationships and behavior. Additionally, age as a variable is chosen because past studies have repeatedly demonstrated significant changes in individual social capital at different age stages (Addae, 2020). Thirdly, this study selects the variable of length of residence. The primary reason for choosing this variable is that social capital theory suggests that social capital arises from frequent interactions among individuals (Lin, 2002). Length of residence inevitably increases the opportunity and probability of interactions among individuals (Yamamura, 2011). Therefore, this study chooses the length of residence variable. Finally, this study includes the income variable. The rationale for selecting this variable is based on previous research that considered individual capabilities as a significant influencing factor on cooperative behavior in the context of neighborhood renewal (Hermann and Kopasz, 2011). This variable may affect residents' cooperative behavior. Hence, this study includes the income variable. Therefore, in this study, data on the gender, age, income, and length of residence of the participants were collected at the same time as the questionnaire investigation. Before completing the survey, participants were briefed about the questionnaire and assured that their personal information would remain confidential. Residents were asked to provide their demographic information.

The gender distribution of the respondents was 55.3 % (n = 575) female; the rest were male. Their ages were from 18 to 78 years old. Regarding the length of residence, 66.4 % (n = 669) had lived in their neighborhood for more than ten years. The majority (82.7 %, n = 859) had a monthly household income of 2500–10000 CNY (approximately 350–1400 USD), while only 17.3 % (n = 180) had a monthly household income lower than 2500 CNY (approximately 350 USD) or higher than 10000 CNY (approximately 1400 USD) (as shown in Table 2).

3.3. Measures

A multiple-item questionnaire was used. Each statement was measured on a seven-point Likert scale. All the scales used were validated in previous studies (see Appendix A). BOSC used a 4-item scale from Leonard et al. (2015) and Carbone (2019). BRSC used a 3-item scale from Williams (2006). LISC used a 4-item scale from Leonard et al. (2015) and Poortinga (2012). GT used a 4-item scale from Moore and Carpiano (2020) and Hooghe et al. (2012). SON used a 3-item scale from Lipperman-Kreda et al. (2010) and John et al. (2011). STC used a 3-item scale from Hartmann et al. (2009) and Li et al. (2005). SBN used a 3-item scale from Zheng et al. (2016) and Zhang et al. (2015). ATT used a 4-item scale from Menozzi et al. (2015) and Obschonka et al. (2012). PBC used a 3-item scale from Wang et al. (2018). BI used a 3-item scale from Menozzi et al. (2015) and Obschonka et al. (2012). BE used a 4-item scale from Du and Pan (2021).

4. Results

4.1. Multi-level analysis and results

This study followed the research of Muthén's (1994). This study first performed a CFA at the within level (N=1039). The major aim of this step is to verify the factor structure. Therefore, a model was performed with eleven factors loading separately; for the eleven-factor model, Satorra-Bentler scaled $\chi^2(610) = 1837.635$, $p<0.001$, CFI=0.980,

Table 2
Characteristics of the questionnaire respondents.

Variables	n=1039	Percentage %
Gender		
Male	464	44.7
Female	575	55.3
Age		
≤30	85	8.2
31–50	216	36.6
≥50	738	54.9
Length of residence		
≤3 years	65	6.3
4–9 years	305	29.4
≥10 years	669	66.4
Monthly household income		
≤2500 CNY (approximately 350 USD)	79	7.6
2500–5000 CNY (approximately 350–700 USD)	352	33.9
5000–10000 CNY (approximately 700–1400 USD)	507	48.8
≥10000 CNY (approximately 1400 USD)	101	9.7

TLI=0.977, SRMR=0.017, RMSEA=0.044. As shown in Appendix B, all the factor loading are higher than 0.9 and all factor are significant.

Secondly, this study performed an estimation of between-group variation by calculating the ICCs. As shown in Table 3, the ICC (1) values for all items ranged from 0.583 to 0.769, which is higher than 0.25 and ICC (2) ranged from 0.938 to 0.972, which is higher than 0.85 (LeBreton and Senter, 2008). This result demonstrates sufficient between-group variation to statistically warrant the use of multi-level analysis (Dyer et al., 2005).

Subsequently, this study performed an analysis on the sample pooled within-level and between-level covariance matrix. The within-level and between-level covariance matrices are shown in Appendix C.

Finally, this study performed the actual multi-level analysis. The results of the MSEM are shown in Table 4.

4.2. The effect of multi-dimensional resident-level external factors

Since this study developed a second-order structural equation model for multi-dimensional resident-level external factors, it was necessary to estimate whether the second-order model was appropriate. Four models, that are single first-order factor model, separate three-dimensional social capital models, correlated three-dimensional social capital models, and the second-order factor model (Fig. 3), were developed separately to validate the acceptable of the second-order factorial model. Table 5 proposed that the first three model had unacceptable model fit indices and M4 had indices with a better fit (CFI = 0.993; TLI = 0.990; RMSEA = 0.059; SRMR = 0.011; $\chi^2(df)$= 187.099(41)). According to Nunkoo et al. (2017), If the second-order factorial model has an acceptable fit, it is preferable to apply the second-order factorial model. Therefore, we retained M4 as the most appropriate model (Wilkins et al., 2007).

4.3. Descriptive and correlational statistics

Table 6 shows that the constructs all demonstrated good convergent validity using indices: construct reliability (CR) and average variance extracted (AVE). Table 6 also shows the convergent validity results for the variables with the CR higher than 0.7 and the AVE higher than 0.5 (Fornell and Larcker, 1981). Therefore, convergent validity was acceptable. Further, Table 6 proposed that all variables' square root of AVE were higher than their correlation coefficient, which means that the discriminant validity is acceptable (Fornell and Larcker, 1981).

Another aspect that needs discussion is the issue of multicollinearity in multi-level structural equation models. Previous research on the problem of multicollinearity in structural equation models did not have a consensus measure (Tarka, 2018). This study refers to the research findings proposed by Grewal et al. (2004). Grewal et al. (2004)'s study did not present a strict test reference indicator either. However, they confirmed through their study that when multicollinearity is between 0.6 and 0.8, and reliability is above 0.8, with R^2 above 0.75, the probability of Type II error can be considered negligible. Simultaneously, with a decrease in multicollinearity, the probability of Type II error can still be ignored without a decrease in reliability and R^2 values. Based on the reporting on multicollinearity and reliability in Table 6 and Table B-1 of this study, as well as the R^2 reported in Section 4.4 of this study, it is proposed that the multicollinearity in this study meets the requirements.

Table 3
Means and ICC of between-level analysis.

Item	Factor	ICC (1)	ICC (2)
Bonding social capital (BOSC)	BOSC1	0.682	0.958
	BOSC2	0.672	0.956
	BOSC3	0.669	0.955
	BOSC4	0.672	0.956
Bridging social capital (BRSC)	BRSC1	0.739	0.968
	BRSC2	0.746	0.969
	BRSC3	0.738	0.968
Linking social capital (LISC)	LISC1	0.613	0.944
	LISC2	0.623	0.946
	LISC3	0.583	0.937
	LISC4	0.590	0.938
General trust (GT)	GT1	0.743	0.968
	GT2	0.719	0.964
	GT3	0.730	0.966
	GT4	0.719	0.964
Social norm (SON)	SON1	0.757	0.971
	SON2	0.757	0.971
	SON3	0.769	0.972
System control (STC)	STC1	0.711	0.963
	STC2	0.720	0.965
	STC3	0.691	0.960

Table 4
Results of MSEM.

Item	Factor	Within level	Between level
Bonding social capital (BOSC)	BOSC1	0.961***	0.984***
	BOSC2	0.956***	0.987***
	BOSC3	0.957***	0.992***
	BOSC4	0.960***	0.997***
Bridging social capital (BRSC)	BRSC1	0.968***	0.990***
	BRSC2	0.960***	0.993***
	BRSC3	0.976***	0.996***
Linking social capital (LISC)	LISC1	0.967***	0.988***
	LISC2	0.956***	0.989***
	LISC3	0.949***	0.989***
	LISC4	0.957***	0.992***
Subjective norm (SBN)	SBN1	0.941***	
	SBN2	0.953***	
	SBN3	0.929***	
Perceived behavior control (PBC)	PBC1	0.915***	
	PBC2	0.958***	
	PBC3	0.962***	
Attitude (ATT)	ATT1	0.969***	
	ATT2	0.963***	
	ATT3	0.964***	
	ATT4	0.967***	
Behavioral intention (BI)	BI1	0.958***	
	BI2	0.942***	
	BI3	0.947***	
Cooperative behavior (BE)	BE1	0.925***	
	BE2	0.943***	
	BE3	0.944***	
	BE4	0.952***	
General trust (GT)	GT1		0.989***
	GT2		0.990***
	GT3		0.991***
	GT4		0.989***
Social norm (SON)	SON1		0.990***
	SON2		0.990***
	SON3		0.992***
System control (STC)	STC1		0.987***
	STC2		0.992***
	STC3		0.996***

4.4. Test of the hypothesized model

Fig. 4 displays the results of MSEM. Consistent with the guidance from previous related research and Mplus syntax (Preacher et al., 2010; Frear et al., 2018), all paths were tested simultaneously. The fit statistics reflect the saturated nature of the model ($\chi^2(512)$ =2008.895, $p<0.001$, CFI=0.968, TLI=0.964, RMSEA=0.053, SRMR $_{(within)}$=0.066, SRMR $_{(between)}$=0.011). The model fit indices provide the most fundamental indicators of the degree of fit between the proposed theory and the data. According to the studies by Browne and Cudeck (1992) and Hayduk (1987), χ^2/df should be less than 5. Following the statements by Jin et al. (2022), TLI should be greater than 0.95, CFI should be greater than 0.95, and RMSEA should be less than 0.08. According to the research by Du et al. (2021), SRMR should be less than 0.08. Therefore, the fit indices of this study meet the specified criteria. Though previous research

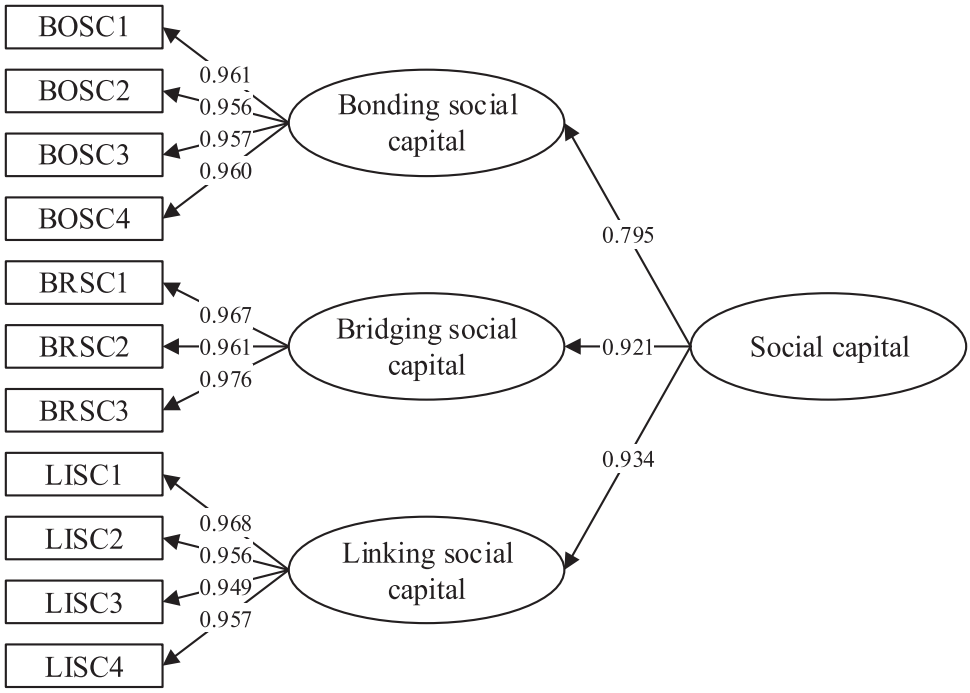

Fig. 3. Three first-order factors, one second-order factor.

Table 5
Model comparison.

Fit indices	Single first-order factor (M1)	Three uncorrelated first-order factors (M2)	Three correlated first-order factors (M3)	Three first-order factors, one second-order factor (M4)
$\chi^2_{(df)}$	3906.051 $_{(44)}$***	1736.333 $_{(44)}$ ***	1050.318$_{(42)}$ ***	187.099$_{(41)}$ ***
CFI	0.674	0.857	0.949	0.993
TLI	0.592	0.821	0.933	0.990
RMSEA	0.291	0.192	0.152	0.059
SRMR	0.095	0.518	0.284	0.011
χ^2/df	88.774	39.462	25.008	4.563
AIC	33525.867	29625.835	28351.528	27490.308

Note: *** $p<0.001$. CFI: Comparative fit index; TLI: Tucker-Lewis index; RMSEA: Root-mean-square error of approximation; SRMR: Standardized root mean square residual; AIC: Akaike information criterion.

Table 6
Results for validity and descriptive statistics.

	AVE	CR	ATT	SBN	PBC	BI	BE	BOSC	BRSC	LISC	GT	SON	STC
ATT	0.933	0.982	**0.966**										
SBN	0.886	0.959	0.633	**0.941**									
PBC	0.893	0.962	0.789	0.634	**0.945**								
BI	0.906	0.967	0.818	0.737	0.828	**0.952**							
BE	0.887	0.969	0.765	0.755	0.782	0.879	**0.942**						
BOSC	0.919	0.978	0.537	0.794	0.599	0.691	0.708	**0.959**					
BRSC	0.937	0.978	0.364	0.568	0.405	0.523	0.538	0.719	**0.968**				
LISC	0.917	0.978	0.394	0.609	0.416	0.523	0.537	0.727	0.842	**0.957**			
GT	0.896	0.972	0.441	0.762	0.540	0.623	0.667	0.805	0.648	0.666	**0.946**		
SON	0.909	0.968	0.342	0.704	0.469	0.522	0.560	0.761	0.674	0.650	0.845	**0.954**	
STC	0.903	0.965	0.316	0.656	0.440	0.504	0.554	0.723	0.667	0.654	0.754	0.816	**0.950**

Note. The diagonal numbers are the square root of AVE; the remaining numbers are Pearson correlation coefficients. [ATT: attitude; SBN: subjective norm; PBC: perceived behavioral control; BI: behavioral intention; BE: cooperative behavior; BOSC: bonding social capital; BRSC: bridging social capital; LISC: linking social capital; GT: general trust; SON: social norm; STC: system control].

proposed that such model fit indices are less meaningful in the case of MSEM, these fit statistics can help improve the thoroughness and transparency of this model (Ryu, 2014; Frear et al., 2018). Furthermore, the comparison of squared multiple correlation (R^2) of BI and BE are 0.867 and 0.840 separately. According to Du, et al. (2021), the R^2 can be used to examine the proportion of the total variation explained by the model.

4.4.1. The effect of internal and external factors of residents' cooperative behavior

Fig. 4 and Table 7 proposed that both internal (SBN, ATT, PBC) and external factors have positive effects on BI. Furthermore, this study

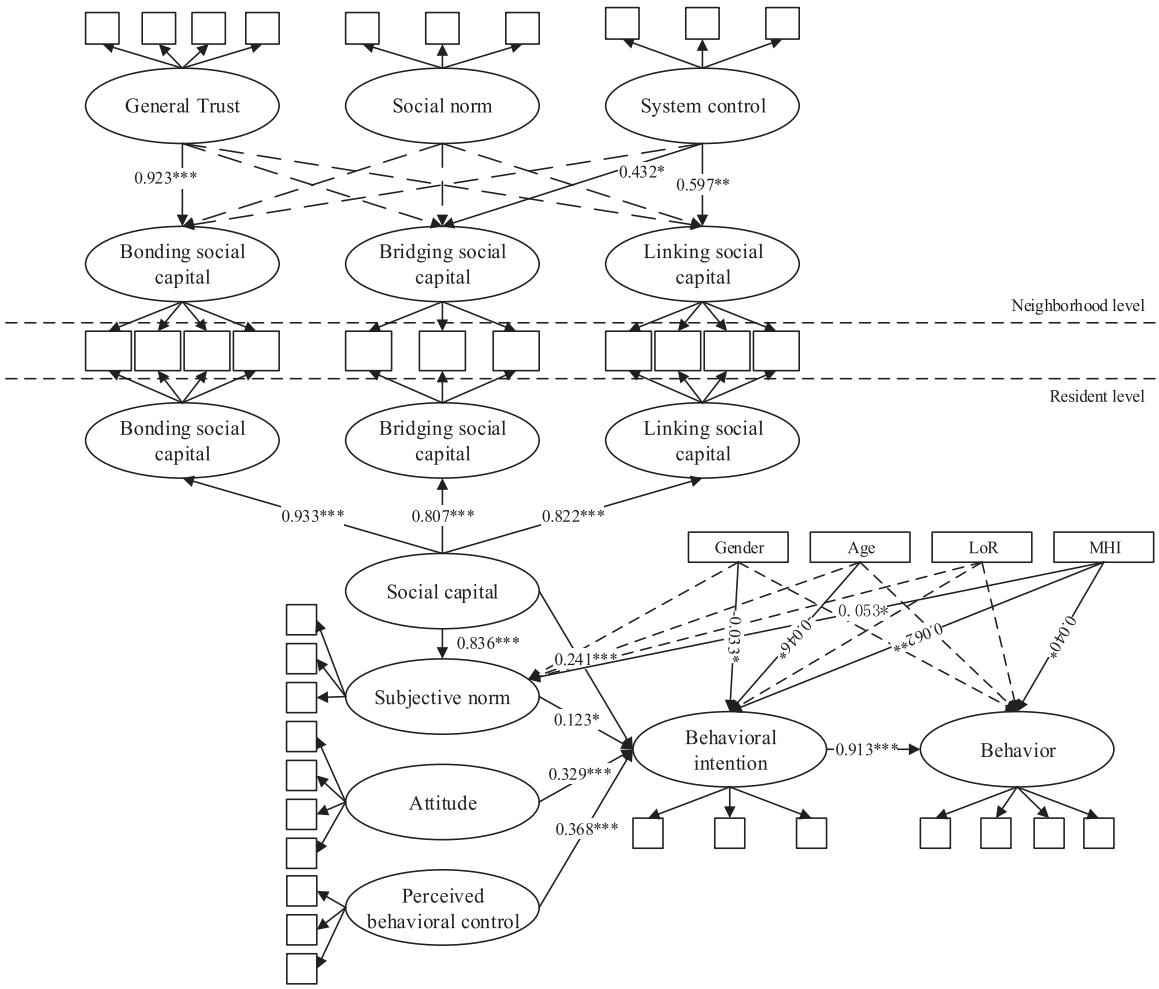

Fig. 4. Multilevel structural equation modeling results. Note: Dashed lines represent non-significant paths. *p<0.05, **p<0.01, ***p<0.001. LoR represents Length of Residence. MHI represents Monthly household income.

Table 7
Testing of direct effects.

Path	Effect Size	Path	Effect Size
GT –> BOSC	0.923***	STC –> LISC	0.597**
GT –> BRSC	0.022 (*ns*)	SC –> BI	0.241***
GT –> LISC	0.298 (*ns*)	ATT –> BI	0.329***
SON –> BOSC	−0.157 (*ns*)	SBN –> BI	0.123*
SON –> BRSC	0.366 (*ns*)	PBC –> BI	0.368***
SON –> LISC	−0.033 (*ns*)	SC –> SBN	0.836***
STC –> BOSC	0.173 (*ns*)	BI –> BE	0.913***
STC –> BRSC	0.432*		

Note. ATT: attitude; SBN: subjective norm; PBC: perceived behavioral control; BI: behavioral intention; BE: cooperative behavior; BOSC: bonding social capital; BRSC: bridging social capital; LISC: linking social capital; SC: social capital; GT: general trust; SON: social norm; STC: system control. *p<0.05, **p<0.01, ***p<0.001, *ns*: non-significant.

found that PBC had the most significant effect on BI (β=0.368, p<0.001), followed by ATT (β=0.329, p<0.001), social capital (β=0.241, p<0.001), and SBN (β=0.123, p<0.05), which support H1a and H1b.

4.4.2. The relationships between neighborhood-level and resident-level external factors

According to the between-level part in Fig. 4 and Table 8, the neighborhood-level external factors have partly effects on resident-level external factors. GT only have a positive effect on BOSC (β=0.923, p<0.001). STC have positive effects on both BRSC (β=0.432, p<0.05) and LISC (β=0.597, p<0.01). Further, no evidence of the association between SON and resident-level social capital was detected.

Table 8
Testing of mediation effect.

Path	Social capital → Subjective norm → Behavioral intention
Effect Size	0.103
S.E.	0.045
p-Value	0.023

4.4.3. The relationships between internal and external factors

Fig. 4 revealed that social capital has a positive effect on SBN (β=0.836, p<0.001) (as shown in Table 7). For residents' social capital, this study found that BOSC (β=0.933, p<0.001) has the most significant effect, followed by LISC (β=0.822, p<0.001) and BRSC (β=0.807, p<0.001). Furthermore, to explore the mediation relationship that exists between SBN, BI, and social capital, this study conducted a mediation analysis. The indirect effect of social capital (β = 0.103, SE = 0.045, p<0.05) on BI through the SBN has been proven (as shown in Table 8).

5. Discussion

Neighborhood renewal has attracted the interest of a growing number of scholars around the world. The current paper investigated the

effect of neighborhood-level and resident-level social capital on residents' cooperative behavior in neighborhood renewal in China. Specifically, two research questions were proposed. 1) Do residents' social relationships affect their cooperative behavior, and in what ways do they influence such behavior? 2) How variations in social factors among different neighborhoods have varying impacts on residents' cooperative behavior? By integrating social capital theory and the TPB, this study designed a questionnaire and collected data from 1039 residents who were experiencing or had experienced neighborhood renewal in China to address the above research questions through multilevel structural equation modeling.

5.1. Relationship or interest? The effect of residents' relationship on cooperative behavior

According to Section 4.4.1, this study concludes that social capital can directly impact residents' cooperative behavior, and that social capital is more important to cooperative behavior intentions than subjective norm. This result is surprising because it suggests that residents may make decisions not based on their interest towards renewal project, but purely based on their relationships with other residents. In previous studies on Chinese social relationships, the concept of "the code of brotherhood" has been proposed (Tzeng et al., 2020). This concept also stems from the cultural influence of Confucianism. In this context, residents' demands for renewal project may not be as important as their relationships with neighbors (Buckley et al., 2010). Residents may be concerned that their behavior is different from their neighbors, causing their neighbors to feel betrayed and ultimately damaging their neighborhood and even friendships. This potential disruption of residents' relationships posits a theoretical alignment with Kaiser et al.'s (2021) research. Kaiser et al. (2021) proposed that individuals are unlikely to engage in a behavior until the strength of their personal interest exceeds the behavioral costs. Therefore, the cost of the breakdown of social relationships among residents may be a possible reason for the direct impact of social capital on cooperative behavior intentions. This conclusion means that the assessment of the social environment of the neighborhood is important for future renewal projects. This is because there is a high probability that the project proposal is good, but the social relationship among the residents makes the project fundamentally impossible to implement. However, it is worth noting that while this study provided evidence for the influence of social capital and subjective norms on residents' cooperative behavior, their effects were found to be relatively lower when compared to residents' attitudes and perceived behavioral control. This implies that, in addition to emphasizing the importance of residents' social relationships, direct benefits to residents through neighborhood renewal projects would be more effective in promoting cooperative behavior, thus providing support for Carbone's research (Carbone, 2019).

Therefore, this paper further analyzes the impact of internal factors on behavior. According to Section 4.4.1, this study found that PBC had the most significant effect on residents' cooperative behavior. In 2020, the Chinese government website organized the "I have something to say to the Prime Minister" event. The event was designed to collect the opinions of the country's citizens on domestic policies. One of the most notable opinions was about reducing the cost of neighborhood renewal for poor households (Chinese government website, 2020). Therefore, the low cost of renewal is one of the main incentives for residents to implement neighborhood renewal. This finding differs from previous studies that have applied the TPB to analyze residents' cooperative behavior in urban renewal projects. For example, Zhang et al. (2021) proposed that ATT had the most significant effect, while Wang et al. (2022) proposed that SBN had the most important effect on BI. This is mainly because this study focused on neighborhood renewal projects, while Zhang et al. (2021) focused on the regeneration of abandoned industrial buildings and Wang et al. (2022) focused on demolition projects. These project types all belong to urban renewal but are different from each other, especially in the context of China. For the last two project types, residents are only asked to state their attitudes toward the project, while for some neighborhood renewal projects in China, residents must fund and spend time participating in these projects. Therefore, poor residents in old neighborhoods do not have sufficient capacity to participate and agree to the renewal program.

5.2. Neighborhood-level social capital: Effects and differences

Consistent with previous studies, this study confirms the difference of social capital among neighborhoods (Subramanian et al., 2003; Neutens et al., 2013). However, unlike previous studies that relied on individual resident characteristics to verify neighborhood differences, this study analyzes the composition elements of social capital at the neighborhood level to validate differences in social capital across neighborhoods (Subramanian et al., 2003; Neutens et al., 2013). This research approach enables a better focus on neighborhood redevelopment projects. This section first examines the influence of neighborhood-level social capital on resident-level social capital and then explores the reasons for differences in neighborhoods-level social capital.

For GT, consistent with Intravia et al. (2016), our results revealed that residing in neighborhoods with higher generalized trust can contribute to a heightened level of residents' social capital. However, contrary to expectations, generalized trust was insignificantly associated with bridging and linking social capital. This finding partly supports the argument made by Son et al. (2019) that the diversity and strength of social ties do not depend on generalized trust in the context of China. Finally, this study proposed that GT can better promote the original relationship between residents in the context of neighborhood renewal. However, considering the insignificant associations, generalized trust cannot repair the antagonistic relationship caused by the different interests of residents, that is, BRSC.

According to Section 4.4.2, this study confirmed the disappearance of the role of SON in neighborhood renewal. In contrast to earlier findings, no evidence of the association between SON and resident-level social capital was detected. A possible explanation for this is that social norms might have less influence on social ties in neighborhood renewal. According to Whitham (2021), social norms significantly impact social exchange, which can further affect cooperative and joint actions within one community. Prior to the 1980s, most neighborhoods in China had overlapping work spaces and living spaces. The management of neighborhoods was influenced to some extent by the corporate organization (Chan, 1993). In contrast to the time before the 1980s, residents in older neighborhoods are now estranged from their neighbors, and residents are more likely to form small groups of a few people. These small groups arise primarily because of shared interests or habits, such as playing cards, taking walks, or taking children to play in the square. The social norms generated by such small groups have little influence on residents' cooperative attitudes toward renewal projects. For the rest of the residents, the low frequency of social exchanges makes it more challenging to produce influential social norms. This study concurs with Hazelzet and Wissink (2012) that local social networks today are far less intensive in urban China. The development of social media and the separation of work space and living space has led to a social network of residents that extends beyond the neighborhood in China. Residents' social relationships occur more often with relatives, friends, and work colleagues than neighbors. Neighbors are no longer introduced to each other and have no mutual background, which leads to less social exchange within resident groups.

For system control, this study proposed the significant effect of system control on BRSC and LISC. The positive association between STC and LISC has been demonstrated in previous research (Taruvinga et al., 2017). Considering that linking social capital is generated from formal institutions and power structures, it is easy to understand the significant relationship between STC and LISC (Poortinga, 2012; Lang and Novy,

2014). An unanticipated finding was the positive relationship between system control and bridging social capital. Shen et al. (2021b) introduced a famous neighborhood renewal case called the Jingsong community and proposed that the government should learn more about residents' opinions to strengthen communication among different participants. Shen et al. (2021b) also suggested that conflicts among residents with different interests often appear to be conflicts of rules, which indicates an important association between system control and linking social capital.

According to Appendix A, it can be observed that, compared to neighborhood-level social capital, residents in neighborhood renewal possess relatively higher levels of resident-level social capital. In the preceding context, this study discussed the disappearance of the role of SON. The study posits that the disappearance of SON is indicative of a weakening in the level of neighborhood-level social capital. In China, the reduction in communication opportunities among residents has led to an overall decline in social capital levels. Additionally, the results from Fig. 4 reveal that, in comparison to BRSC and LISC, residents' BOSC is more susceptible to the influence of GT. In other words, neighborhood-level social capital does impact individual social capital among residents, but more significantly influences aspects related to residents' aspirations. The promoting effect of neighborhood-level social capital on cooperation among heterogeneous groups is far less pronounced than its effect on cooperation among homogeneous groups. This raises concerns about whether neighborhood-level social capital might trigger conflicts among heterogeneous groups that are more challenging to resolve.

Based on considering the differences in social capital among neighborhoods, this study analyzed the impact of neighborhood social capital on residents' social capital. As stated in Section 4.2, this study confirmed that there are differences in social capital at both the resident and neighborhood levels among neighborhoods, and that there is a clear data nesting structure. This contradicts the findings of Neutens et al. (2013), whose study found no significant differences in general trust between neighborhoods. This study suggests that this may be because the neighborhoods studied by Neutens et al. (2013) were based in Belgium, and the neighborhoods' form differs from that of Chinese neighborhoods. Specifically, the difference lies in whether there is the formation of relatively independent social networks in gated-neighborhoods. This leads to differences in the clarity of residents' cognition of the boundaries of the neighborhood when discussing general trust in the neighborhood. Further, this study found different conclusions from previous research based on the premise that there are differences in social capital between neighborhoods. For example, social norms have no impact on individual social capital, which is different from the conclusions of previous research (T. Du et al., 2020; Whitham, 2021). This study suggests that the differences in results are mainly due to whether the research considers differences between neighborhoods or not. However, this study supports the view of Subramanian et al. (2003) that social capital should be seen as a contextual construct. This means that social capital has collective characteristics that arise from individual common experiences. The structure that involves individuals coming together to form collectives is what researchers need to focus on when studying social capital. Therefore, this study suggests that considering the differences between neighborhoods in future research on residents' and neighborhoods' social capital is necessary, not only in the context of China but in every country and region with neighborhood forms of residence.

5.3. Thoughts on residents' multi-dimensional social capital

This study found that BOSC plays the most important role, followed by LISC and BRSC, as proposed in Section 4.4.3. Previous research that has analyzed three types of individual-level social capital has usually proposed that BRSC or LISC may have a more important effect than BOSC (Guo et al., 2018; Anuradha et al., 2021). The findings of this study contradict those of previous research. The study suggests that the possible reason for this discrepancy lies in the particularities of the type of renewal projects and the unique characteristics of the Chinese context. As noted in the literature review, neighbor relationships among Chinese residents have been gradually weakening (D. Wang and Chai, 2009). At the same time, due to the distribution of interests, residents in neighborhood renewal projects need to make a choice between cooperative and non-cooperative behavior. This labeling of residents also increases their sense of identity with the neighborhood and has a clear effect on the gradually weakening social relationships among residents, leading to the formation of interest groups made up of different interests of residents. Consistent with Carbone (2019), such groups will promote the formation of bonding social capital. Further, in China, neighborhood renewal is likely to result in unequal benefits among residents. Unequal distribution of benefits can cause conflict among residents, and these conflicts can reduce the exchange of information between residents with different interests. Most exchanges are formal, such as meetings. Other than communicating with residents of the same interest group, the first reaction of most residents who lack the ability to self-govern is to turn to the government or residents' organizations for coordination when they encounter conflicts or problems. This also explains why this study found that the impact of LISC was higher than the impact of BRSC.

6. Conclusion and policy implications

There is increased attention to neighborhood renewal in China. Residents' cooperative behavior is the key to successfully implementing renewal projects. This paper explores how internal and external factors (including multidimensional and multilevel factors) influence residents' cooperative behavior. By adopting social capital theory and the TPB, this study has shown that residents' bonding social capital can be affected by general trust and that bridging and linking social capital can be affected by system control. Furthermore, resident-level external and internal factors can influence residents' cooperative behavior, and subjective norms can mediate the effect of residents' social capital on cooperative behavior intention.

This study argues for the critical role of bonding social capital through residents' external factors and the positive effect of system control on linking and bridging social capital. The government can take more measures to improve the relationship between heterogeneous resident groups in the case of social exclusion in old neighborhoods. Considering that many previous studies have warned about the negative effect of BOSC (i.e., social exclusion), the improvement of BRSC must be given more attention (Pillai et al., 2017; Lukasiewicz et al., 2019). Putnam (2015) highlighted the exclusive nature of BOSC and called for the promotion of BRSC to break down social barriers. This study also found that the government can improve bridging social capital by developing efficiency system control measures. As Zheng et al. (2021) proposed, the government has the most important function in the urban renewal governance structure. It directly influences renewal processes, including planning, decision-making, and construction. Hibbitt et al. (2001) highlighted the important role of local authority coordinators and partnerships in developing residents' social capital. Therefore, shequ, as one kind of grassroots government in China, should adopt efficient ways to improve information exchange and social interactions between resident groups with different interests. However, the government must be cautious and careful about improving BRSC. Leonard (2004) proposed that it is not easy for the government to provide inclusive BRSC, and this may come at the expense of groups that were once able to take advantage of BOSC. Therefore, shequ must be careful to avoid creating new opposing groups among existing homogeneous resident groups when promoting BRSC in neighborhood renewal projects.

Another implication is that the government needs to pay attention to the uncooperative behavior of residents due to their abilities. In China, a large portion of neighborhood renewal projects are led and managed by

residents. Therefore, there may be situations where residents refuse to cooperate because they cannot pay for the renewal project, or younger residents may not have the time to participate in the management of a neighborhood renewal project. This is especially true for economic issues. In China, a neighborhood renewal project is one kind of public project related to residents' well-being. Typically, such projects are government-led and funded by the government or private companies. However, some projects in neighborhood renewal are funded by residents, such as the elevator installation project. For some neighborhoods with a large gap between the rich and poor, affordability may create new types of social exclusion among resident groups. While promoting neighborhood renewal, the government should take measures to avoid such problems, such as providing appropriate financial subsidies.

Lastly and most importantly, this study underscores the need for China's grassroots government to contemplate the feasibility of resident-led neighborhood renewal as a crucial consideration. As demonstrated by previous theoretical and policy implications, the capability and social networks of residents have rendered certain neighborhoods inherently unsuitable for renewal project. Nevertheless, many of China's neighborhood renewal initiatives remain resident-led. Most residents who are ardent advocates of community renewal lacking the requisite project management skills. Consequently, these residents have not carried out adequate social and economic pre-assessments of their neighborhoods. In such circumstances, the active implementation of renewal projects by part of residents is bound to exacerbate existing conflicts among residents. This is also a source of inspiration for similar renewal projects in other countries' neighborhoods. During the course of public spaces renewal, resident-led initiatives will invariably give rise to conflicts among residents. The government is therefore faced with the decision of choosing between the cost of governing renewal projects and the cost of managing resident conflicts, with the latter often carrying more severe repercussions.

This study delves into the realm of complex social capital, expanding the depth of social capital theory. While existing research often fixates on singular or multidimensional aspects of social capital, it frequently overlooks the dynamics across different levels. Anchored in the distinctive nature of social capital within the context of neighborhood renewal, this study broadens the exploration of social capital from individual levels to the synergy between individual level and neighborhood level. By concurrently addressing cross-level social capital issues, the research establishes a theoretical framework, systematically unveiling the formation mechanisms and functional dynamics of social capital among residents in the context of neighborhood renewal at both the individual and neighborhood levels. This expansion significantly contributes to the evolving landscape of social capital theory.

Future research is recommended to explore the impact of different socio-economic indicators on residents' social capital and cooperative behavior. In this study, due to limitations in research resources and a lack of sufficient support from previous studies, the research focused on the four most significant covariates. For future research, it is suggested that more attention be given to factors such as residents' education attainment, employment, and huku status. Particularly concerning huku status, this study primarily focuses on the cooperative behavior of homeowners. However, in future research, a greater emphasis on studying the social capital of tenants may contribute to a more equitable redistribution of interests in neighborhood renewal. Moreover, this study refrained from categorizing the types of renewal projects due to temporal and financial constraints. The lack of specificity in classification arises from the absence of detailed categorizations for the renewal types in pilot neighborhoods within the policies disclosed across the three surveyed cities. In essence, the government's approach to policy support for different types of renewal projects was impartial. As a result, this study did not undertake a more in-depth examination of the specific categories of renewal projects. Subsequent research endeavors could further scrutinize the influence of various renewal project types on residents' social capital and cooperative behaviors.

Ethics statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors. Informed consent was obtained from all individual participants included in the study.

CRediT authorship contribution statement

Ruopeng Huang: Writing – original draft, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Guiwen Liu:** Writing – review & editing, Supervision, Resources, Project administration, Funding acquisition, Data curation, Conceptualization. **Queena K. Qian:** Writing – original draft, Supervision, Methodology, Investigation, Data curation, Conceptualization. **Henk Visscher:** Writing – review & editing, Supervision, Project administration, Conceptualization. **Kaijian Li:** Writing – review & editing, Resources, Project administration, Formal analysis, Data curation, Conceptualization. **Wenshun Wang:** Writing – review & editing, Supervision, Software, Data curation, Formal analysis. **Xinyue Fu:** Writing – original draft, Software, Methodology.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

Table A-1
Measurement of factors

Dimension		Item name	Item wording	Item value: scale	Mean (S.D.)
Resident-level external factor	Bonding social capital	BOSC1	Satisfied with closeness of neighbors who shared same interest with me in my neighborhood.	Strongly disagree → Strongly agree: 1 → 7	4.283 (2.022)
		BOSC2	Confident my neighbors who shared same interest with me would come together to solve a serious problem.	Strongly disagree → Strongly agree: 1 → 7	4.085 (2.018)
		BOSC3	A lot of my neighbors who shared same interest with me don't really get involved in neighborhood renewal (reverse coded).	Strongly agree → Strongly disagree: 1 → 7	4.088 (2.019)
		BOSC4	Most of my residents in my neighborhood share the same values towards neighborhood renewal.	Strongly disagree → Strongly agree: 1 → 7	4.194 (2.024)
	Bridging social capital	BRSC1	Interacting with neighbors who shared different interest with me makes me more understanding of their interests toward neighborhood renewal.	Strongly disagree → Strongly agree: 1 → 7	3.063 (1.921)
		BRSC2	Interacting with neighbors who shared different interest with me makes me feel like part of a larger community.	Strongly disagree → Strongly agree: 1 → 7	3.064 (1.911)
		BRSC3	Neighbors in my neighborhood help each other out.	Strongly disagree → Strongly agree: 1 → 7	3.024 (1.877)
	Linking social capital	LISC1	How much do you trust the grassroot government.	Strongly disagree → Strongly agree: 1 → 7	3.398 (1.792)
		LISC2	How much do you trust the residents' self-organization.	Strongly disagree → Strongly agree: 1 → 7	3.370 (1.751)
		LISC3	Have you contacted any of the people mentioned above?	Strongly disagree → Strongly agree: 1 → 7	3.395 (1.799)
		LISC4	How much can you influence decisions on neighborhood renewal in your neighborhood?	Strongly disagree → Strongly agree: 1 → 7	3.376 (1.782)
Neighborhood-level external factor	General Trust	GT1	Generally speaking, would you that most neighbors can be trusted.	Strongly disagree → Strongly agree: 1 → 7	3.968 (1.742)
		GT2	You can't be too careful in dealing with neighbors (reverse coded).	Strongly agree → Strongly disagree: 1 → 7	3.896 (1.620)
		GT3	Your neighbors will seldom take advantage of you?	Strongly disagree → Strongly agree: 1 → 7	3.518 (1.737)
		GT4	You will seldom be cheated when you help other neighbors?	Strongly disagree → Strongly agree: 1 → 7	3.870 (1.620)
	Social norm	SON1	How wrong would most neighbors in your neighborhood think it is for someone disrupt neighborhood cooperation?	Strongly disagree → Strongly agree: 1 → 7	3.518 (1.737)
		SON2	Your neighbors help solve community problems.	Strongly disagree → Strongly agree: 1 → 7	3.551 (1.719)
		SON3	Your neighbors pull together.	Strongly disagree → Strongly agree: 1 → 7	3.726 (1.859)
	System control	STR1	I have full confidence in the system's fairness in determining targets.	Strongly disagree → Strongly agree: 1 → 7	3.466 (1.633)
		STR2	Standardize decision making process.	Strongly disagree → Strongly agree: 1 → 7	3.513 (1.685)
		STR3	The feedback you receive from grassroot government and residents self-organization helps neighborhood cooperation.	Strongly disagree → Strongly agree: 1 → 7	3.418 (1.649)
Internal factor	Subjective norm	SBN1	My neighbors would expect me to support the neighborhood renewal.	Strongly disagree → Strongly agree: 1 → 7	4.620 (1.687)
		SBN2	People around me almost all are going to or have agreed with the renewal plan.	Strongly disagree → Strongly agree: 1 → 7	4.592 (1.674)
		SBN3	My neighbors once told me about the benefits of the neighborhood renewal.	Strongly disagree → Strongly agree: 1 → 7	4.433 (1.701)
	Perceived behavioral control	PBC1	If I support the neighborhood renewal, I can bear the disruption of my living environment during the construction.	Strongly disagree → Strongly agree: 1 → 7	4.471 (1.841)
		PBC2	If I support the neighborhood renewal, I may have the ability to afford the expenses during the renewal project.	Strongly disagree → Strongly agree: 1 → 7	4.728 (1.812)
		PBC3	I will agree with the renewal plan even if renewal projects demand on my time.	Strongly disagree → Strongly agree: 1 → 7	4.852 (1.841)
	Attitude	ATT 1	I think neighborhood renewal project is beneficial.	Strongly disagree → Strongly agree: 1 → 7	4.731 (2.093)
		ATT2	I think neighborhood renewal project is useful.	Strongly disagree → Strongly agree: 1 → 7	4.725 (2.073)
		ATT3	I think neighborhood renewal project is desirable.	Strongly disagree → Strongly agree: 1 → 7	4.734 (2.098)
		ATT4	I think neighborhood renewal project protects my personal rights.	Strongly disagree → Strongly agree: 1 → 7	4.717 (2.136)
Behavioral intention		BI1	I am willing to agree with the renewal plan.	Strongly disagree → Strongly agree: 1 → 7	4.793 (1.987)
		BI2	I am willing to make appropriate compromises to resolve the conflict	Strongly disagree → Strongly agree: 1 → 7	4.815 (1.818)
		BI3	I am willing to take the time to communicate the details of the renewal plan.	Strongly disagree → Strongly agree: 1 → 7	4.615 (1.922)
Behavior		BE1	I was involved in the vote on the renewal plan and quickly voted in favor of it.	Strongly disagree → Strongly agree: 1 → 7	4.598 (1.809)

(*continued on next page*)

Table A-1 (*continued*)

Dimension	Item name	Item wording	Item value: scale	Mean (S.D.)
	BE2	Item 2: I have made compromises on neighborhood renewal project.	Strongly disagree → Strongly agree: 1 → 7	4.552 (1.775)
	BE3	Item 3: I have spent lots of time on neighborhood renewal affairs.	Strongly disagree → Strongly agree: 1 → 7	4.294 (1.861)
	BE4	Item 4: I have taken the initiative to learn about neighborhood renewal affairs.	Strongly disagree → Strongly agree: 1 → 7	4.511 (1.825)

Appendix B

Table B-1
Results of confirmatory factor analysis at within level

Item	Measures	Factor loadings	p value
BOSC	BOSC1	0.962	***
($\alpha = 0.978$)	BOSC2	0.956	***
	BOSC3	0.956	***
	BOSC4	0.960	***
BRSC	BRSC1	0.967	***
($\alpha = 0.978$)	BRSC2	0.962	***
	BRSC3	0.975	***
LISC	LISC1	0.967	***
($\alpha = 0.978$)	LISC2	0.956	***
	LISC3	0.949	***
	LISC4	0.957	***
SBN	SBN1	0.941	***
($\alpha = 0.958$)	SBN2	0.950	***
	SBN3	0.962	***
PBC	PBC1	0.916	***
($\alpha = 0.961$)	PBC2	0.950	***
	PBC3	0.932	***
ATT	ATT1	0.970	***
($\alpha = 0.982$)	ATT2	0.964	***
	ATT3	0.964	***
	ATT4	0.966	***
BI	BI1	0.960	***
($\alpha = 0.966$)	BI2	0.945	***
	BI3	0.951	***
BE	BE1	0.926	***
($\alpha = 0.969$)	BE2	0.943	***
	BE3	0.945	***
	BE4	0.954	***
GT	GT1	0.939	***
($\alpha = 0.971$)	GT2	0.945	***
	GT3	0.958	***
	GT4	0.943	***
SON	SON1	0.953	***
($\alpha = 0.967$)	SON2	0.954	***
	SON3	0.954	***
STC	STC1	0.952	***
($\alpha = 0.965$)	STC2	0.945	***
	STC3	0.953	***

Appendix C

Table C-1
Table covariance matrix

	GT1	GT2	GT3	GT4	SON1	SON2	SON3	STR1	STR2	STR3	BOSC1	BOSC2	BOSC3	BOSC4	BRSC1	BRSC2	BRSC3	LISC1	LISC2	LISC3	LISC4	ATT1	ATT2	ATT3	ATT4	SBN1	SBN3	SBN4	PBC1	PBC2	PBC3	BI1	BI2	BI3	BE1	BE2	BE3
GT1		2.222	2.244	2.116	2.252	2.230	2.441	1.854	1.943	1.917	2.347	2.327	2.366	2.387	1.953	1.992	1.920	1.689	1.717	1.760	1.703																	
GT2			2.163	2.033	2.168	2.152	2.349	1.791	1.889	1.859	2.229	2.212	2.255	2.282	1.892	1.927	1.866	1.693	1.711	1.747	1.692																	
GT3				2.049	2.180	2.170	2.371	1.757	1.861	1.841	2.268	2.242	2.280	2.305	1.854	1.879	1.823	1.639	1.660	1.699	1.640																	
GT4					2.044	2.023	2.202	1.670	1.764	1.737	2.147	2.131	2.172	2.199	1.742	1.774	1.718	1.539	1.555	1.598	1.539																	
SON1						2.354	2.527	1.977	2.071	2.020	2.274	2.266	2.321	2.327	2.039	2.085	2.014	1.765	1.805	1.826	1.762																	
SON2							2.524	1.945	2.059	2.008	2.250	2.225	2.287	2.301	1.999	2.042	1.963	1.733	1.758	1.786	1.725																	
SON3								2.136	2.254	2.201	2.473	2.439	2.498	2.515	2.213	2.272	2.175	1.921	1.950	1.977	1.909																	
STR1									1.979	1.918	1.905	1.898	1.894	1.917	1.793	1.851	1.783	1.598	1.600	1.652	1.588																	
STR2										2.006	2.057	2.043	2.047	2.078	1.933	1.975	1.908	1.715	1.719	1.748	1.693																	
STR3											1.992	1.981	1.982	2.010	1.841	1.894	1.829	1.633	1.645	1.683	1.628																	
BOSC1												2.821	2.779	2.821	2.175	2.145	2.089	1.915	1.883	1.939	1.876																	
BOSC2											3.781		2.778	2.792	2.216	2.183	2.134	1.916	1.906	1.954	1.890																	
BOSC3											3.721	3.723		2.816	2.302	2.270	2.220	1.945	1.935	1.975	1.909																	
BOSC4											3.778	3.712	3.776		2.271	2.253	2.194	1.944	1.933	1.972	1.914																	
BRSC1											2.603	2.688	2.730	2.719		2.814	2.766	2.277	2.245	2.218	2.221																	
BRSC2											2.555	2.603	2.706	2.648	3.396		2.776	2.286	2.272	2.249	2.256																	
BRSC3											2.465	2.541	2.596	2.577	3.407	3.360		2.235	2.222	2.197	2.204																	
LISC1											2.439	2.465	2.532	2.487	2.772	2.788	2.708		2.054	2.035	2.031																	
LISC2											2.372	2.450	2.468	2.454	2.673	2.716	2.642	2.903		2.005	2.021																	
LISC3											2.454	2.495	2.499	2.477	2.695	2.759	2.654	2.954	2.844		2.000																	
LISC4											2.376	2.429	2.441	2.418	2.653	2.715	2.646	2.952	2.852	2.920																	
ATT1											2.246	2.221	2.172	2.246	1.421	1.359	1.375	1.427	1.385	1.388	1.392																	
ATT2											2.084	2.082	2.049	2.116	1.410	1.336	1.356	1.399	1.341	1.366	1.363	4.068																
ATT3											2.160	2.113	2.099	2.141	1.440	1.360	1.355	1.422	1.354	1.336	1.366	4.079	4.030															
ATT4											2.177	2.156	2.147	2.212	1.465	1.360	1.380	1.451	1.393	1.407	1.421	4.186	4.103	4.189														
SBN1											2.521	2.464	2.448	2.491	1.673	1.670	1.638	1.682	1.670	1.713	1.651	2.098	2.037	2.009	2.014													
SBN3											2.495	2.446	2.419	2.455	1.646	1.669	1.612	1.624	1.621	1.672	1.636	2.196	2.134	2.099	2.124	2.554												
SBN4											2.669	2.612	2.577	2.633	1.841	1.859	1.792	1.775	1.760	1.826	1.780	2.136	2.100	2.087	2.130	2.482	2.507											
PBC1											2.055	1.966	1.879	1.969	1.275	1.269	1.249	1.170	1.136	1.204	1.140	2.777	2.642	2.744	2.764	1.658	1.731	1.765										
PBC2											2.223	2.127	2.065	2.163	1.384	1.404	1.367	1.331	1.290	1.365	1.287	2.886	2.776	2.877	2.850	1.803	1.859	1.834	2.929									
PBC3											2.151	2.068	2.051	2.094	1.336	1.374	1.320	1.311	1.281	1.361	1.289	2.990	2.900	3.005	2.950	1.837	1.929	1.891	2.967	3.073								
BI1											2.635	2.561	2.565	2.614	1.880	1.883	1.792	1.737	1.694	1.759	1.703	3.273	3.231	3.295	3.341	2.247	2.331	2.376	2.858	2.826	2.918							
BI2											2.354	2.287	2.298	2.339	1.705	1.708	1.628	1.572	1.525	1.593	1.550	2.908	2.901	2.946	2.995	2.021	2.116	2.168	2.484	2.496	2.605	3.253						
BI3											2.625	2.565	2.575	2.584	1.903	1.884	1.793	1.752	1.693	1.735	1.688	3.033	3.010	3.052	3.111	2.119	2.197	2.289	2.709	2.656	2.744	3.478	3.168					
BE1											2.460	2.408	2.405	2.443	1.655	1.600	1.613	1.546	1.513	1.559	1.516	2.596	2.554	2.581	2.641	2.093	2.158	2.271	2.409	2.287	2.381	2.939	2.616	2.811				
BE2											2.341	2.264	2.299	2.348	1.746	1.756	1.698	1.615	1.558	1.619	1.578	2.749	2.734	2.791	2.819	1.954	2.024	2.126	2.351	2.324	2.403	2.961	2.646	2.720	2.798			
BE3											2.513	2.446	2.434	2.510	1.905	1.881	1.825	1.741	1.682	1.712	1.674	2.621	2.577	2.663	2.683	2.070	2.119	2.276	2.468	2.370	2.445	3.051	2.689	2.912	2.985	2.908		
BE4											2.447	2.364	2.394	2.468	1.772	1.747	1.700	1.607	1.594	1.621	1.584	2.853	2.813	2.860	2.952	2.032	2.117	2.273	2.458	2.403	2.450	3.026	2.698	2.814	2.874	2.934	3.067	

Data availability

Data will be made available on request.

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