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Collaborative neighborhood governance and its effectiveness in community mitigation to COVID-19 pandemic: From the perspective of community workers in six Chinese cities

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ABSTRACT

The COVID-19 pandemic is a governance challenge for nations and cities across the world. While early observations have primarily focused on government actions, neighborhoods are at the frontline for coordinating grassroots level joint actions to fight against the pandemic. We draw from the collaborative governance theory and develop a theoretical framework for understanding the horizontal and hierarchical dynamics of collaborative neighborhood governance during crisis responses in urban China. Using a large-scale questionnaire survey of frontline community workers operated in six Chinese cities in February 2020, we conduct statistical analyses and find that the effectiveness of neighborhood collaboration in the pandemic control is predicted by both neighborhood social capital (i.e. civic engagement and citizen participation) and hierarchical steering by the government through setting policy priorities and providing support. Our research contributes to the international literature on neighborhood governance dynamics and provides policy lessons for improving neighborhood governance capacity in crisis response situations.

1. Introduction

The COVID-19 pandemic is more than a public health crisis; it is also an urban governance challenge for both developed and developing countries (Dodds et al., 2020). Urban settlements are subject to greater risks of virus transmission due to high density and spatial mobility (Kapucu, 2012). Furthermore, the pandemic has increased existing inequalities and divisions across social groups and residential communities (Kim & Bostwick, 2020; Maroko et al., 2020). A myriad of studies has been published on how countries responded to this public health crisis while minimizing social and economic losses caused by the pandemic. Most studies have focused on government actions (e.g. Benavides & Nukpezah, 2020; Mallinson, 2020; Mei, 2020; Migone, 2020; Yan et al., 2020), while relatively few studies examined how COVID-19 responses have been organized and coordinated at the grassroots level.

Some scholars have observed the important roles of community-layer organizations in adopting and enforcing public health measures, as well

as responding to the needs and concerns of local communities (Brodtkin, 2021; Cheng et al., 2020). In developing countries such as Brazil, Thailand and Kenya, community health workers helped bridge the gap between government and citizens, provide critical pandemic-related information, enforce public health measures, and provide assistance to vulnerable populations (Lotta et al., 2020; Sudhipongpracha & Poocharoen, 2021).

During COVID-19, China was quick to tame the spread of the virus, with most cities beginning the phased re-opening in late February 2020. Whereas many studies attributed China's success in controlling the pandemic to the firm leadership provided by the central government and coordination between central and local governments (Liu et al., 2021; Mei, 2020), some scholars have stressed the effective cross-sector collaboration at the neighborhood level, coordinated by residents' committees, as another critical factor (Cheng et al., 2020). Led and supported by city governments, residents' committees mobilized and collaborated with residents, other community-level organizations, as well as outside private and non-profit organizations, to form

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community-level joint action groups in response to the pandemic (Cheng et al., 2020; Zhao & Wu, 2020).

This phenomenon provides urban scholars a unique opportunity to revisit the long-time theoretical and policy debate in the international literature, with respect to state-society relations in governing grassroots level public affairs in urban settlements. On the one hand, the conventional wisdom vouches for more spontaneous organization of the civil society in neighborhood governance, built upon horizontal ties, social capital, and civic organizations in residential neighborhoods (Sampson et al., 1997). On the other, in recent decades, cities in the US, China, and other countries have seen more active involvement of the government in steering and sponsoring reforms in public service delivery and neighborhood governance (Bray, 2006; Chen et al., 2009; Fagotto & Fung, 2006; Li et al., 2019; Liu, 2008). Nonetheless, how do the state-society dynamics play out and shape the effectiveness of collaborative neighborhood governance during COVID-19 pandemic responses remains unclear.

In this paper, we draw from the collaborative governance literature (Ansell & Gash, 2007; Emerson et al., 2011), and adapt it to the context of urban neighborhood governance during public health emergencies. Using a questionnaire survey of frontline community workers from six cities—conducted in early February 2020—we examined the determinants of the neighborhood governance collaboration during the early stage of COVID-19 responses in China. We adopted multiple regression analyses to test the extent to which the effectiveness of such collaboration was predicted by both the internal conditions (i.e., neighborhood social capital) and external factors (i.e., hierarchical steering by the government). Controlling for perceived crisis level, city features, and respondents' socio-demographic features, we find that strong civic engagement and community participation, rather than neighborhood social trust, predicted a higher perceived level of collaboration effectiveness in COVID-19 responses. In addition, the role of hierarchical steering was primarily reflected in the government setting policy priorities and providing critical support for joint pandemic-control efforts in urban neighborhoods, rather than simply asserting a top-down incentive structure or an oversight authority.

Our intellectual contributions are threefold. Firstly, scholars have written extensively about the emerging forms and power structures of neighborhood governance, mostly based on observations of non-crisis situations (Hemphill et al., 2006; Li et al., 2020; Parés et al., 2017; Provan et al., 2005; Wang, 2016). Focusing on real-time experiences of frontline community workers during COVID-19, we hope to revisit the structure, agencies, and dynamics of neighborhood governance in a crisis situation. Our empirical assessments of China's experiences of collaborative neighborhood governance in COVID-19 responses also seek to inform urban policy and governance for better preparedness and responses to public health crises.

Secondly, we draw from the collaborative governance literature to develop a theoretical framework for understanding the dynamics of neighborhood collaboration in public health crisis responses. Previous studies have primarily focused on the internal factors of horizontal interaction and civic engagement in neighborhood governance (McGuire & Silva, 2010; Provan & Milward, 1995; Wang, 2016). Recently scholars have begun to recognize the importance of hierarchical mechanisms that facilitate horizontal collaboration at the grassroots level (Acar et al., 2008; Hafer, 2018; Rodríguez et al., 2007). Our empirical findings of residents' committees in Chinese cities expand the knowledge of collaborative neighborhood governance by highlighting the positive role of hierarchical steering during crisis response situations.

Thirdly, existing studies have considered neighborhood governance in urban China as a contentious area of urban institutional reforms in the context of marketization and privatization (Bray, 2005; Fu et al., 2015; He, 2015; Wu, 2002, 2018). Yet the majority of existing studies have adopted qualitative case study approaches. Built on a unique dataset from a large-scale survey of local community workers from multiple

Chinese cities, we are able to statistically test our theoretical hypotheses drawn from the existing literature as well as further explore heterogeneity across cities and locations.

The rest of the paper is divided into four sections. The next section provides a review of neighborhood governance in China and collaborative governance in the urban context, as well as an explanation of the theoretical framework. The data and method section presents the survey strategies and data briefs. Following a descriptive analysis, the results of the multiple regression analyses are discussed. A conclusive summary is provided in the final section.

2. Literature review and theoretical framework

2.1. China's urban neighborhood governance in transition

Over the past four decades, a rapid spatial and institutional transition has led to transformative changes in how neighborhoods are organized and governed in Chinese cities. In the pre-reform era, urban neighborhoods were primarily organized around the state work-unit (*danwei*) system, which provided housing and welfare services to state employees (Bray, 2005). Meanwhile, residents' committees, as subsidiaries of the government, recruited community workers to organize neighborhoods that were not affiliated with any specific work unit (Lu & Perry, 1997). With the economic reforms came the transformation of neighborhood governance. Residents' committees had taken over the responsibility of neighborhood service provision since the dismantling of the work-unit system (Wu, 2002). Although residents' committees were legally deployed to represent and serve the interests of all the residents of a particular neighborhood, in practical terms, they had only limited autonomy, capacity, leverage, or representation to organize grassroots public affairs in a bottom-up manner (Liu, 2008).

Other dimensions of the urban reforms further complicated the functioning of residents' committees in urban neighborhood governance in China. First, housing marketization has brought the private sector into neighborhood governance, leading to a market-based provision of neighborhood services (Lu et al., 2020). The existing literature has highlighted state-market-society tensions and even conflicts in neighborhood governance, e.g., among residents' committees representing the state, property management companies functioning as a market player, and homeowner associations—as well as the residents themselves—representing civil society (Fu & Lin, 2014; Read, 2003). Second, social polarization and residential segregation also challenged China's urban neighborhood governance. Ever since the housing marketization process began, residents have found themselves in heterogeneous urban neighborhoods (Fang et al., 2020; Li & Wu, 2008). Especially in relatively deprived neighborhoods, residents' committees have had to serve as a liaison between the government and residents in order to secure alternative means of neighborhood service delivery, which in turn has increased the dependence of residents' committees on government funding and resources. Third, the traditionally strong social fabric of urban neighborhoods has been dissolved by increased residential mobility toward new residential spaces in the suburbs, the massive redevelopment of inner-city old neighborhoods, and the massive influx of rural-to-urban migrants (Lin et al., 2020; Shen et al., 2015). Neighborhood governance has faced the challenge of enhancing neighborhood social capital and civic engagement through the promotion of participatory and reciprocal activities (Read, 2003).

The above circumstances highlight the peculiar position of residents' committees in neighborhood government in urban China. While being positioned as a grassroots community organization, residents' committees also function as an extension of the government apparatus for social organization and control. While historically having only a marginal role and inadequate resources, residents' committees are now being called upon by the government as well as residents to ensure adequate service provision and maintain governance efficacy (Wu, 2018). In fact, since the late 1990s, the state has initiated multiple waves of community-

building campaigns with the aim of re-asserting the power of the state in local/neighborhood governance and ensuring the governability of urban spaces (Bray, 2006; Fu & Lin, 2014). These campaigns have primarily revolved around strengthening the presence and capacity of residents' committees in neighborhood public affairs, ranging from facilitating the social-service delivery function of sub-district governments (*jiedao*); resolving conflicts between property management companies, homeowner associations, and individual residents; and coordinating bottom-up neighborhood activity organizations and the engagement of non-governmental organizations in neighborhood governance.

This transitional form of neighborhood governance has been tested during the fight against the COVID-19 public health crisis since January 2020. Residents' committees have played a key role in enforcing government lockdown measures, ensuring timely contact-tracing to contain the transmission of the virus, and providing necessary lifeline supports and social services to local residents (Zhao & Wu, 2020). It was reported that nearly four million community workers from 650,000 residents' committees in both rural and urban areas were mobilized to coordinate the grassroots joint actions to fight against the community transmission of the coronavirus (Zhao & Wu, 2020). Typically deprived of sufficient amounts of personnel and resources, members of residents' committees have had to mobilize volunteers and coordinate with other stakeholders (e.g., property management companies, homeowner associations, non-profit organizations inside and outside the neighborhoods, government agencies, etc.) to ensure effective neighborhood collaboration in the pandemic control. Therefore, it is important to examine, from the experiences and perceptions of community workers, the mechanisms and determinants of effective collaboration at the neighborhood level during the COVID-19 pandemic response in urban China.

2.2. Collaborative governance theory in the urban context

The theory of collaborative governance was first proposed in the 1990s to help facilitate an understanding of the formation and operation of new modes of public policy making and service delivery (Agronoff & McGuire, 2001; Ansell & Gash, 2007; Emerson et al., 2011). Given the increasing complexity of policy challenges, such as environmental management and social-service delivery, governments have found themselves increasingly dependent on other agencies from the same or other tiers of government, as well as non-state sectors, such as private businesses and civil society, to solve policy problems (Leach, 2006; Lubell et al., 2002; Provan & Milward, 1995). Crisis events such as natural disasters or public health emergencies often involve a higher level of uncertainty and complexity that cannot be resolved by any single government agency, or even by the government alone, and this makes multi-stakeholder collaboration indispensable in crisis situations (Kapucu, 2012; Kapucu & Garayev, 2012; McGuire & Silva, 2010).

Urban and policy scholars have also examined the emerging forms of multi-stakeholder collaboration or partnership in the urban context (Kapucu, 2012; Wang, 2016). However, urban governance that involves non-government stakeholders can be contentious or problematic rather than collaborative, leading to ineffective outcomes in neighborhood governance (Parés et al., 2017). Relatively few studies have systematically investigated the determinants of effective collaboration in urban neighborhood governance, particularly from local community workers' perspective (Li et al., 2019).

Most empirical studies on collaborative governance have been based on Western contexts, where neighborhood governance has long been built on assumptions of clear boundaries between the state, market, and civil society. However, reforms of public service delivery in the past few decades have blurred these boundaries with cross-sector collaboration ensued (Lowery, 1998; Provan & Milward, 1995). Some local governments in the US, for instance, also initiated neighborhood governance reforms by setting up and sponsoring neighborhood associations or councils, which aimed at enhancing the links between city governments and residents in areas such as neighborhood planning, community

development, and social service delivery (Chen et al., 2009; Fagotto & Fung, 2006; Li et al., 2019).

In recent years, collaborative governance has been adopted to understand the administrative modernization process in China (Jing, 2015). Yet the extent to which urban neighborhood governance in China can be framed as collaborative governance has been subject to scholarly debates (Tomba, 2014). Nonetheless, persistent and active involvement of the state does not preclude collaborative dynamics between the state and community-level organizations, which has historical roots in the Chinese state governing the grassroots society through extended arms of local elites (Read, 2012). Neither does it preclude cross-sector collaborations in neighborhood governance that has emerged along with housing marketization and public service delivery (Wang, 2016; Wen, 2017). Based on the above discussion, we have adapted the collaborative governance theory to the empirical context of crisis governance in urban China, and developed a theoretical framework for understanding both the horizontal and hierarchical dynamics of multi-stakeholder neighborhood collaboration in response to the COVID-19 crisis.

2.3. Theoretical framework

Fig. 1 illustrates our theoretical framework. Studies of collaborative governance in Western contexts have primarily focused on the horizontal mechanisms of collaborative networks in community service provision (McGuire & Silva, 2010; Provan & Milward, 1995). Collaborative governance, by definition, refers to horizontal interactions among public, private, and non-profit sectors (Ansell & Gash, 2007). Effective collaboration in neighborhood governance, therefore, would rely on informal mechanisms of trust, reciprocity, engagement, and negotiation with the aim of "making collective decisions" (Emerson et al., 2011). Recently, however, scholars have begun to acknowledge the role of hierarchical mechanisms in the formation and maintenance of horizontal collaborative governance for complex policy problems (Acar et al., 2008) — a role that is indicative of a form of "mandated collaboration" (Hafer, 2018; Rodríguez et al., 2007). Compared to Western contexts, top-down, hierarchical mechanisms play a more important role in neighborhood governance in urban China including, in particular, steering collaborative responses to the COVID-19 pandemic (Cheng et al., 2020; Zhao & Wu, 2020). Therefore, we have considered both the internal conditions (i.e., neighborhood social capital) and external factors (i.e., hierarchical steering by the government) that could determine the effectiveness of collaborative neighborhood governance in public health crisis responses.

On the one hand, a virtuous cycle of interaction and engagement among stakeholders can provide the internal conditions for effective collaborative responses to a crisis incident. Social capital, which refers to the "stock" of trust, reciprocity, and civic engagement in a neighborhood (Putnam, 1995), has long been argued to facilitate collective actions and neighborhood governance efficacy (Sampson et al., 1997). Strong civic engagement can help build up a sense of shared purpose and identity, thus increasing the willingness and determination to collaborate across sectors to achieve a common goal (Cooper et al., 2006). This makes civic engagement key to successful collaborative governance (Emerson et al., 2011). The lack of civic engagement in public affairs can be the main barrier to the establishment and maintenance of a collaborative relationship in neighborhood planning and governance (Frieling et al., 2012). Previous experiences of successful cooperation can also create a high level of trust and social capital with which to produce a virtuous cycle of collaboration (Ansell & Gash, 2007; Kathi & Cooper, 2005). Moreover, citizen participation is vital if there are to be effective collaborative responses during emergencies in urban settings (Kapucu, 2012).

On the other hand, simply focusing on the internal condition of horizontal collaboration within the neighborhood ignores the role played by political and other institutions outside the neighborhood. For example, local governments are deeply involved in the formation and

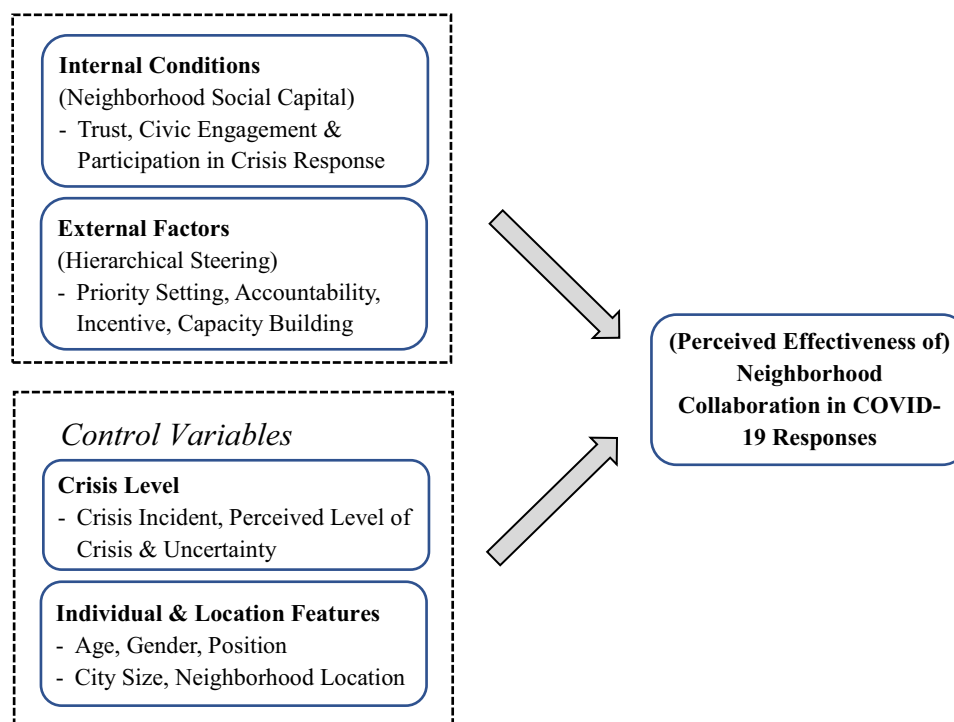


Fig. 1. Theoretical framework.

functioning of local community partnerships or collaborations (Maloney et al., 2000). Top-down intervention by the government has played an important role in facilitating community participation in urban regeneration projects (Li et al., 2020). Furthermore, local governments can cultivate and control the strategic direction of collaborative partnerships through their own commitment and leadership when facing a policy challenge (Therrien & Normandin, 2020). They can also provide incentives to local stakeholders to collaborate by creating shared motivations and developing an institutional and procedural arrangement for collaboration (Hafer, 2018). Their key role in developing capacities for joint action with shared knowledge, expertise, and resources is widely acknowledged (Emerson et al., 2011; Therrien & Normandin, 2020).

3. Data and methods

3.1. Data

In February 2020, at the height of the nationwide mobilization to control the COVID-19 outbreak, which had started in Wuhan City (Hubei Province) and quickly spread across the country, we conducted a large-scale questionnaire survey of community workers (i.e., chairs and members, as well as hired socialworkers in neighborhood residents' committees), selected from 20 sub-districts in six Chinese cities. The purpose of the survey was to understand the real-time experiences and perceptions of community workers regarding grassroots level mobilization and collaboration efforts during the critical stage of the pandemic control. At the time of the survey, it was impossible to conduct a probability sampling because most community workers were working around the clock and not available to participate in the survey, and because the stay-at-home policies prevented the authors from taking

field research travels and conducting face-to-face interviews.

Given these unique circumstances, we adopted a multi-stage, snowball sampling method to recruit participants for the online questionnaire survey. First, we purposefully selected six Chinese cities that were most affected by the COVID-19 outbreak outside Hubei Province.¹ The six cities included four megacities, namely Beijing, Shanghai, Guangzhou, and Shenzhen, and two other cities that were most heavily hit by COVID-19 in their respective provinces, namely Wenzhou in Zhejiang Province and Nanyang in Henan Province. Though not statistically representative of all Chinese cities, these sample cities represent cities of diverse location, population size, economic structure, and administrative hierarchy. Moreover, they were all main destinations for Wuhan's out-flow population during China's Spring Festival, and thus faced the greatest risk of a COVID-19 outbreak in January–February 2020 (Table 1).

Second, we selected two to five sub-districts in different locations (inner city vs. suburbs) in each city. While following the stay-at-home orders, we managed to obtain access to a total of 20 sub-district governments, mostly through our contacts and key informants in the selected cities. Finally, assisted by sub-district government officials, we distributed the survey by sending specifically designated links to the online survey instrument to a maximum of 50 residents' committee staffers in each of the 20 sub-districts we surveyed.

We acknowledge possible selection bias associated with the non-probability sampling method. This was the only feasible, though by no means most ideal, approach to respondent recruitment as we were trying to capture real-time experiences of frontline community workers during the most difficult time of COVID-19 responses in China. Nonetheless, we adopted several strategies to minimize the potential selection bias. First, we maximized the diversity of sub-districts in geographical location and demographic structure, selected from a diverse group of cities. Second,

¹ We deliberately chose not to include Wuhan, the epicenter of the outbreak, in our study. We thought that it would be unethical and unfeasible to impose on community workers the additional burden of participating in the survey while already being under enormous pressure to stop the community transmission of the virus in the city.

Table 1
Characteristics of case cities.

	Permanent population (10,000 persons)	Pct. migrant population (%)	Pct. population in-flow from Wuhan in total Wuhan's out flow population ¹ (%)	Number of COVID-19 cases (as of March 19th 2020)	Number of COVID-19 cases (per 10, 000 persons)	Number of surveyed sub-districts
Beijing	2153.60	36.88	0.88	480	0.22	4
Shanghai	2428.14	40.13	0.67	371	0.15	5
Guangzhou	1530.59	64.90	0.50	359	0.24	3
Shenzhen	1343.88	62.80	0.49	427	0.33	2
Wenzhou	830.55	32.11	0.21	504	0.54	4
Nanyang	1003.16	0.35	0.69	156	0.16	2

Note: The migration data is from Baidu Map (<http://qianxi.baidu.com/>), which records traveling data from January 10th (the beginning of China's Spring Festival) to January 23rd (Wuhan's lockdown).

based on our preliminary interviews, there are typically 10–20 staff members in one neighborhood residents' committee. Therefore, we decided to recruit 50 respondents in each sub-district to ensure that our respondents came from a diversity of neighborhoods and represented community workers of different age cohorts and in different positions in residents' committees. Third, as a robustness check in the empirical analysis, we adopted weighted regression models to partially address the overrepresentation of megacity residents in the sample.

The survey finally yielded 820 valid samples out of a total of 910 returned questionnaires, with a valid response rate of 90.1%. The majority of our survey respondents were female (65.0%), reflecting the overall gender composition of residents' committee staff. Moreover, 17.3% of the respondents were chair or vice-chair of their residents' committees, whereas 60% were hired social workers (see Table 2 for the socio-demographic profile of the respondents).

3.2. Dependent variable: perceived effectiveness of collaboration

Evaluating governance collaboration is challenging because of the difficulty in operationalizing and measuring the effects, impacts, or outcomes (Emerson et al., 2011; Li et al., 2019). Assessing the outcomes of neighborhood collaborative governance during the COVID-19 pandemic was even more difficult since the outbreak had not been fully contained at the time of our survey, and indeed the pandemic is still far from over in the world. Therefore, we did not attempt to assess the outcomes or impacts of collaborative governance (for instance, in terms of a reduced number of confirmed COVID-19 cases in the neighborhood). Rather, we chose to assess, from the perspective of community workers, the perceived effectiveness of the ongoing multi-stakeholder collaborative relationship within the neighborhood in terms of collectively containing the coronavirus during this unprecedented public health crisis.

Our dependent variable in the study, *perceived effectiveness of neighborhood collaboration*, was captured by a question in the survey asking

Table 2
Summary statistics of sample structures (N = 820).

Variable	Value	N	Pct.
Gender	Male	287	35.0%
	Female	533	65.0%
Age	Mean = 37.9		
	(SD = 9.1)		
Position	Residents' committee Chair/Vice-Chair	142	17.3%
	Residents' committee member	186	22.7%
	Ordinary workers	492	60.0%
Neighborhood location	City center	404	49.3%
	Suburb	416	50.7%
City	Beijing	192	23.4%
	Shanghai	206	25.1%
	Shenzhen	94	11.5%
	Guangzhou	110	13.4%
	Wenzhou	142	17.3%
	Nanyang	76	9.3%

each respondent to rate, on a 0–10 scale, the effectiveness of neighborhood collaborative responses in containing COVID-19, with a score of zero representing least effectiveness, and 10 representing maximum effectiveness. We acknowledge that solely relying on the survey to capture perceived collaborative effectiveness may introduce measurement bias because community workers were likely to give favorable assessments to their work. While distributing the online survey instrument, we ensured that our respondents understood the anonymity of their answers by sending specifically designated links and by purposively omitting questions about the neighborhoods where they worked. Additionally, we followed previous studies (e.g., Li et al., 2019) and performed the Harman's single factor test to check the estimated variance for the models (Harman, 1976). The variance explained was 26.8%, suggesting the common source bias was not an issue with the independent and dependent variables.

3.3. Independent variables

There are two sets of key independent variables: neighborhood social capital and hierarchical steering (refer to Table 3 for descriptive statistics).

Neighborhood social capital was captured by three variables: social trust, civic engagement, and community participation in COVID-19 responses. First, *neighborhood social trust* was measured by a Likert-scale question asking the respondent's level of agreement with the statement that "residents in my neighborhood maintain good trust and provide mutual assistance to each other", with a value of 1 indicating total disagreement and 5 indicating total agreement. Second, *neighborhood civic engagement*, measured by a similar Likert-scale question, referred to the perception that "residents in my neighborhood care and actively participate in neighborhood public affairs". Third, we included *perceived lack of community participation*, a binary variable measuring whether a respondent perceived a lack of participation by citizens and organizations in the neighborhood during the COVID-19 responses. We expected

Table 3
Summary statistics of key independent variables.

Variable name	Variable type	Mean	SD	Min	Max
Neighborhood social trust	Ordinal (1–5)	4.40	0.76	1	5
Neighborhood civic engagement	Ordinal (1–5)	4.30	0.82	1	5
Lack of community participation	Binary (0/1)	19.9%	/	0	1
Perceived priority	Ordinal (0–10)	9.43	1.22	0	10
Perceived pressure	Binary (0/1)	41.6%	/	0	1
Lack of incentives	Binary (0/1)	41.1%	/	0	1
Perceived government support	Mean value of three ordinal questions (1–5)	3.70	1.07	1	5
COVID case	Binary (0/1)	38.9%	/	0	1
Perceived uncertainty	Binary (0/1)	20.2%	/	0	1
Perceived difficult of virus control	Ordinal (0–10)	8.66	1.83	0	1

to find a higher level of perceived collaboration effectiveness alongside greater social trust and civic engagement in the neighborhood, and lower collaboration effectiveness alongside a perceived lack of community participation.

Hierarchical steering was captured by four variables, namely perceived priority, accountability, incentives, and the support that neighborhoods received from the city government while fighting the COVID-19 pandemic. First, *perceived priority* referred to community workers' perceptions regarding the upper-level government's prioritization of the fight to contain COVID-19, with the score ranging from zero (indicating no priority at all) to 10 (indicating the highest level of prioritization). Second, *perceived pressure* reflected whether community workers perceived excessive pressure from government oversight and accountability. Third, *lack of incentive* referred to whether the survey respondents felt that insufficient incentives were being provided by the upper-level government. Fourth, *perceived support* reflected the perceived level of support which neighborhoods were receiving from the upper-level government to fight the COVID-19 pandemic. This was measured in terms of the mean value of three Likert-scale questions asking about the extent to which a respondent agreed that the neighborhood was receiving sufficient support from the upper-level government in relation to personnel, supplies, and public health professional assistance.

3.4. Control variables

We first controlled for the possible effects of the perceived crisis level. Collaboration across boundaries becomes inevitable during emergency events, especially in urban settlements (Kapucu, 2012; Parker et al., 2020; Therrien & Normandin, 2020). A greater risk of COVID-19 transmission, as well as a higher uncertainty associated with the risk, can generate a greater willingness among multiple stakeholders to collaborate on finding collective solutions (Emerson et al., 2011). Therefore, we included three variables to capture the crisis level: whether there was any positive case reported in the neighborhood (*COVID case*), whether the respondent perceived the virus' spread to be too rapid to control (*uncertainty*), and whether there was a perceived difficulty in containing the virus in the neighborhood (*difficulty*), ranging from zero (not difficult at all) to 10 (extremely difficult).

Finally, we controlled for the respondent's socio-demographic features, including age, gender, and position (1 = leader in the residents' committee), as well as the hierarchical status of the city (1 = megacity) and the location of the sub-district (1 = inner city) to investigate whether the perceived effectiveness of neighborhood collaborative governance varied across cities and locations.

4. Empirical findings

4.1. Descriptive statistics

As shown in Fig. 2, the average perceived effectiveness of neighborhood collaboration was 8.95, indicating a rather high level of perceived effectiveness among all community workers in our sample. The vast majority of the respondents (97.2%) described it as relatively effective (6–10), while 47.2% described the effectiveness as maximum (10). Note that the numbers may not reflect an objective assessment of the actual effectiveness of collaboration governance in urban neighborhoods in China. Nevertheless, the survey allowed us to compare frontline community workers' real-time perceptions of neighborhood collaborative governance across residential locations and city sizes.

As shown in Fig. 3, no significant difference was found in the mean values of perceived effectiveness between community workers of inner-city neighborhoods and those of suburban neighborhoods. But perceived effectiveness is significantly different across six case cities, with megacities having overall lower levels of average perceived effectiveness than the other two cities. Nanyang had the highest level of perceived

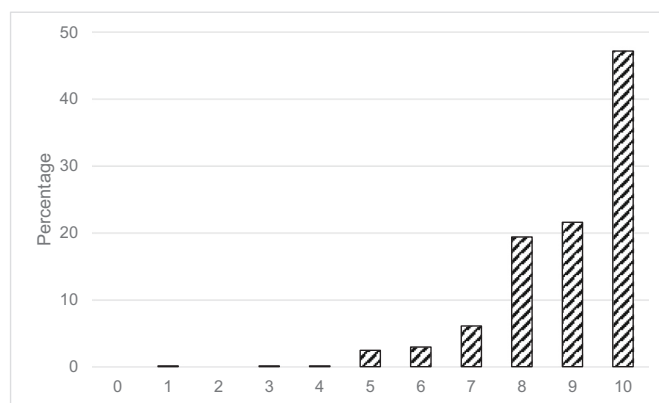


Fig. 2. Perceived effectiveness of neighborhood collaboration (0 = the least effective, 10 = the most effective).

effectiveness (with a mean value of 9.26), while reporting one of the highest levels of neighborhood social trust, civic engagement, and government support but the lowest level insufficient incentives from the government (see Table 4). In contrast, respondents from Guangzhou reported the lowest level of perceived effectiveness (8.55; see Fig. 3), but also the lowest level of government support and the highest levels of perceived pressure and lack of incentives from the government.

An interesting contrast can also be found among the four megacities: respondents from Guangzhou and Shenzhen, both in Southern China, reported lower levels of perceived effectiveness than Beijing and Shanghai (Fig. 3), although Guangzhou and Shenzhen did not necessarily face a greater risk of COVID-19 spreading or population inflow from Wuhan (shown in Table 1). Further comparisons (see Table 4) showed that respondents in Beijing and Shanghai reported relatively higher levels of neighborhood social trust and civic engagement than respondents from Shenzhen and Guangzhou. By contrast, higher percentages of respondents in Shenzhen and Guangzhou perceived excessive pressure while insufficient incentives from the government. Nonetheless, these findings may not be conclusive and we further adopt multivariate regression analysis to determine to what extent these factors may explain the variance in the perceived effectiveness of neighborhood collaboration among community workers.

4.2. Regression results from the full-sample models

We conducted multiple linear regression analyses to estimate the effects of neighborhood social capital and hierarchical steering on perceived collaborative effectiveness (refer to Table 5 for model results for the full sample analyses). Model 1 included only the two sets of independent variables, i.e., neighborhood social capital and hierarchical steering factors. Model 2 further included the three sets of control variables, namely crisis levels, respondent's socio-demographic features, and neighborhood locational features. As robustness checks, we ran weighted regression with weights proportional to the size of the permanent urban population to address the selection bias from non-probability sampling (results were shown in model 3). Additionally, we ran an ordinal logistic regression analysis, treating the dependent variable as an ordinal variable (model 4). We employed the cluster-robust estimator approach—with estimations of standard errors clustered by sub-district—to account for the nested nature of the survey data, in which individual respondents were clustered in the 20 sub-districts we surveyed. All models show largely consistent results, indicating an overall robustness of the empirical findings.

In all four models, coefficients for neighborhood social trust are positive but insignificant (Table 5). Civic engagement was also positive, but only significant on 0.05 level in model 1 ($B = 0.169$), when control variables were not included. Rather, a community worker tended to

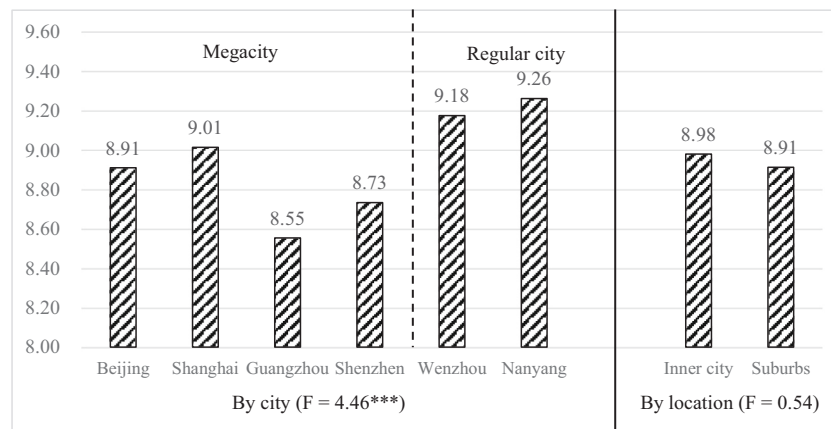


Fig. 3. Perceived effectiveness of neighborhood collaboration by city and by location.

Table 4
Comparing key independent variables among six case cities.

Variable name	NY	WZ	SH	BJ	SZ	GZ	F-statistics/Chi-square
Neighborhood social trust ^a	4.54	4.24	4.45	4.47	4.28	4.38	2.75**
Neighborhood civic engagement ^a	4.38	4.26	4.40	4.34	4.05	4.21	2.99**
Lack of community participation ^b	15.8%	21.8%	17.5%	24.5%	14.9%	20.9%	1.20
Perceived priority ^a	9.31	9.48	9.46	9.49	9.62	9.09	2.49**
Perceived pressure ^b	34.2%	33.8%	33.5%	38.5%	60.6%	60.9%	8.89***
Lack of incentives ^b	25.0%	40.1%	38.4%	40.6%	48.9%	52.7%	3.53***
Perceived government support ^a	3.91	3.77	3.87	3.51	3.74	3.42	4.52***

^a Reporting mean values and standard deviations and results from ANOVA tests.

^b Reporting percentages and results of chi-square tests.

*** p < 0.001.

** p < 0.01.

Table 5
Regression results on the effectiveness of neighborhood collaboration across six cities in China.

	Model 1		Model 2		Model 3 (weighted)		Model 4	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Neighborhood social trust	0.046	0.079	0.051	0.079	0.096	0.096	0.149	0.131
Neighborhood civic engagement	0.169*	0.075	0.131	0.098	0.079	0.095	0.250	0.164
Lack of community participation	-0.271**	0.096	-0.280*	0.101	-0.266*	0.118	-0.353*	0.159
Perceived priority	0.477***	0.032	0.449***	0.075	0.470***	0.065	0.851***	0.124
Perceived pressure	-0.136	0.083	-0.128	0.089	-0.143	0.088	-0.219	0.157
Lack of incentives	-0.054	0.085	-0.035	0.086	-0.090	0.087	-0.168	0.16
Perceived government support	0.147**	0.044	0.168**	0.046	0.190***	0.053	0.307**	0.106
COVID case			0.159 ⁺	0.082	0.146 ⁺	0.081	0.332 ⁺	0.166
Perceived uncertainty			-0.123	0.078	-0.144	0.098	-0.101	0.200
Perceived difficulty			0.082*	0.032	0.088**	0.026	0.172***	0.054
Age			0.015**	0.004	0.016***	0.004	0.033***	0.009
Female			0.000	0.055	-0.020	0.077	-0.095	0.104
Leader			-0.056	0.123	-0.043	0.105	-0.179	0.225
Inner-city location			-0.042	0.090	-0.078	0.080	-0.084	0.177
Megacity			-0.370***	0.087	-0.359***	0.090	-0.739***	0.174
Constant	3.111***	0.348	2.418**	0.690	2.131***	0.594	0.149	0.131
N	820		820		820		820	
R ²	0.338		0.379		0.402		/	
Log likelihood	/		/		/		-954.946	

Note: Models 1–3 report results from multiple linear regression and model 4 report results from ordinal logistic regression, with standard errors clustered by sub-district in all models.

*** p < 0.001.

** p < 0.01.

* p < 0.05.

⁺ p < 0.1.

perceive less effective neighborhood collaboration in coronavirus responses if he or she perceived a lack of community participation in the joint efforts, with all control variables held constant (B = -0.280, p < 0.05, model 2).

These findings indicate that, rather than simply forging neighborliness and trustworthiness among residents, having strong citizen engagement in public affairs, particularly in a crisis situation, is a key internal determinant to more effective joint efforts to fight a public

health crisis. The finding also echoes previous observations that widespread mobilization of the general public was a critical part of China's early success in controlling the virus spread (China Watch Institute, 2020). Residents were mobilized to follow the health care guidelines (e.g., wearing masks, temperature checking) and comply with the quarantine or lockdown measures. In addition, community-based organizations and community volunteers provided residents' committees with critical personnel support and resources for residents' committee (Cheng et al., 2020).

Among the four hierarchical steering variables, neither perceived pressure or lack of incentive significantly predicted more effective neighborhood collaboration in fighting the coronavirus pandemic: the coefficients were negative but insignificant (Table 5). This is interesting given that much of the policy debate has been centered around providing more incentives (i.e. monetary compensation or career development) for community workers along with sufficient oversight and accountability. Our survey data indicated that the incentive-accountability mechanism may not necessarily enable community workers to coordinate better horizontal collaboration in the neighborhood.

Instead, hierarchical steering was more effective in facilitating collaborative governance in the neighborhood by setting up a clear policy priority and providing sufficient support to local community workers. All else equal, a one-unit increase in perceived priority contributed to collaborative response effectiveness by 0.449 ($p < 0.001$, model 2; see Table 5). A community worker also tended to perceived a higher level of collaborative effectiveness if he or she perceived to have received more support from the government ($B = 0.168$, $p < 0.01$, model 2).

As we expected, perceived problem severity regarding the coronavirus transmission tends to contribute to more active collaboration among neighborhood stakeholders (Table 5). A community worker tended to perceive a higher level of collaborative effectiveness if there have been positive COVID-19 cases reported in the neighborhood ($p < 0.1$ in model 2 and model 3, and $p < 0.05$ in model 4), and if he or she perceived a greater challenge of the pandemic control facing the neighborhood ($p < 0.05$ in model 2, $p < 0.01$ in model 3, and $p < 0.001$ in model 4). Although perceived uncertainty of the virus spread was insignificant, the findings in general confirmed previous findings that greater risk perception associated with a crisis situation leads to more

effective collaboration in responses (McGuire & Silva, 2010).

Among other control variables, it is not surprising to find respondents of an older age tended to report a higher performance of neighborhood governance in the pandemic (Table 5). Furthermore, regression results confirmed findings from the descriptive analysis that, on a 0.001 significance level, community workers in megacities perceived a lower level of collaborative effectiveness during the COVID-19 responses than in regular cities, whereas the difference was not significant between inner-city and suburban locations. The difference by city size may result from the higher population density and mobility in megacities, which tended to complicate the responses to a pandemic crisis. It may also reflect the intense challenge in megacities, where more dynamic urban transformation and greater population heterogeneity within and across neighborhoods have made collaboration among diffused interests more difficult.

4.3. Geographical differences

We further explored possible geographical heterogeneity with respect to the determinants of collaborative effectiveness in the neighborhood responses to COVID-19. Table 6 presents results of separate linear regression models for subsamples in megacities (model 5), inner-city neighborhoods (model 6), and suburban neighborhoods (model 7).

In all three models, perceived collaborative effectiveness was predicted by the same set of hierarchical steering variables across different geographical locations as in the full sample model. In other words, whether in a megacity, an inner-city neighborhood, or a suburban neighborhood, local community workers tended to perceived a significantly higher level of collaborative effectiveness in cases of higher perceived priority and government support, but not incentives or pressure (Table 6). It was noted that the effects of hierarchical steering factors exhibited greater significance to the collaboration effectiveness in megacity neighborhoods samples ($p < 0.001$, model 5) than in rest samples.

On the other hand, model results in Table 6 also indicated heterogeneous effects of neighborhood social capital variables on collaborative effectiveness in different locations of neighborhoods. In fact, none of the neighborhood social capital variables was significant in the model for inner-city respondents, whereas lack of community participation was significant and negatively associated with collaborative effectiveness

Table 6
Results from separate regression models for megacity samples, inner city samples, and suburban samples.

	Model 5 (megacity sample)		Model 6 (inner-city sample)		Model 7 (suburban sample)	
	B	S.E.	B	S.E.	B	S.E.
Neighborhood social trust	0.083	0.079	0.052	0.112	0.038	0.119
Neighborhood civic engagement	0.152	0.133	0.101	0.165	0.114	0.116
Lack of community participation	-0.202	0.128	-0.161	0.147	-0.329*	0.113
Perceived priority	0.483***	0.092	0.436**	0.111	0.480**	0.103
Perceived pressure	-0.169	0.107	-0.162	0.149	-0.043	0.113
Lack of incentives	-0.091	0.095	-0.041	0.119	-0.034	0.149
Perceived government support	0.222***	0.048	0.211**	0.063	0.156*	0.052
COVID case	0.103	0.100	0.303*	0.096	-0.004	0.085
Perceived uncertainty	-0.173	0.099	-0.168	0.125	-0.123	0.085
Perceived difficulty	0.097***	0.042	0.021	0.037	0.154**	0.042
Age	0.017**	0.005	0.013**	0.003	0.016+	0.008
Female	-0.041	0.068	0.096	0.075	-0.090	0.064
Leader	-0.067	0.132	0.108	0.114	-0.156	0.202
Inner-city location	-0.106	0.108	/	/	/	/
Megacity	/	/	-0.498***	0.051	-0.217	0.120
Constant	1.222+	0.618	3.044*	1.016	1.637+	0.810
N	602		404		416	
R ²	0.414		0.406		0.384	

Note: Standard errors were clustered by sub-district in all models.

- *** $p < 0.001$.
- ** $p < 0.01$.
- * $p < 0.05$.
- + $p < 0.1$.

perceived by suburban respondents. It possibly indicated a more important role of neighborhood participation in forging better neighborhood governance in suburban areas.

5. Conclusions

COVID-19, as the biggest public health crisis in a century, has presented a unique opportunity to revisit the functioning and performance of collaborative neighborhood governance in a crisis response situation. In this paper, we drew from the theory of collaborative governance and the literature on China's urban governance to investigate the determinants of neighborhood-scale collaborative efforts to control the pandemic in six Chinese cities. We focused on the real-time experiences and perceptions of frontline community workers, who played a key coordinating role in the community-level pandemic responses in China. We believed that this study contributed to the scholarly knowledge of the transitional urban governance in China, and more generally, to the international literature on the horizontal and hierarchical dynamics underlying neighborhood governance, particularly in a crisis situation.

Our findings confirmed the role of civic engagement in the effective collaborative neighborhood governance, as have been argued in the existing literature (Cooper et al., 2006; Frieling et al., 2012). Active citizen participation is a critical component of neighborhood governance and key to its success in crisis responses. Our statistical analysis based on a multi-city survey also revealed that, in China, the effect of citizen participation was more salient in suburban locations than central locations to foster a collaborative neighborhood governance.

Our empirical analysis also highlighted the important roles of hierarchical steering by public authorities in facilitating horizontal collaboration, which was not only a unique feature in China's neighborhood governance (Li et al., 2020; Wu, 2018) but also a factor that has attracted growing interest from Western scholars (e.g., Hafer, 2018; Maloney et al., 2000; Therrien & Normandin, 2020). Our survey research confirmed that frontline community workers would report greater effectiveness in neighborhood collaboration to fight against the pandemic if city and sub-district governments set up clear policy priorities and provided critical support. The effects of hierarchical steering were overtly seen in megacities where high residential mobility had already imposed greater challenges on forming collaborative partnerships within neighborhoods.

The above findings provide important policy implications as well. First, although much scholarly knowledge has been produced on neighborly interactions and trustworthiness in urban China, civic engagement – the willingness of residents to engage in neighborhood public affairs – rather holds to be the key to more effective neighborhood governance. Local governments' community building campaigns should strive to provide opportunities, venues, platforms, and even techniques to encourage more citizen participation in collective decision-making within neighborhoods, thereby cultivating the level of “civic-ness” that can transform into active community participation in joint crisis responses. Government in suburban districts in particular need to foster civic engagement and citizen participation in neighborhood public affairs. Second, the state has an important steering role in neighborhood collaborative governance, particularly during crisis responses. But hierarchical steering should focus more on setting up a clear policy priority and providing sufficient support, while avoiding adding unnecessary oversight and burden on community organizations such as residents' committees. This is specifically important for the collaborative neighborhood governance in megacities where the public health challenge is relatively severe.

This research has several limitations, largely because the travel restrictions during the pandemic prevented us from conducting in-depth field observations. We had to resort to the online questionnaire survey as an instrument for collecting real-time data as the grassroots mobilization was well underway in February 2020. Nevertheless, our measurement of the effectiveness of neighborhood collaboration may be

superficial and potentially biased, and we were not able to control more objective measures of neighborhood characteristics in our model. We made our best efforts to conduct informal interviews with community workers before, during, and after the survey, as well as rely on media reports and our own participant observations while living through the pandemic in various Chinese cities, in order to both inform our research design and interpret model results. Nonetheless, our cross-sectional survey data can only help us determine the correlations of key variables. We hope that, with the pandemic largely under control and travel restrictions lifted in China, future research may focus on more in-depth interviews of both residents' committees and other stakeholders to understand how collaborative efforts were organized within neighborhoods and promoted by various internal and external conditions.

CRedit authorship contribution statement

Zhilin Liu: Conceptualization; Formal analysis; Funding acquisition; Investigation; Project administration; Writing - original draft & review.

Sainan Lin: Formal analysis; Investigation; Visualization; Writing - original draft & review.

Yue Shen: Formal analysis; Investigation; Visualization; Writing - original draft & review.

Tingting Lu: Formal analysis; Funding acquisition; Investigation; Methodology; Writing - original draft & review.

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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