

# A large-scale field experiment on participatory decision-making in China

Received: 2 October 2023

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Accepted: 22 July 2024

Published online: 26 August 2024

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Can local democratic decision-making in authoritarian environments increase or pacify civic engagement and government accountability? Here we conducted an intervention reaching over 20 million people in China. Communities were randomly assigned such that citizens in treatment communities were invited to deliberate and make collective decisions on how local community budgets were allocated through both in-person and online communication channels (participatory budgeting). We find that participatory decision-making in community budgeting increased a wide range of civic-engagement behaviours outside of the budgeting domain 6 months after the start of the intervention. Residents in treatment communities reported more need for improvement from the central government, providing a potential foundation for seeking accountability from the authoritarian regime. These changes were accompanied by a more positive societal outlook and increased satisfaction in the country's policies.

Annually, hundreds of millions of dollars are spent on initiatives encouraging citizens in developing countries to engage in civic actions and voice opinions to their governments about local performance and public service delivery<sup>1–3</sup>. Citizen participatory channels are designed to increase civic participation and improve policy-making but the introduction of these channels in authoritarian regimes may ease the pressure for broader change, thus increasing authoritarian resilience<sup>4,5</sup>. Here, we develop and test an intervention that is designed to address tensions on democratic resistance to authoritarian regimes. Broadly, we ask: do particular forms of local participatory institutions in authoritarian regimes help to build democratic engagement in the mass public or pacify further actions and demands for democracy?

Whether citizens' direct participation in localized decision-making can improve citizen engagement and government accountability in non-democratic political environments is at the centre of academic debates<sup>1,6–14</sup>. Some theories point to the benefits of localized participation. For example, citizens can develop a sense of agency by sharing a granular knowledge of their local communities that governments find almost impossible to develop<sup>15–17</sup>. Once citizens have a voice and agency with respect to the government, they may feel they can demand accountability from it. In contrast, partial democratic reform at the local level may reduce citizen demands for more

meaningful changes<sup>18,19</sup>. Contrary to the optimistic theoretical predictions, many 'community-driven development' or 'social accountability' programmes fail to have an impact on increasing citizen engagement and government accountability due to a lack of sensitivity to contexts<sup>3</sup>.

A growing area of political and behavioural sciences examines political behaviour in authoritarian environments and has uncovered key political processes such as responsiveness, censorship, propaganda, surveillance and repression<sup>5,19–22</sup>. Such work has advanced our understanding of hidden political actions in non-democratic contexts, particularly how authoritarian politics may impose social and political control and the effects of these measures on citizens' public opinion and participation. Despite the growing interest in the topic, our understanding of citizens' political and civic behaviours in authoritarian regimes is relatively limited<sup>3</sup>, partly because of the difficulty in measuring and identifying the causal drivers of civic behaviours under conditions of fear, risk and uncertainty.

In this Article, we assess the extent to which the building blocks of responsive citizenship, namely, broad civic engagement and government accountability seeking, are being established or weakened by local participatory decision-making. Here, we define participation as having both the option to voice and the option to engage in collective decision-making that may directly influence policy outcomes.

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We provide causal evidence by drawing from a unique field experiment on local participatory decision-making in community budgeting (known as participatory budgeting), reaching over 20 million residents in a megacity in China. We aim to assess citizens' democratic attitudes and behaviours—their ability to demand improvement from the government and their broader civic engagement in society—6 months after the start of the intervention initiated by the local government. We argue that China presents a particularly interesting context for studying the generative power of local participatory decision-making. Specifically, China is home to an authoritarian regime in which the scope of civil and political actions is limited and the central government harbours an extremely high level of satisfaction, much more so than the local government<sup>3,23</sup>. Thus, China presents a challenging case for studying political and civic behaviour and accountability seeking from the central government.

An extensive body of literature has examined participatory budgeting, in which citizens are directly involved in deciding how local communities spend their resources<sup>24–27</sup>. Participatory budgeting started in Brazil in the late 1980s and has been adopted by at least 11,000 municipalities across 6 continents<sup>14,24</sup>. Despite attracting global attention, previous researchers point out that only a few causal evaluations of participatory budgeting have been conducted for the case of Brazilian municipalities<sup>28,29</sup>. Specifically, participatory budgeting channelled larger fractions of public budgets towards investments in high-priority services for citizens, such as sanitation and healthcare, thereby reducing infant mortality rates<sup>29</sup>. The first experimental evaluation<sup>29</sup> showed that participatory budgeting increased citizen participation and local tax revenue collection, channelled larger fractions of public budgets to services identified as top priorities by citizens, and increased citizens' satisfaction with public services. Although existing research mostly examined the influence of participatory budgeting on public-goods provision and development outcomes, little attention has been focused on the potential transfer of social learning in other contexts unrelated to budgeting.

Writings within political philosophy have long theorized how local participatory practices can educate and socialize individuals to be socially responsible citizens<sup>30</sup>. Theorists contend that necessary individual qualities underlying national participation and universal suffrage have to be fostered and developed at the local level because it is by participating at the local level that an individual 'learns democracy'<sup>31,32</sup>. Related, a 'spillover hypothesis' is proposed in which local participation in one's daily occupations (such as workplaces and communities) serves as a vehicle for democratic citizenship by building more 'political efficacy' among citizens, which can subsequently lead to more participation in other domains<sup>11,17,33,34</sup>. Empirical, particularly causal, evidence in this area is scarce. Recent studies<sup>16,17</sup> present field experimental evidence that local workplace participation can lead to long-term changes in societal attitudes towards generalized authority and justice in both China and the United States. These findings suggest that meaningful local participation—rehearsing having more authority in social groups in which one is embedded and identifies with—may fundamentally shift people's world-view, even when these local experiences stand in contradiction to the society's governing context. Once citizens collectively experience having a voice and agency with respect to their local community governance, they may raise their expectations for having a voice and feel empowered to demand accountability from an authoritarian regime.

In this research, we predict that individuals will increase their broader civic participation when they collectively experience participatory decision-making with their local community members. The collective participation experience, when perceived as legitimate and coming from a shared identity, will increase the general satisfaction with decision outcomes and with the focal authority<sup>17,35</sup>. However, citizen participants may use their focal experience of community participation as a reference point to make inferences about the normative

**Table 1 | Primary behavioural and attitudinal outcomes**

Behavioural outcomes	
(1)	Participate in or pay attention to policy-related meetings
(2)	Express personal views to government or government officials
(3)	Express personal views through media
(4)	Vote in neighbourhood committee elections
(5)	Participate in government-approved marches or demonstrations
(6)	Petition (including writing letters and in person)
(7)	Donate blood
(8)	Donate money or resources
(9)	Do volunteer work
Attitudinal outcomes	
(1)	Central and local government
How much improvement is needed for each of the following items (ranging from 1 for no improvement needed to 4 for a lot of improvement needed)?	
(1.1)	Central government
(1.2)	Local government
(2)	Societal outlooks
(2.1)	To what extent are you generally satisfied with the country's policies?
(2.2)	How would you rate the overall economic condition of your city today?
(2.3)	To what extent do you feel pride for being a resident of your city?
(3)	Voice
(3.1)	The government cares about the voice of people like me
(3.2)	People like me do not have a say in what the government does

level of participation in broad societal domains. If the level of voice or participation allowed in a broad domain is lower than citizens' focal experiences in their community, citizens' satisfaction towards the broad authority and justice may lower<sup>16</sup>. In other words, we predict that people's experience of participation to be generative across domains and may transform their sense of voice and accountability-seeking behaviour beyond the local community.

To test these predictions, we designed a new community-based citizen participation procedure in the public-budgeting domain in China as part of the local government initiatives, which allowed local citizens to voice their opinions and participate in the collective decision-making process regarding the public-budgeting plan of the local government. Unlike previous development projects in other countries, this intervention is a locally designed process embedded in communities' political and administrative structures, without international aid, and perceived as coming from within. Specifically, we paired local communities in the city based on their characteristics and randomly assigned one of each paired community to a treatment group and the other to a control group. Residents in treatment communities were invited to participate in budgetary decision-making by deliberating and voting for how the local community budget should be allocated. We measured citizens' civic attitudes and behaviour and their general societal outlooks in a representative sample of 7,851 residents during the same period across communities (see Supplementary Table 1 for demographic details of participants). Table 1 shows the behavioural and attitudinal outcomes measured.

## Results

For the main analysis, we estimated the average treatment effect on each self-reported behavioural and attitudinal outcome, controlling for demographic covariates while clustering standard errors at the community level (see Supplementary Information for robustness checks using

**Table 2 | Balance check for individual characteristics**

	Dependent variable: condition
Sex: women	-0.069 (0.103)
Age (years)	0.003 (0.010)
Education (levels)	0.010 (0.086)
Occupation: IT	0.036 (0.370)
Occupation: clerk	-0.112 (0.400)
Occupation: farming	0.253 (0.662)
Occupation: service	0.429 (0.414)
Occupation: manufacturing	0.608 (0.484)
Occupation: military	-0.741 (0.917)
Occupation: unemployed	0.584 (0.495)
Occupation: retired	0.558 (0.451)
Occupation: student	0.311 (0.413)
Communist Youth League affiliation	-0.477 (0.386)
Chinese Communist Party affiliation	0.175 (0.256)
Other party affiliation	0.186 (1.200)
Household income (levels)	0.117 (0.129)
Constant	-1.056 (1.036)

Sex, occupations and party affiliations are coded as dummy variables where 1 = yes and 0 = no. \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

**Table 3 | Balance check for community characteristics**

	Dependent variable: condition
Urban	16.785 (2,399.545)
Population	-0.00001 (0.00004)
GDP per district	-0.0001 (0.0001)
Km to center	-0.054 (0.041)
House price per m <sup>2</sup>	0.0002 (0.0001)
Constant	-11.230 (2,399.548)

\* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

randomization inference, bootstrapping and approximate maximum influence perturbation analysis; Supplementary Table 2). See Tables 2 and 3 for balance tests. The main analysis was pre-registered except when otherwise noted as exploratory. All statistical tests reported are two tailed.

### Civic-engagement behaviours

Figure 1 summarizes the behavioural results. Residents in the treatment communities were 33.3% (4.69 percentage points) more likely to participate in policy-related meetings (95% confidence interval (CI) = [0.021, 0.073],  $P < 0.001$ ), 86.4% (5.63 percentage points) more likely to express personal views through media (95% CI = [0.036, 0.076],  $P < 0.001$ ), 14.3% (7.01 percentage points) more likely to vote in neighbourhood committee elections (95% CI = [0.037, 0.103],  $P < 0.001$ ), 73.9% (1.88 percentage points) more likely to participate in authorized marches or demonstrations (95% CI = [0.006, 0.032],  $P = 0.004$ ), 25.0% (10.73 percentage points) more likely to donate money or resources (95% CI = [0.071, 0.143],  $P < 0.001$ ) and 57.9% (12.17 percentage points) more likely to do volunteer work (95% CI = [0.092, 0.152],  $P < 0.001$ ). Residents in the treatment communities were also marginally more likely (7.7% or 2.68 percentage points) to donate blood (95% CI = [-0.005, 0.058],  $P = 0.098$ ). We did not find that they were more likely (-0.16

percentage points) to petition (95% CI = [-0.011, 0.008],  $P = 0.744$ ) or to express personal views to government or government officials (2.21 percentage points; 95% CI = [-0.004, 0.048],  $P = 0.34$ ), potentially due to the low rate of petition for residents in both the treatment and control communities.

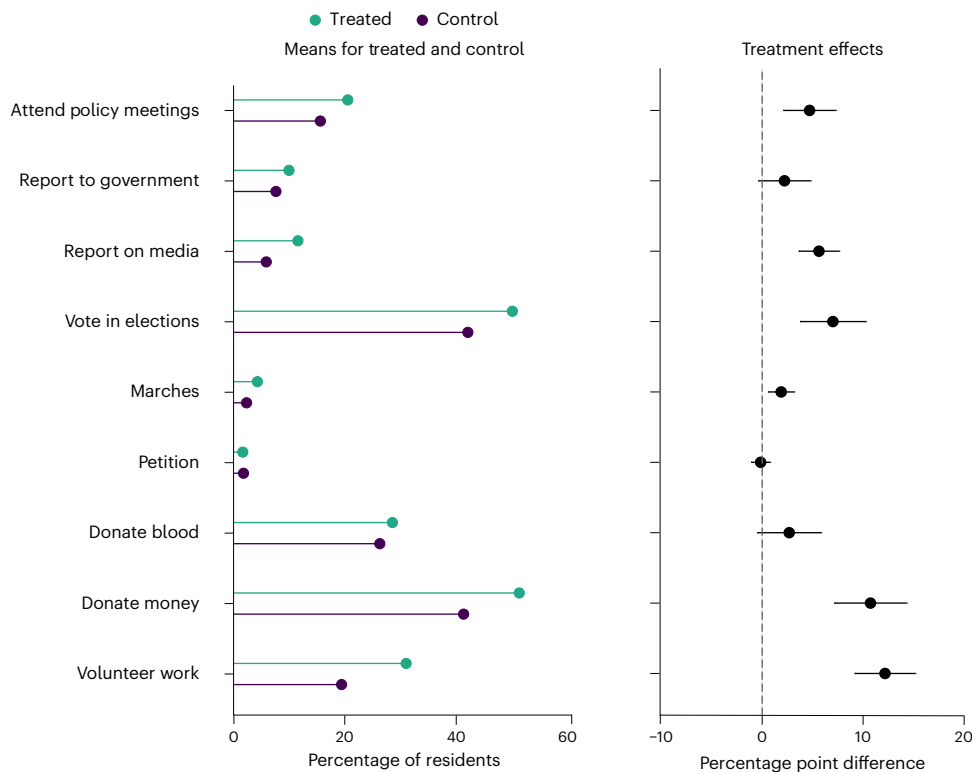
On an exploratory basis, we recruited a separate sample of Mainland Chinese participants ( $N = 200$ ) who rated the levels of perceived personal risk of each civic-engagement behaviour. The rank order of these civic-engagement behaviours from the riskiest to the least risky was as follows: petition, report to media, report to government, authorized marches, donate blood, attend policy meetings, vote in neighbourhood committee elections, donate money and do volunteer work. Interestingly, there was a significant rank-order correlation between the effect size of the behavioural change from the intervention and the perceived risk level of each behaviour (Spearman's  $r = 0.82$ , 95% CI = [0.333, 0.960],  $P = 0.011$ ). This result suggests that the intervention probably had a larger effect on the behaviours that are less risky and considered universal public goods (such as donating money and doing volunteer work) than on behaviours that are riskier in an authoritarian environment and perhaps more characteristic of democratic citizenship (such as petitioning and expressing personal opinions to media and government).

Using the original data, we then created an index of the number of civic-engagement behaviours by adding up each of the nine civic behaviours self-reported by each resident. Consistent with the results on the individual-behaviour level, residents in treatment communities were more likely to report having engaged in civic behaviours on the aggregate level than residents in the control communities (mean ( $M$ ) for treatment communities ( $M_t$ ) = 2.02, s.d. = 1.65;  $M$  for control communities ( $M_c$ ) = 1.58, s.d. = 1.46; unstandardized regression coefficient  $b = 0.55$ , 95% CI = [0.438, 0.652],  $P < 0.001$ ). Correlational analysis with residents from both treatment and control communities reveals that education level and party membership were associated with more civic-engagement behaviours (for education level,  $b = 0.17$ , 95% CI = [0.125, 0.217],  $P = 0.002$ ; for party membership,  $b = 0.92$ , 95% CI = [0.735, 1.099],  $P < 0.001$ ), whereas income level was associated with lower civic-engagement behaviours ( $b = -0.24$ , 95% CI = [-0.276, -0.197],  $P < 0.001$ ). Men were marginally more likely to engage in civic behaviours than women, although the difference was not statistically significant ( $b = 0.10$ , 95% CI = [-0.208, 0.010],  $P = 0.11$ ).

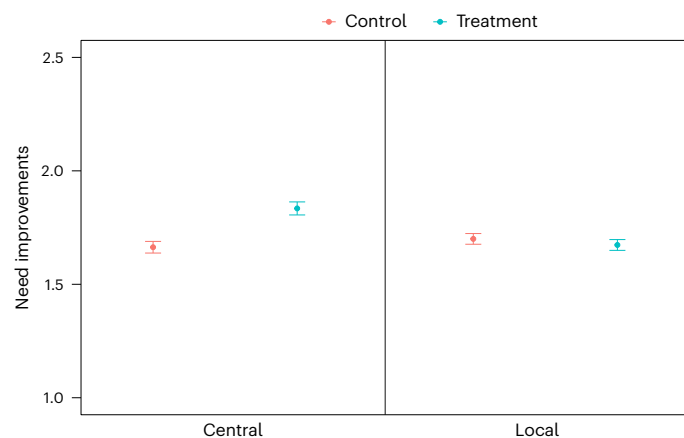
As an exploratory measure, we asked residents to report the likelihood of engaging in each of the civic behaviours in the future regardless of their past behaviours (Supplementary Fig. 1). Residents in the treatment communities were more likely to express a willingness to attend policy-related meetings ( $b = 0.06$ , 95% CI = [0.028, 0.083],  $P < 0.001$ ), vote in neighbourhood committee elections ( $b = 0.069$ , 95% CI = [0.034, 0.104],  $P < 0.001$ ), donate blood ( $b = 0.041$ , 95% CI = [0.006, 0.076],  $P = 0.022$ ) and do volunteer work ( $b = 0.143$ , 95% CI = [0.108, 0.178],  $P < 0.001$ ). Reported tendencies to engage in other civic behaviours did not differ significantly ( $P$  values  $> 0.05$ ). Next, we created an aggregate index of the number of civic behaviours residents expressed an interest to engage in in the future and found that residents in treatment communities expressed a significantly stronger likelihood of engaging in more civic behaviours in the future ( $M_t = 2.69$ , s.d. = 1.80;  $M_c = 2.45$ , s.d. = 1.84;  $b = 0.30$ , 95% CI = [0.175, 0.423],  $P < 0.001$ ).

### Need for improvement from central and local government

Similar to behaviours in civic engagement, attitudes towards government and societal outlooks also changed after the participatory decision-making intervention. The mean level of citizens' need for improvement from the central government for the whole sample of survey respondents was 1.75 out of 4 (s.d. = 0.50). The higher the score, the more improvement residents demanded from the government. This value indicates that, on average, citizens wanted a 'slight' to 'moderate' level of improvement in the functioning of the central government.



**Fig. 1 | The intervention consistently improved civic-engagement behaviours.** Left: covariate-adjusted mean outcomes for sampled residents ( $N = 7,851$ ) in treatment ( $N = 19$ ) and control ( $N = 20$ ) communities. Right: the difference between residents in treatment and control communities, with the dots indicating average treatment effects and error bars indicating 95% CIs.



**Fig. 2 | Citizens' need for improvement from central versus local government.** The intervention shifted citizens' need for improvement from the central government (ranging from 1 for no improvement needed to 4 for a lot of improvement needed). There was no difference in citizens' need for improvement from the local government. The plot shows condition means, with 95% CIs, for citizens' need for improvement from the central versus local government, comparing residents ( $N = 7,851$ ) in treatment ( $N = 19$ ) and control ( $N = 20$ ) communities.

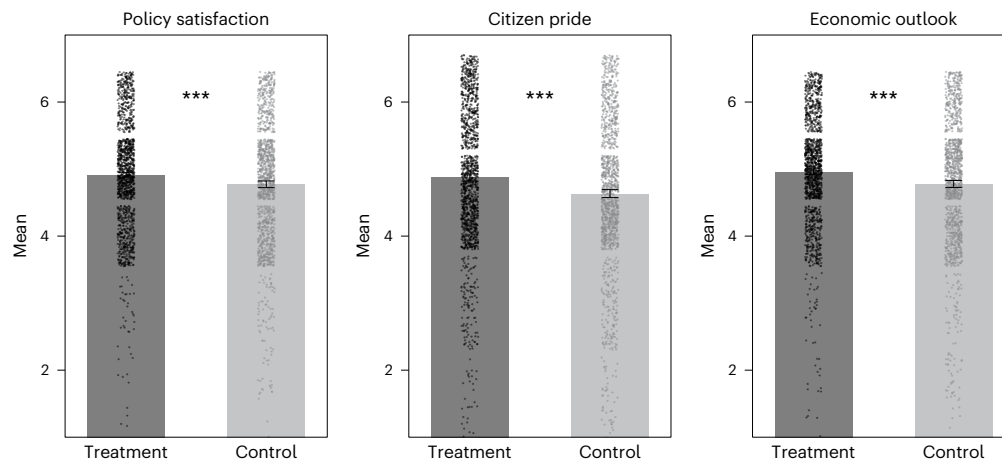
Interestingly, there was a significant difference between residents in treatment and control communities in their need for improvement from the central government. Residents in the treatment communities reported significantly higher need for improvement from the central government ( $M = 1.80$ ,  $s.d. = 0.51$ ) than did residents in the control communities ( $M = 1.61$ ,  $s.d. = 0.47$ ;  $b = 0.16$ , 95% CI = [0.091, 0.246],  $P = 0.00012$ ).

For the local government, the mean level of citizens' need for improvement for the whole sample was 1.68 out of 4 ( $s.d. = 0.47$ ). This value indicates that, on average, citizens tended to demand a slight to moderate level of improvement in the functioning of their local government. There was no significant difference in the need for improvement from the local government between citizens in the treatment communities ( $M = 1.64$ ,  $s.d. = 0.44$ ) and citizens in the control communities ( $M = 1.61$ ,  $s.d. = 0.53$ ;  $b = -0.035$ , 95% CI = [-0.102, 0.030],  $P = 0.32$ ) (Fig. 2).

**General satisfaction and voice**

The citizens' need for more improvement in the central government may not correspond to lowered satisfaction. For the general satisfaction question 'To what extent are you generally satisfied with the country's policies?', residents in treatment communities ( $M = 4.91$ ,  $s.d. = 0.82$ ) reported significantly higher satisfaction than did residents in control communities ( $M = 4.79$ ,  $s.d. = 0.92$ ;  $b = 0.12$ , 95% CI = [0.059, 0.187],  $P < 0.001$ ). Compared with the residents in the control communities, residents in treatment communities also reported significantly higher satisfaction with the overall economic condition of the city ( $M_t = 4.96$ ,  $s.d. = 0.85$ ;  $M_c = 4.83$ ,  $s.d. = 0.97$ ;  $b = 0.13$ , 95% CI = [0.059, 0.194],  $P < 0.001$ ) and significantly more pride in being a resident of the city ( $M_t = 4.96$ ,  $s.d. = 0.85$ ;  $M_c = 4.82$ ,  $s.d. = 0.97$ ;  $b = 0.16$ , 95% CI = [0.108, 0.211],  $P < 0.001$ ; Fig. 3). In addition, residents in the treated communities reported a stronger sense of voice ( $M_t = 3.97$ ,  $s.d. = 1.35$ ;  $M_c = 3.65$ ,  $s.d. = 1.41$ ;  $b = 0.33$ , 95% CI = [0.259, 0.407],  $P < 0.001$ ).

As we estimated several outcomes from the experiment, we used a joint significance test against the null hypothesis that none of the coefficients on the treatment effects from multiple regressions is significant. As predicted, there was a joint significance of the average treatment effects on all measures between citizens in the treatment condition and the control condition:  $F(1, 39) = 11.16$ ,  $P < 0.001$ .



**Fig. 3 | General satisfaction.** The charts show the condition means (on a Likert scale from 1 to 7), with 95% CIs, for residents' general satisfaction with the country's policies, pride for being a resident of the city and the perceived

economic condition of the city, comparing sampled residents ( $N = 7,851$ ) in treatment ( $N = 19$ ) and control ( $N = 20$ ) communities. Dots represent raw data and error bars represent 95% CI. \*\*\* $P < 0.001$ , by two-tailed statistical tests.

## Discussion

The ongoing rise in authoritarianism in many parts of the world, increasing levels of social inequality, and a lack of interest in political participation have reinvigorated the question of how to build responsive citizenship and encourage participation at the local and national levels. Governments and civil societies in developing and non-democratic countries increasingly adopt local participatory institutions to increase participation and build accountability on a subnational level. However, the introduction of citizen participatory channels challenges existing conceptions of authoritarian governance. Some have argued that local democratic reforms in authoritarian regimes may serve as a tool to enhance legitimacy and sustain authoritarian governance, thus easing pressure from further citizen engagement and accountability seeking<sup>4,5</sup>.

To address the tensions in the literature on democratic resistance to authoritarian regimes, this study provides causal evidence using a field experimental design in an authoritarian region of the world. We found that citizens assigned to participate in democratic decision-making on local community budgeting were more likely to engage in a wide range of civic behaviours outside of the budgeting domain 6 months after the start of the intervention. They were also more likely to demand improvement from the central government, which may correspond to an increase in accountability seeking. These changes were accompanied by a more positive societal outlook and increased satisfaction with social policies.

Participatory decision-making did not change citizens' demands for improvement from the local government; however, it led to more demands for improvement from the central government. Several factors might explain this differential attitudinal change. First, local and central governments are perceived as distinct entities and are associated with different functions<sup>23,36</sup>. The experience of a more deliberative local government might be contrasted with a less deliberative central government, leading to more demands for a voice in functions governed by the central government. A second possibility is that citizens increased their demands for improvement from both levels of government after experiencing a less-hierarchical local power structure. However, at the local level, the increased demand was offset by a noticeably positive change in their neighbourhoods, which was attributed to increased procedural justice from participatory decision-making<sup>16</sup>. Finally, events occurring at the national level, such as the COVID-19 pandemic, might also exacerbate citizens' needs for improvement from the central government because substantial policy decisions to cope with such national-level events were often

made by the central rather than the local government. However, these national events should have impacted all communities—we do not expect that they differentially impacted attitudes towards the central government in treated communities more so than in the control communities.

The increased citizen demands for improvement from the central government may not equal lowered satisfaction. In fact, we found that residents in treatment communities reported more satisfaction with the country's policies, a more positive economic outlook and more citizen pride than the residents in control communities. In addition, residents in treatment communities were more likely to report that the generalized government (regardless of local or central government) cares about the voice of regular people and that regular people can have a say in what the government does. This relates to previous literature that found positive correlations between voice or the provision of feedback and general satisfaction towards an institution<sup>35,37</sup>. Interestingly, citizens who are more satisfied are potentially more demanding of further improvement from the central government compared with an otherwise indifferent or non-responsive citizenry. Rather than inducing dissatisfaction or backlash, local participatory decision-making seems to increase citizens' responsive citizenship and their general evaluation of public policy.

Regarding the educative function or the spillover hypothesis from local participation, we found that participatory decision-making in a narrow domain has spillover effects on broader civic engagement outside the domain. Six months after the start of the participatory budgeting intervention, treatment citizens were more likely to report having participated in a wide range of civic-engagement behaviours, ranging from attending policy-related meetings and expressing personal views to the government and media to donating money and doing volunteer work. None of these behaviours was directly advocated in the participatory budgeting intervention and yet residents in treatment communities were more likely to have participated and expressed willingness to continue participating in the future, especially for behaviours involving non-risky public-goods provision (for example, donating money and volunteering). However, for personally risky behaviours and behaviours perhaps more characteristic of democratic citizenship (for example, petitioning and demonstration), the effect sizes were much smaller or close to null. Future work will need to verify participants' self-reported claims about participation by measuring actual behaviours, perhaps with standardized behavioural games or, with difficulty but high pay-off, observed behaviours in the context of participants' own lives.

Projects aimed at localizing development have yielded mixed results, with some even bringing backlash and reinforcing existing divisions<sup>15</sup>. Little empirical research has examined the role of culture and the developing environment of a local participatory institution<sup>14,28</sup>. We argue that contexts and the ways in which interventions are implemented—the source and perceived meaning of the intervention, the responsiveness of the state and the processes of group deliberation—have a critical impact on the success of participatory practice. From our results, participation that is integrated into everyday activities and nested within one's local communities is effective in driving behavioural and attitudinal changes. When citizens are invited to deliberate and collectively make decisions about the welfare of their own communities, they will probably experience an increased sense of agency and political efficacy<sup>11</sup>. This is consistent with what Mansbridge<sup>34</sup> calls a 'deliberative system' in which discussion and participation continue outside formal spaces as informal conversations between citizens and their representatives. This direct participation closely connected to everyday life changes the nature of participation from a rhetoric ritual to a consensual collective experience. People will more readily change how they think about societal issues when they are exposed to others' views and are actively influencing and being influenced by their group<sup>38,39</sup>. In contrast, participation in silos or participation disconnected from people's lives may be less likely to bring about substantive behavioural change.

China is an interesting yet unlikely place to study democracy. Yet bringing China into the discussion will probably bring insights and raise more questions for future research. Why would an authoritarian regime adopt democratic practices that might risk authoritarian rules? From our results, there is reason to think that local democratic practices might propagate in authoritarian regimes because although they encourage pro-democratic attitudes, such as accountability seeking, they have an even larger effect on the provision of public goods and the evaluation of authoritarian public policy.

The participatory budgeting initiative in China ranks among the world's largest in terms of scale, preceded by a decade of smaller pilot programmes across various regions. Besides Chengdu, there are some other forms of participatory budgeting approaches occurring in Hainan, Nanchang of Jiangxi and Wenling of Zhejiang in China<sup>27</sup>; therefore, future research should explore the generalizability of these results, the long-term impact on citizens' social and behavioural outcomes, and impacts on authoritarian resilience. What is the lasting impact for an authoritarian regime in which the government may welcome individual feedback or frank criticism but not collective action against it? Can local participatory decision-making scale-up democracy more broadly or contribute to authoritarian resilience? In addition, this intervention integrates both the opportunity for a deliberative voice (which may not directly influence policy outcomes) and the option for collective decision-making through voting (aimed at directly influencing policy outcomes). Thus, a question arises regarding which factor plays a more important role in shaping political behaviours and attitudes. Providing causal answers to these questions could inform policymakers' decisions on the allocation of hundreds of millions of dollars annually towards programmes aimed at promoting civic engagement and public participation.

## Methods

### Experimental design

We conducted the intervention in Chengdu, a megacity in China. Participatory budgeting has been part of broader government initiatives<sup>25,27</sup>. According to the 6th national population census in 2021, Chengdu is the 4th largest city in China, with a population of over 20 million people, including both urban residents and residents registered and living in villages or rural communities<sup>40</sup>. The experimental unit in our sample is the local communities, both urban and rural. These communities vary in geographic size, population and economic development. All

registered households within treatment communities were eligible and invited to participate. Participation was completely voluntary. This intervention gave local citizen groups the power to participate in collective decision-making about resource allocation and monitoring and management of community funds. Specifically, citizens formed community-deliberation groups and were invited to propose, deliberate and vote on public service projects over the course of the intervention period. All registered community households could suggest proposals as to what public projects were needed. The community funds and budgeting process information were disseminated to the public via diverse channels, such as a newly developed online platform, posters, flyers, public information boards and local community meetings. Residents might call in 'local experts' to help them assess and evaluate community-budgeting proposals. For example, a construction worker might become the local expert to review a village road proposal.

As the participatory budgeting intervention was implemented at the community level, we randomized the timing when this budgeting participation intervention was delivered to local communities. Some of these communities started this participation intervention in the first half of 2021, and others in the second half of the year. We conducted a cluster randomization in which communities were randomly assigned to the experimental (early treatment) condition or control (late treatment) condition. We sorted communities based on a number of observable community-level characteristics, including rural or urban location, population composition, and economic indicators, and then randomized within closely ranked pairs. This blocked cluster randomization scheme balanced and minimized observable differences between the communities *ex ante* (see Tables 2 and 3 for the balance check on community-level characteristics and individual-level demographics between the treatment and control communities).

We used a stepped-wedge or wait-list experimental design to manipulate the treatment status of communities across different points in time<sup>41</sup>. As pre-registered, communities assigned to the experimental condition started the participatory budgeting intervention roughly 6 months before communities assigned to the control condition. At the individual level, all registered households in all communities were eligible and were invited to participate based on the timing of their community's treatment status. Although the actual online and offline participation rate among all eligible residents was not available, our field partner estimated that at least 20% of all eligible residents (over 4 million individuals) had actively participated in the intervention using the mobile phone application during the intervention period. In-person participation rates were not available. We collected data regarding various citizen behaviours and attitudes before and after the intervention to estimate the causal impact of the intervention on civic attitudes and behaviour and general societal outlooks.

We collected a representative sample of 7,851 residents stratifying by population strata (including gender, age, geographic location and urban–rural divide) across 19 treatment and 20 control communities from early 2021–2022. For experimental background, there was a total of 349 communities (174 treatment and 175 control) in the participatory budgeting intervention. Forty communities were originally randomly selected by local field partners who were blind to the study hypotheses before the treatment assignment. One community assigned to treatment unexpectedly withdrew from the consent of survey data collection, leaving us with 19 treatment and 20 control communities in the final sample. Participants were equally distributed across each sampled community. Professional survey enumerators blind to treatment conditions conducted in-person survey data collection in the sampled communities. Participants in representative communities were offered a survey that was described as helping researchers understand the attitudes and experiences of residents. Participants gave oral informed consent for the survey and were compensated with a small

gift (for example, a tissue box, an umbrella or a bottle of vegetable oil) as a token of appreciation. Consent was waived for participation in the actual intervention (that is, citizens did not need to sign an informed consent to participate in the collective decision-making). We focused on two core components of citizen responsiveness: self-reported behaviours on civic engagement outside of the budgeting domain (what we label as behavioural outcomes) and attitudes towards the government and society (attitudinal outcomes). Behavioural outcomes captured residents' participation in broad civic actions outside of the local budgeting domain. We measured residents' self-reported engagement in nine civic behaviours during the measurement period, ranging from taking part in policy-related meetings, voting in neighbourhood committee elections and donating blood to doing volunteer work (Table 1). To capture attitudinal changes, we measured a set of outcomes focused on attitudes towards local and central governments, voice and perceived societal outlooks.

### Analysis strategy

For the main analysis, we estimated the average treatment effect on each behavioural and attitudinal outcome, controlling for baseline covariates while clustering standard errors at the community level.

To test our predicted outcomes, we use fixed-effects regressions with a dummy variable indicating early treatment (ET), a vector of pretreatment individual covariates to improve efficiency and with clustered standard errors. Suppose the survey response  $P$  (for example, civic engagement) from an individual  $i$  of community  $j$  is

$$P_{ij} = \beta_0 + D_{ij}\beta_1 + \mathbf{Z}_{ij}\boldsymbol{\gamma}_1 + \mathbf{H}_j\boldsymbol{\gamma}_1 + g_j + \mu_{ij} \quad (1)$$

The regression coefficient  $\beta_1$  represents the average treatment effect of early participatory budgeting treatment (ET) on the dependent variable, as measured by  $P_{ij}$  in the main survey.  $D_{ij}$  refers to a binary variable of ET randomly assigned to the individual embedded in a community, in which  $D_{ij} = 1$  refers to ET and  $D_{ij} = 0$  refers to late treatment.  $\mathbf{Z}_{ij}$  is a vector of individual-level demographics that are unaffected by the treatment (education, age, gender, occupation, party affiliation and family income).  $\mathbf{H}_j$  denotes a vector of controls for the pretreatment community-level characteristics (urban or rural, population, community size, and economic indicators such as gross domestic product (GDP) per district and average household price).  $g_j$  denotes a community fixed effect.  $\mu$  is a zero-mean error term, assumed to be mutually independent across (but not within) communities. We use robust standard error clustered at the community treatment level. R software (v.4.2.3) was used for data analyses.

### Balance test

We used a logistic regression with citizens' pretreatment characteristics to predict citizens' treatment assignment. These characteristics include both citizen demographics (including gender, age, education, occupation, party affiliation and household income) and community characteristics (including urban or rural classification, population, GDP per community, distance from community centre and average house price per square metre). The balance tests revealed no significant observed differences on average between individuals and communities in the treatment ET condition and control late treatment condition (Tables 2 and 3).

### Reporting summary

Further information on research design is available in the Nature Portfolio Reporting Summary linked to this article.

### Data availability

Data collection was approved by the University of California, Los Angeles's Institutional Review Board (number 21-000085). The study was pre-registered on Open-Science Framework (<https://osf.io/ypge7/>).

Data will be available under restrictions. As the data contain individual and district information from Mainland China, data availability will be subject to restrictions under China's Personal Information Protection Law (PIPL), which came into effect in November 2021. The field experimental dataset is proprietary to our field partner Social Equity and Participation Center, and the dataset is subject to strict privacy regulations. The corresponding authors can facilitate the connection between data requesters and the field partner, ensuring that proper approval is obtained for accessing the data.

### References

1. Fox, J. A. Social accountability: what does the evidence really say? *World Dev.* **72**, 346–361 (2015).
2. Heller, P. in *States in the Developing World* (eds Kohli, A. et al.) 309–338 (Cambridge Univ. Press, 2017).
3. Tsai, L. L. Bringing in China: insights for building comparative political theory. *Comp. Political Stud.* **50**, 295–328 (2017).
4. He, B. & Warren, M. Authoritarian deliberation: the deliberative turn in Chinese political development. *Perspect. Polit.* **9**, 269–289 (2011).
5. Truex, R. Consultative authoritarianism and its limits. *Comp. Political Stud.* **50**, 329–361 (2017).
6. Evans, P., Huber, E. & Stephens, J. *The Political Foundations of State Effectiveness* (Cambridge Univ. Press, 2017).
7. Herrera, V. *Water and Politics: Clientelism and Reform in Urban Mexico* (Univ. Michigan Press, 2017).
8. Jablonski, R. S., Buntaine, M. T., Nielson, D. L. & Pickering, P. M. Individualized text messages about public services fail to sway voters: evidence from a field experiment on Ugandan elections. *J. Exp. Political Sci.* **9**, 346–358 (2022).
9. Montambeault, F. *The Politics of Local Participatory Democracy in Latin America: Institutions, Actors, and Interactions* (Stanford Univ. Press, 2015).
10. Ostrom, E. *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge Univ. Press, 1990).
11. Pateman, C. Participatory democracy revisited. *Perspect. Politics* **10**, 7–19 (2012).
12. Sheely, R. Mobilization, participatory planning institutions, and elite capture: evidence from a field experiment in rural Kenya. *World Dev.* **67**, 251–266 (2015).
13. Sen, A. *Development as Freedom* (Alfred Knopf, 1999).
14. Touchton, M. & Wampler, B. Participation, development, and accountability: a survey experiment on democratic decision-making in Kenya. *Am. Political Sci. Rev.* <https://doi.org/10.1017/S0003055422001484> (2023).
15. Mansuri, G. & Rao, V. *Localizing Development: Does Participation Work?* (World Bank, 2012).
16. Wu, S. J. & Paluck, E. L. Participatory practices at work change attitudes and behavior toward societal authority and justice. *Nat. Commun.* **11**, 2633 (2020).
17. Wu, S. J. & Paluck, E. L. Having a voice in your group: increasing productivity through group participation. *Behav. Public Policy* 1–20 (2022).
18. He, B. & Thøgersen, S. Giving the people a voice? Experiments with consultative authoritarian institutions in China. *J. Contemp. China* **19**, 675–692 (2010).
19. Chen, Y. & Yang, D. Y. The impact of media censorship: 1984 or Brave New World? *Am. Econ. Rev.* **109**, 2294–2332 (2019).
20. Chen, J., Pan, J. & Xu, Y. Sources of authoritarian responsiveness: a field experiment in China. *Am. J. Political Sci.* **60**, 383–400 (2016).
21. King, G., Pan, J. & Roberts, M. E. Reverse-engineering censorship in China: randomized experimentation and participant observation. *Science* **345**, 1251722 (2014).
22. Lauren, P. G. in *The China Hands' Legacy: Ethics and Diplomacy* (ed. Lauren, P. G.) 1–36 (Routledge, 2019).

23. Cunningham, E., Saich, T. & Turiel, J. *Understanding CCP Resilience: Surveying Chinese Public Opinion Through Time* (Harvard Kennedy School Center for Democratic Governance and Innovation, 2020); [https://ash.harvard.edu/files/ash/files/final\\_policy\\_brief\\_7.6.2020.pdf](https://ash.harvard.edu/files/ash/files/final_policy_brief_7.6.2020.pdf)
24. Baiocchi, G. & Ganuza, E. *Popular Democracy: The Paradox of Participation* (Stanford Univ. Press, 2016).
25. Cabannes, Y. & Ming, Z. Participatory budgeting at scale and bridging the rural–urban divide in Chengdu. *Environ. Urban.* **26**, 257–275 (2014).
26. Dias, N. (ed.) *Hope for Democracy: 30 Years of Participatory Budgeting Worldwide* (Hewlett Foundation and Omidyar Network, 2018).
27. Yi, F. in *The Rise of Progressive Cities East and West* (eds Douglass, M. et al.) 137–150 (Springer, 2019).
28. Beuermann, D. W. & Amelina, M. Does participatory budgeting improve decentralized public service delivery? Experimental evidence from rural Russia. *Econ. Gov.* **19**, 339–379 (2018).
29. Gonçalves, S. The effects of participatory budgeting on municipal expenditures and infant mortality in Brazil. *World Dev.* **53**, 94–110 (2014).
30. Rousseau, J. J. *The Social Contract* (Penguin Books, 1968).
31. Mill, J. S. *Essays on Politics and Culture* (Peter Smith, 1963).
32. Tocqueville, A. *Democracy in America* (G. Dearborn & Co., 1838).
33. Barber, B. *Strong Democracy: Participatory Politics for a New Age* (Univ. California Press, 1984).
34. Mansbridge, J. in *Deliberative Politics: Essays on Democracy and Disagreement* (ed. Macedo, S.) 1–211 (Oxford Univ. Press, 1999).
35. Tyler, T. R. & Lind, E. A. in *Advances in Experimental Social Psychology* Vol. 25 (ed. Zanna, M. P.) 115–191 (Academic Press, 1992).
36. Frug, G. E. The central-local relationship. *Stan. Law Policy Rev.* **25**, 1 (2014).
37. Wu, S. J., Yuhan Mei, B. & Cervantez, J. Preferences and perceptions of workplace participation: a cross-cultural study. *Front. Psychol.* **13**, 806481 (2022).
38. Fishkin, J. S. *Democracy and Deliberation: New Directions for Democratic Reform* (Yale Univ. Press, 1991).
39. Lewin, K. Frontiers in group dynamics. II. Channels of group life; social planning and action research. *Hum. Relat.* **1**, 143–153 (1947).
40. *2020 Population Census* (National Bureau of Statistics of China, 2021); <http://www.stats.gov.cn/sj/tjgb/rkpcgb/>
41. Gerber, A. S. & Green, D. P. *Field Experiments: Design, Analysis, and Interpretation* (W. W. Norton, 2012).

## Acknowledgements

We thank all the local survey enumerators, research assistants and staff at the Social Equity and Participation Center for research support. This work is supported by the UCLA Society of Hellman Fellows (awarded to S.J.W.) and the Singapore Ministry of Education Academic Research Fund Tier 1 Grant (A-0003186-00-00 awarded to K.M.M.). The funders had no role in study design, data collection and analysis, decision to publish or preparation of the manuscript. We thank R. Truex, D. Tian, X. Xu, X. Hu and N. Goldstein for their feedback and support.

## Author contributions

All authors contributed to the study design and jointly supervised the work. M.Z. led the study implementation and data collection. S.J.W. led the data analysis, conceptualized the study and drafted the article. K.M.M., M.Z. and F.Y. revised the article.

## Competing interests

The authors declare no competing interests.

## Additional information

**Supplementary information** The online version contains supplementary material available at <https://doi.org/10.1038/s41562-024-01964-y>.

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**Peer review information** *Nature Human Behaviour* thanks Diether W. Beuermann, Jessica Teets and the other, anonymous reviewer(s) for their contribution to the peer review of this work.

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### Software and code

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- |                 |  |
|-----------------|--|
| Data collection | In-person paper survey. No software was used.  |
| Data analysis   | R version 4.2.3 (2023-03-15), "ri2" R package (Coppock, 2020), "fwiwdclusterboot" R package (Fischer, 2023), "nbpMatching" R package (Beck et al., 2015) |

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Data collection was approved by the University of California, Los Angeles's Institutional Review Board (Number #21-000085). The study was pre-registered on Open-Science Framework (<https://osf.io/ypge7/>). Data will be available under restrictions. Because the data contains individual and district information from Mainland China, data availability will be subject to restrictions under China's Personal Information Protection Law (PIPL), which came into effect in November 2021. The field

experimental dataset is proprietary to our field partner—Social Equity and Participation Center, and the dataset is subject to strict privacy regulations. The corresponding authors can facilitate the connection between data requesters and the field partner within three weeks of receiving the request, ensuring that proper approval is obtained for accessing the data.

## Research involving human participants, their data, or biological material

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### Reporting on sex and gender

Data on gender and sex were collected as a part of demographic information at the end of the survey. We did not have specific hypotheses regarding gender or sex differences. Information on gender and sex was only used as a covariate in regression analyses to improve efficiency. No statistically significant gender-based differences in dependent outcomes were found.

### Reporting on race, ethnicity, or other socially relevant groupings

Participants were self-identified native China residing in Chengdu, China. No race, ethnicity, and other socially relevant groupings were used. Demographic covariates were used in the regression analysis to increase efficiency. Such covariates include education, age, gender, occupation, party affiliation, and family income. All self-reported.

### Population characteristics

See below. Also see the full demographic breakdown in SI.

### Recruitment

For experimental background, there was a total of 349 communities (174 treatment and 175 control) in the participatory budgeting intervention. 40 communities were originally randomly selected by local field partners who were blind to the study hypotheses prior to the treatment assignment. One community assigned to treatment unexpectedly withdrew from the consent of survey data collection, leaving us with 19 treatment and 20 control communities in the final sample. Participants were equally distributed across each sampled community. Professional survey enumerators blind to treatment conditions conducted in-person survey data collection in the sampled communities. Participants in representative communities were offered a survey that was described as helping researchers understand the attitudes and experiences of residents. Participants gave oral informed consent for the survey and were compensated with a small gift (e.g., a tissue box, an umbrella, or a bottle of vegetable oil) as a token of appreciation. Consent was waived for participation in the actual intervention (i.e., citizens did not need to sign an informed consent to participate in the collective decision making). For survey data collection, potential self-selection bias might be present (e.g., people who had actively participated in the intervention might be more likely to participate in the survey). It is unclear how the potential self selection bias might impact study results.

### Ethics oversight

Data collection was approved by the University of California, Los Angeles's Institutional Review Board (Number #21-000085).

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## Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

### Study description

Field experiment in China, quantitative data

### Research sample

A representative sample of Chengdu citizens in China (see SI for full demographic breakdown) as they were the direct targets of the participatory budgeting intervention

### Sampling strategy

We used a stepped-wedge or waitlist experimental design to manipulate the treatment status of communities across different points in time (Gerber & Green, 2012). As pre-registered, communities assigned to the experimental condition started the participatory budgeting intervention roughly six months before communities assigned to the control condition. At the individual level, all registered households in all communities were eligible and were invited to participate based on the timing of their community's treatment status. We collected data regarding various citizen behaviors and attitudes before and after the intervention to estimate the causal impact of the intervention on civic attitudes and behavior as well as general societal outlooks.

### Data collection

We collected a representative sample of 7,851 residents across treatment and control communities. Professional survey enumerators blind to treatment conditions conducted in-person survey data collection using pen and paper.

### Timing

The intervention was conducted from February 2021- 2022. Main survey data collection was from 6/26-8/9, 2021.

### Data exclusions

No data were excluded.

### Non-participation

No participants dropped out/declined participation in the study.

Randomization

See Sampling strategy above. Communities were randomly assigned where citizens in treatment communities were invited to deliberate and make collective decisions on how local community budgets were allocated through both in-person and online communication channels.

## Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

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