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Crisis and Correction: Do Government Rectification Efforts Restore Citizen Trust After Governance Failure?

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Abstract

In a substantial literature on political trust in normal times, we know little about the impact on trust of crises or subsequent government efforts at correction. We investigate these impacts by analyzing a pair of similar governance failures in China, a strong single-party authoritarian state with high levels of political trust and sophisticated tools to manage negative information about its performance. We theorize that how citizens update beliefs about government trustworthiness depends on prior experience: firsthand knowledge and anecdotal evidence supply powerful "insider" information that citizens bring to their processing of news. We leverage occurrence of two exogenous shocks—a vaccine crisis and a subsequent government correction—with administration of a face-to-face, nationally representative survey in 2018. We find: (1) the 2018 crisis reduced trust, regardless of prior experience; and (2) the subsequent correction did not increase trust for "insiders," residing in cities exposed to a similar crisis and correction in 2016, but did increase trust for other citizens. We show that governance failure is not a singular event concluded with crisis weathered and trust rebuilt through corrective efforts. Instead, it introduces a persistent constraint on the persuasiveness of government claims of trustworthiness. Past governance failures persist in social perceptions and are reactivated by similar failures, with attention to one failure elevated in the long term for citizens familiar with it from experience.

Keywords Political trust · Governance failure · Government correction · China · Authoritarianism

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Introduction

Recent global surveys find trust in government at all-time lows in democracies but surging in autocracies. China, the world's largest autocracy, ranks in first place (Edelman, 2022), a finding consistent with many studies of Chinese politics (Dickson, 2016; Huang et al., 2023; Shi, 2001, 2014; Tang, 2016, 2018). In post-Mao China, a high level of political trust has survived numerous governance failures and resultant crises that directly harmed the lives and livelihoods of ordinary Chinese over four decades: contagious disease outbreaks (Huang, 2003; Ye & Lyu, 2020), food and drug scandals (Yan, 2012; Yasuda, 2017), high-speed train crashes (Bondes & Schucher, 2014), major industrial accidents (Chan et al., 2015; Zhao, 2016), widespread illness due to environmental pollution (Liu, 2010), and substandard construction work revealed by natural disasters (Hui, 2009; Lo, 2014). Roots of these crises can be traced to deficient regulation, failure of oversight and reporting systems, lack of transparency, and official malfeasance. In response, touting the claim that the communist party can fix its mistakes, Beijing characteristically conducts high-profile drives to correct governance problems. Do such efforts restore citizen trust? Can governments emerge from such crises unscathed? A documented high level of political trust over decades does not answer these questions.

Indeed, despite a substantial literature on political trust in normal times, we know little about the impact on trust of crises or subsequent government efforts at correction. This paper analyzes a pair of similar governance failures to investigate the impact of crisis and correction on political trust in China, a strong single-party authoritarian state. We theorize that citizen updating of political trust after correction is heterogeneous: it depends on prior experience with crisis and operates through the mechanism of "insider information," which increases crisis salience and thereby also increases attention to subsequent similar crises.

We study a vaccine crisis in China to test our theory. We leverage the occurrence of two exogenous shocks—the vaccine crisis and Beijing's subsequent attempt to remedy it—during the administration of a face-to-face, nationally representative survey of 3,144 Chinese citizens in summer 2018. The survey data offer a unique opportunity to estimate the impact of crisis and correction. First, news of the vaccine crisis broke on 21 July 2018, day 11 after the survey went into the field. A major Chinese pharmaceutical company had produced some 250,000 substandard vaccines for diphtheria, tetanus, and whooping cough, which had been used to inoculate thousands of infants. Breaking news about the fake vaccines intersected interviews with survey respondents, giving us a strong identification strategy. Second, several weeks later, on 16 August 2018, Beijing held a widely publicized meeting to announce dismissal and severe punishment of top officials involved in the crisis. It promised to reform the drug regulatory system, giving us an opportunity to measure the impact of a government effort to correct its failure to regulate. Third—and critically for our theory— about 38 percent of survey respondents reside in cities affected by a similar vaccine crisis in 2016, allowing us to measure how recurrence of a governance failure affects response to a government correction. We identify these respondents as *insiders*, who can draw on *insider information*—that is, information from their own *experience* of local and even personal exposure to a similar failure.

Specifically, consistent with a literature in political psychology on the persuasive impact of an "inside" view (Freling et al., 2020; Kahneman & Tversky, 1982), we theorize that prior experience with governance failure influences how citizens respond to subsequent efforts at correction. For individuals who can recall and recognize from experience the failure as substantively similar—and therefore suggestive of unsolved underlying problems—the impact is likely to be particularly consequential. In the case studied here, we expect that citizens living in cities affected by the 2016 vaccine crisis can draw on vivid, concrete, anecdotal evidence from local lived experience of a similar crisis and, consequently, will be relatively less receptive to the government effort to fix its mistakes and increase trust.

We develop a city-day measure that captures variation in citizen attention to the 2018 vaccine crisis across respondents surveyed on different days or residing in different cities. We show that the crisis reduced trust: regardless of prior experience, the greater the attention to the 2018 vaccine crisis, the lower the citizen trust in government. Of greater interest here, we also show that, as theorized, responses to the subsequent government correction effort are heterogeneous: after the announcement of promises to reform the regulatory system and severe punishments for top officials involved in the vaccine crisis, political trust increased for some citizens; however, for insiders, who could recognize from their 2016 experience the 2018 vaccine crisis as a familiar failure, the correction failed to increase trust in government.

The failures in vaccine regulation that we study are substantively important: they caused serious harm—and, for Chinese citizens, public health threats are a top determinant of political trust (Ma & Christensen, 2019). More generally, this paper makes novel theoretical and empirical contributions in three areas: political trust, governance, and information management. Studies (Levi & Stoker, 2000; Lu, 2014; Tang, 2016; Wang, 2005) identify government performance as a major underpinning of political trust in normal times. However, much less is known about trust in crisis times, after governance failures and especially after efforts to improve performance with corrective measures. We contribute a rigorous quasi-experimental analysis of the heterogeneous impact of recurrent, similar governance failures that produce crises and of subsequent government corrections. To our knowledge, ours is the first study with this analytical focus. Further, foremost among authoritarian governments, China employs an impressive range of sophisticated tools to monitor, control, censor, spin, and rebut negative information (Gallagher & Miller, 2021; Huang, 2017; King et al., 2013; Roberts, 2018; Stockmann & Gallagher, 2011; Wang & Huang, 2021)—to manage the message about its performance, especially at times of crises, when its performance legitimacy is tested. We argue that firsthand experience and anecdotal evidence from day-to-day, face-to-face interactions with fellow citizens can supply powerful contradictory tacit information that is difficult for the government to manage. We show that governance failure is not a singular event concluded with the crisis weathered and trust rebuilt through corrective efforts. Instead, it introduces a persistent constraint on the persuasiveness of government claims of its trustworthiness. Past governance failures persist in social perceptions and, for citizens with insider information, gleaned through experience, are reactivated by similar failures.

The rest of the paper is organized as follows. Sect. "The Impact of Experienced Crisis and Correction on Political Trust" situates the study in existing literature,

develops our theory, and introduces our hypotheses. Sect. "Vaccine Crises and Correction in China" provides background on the 2016 and 2018 vaccine crises and correction efforts. Sect. "Research Design" describes our research design, data, measures, and identification strategy. Sect. "Results" presents results. Sect. "Evidence for Mechanisms" provides evidence on mechanisms and rules out plausible alternatives. Sect. "Conclusion" concludes.

The Impact of Experienced Crisis and Correction on Political Trust

We study political trust in an authoritarian state in crisis times, after governance failure. We are particularly interested in the impact on trust of a subsequent government effort at correction.

Political Trust

Political trust encapsulates basic beliefs about government trustworthiness as a custodian of citizen welfare, along dimensions of sincerity and competence (Hetherington, 2005; Levi & Stoker, 2000; Miller, 1974; Stokes, 1962; Weatherford, 1992). Political trust is critical to outcomes that allow a state to function, such as legal compliance and political stability (Chanley et al., 2000; Levi, 1997, 1998). It is also a component of political support, providing room to maneuver when governments face difficulties in performing political tasks (Shi, 2001). Though citizens cannot punish authoritarian governments for bad performance at the polls, low levels of political trust can undermine regime authority and mobilize citizens for political action (Geddes et al., 2018; Haggard & Kaufman, 1997; Pepinsky, 2009).

In China, the observed high level of political trust is shaped and supported by a range of forces and long-term processes, most not unique: political socialization (Cantoni et al., 2017; Kennedy, 2009), propaganda through a state-controlled media (Kennedy, 2009; Li, 2004), traditional Chinese values (Shi, 2001; Tang, 2016), and government performance (Lu, 2014; Tang, 2016; Wang, 2005).

Governance Failure and Information Management in China

Performance legitimacy is carefully cultivated in China. Faced with failures that erode political trust—land expropriation (Cui et al., 2014) and environmental pollution (Chen & You, 2021; Zhong & Hwang, 2016), for example—Beijing often blames local state agents, producing a "trust gap": high trust in the center and lower trust in local governments (Dickson, 2016; Li, 2013, 2016). Governance failures are politically sensitive; as in other authoritarian states, negative information about government performance is carefully managed.

Beijing manages negative information about sensitive events in many ways, often effectively. Its state media sometimes ignore them and sometimes publicize an official version that can be persuasive (Stockmann & Gallagher, 2011). Beijing issues instructions to commercial media: "delete any mention" of occurrence or "follow state media" reportage or "do not sensationalize" (Chang & Manion, 2021), for

example. It delegates censorship of online reader comments to private companies that leverage sophisticated targeted technology to satisfy its demand for information control without losing their audiences and advertising (Gallagher & Miller, 2021; King et al., 2013). It mobilizes an army of volunteer boosters to distract and guide public opinion (King et al., 2017). It denies inconvenient information and rebuts rumors, sometimes effectively changing views and recovering support, although less effectively with repetition (Huang, 2017; Wang & Huang, 2021).

When sensitive events occur, politically interested and well-resourced citizens are not passive takers of the official version: they supplement government propaganda by actively seeking out information from outside or within China, using virtual private networks or scrutinizing social media, for example (Zhu & Wang, 2021). In this paper, we are interested in the impact on political trust of a different sort of information that citizens bring to the official story of sensitive events: namely, insider information from lived experience of such events.

Insider Information

To recover political trust after a harmful governance failure, the government must persuade citizens of its sincerity and ability to address the sources of failure. Intuitively, we expect this is more difficult among populations that have experienced similar failures up close, as insiders. In the case studied here, we propose that, all else equal, the 2016 vaccine crisis is more salient to residents of the 87 impacted cities than it is to other citizens. Some of them experienced it personally, as a family crisis. Others had routine access to anecdotal evidence of the failure, through day-to-day, face-to-face interactions with fellow city dwellers as the crisis unfolded. We propose that for these citizens, primed by their insider view of the 2016 crisis and its local impact, the recurrence of the similar crisis in 2018 is more salient. When news of the 2018 vaccine crisis breaks, they pay attention because they can more easily (even viscerally) recognize it as a familiar failure—and understand it as a reflection of underlying problems that remain unfixed, despite Beijing's promises in 2016. To be sure, other news-savvy citizens may also recognize the failure as familiar, but they process this publicly available information from a distance. This has implications for beliefs that underpin political trust. We propose that, given their access to insider information, residents of the 87 cities impacted by the 2016 crisis are comparatively less susceptible to propaganda about government trustworthiness to fix its mistakes in the wake of the 2018 crisis.

Our account of insider information is consistent with findings in political psychology on the persuasive impact of an "insider" view, classically identified by Kahneman and Tversky (1982) as a major bias of intuitive judgement. Anecdotal evidence is vivid, concrete, easy to process, and emotionally interesting (Freling et al., 2020, 59)—which researchers find may increase its availability as a cue. In a meta-analysis that sorts through findings in all relevant studies, Freling et al. (2020) show that anecdotal evidence is especially influential where emotional engagement is high, such as in situations associated with severe threat. We propose that, in 2018, residents of cities impacted by the 2016 vaccine crisis bring their prior, insider experience to bear on their processing of news about the new crisis and correction. Compared to citizens

who are exposed to the crisis primarily through publicly available information, insiders, who know the "real story" from lived experience, are less likely to accept the official version of events.

Our account is also consistent with a large body of literature that demonstrates experience through spatial proximity to crises impacts citizen political attitudes and behaviors. Existing studies show that volume of local war casualties influences support for national-level policies and politicians (Gartner et al., 1997; Karol & Miguel, 2007). Similarly, firsthand experience with a natural disaster that necessitates government management, such as a wildfire (Hazlett & Mildenberg, 2020) or hurricane (Reinhardt, 2015), affects voting behavior and levels of political trust, respectively. Indeed, Reinhardt (2015) shows that citizens who rely on media accounts for information about government management of disastrous hurricanes are susceptible to media biases when they update trust; by contrast, hurricane evacuees update political trust based on firsthand experience, which seems to operate through mechanisms of performance evaluation.

The impact of insider information on political trust after governance crises and corrections has also been established in the context of China. For example, Kang and Zhu (2021) analyze the impact of China's recent crackdown on corruption. Compared to citizens who rely on media revelations, the crackdown increases trust less for "state insiders," who have "deeper knowledge" about failed previous anticorruption corrections. Similarly, Wang and Dickson (2022) find that how much Chinese update political trust in the anticorruption crackdown depends on priors about official integrity—which are associated with local variation in the intensity of corruption, as revealed in previous investigations. Further, in a study that traces the causal relationship between political trust in 2012 and personal experience during China's Great Famine of 1958–61, Chen and Yang (2019) find that, for Chinese who experienced starvation, local drought conditions provided information that either corroborated or contradicted propaganda about famine causes—and firsthand information that contradicted the official famine story reduces political trust decades later and is transmitted to the next generation.

Hypotheses

We theorize that a government attempt to fix its mistakes after a governance failure has heterogenous effects on political trust. For citizens who encounter the failure as new information or as familiar through public information, trust may increase. By contrast, insiders, who recognize a harmful governance failure as familiar from personal or local *experience*, will be more skeptical. As the expression goes: "Fool me once, shame on you; fool me twice, shame on me." We test three hypotheses:

H1. A crisis due to governance failure lowers political trust.

H2. A government correction increases political trust for citizens lacking information from experience of similar events.

Table 1 Hypotheses

		2018 EVENT	
		CRISIS	CORRECTION
2016 crisis exposure	No	H1. failure: trust lost	H2. trust gained
	Yes	H1. experience of similar failure, 2016 response as evident failure: trust lost	H3. experience of failed 2016 response: trust not gained
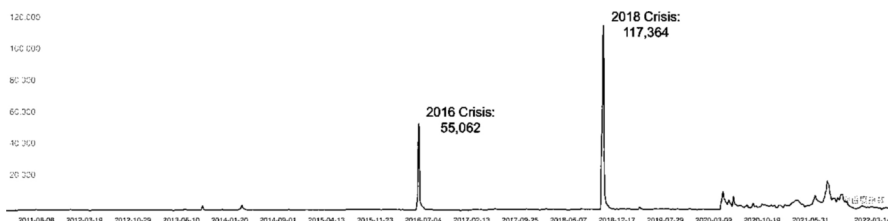
Fig. 1 Baidu Searches for the Term "Vaccine"

H3. A government correction does *not* increase political trust for citizens whose prior personal or local experience with similar events makes a governance failure and response familiar.

We summarize these hypotheses in Table 1. We do not hypothesize about heterogeneity in the effect of the crisis itself on trust. This is because the crisis reveals new information about governance failure for all citizens who learn of it: even for insiders, with experience of such an event, it reveals information about past failure to address sources of harm. We lack a theoretical basis to hypothesize across sub-groups about the effect of the crisis on trust.

Vaccine Crises and Correction in China

Vaccines are consumption goods vital to public health, but consumers cannot evaluate their quality on their own. Citizens depend on government to regulate and enforce standards to ensure the vaccines they consume are safe and effective. In China, only in recent decades have private companies, not only the state, produced and distributed vaccines. Before 2018, the 2016 vaccine crisis was only the most recent and serious of several such crises, endemic to the organization of drug manufacturing and procurement in China.[1]

Figure 1 shows netizen searches since 2011 for the term "vaccine" on Baidu, China's most popular search engine. Given Baidu's dominance in China, we treat Baidu search volume as researchers treat Google Trends in the United States: as an indicator

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[1] Vaccine crises occurred in China in 2004, 2005, 2008, 2009, 2010, and 2013. All received Chinese and international press attention. See Appendix 1.

of issue salience across citizens.[2] The Baidu Index is a weighted sum of the search frequency for each keyword in Baidu web searches, based on search volume by netizens on Baidu, with keywords as the statistical object. As Fig. 1 illustrates, the 2016 and 2018 vaccine crises are by far the most salient of several instances where harmful vaccines were distributed in China.[3] The greater recentness and vastly greater salience of the 2016 vaccine crisis, relative to others prior to 2018, make it highly suitable to test our theorized impact of insider information. To the extent that all past vaccine crises—or, indeed, governance failures of any sort—influence the outcomes we analyze, this only biases against our results.

Treatments: Vaccine Crisis and Correction in 2018

On the evening of 21 July 2018, Chinese state media outlets reported that a major pharmaceutical company, Changchun Changsheng in northeast China, had produced at least 250,000 substandard vaccines for diphtheria, tetanus, and whooping cough (DPT) and had engaged in data forgery related to rabies vaccines. The faulty DPT vaccines had been used in Jilin, Shandong, and Anhui provinces to inoculate thousands of infants. Although no deaths or serious illnesses were reported, the news triggered widespread anger on social media. Premier Li Keqiang vowed to "resolutely crack down on all illegal and criminal acts that endanger the safety of people's lives" (China Government Network, 2018). Attentive netizens circulated a screenshot of Li's statement juxtaposed with a nearly verbatim statement that he had offered after the 2016 vaccine crisis, implying that Beijing had failed to resolve the problem. Beijing quickly imposed heavy state censorship: the University of Hong Kong Weiboscope project found "vaccine" one of the most restricted terms on Weibo immediately after 21 July (Lo, 2018). State instructions to Chinese media restricted them to official copy in front page news and prohibited them from developing special topic stories or linking to older news stories (Beach, 2018) when reporting on the vaccine crisis.

On 16 August 2018, the Politburo Standing Committee convened a widely publicized meeting to hear reports on an investigation into the crisis. Communist Party General Secretary Xi Jinping delivered a speech calling for "serious accountability, strict handling in accordance with the law, resolutely guarding the bottom line of safety, and making every effort to protect the vital interests of the masses and social stability" (Xinhua, 2018). The high-level meeting promised systemic change: it

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[2] Researchers establish that demographic discrepancies between populations that use and don't use the internet do not pose the bias to representativeness that traditional surveyors might fear (Mellon, 2013). Lee et al. (2016, 442) argue that, given its dominance of online search, Google search volume for an issue may serve as a "rough indicator of the public interest in that issue." Chykina and Crabtree (2018) use Google Trends to measure issue salience for hard-to-survey populations. Mellon (2014) tests Google search data against Gallup's "most important problem" question for salience of social issues and finds that issue salience can be measured with search data. Many Chinese researchers use the Baidu Index to proxy issue attention in China. In a study of public concern about COVID-19 in its early days, Gong et al. (2020) establish that the index reliably reflects patterns of case indicators.

[3] Measured by search volume, the 2018 vaccine crisis at its height was more salient than the other "hot topics" of summer 2018: the U.S.-China trade war, celebrity Fan Bingbing's tax evasion scandal, and typhoons, for example. See Appendix 2 on official news coverage. Figure A.2.1 shows that the vaccine scandal was frequently the top-ranked news item.

pledged to "improve laws, regulations, and institutional rules, clarify and implement supervisory responsibilities, strengthen on-site inspections in the production process, urge enterprises to fulfill their main responsibilities and obligations, establish a quality and safety traceability system, and implement a product risk reporting system" (Xinhua, 2018).

The Politburo Standing Committee also announced the dismissal or forced resignation of many senior officials. They included the former director of China's Food and Drug Administration (FDA), several officials with supervisory authority over food and drugs in Jilin province, and the mayor of Changchun (Xinhua, 2018). A separate statement announced that Wu Zhen, a former deputy head of the FDA known as China's "vaccine czar," was under investigation by the party's anticorruption watchdog (Sohu, 2018). In total, by the time of the 16 August meeting, over 40 officials, including seven provincial-level officials, had been punished for involvement in the crisis.

Condition: Vaccine Crisis and Correction in 2016

In February 2016, news broke that an illegal vaccine ring originating in Shandong province had distributed millions of tainted vaccines for children across the country. The news sparked an outpouring of fear and mistrust directed at the government and its regulatory agencies: since 2015, the authorities had been investigating a former pharmacist and her daughter who had illegally sold vaccines worth $88 million. The vaccine ring involved 12 different kinds of vaccines with over 300 illegal distributors located in 87 cities across 24 provinces, as publicized by the Shandong FDA (Shandong Food and Drug Administration, 2016). The vaccines—mostly standard childhood immunizations such as polio, mumps, and hepatitis B—had been stored and transported improperly, rendering many of them ineffective or harmful.

Addressing a public outcry that the government had withheld information, Premier Li Keqiang vowed "no leniency" for those involved. In the immediate wake of the scandal, 357 officials were fired or demoted and 202 suspects arrested. By March 2018, authorities had sentenced 137 people in 18 provinces, including 64 officials from the National Health Commission, the China Food and Drug Administration, and provincial and city governments. Kingpin pharmacist Pang Hongwei was sentenced in 2019.

Before 2016, the county government centers that directly purchased market-based (non-mandatory) vaccines from drug companies had bought vaccines from manufacturers offering the lowest prices (Zhuang et al. 2019). This caused manufacturers and suppliers to lower prices at the expense of vaccine quality. In response to the 2016 vaccine crisis, the State Council (2016) amended regulations to exercise stricter oversight of vaccines. Procurement was transferred from the county to the provincial level—but competitive procurement, with incentives that sacrificed quality, remained unchanged.

Research Design

To estimate the effect of crisis and correction on political trust, we exploit the administration of a nationwide survey in China with the coincidence of the 2018 vaccine crisis and subsequent effort at government correction.

Data and Measures

We analyze individual-level data from a nationally representative probability sample survey of 3,144 adults in 63 cities across 24 of China's 31 provincial-level jurisdictions. The survey was conducted in summer 2018 through face-to-face interviews by trained, experienced interviewers affiliated with a survey research center at a major Chinese university.[4] Iterative spatial sampling via global positioning system ensured inclusion of the large numbers of Chinese internal migrants who are not officially registered at their place of residence. Survey implementation spanned roughly two months, from 11 July through 12 September 2018.[5] As Fig. 2 shows, news of the vaccine crisis broke on day 11 of the survey, Beijing announced corrective measures on day 38, and the survey concluded on day 64.

Dependent Variable: Political Trust

Our outcome of interest is political trust. Theoretically, we are most interested in trust in the central government, but we include city government because the crises we study are primarily city-level incidents handled by city-level leaders. We measure trust as reported trust: the survey asks respondents separate questions about how much they trust the central government and city government on a scale of 0 (not at all) to 10 (strongly trust).[6]
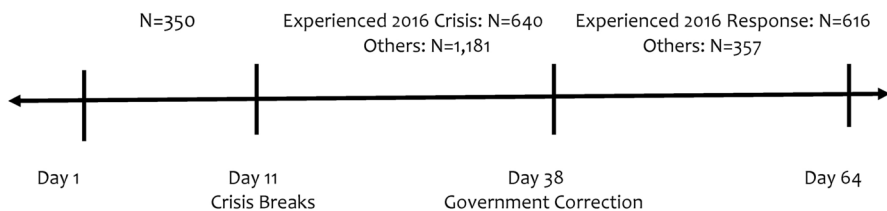
Fig. 2 Survey Timeline

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[4] The center has conducted numerous high-quality surveys, including World Values surveys and surveys for U.S. Government NSF-funded projects.

[5] See Appendix 3 for more information on the survey and items used in our analyses.

[6] Several studies (e.g., Lei & Lu, 2017; Robinson & Tannenberg, 2019; Shi, 2001; Tang, 2016) investigate whether overreporting political trust constitutes a problem in Chinese surveys. Findings are mixed. We are persuaded by Huang et al. (2023) that the Chinese government enjoys genuinely high levels of political trust. Of course, our interest here is not point estimates but relative effects on trust of exposure to exogenous shocks. In Appendix 4, we present a logic for China Central Television News viewership as

Independent Variable: Crisis Salience

The simplest approach to analyzing the effect of the 2018 vaccine crisis on political trust is to distinguish between the 350 respondents interviewed before and the 2,794 interviewed after news of the crisis broke. Yet, we expect any effect of the crisis to diminish over time, across survey respondents interviewed after 21 July, as news of it is crowded out by other stories. Indeed, internet searches for terms related to the crisis suggest this: Fig. 3 shows that searches for "vaccine" and "Changchun Changsheng vaccine incident" peaked on 23 July. A before-and-after estimation approach averages across days and weeks after 21 July, which is incorrect for our purpose.[7] We want a measure that captures the diminishing interest in the crisis over time.

We use city-specific and date-specific online search data from Baidu to construct an independent variable that captures the vaccine crisis in a continuous measure calibrated to proxy variation in *salience of the crisis* across respondents surveyed on different days or residing in different cities.[8]

Specifically, we construct the variable 2018 Vaccine Crisis Salience by aggregating online searches for information about the crisis, as measured by Baidu searches for "vaccine" and "Changchun Changsheng vaccine incident" in the respondent's city on the respondent's interview date. Baidu search behavior can vary for several reasons. Timing is important: as Fig. 3 shows, Baidu searches for the two terms exploded on 22 July, the day after news of the fake vaccines broke, and peaked on 23 July. Geography is also important: in cities proximate to Changchun, where the faulty vaccines were distributed, families with young children were directly impacted. Cities across China vary in other ways relevant to our construct of interest too, in internet penetration and even public interest in political affairs, for example. Our measure captures variation across cities for respondents interviewed on the same day and variation within cities for respondents interviewed on different days. As the measure exhibits
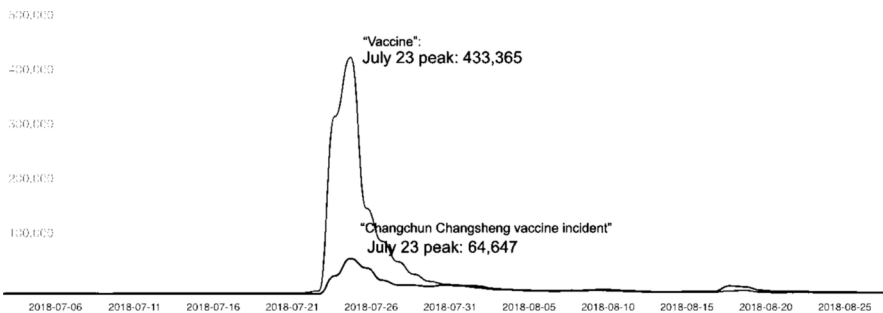
Fig. 3 Baidu Searches for Terms Related to the 2018 Vaccine Crisis

a behavioral measure for political trust. Analytical results using this measure are consistent with those for reported trust.

[7] We report before-and-after estimations in Appendix 5. The coefficient is not statistically different from zero.

[8] Sect. "Evidence for Mechanisms" reassures us about the proxy's construct validity. See also note 2 on the Baidu Index as a measure of issue salience for the population.

temporal and spatial variation, it is unlikely that our analytical results will be driven by unobservable events that vary similarly both spatially and temporally.

We adjust city-date salience values in two ways. First, because the scale of crisis salience in each city depends on city-specific characteristics, we normalize each city-date's salience by the average search frequency for "vaccine" in the city from 11 July 2017 to 11 July 2018. This controls for baseline salience of vaccines.[9] Second, we take the logarithm of the normalized sum of Baidu search indices for the two terms in the respondent's city on the respondent's interview date. This reflects our assumption that crisis salience diminishes non-linearly. Our choice of functional form also ensures that possible heteroskedasticity due to city-specific characteristics can be normalized by city fixed effects.[10] With these two adjustments, 2018 Vaccine Crisis Salience for city i on date t is computed as:

$$\log \left(\frac{\text{Baidu Index of }''\text{vaccine}''_{it} + \text{Baidu Index of }''\text{Changchun Changsheng vaccine incident}''_{it}}{\text{average Baidu Index of }''\text{vaccine}''\text{ from 11 July 2017 to 11 July 2018}_i} + 1 \right)$$

Figure 4 displays the distribution of values for 2018 Vaccine Crisis Salience. It uses Baidu search data for the cities and interview dates for our 3,144 respondents and computes respective city-date salience increases from the baseline.[11] All respondents with the same city-date share the same salience value, which is represented by the dot's color.

Prior Experience of Crisis and Correction

We theorize heterogeneous effects of government correction, depending on whether citizens have insider information, from prior experience of a similar crisis and correction. Following the 2016 vaccine crisis, the Shandong Food and Drug Administration (19 March 2016) published a list of names, phone numbers (with area code), and cities of 300 suppliers and distributors implicated in distribution of the vaccines. We identify 23 cities across 16 provinces in our survey as cities in which local brokers distributed the illegal vaccines in 2016.[12] A total of 1,217 respondents surveyed in 2018—about 38 percent of all respondents—reside in these 23 cities. Our analyses treat them as insiders who *experience* the crisis and correction as a familiar failure.
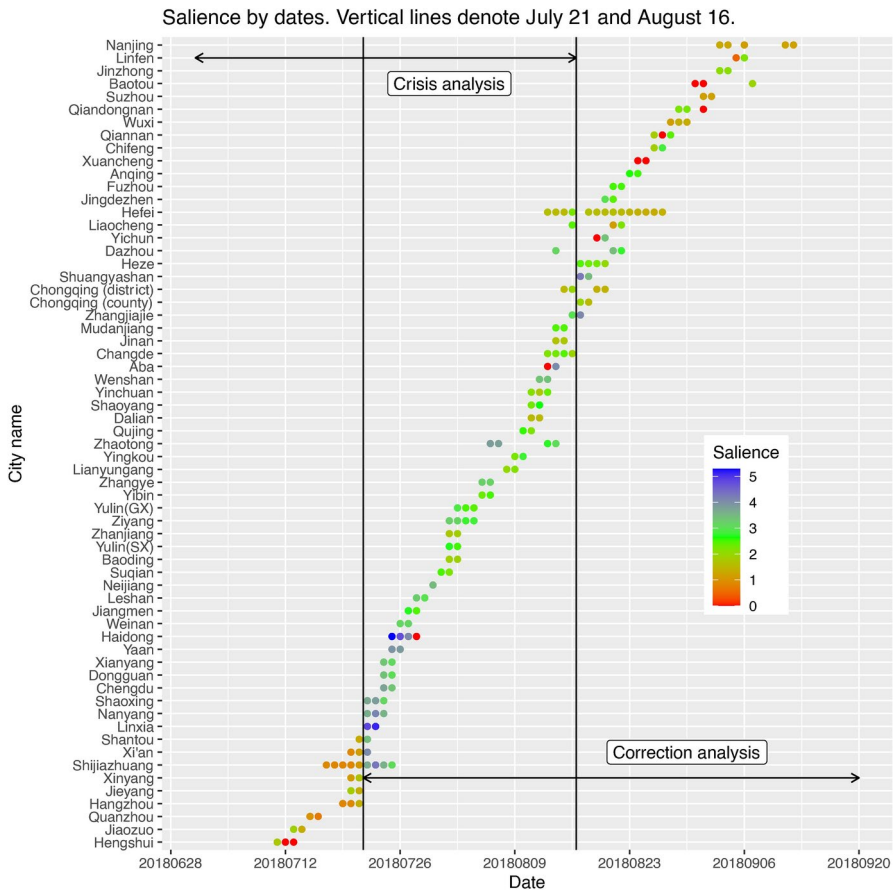
Control Variables

Our models include standard demographic controls: sex, age, age-squared, ethnicity, education, income, and marital status. We also control for official residence status

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[9] Baidu is not transparent about weights used for the Baidu Index, but it should not impact our findings: we control for baseline salience to capture *relative change* in salience, regardless of weights.

[10] We show below that our analytical results are consistent with different computations of salience and different functional forms.

[11] Appendix 6 shows values for daily crisis salience average for the survey period.

[12] We list the 23 cities in Appendix 7. Note that discovery of the list of victim cities does not depend on capacity of these cities because they were exposed by the kingpin; moreover, given the frequency of vaccine scandals in China, we do not expect significant selection bias for victim cities in our sample.

Fig. 4. 2018 Crisis Salience by City-Date

(i.e., urban or rural), communist party membership, ownership of a device to access the internet, and ties outside of mainland China. In addition, we control for individual-level variables that might affect citizen judgements about the vaccine crisis we study here—for example, whether respondents have young children.[13] We return to these variables in our inquiry into mechanisms in Sect. "Evidence for Mechanisms."

We include city fixed effects and date fixed effects to control for unit-invariant unobservables on each date and date-invariant unobservables in each city.[14] Date fixed effects are particularly important because we do not assume loss of political trust is necessarily static. Even after a crisis for which the government bears major responsibility, citizens may regain trust if they perceive an effective response. Date

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[13] The survey instrument does not measure this directly. However, an interviewer checklist asks about the presence of others during the interview. We create a dichotomous measure that takes the value of 1 for presence of children under six years old and 0 otherwise.

[14] We show below that analyses that substitute city-level coefficients for city fixed effects yield consistent results.

fixed effects capture fluctuations in government credibility as citizens gather more information about the crisis and their government. Summary statistics for variables used in the analyses are reported in Appendix 8.

Identification Strategy

Crisis Effect

We exploit a natural experiment in which an unexpected public health crisis intersects with a nationally representative survey of citizen political opinions. Since our measure of salience captures both surging curiosity after the crisis and inherent local curiosity about the issue, it acts as an exogenous assignment of city-level vaccine crisis information on individual respondents. We assume that the more salient the crisis was in that city on the interview date, the more likely the respondent was aware of the crisis. Admittedly, the measure has the limitation of not directly observing whether individual respondents know about the crisis, because the survey could not foresee its occurrence. However, city-level salience can be used to estimate average effects of the crisis when studying the effect of a macro event on individuals without knowing compliance status, as some recent studies (e.g., Wang & Dickson, 2022) show. Analyzing the sample of respondents surveyed before the government correction effort on 16 August, this design can identify the differential effects of the vaccine crisis across cities due to varying salience.

The identification assumption is that: without the vaccine crisis, the difference in average government trust between cities with higher and lower salience should stay constant over time and be controlled for by city fixed effects. The assumption is supported by the fact that the vaccine crisis was the single most important news item for days with the most variation in salience. Our survey of the official party-state online daily news finds that all top-ranked news articles on 23 July and four of the seven top-ranked articles on 16 August are about the vaccine crisis (see Figure A.3.1. in Appendix 3). It is unlikely that the variations in salience of the vaccine crisis were significantly confounded by other time-variant factors.

Correction Effect

We especially want to test how government efforts at correction affect political trust. We estimate the heterogenous effects on trust of Beijing's order on 16 August to purge officials it held responsible for the vaccine crisis across city-days for which the crisis salience varies. The government correction should have a stronger effect when and where the crisis had higher salience. Analyzing the sample of respondents surveyed after the crisis broke on 21 July, this design can identify the differential effects of the 16 August correction across city-days. The variable of interest is the interaction term of crisis salience and government correction.[15] Due to the sequential rollout of

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[15] Although one may still be concerned that the crisis salience measure captures innate distrust in government, the exogenous timing of the correction ensures that the interaction term can be consistently estimated by OLS estimators (Bun & Harrison, 2019).

the survey across cities, only five cities (Hefei, Chongqing's districts, Liaocheng, Dazhou, and Zhangjiajie), with 252 respondents, were surveyed both before and after the correction. We recognize the data limitation constrains the generalizability of the results.

Another major theoretical interest is the heterogenous effects of correction that are due to whether or not respondents are insiders, citizens who experience the 2018 vaccine crisis as the repetition of a recent, similar governance failure that harmed the local community—which also points to the ineffectiveness of the previous correction to prevent future harm. To investigate this effect, we separate the sample into respondents who live in cities affected by the 2016 vaccine crisis and respondents who live in other cities.

Results

We test our hypotheses in three analytical steps. Step 1 tests Hypothesis 1 by estimating the average effect of crisis salience at the city level on individual-level political trust. Steps 2 and 3 test Hypotheses 2 and 3 by estimating whether the effect of crisis salience on political trust differs before and after the government correction for citizens with and without insider information.

Crisis Effect

We recognize a concern about possible endogeneity: that our measure of salience may reflect not only interest in the crisis but also an appetite for unofficial narratives, which can be a measure of longstanding political distrust. To address this, we first adopt an instrumental variable approach, exploiting a component of variation in the measure that is clearly not influenced by public opinion: namely, number of days from 21 July, when news of the crisis broke. This captures the mechanical variation in interest driven only by the respondent's interview date.

Reassured by two-stage-least-squares (2SLS) results that 2018 Vaccine Crisis Salience is not endogenous with longstanding political trust, we use ordinary least squares (OLS) models with city and date fixed effects on respondents surveyed between the start of the survey and the government correction on 16 August.[16] Table 2 reports the 2SLS results as well as OLS estimates of the effect of the 2018 vaccine crisis on reported trust in the central government (column 2) and in city government (column 3). Coefficients for 2018 Vaccine Salience are consistently negative and statistically significant: reported trust is lower when crisis salience is higher, supporting Hypothesis 1. The coefficients indicate a relatively greater loss of trust in city governments, supporting what studies find about the central-local "trust gap"—but a significant loss of trust in the center is also evident. When a city's search index increases to the overall average log(salience) from its pre-crisis baseline, individual

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[16] We use OLS estimation because we control for city and date fixed effects in these models. We do not use non-linear models because maximum likelihood estimators with fixed effects are inconsistent and may be biased in finite samples (Greene, 2004).

Table 2 Impact of 2018 vaccine crisis, OLS and 2SLS estimations

	OLS Estimation	
Outcome Variable	(2)	(3)
	Trust in Center	Trust in City
Salience	**−0.231**	**−0.325**
	(0.104)	(0.148)
Constant	7.693	8.538
	(0.787)	(1.190)
City Fixed Effects	Yes	Yes
Date Fixed Effects	Yes	Yes
Controls	Yes	Yes
Observations	1968	1929
R-squared	0.260	0.209
	2SLS Estimation	
	First Stage	Second Stage
Outcome Variable	(1)	(2)	(3)
	Salience	Trust in Center	Trust in City
Salience		**−0.881**	0.273
		(0.184)	(0.199)
Days from Crisis	**−0.032**		
	(0.003)		
Controls	Yes	Yes	Yes
Observations	2064	1969	1930
R-squared	0.158	−0.228	0.015
Cragg-Donald Wald F statistic		146.520	148.853

Dependent variables: (1) crisis salience of city-day (2) trust in central government, on 0–10 scale (3) trust in city government, on 0–10 scale. Control variables: sex, age, age-squared, ethnicity, education, income, marital status, children under 6 years old, official residential status, communist party membership, ownership of device to access internet, ties outside mainland China, urban locality. For respondents surveyed from day 1 to day 38

Bolded: $p < .05$

trust decreases by 0.53 points for the central government and 0.75 points for the city government on the 0–10 scale.[17] We note that 2SLS estimates are substantially larger than OLS estimates, suggesting a larger Local Average Treatment Effect than Average Treatment Effect. That is, cities that saw a surge in search frequency as a result of time proximity to the scandal breakout are more likely to lose trust in governments than cities where search frequency was not driven by the time proximity. This is expected, as variations in search frequency of "vaccine" on other dates are more likely to be due to non-vaccine scandal reasons.

Correction Effect

We use OLS to fit the following model for respondents surveyed after news of the crisis broke on 21 July up to the end of the survey on 12 September:

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[17] We also estimate OLS models, reported in Appendix 9, that drop the log in the computation of salience and substitute city covariates for city fixed effects. Results are consistent with those in Table 2.
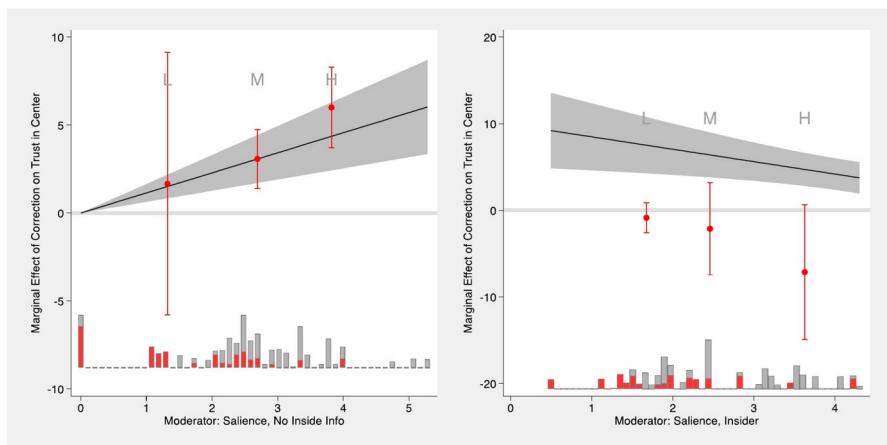
$$Trust\ in\ Government_{itj}$$
$$= \theta_0 Salience_{tj} + \theta_1 Salience_{tj} \times Post - Correction_t$$
$$+ X\beta + \eta_t + \zeta_j + \epsilon_i$$

where *Trust in Government$_{itj}$* is trust in government for city *j*'s respondent *i* interviewed on date *t*, *Salience$_{tj}$* is crisis salience for city *j* on date *t*, and *Post-Correction$_t$* is whether the interview date *t* occurs after 16 August, when Beijing purged officials it held responsible for the crisis. θ_1 is the interaction estimator. *X* is a vector of the demographic controls discussed in Sect. "Research Design".

Our theory predicts that the effect of the government correction depends on information from prior local or personal experience with a similar failure. Figure 5 plots marginal effects of the correction on trust in the central government at low, medium, and high levels of 2018 Vaccine Crisis Salience, separating the sample into cities exposed to the 2016 vaccine crisis and other cities. The figure shows: the higher the level of crisis salience, the more the correction improves political trust for respondents without insider information from the earlier crisis and correction. This effect is statistically significant at medium and high levels of crisis salience. In cities of insiders, with prior experience of a similar failure, however, there is no such association: the correction does not increase trust as crisis salience increases.

Table 3 presents OLS results. We split the sample to allow for different effects of covariates across the two types of cities, as theorized.[18] The government correc-

Fig. 5 Marginal Effects of Government Correction on Trust in the Center. Note: The bars below refer to the distribution of the moderator and red parts denote the proportion of being after 16 August. We follow the best practice proposed by Hainmueller et al. (2019) and provide a binning estimator to divide the samples into three groups (low, medium, and high) based on their crisis salience level

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[18] This is also required because the two groups are unbalanced (see Appendix 10). We split the sample to allow for different effects of covariates across the two types of cities, because encountering a familiar failure may lead people with different demographic characteristics to respond differently. For example, education is correlated with higher trust in central government (0.077) for respondents who experience the failure as new; for insiders, who experience it as familiar, education is correlated with *lower* trust in

Table 3 Heterogenous effects of government correction

Outcome Variable	NOT INSIDERS		INSIDERS	
	(1) Trust in Center	(2) Trust in City	(3) Trust in Center	(4) Trust in City
Salience	–0.153	–0.165	**2.274**	**7.782**
	(0.119)	(0.109)	(0.648)	(1.028)
Salience*Post-Correction	**1.140**	**3.318**	**–1.432**	**–6.435**
	(0.256)	(0.359)	(0.543)	(0.721)
City Fixed Effects	Yes	Yes	Yes	Yes
Date Fixed Effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	1706	1673	914	896
R-squared	0.250	0.324	0.290	0.209

Dependent variables: (1) trust in central government, on 0–10 scale; (2) trust in city government, on 0–10 scale. Control variables: sex, age, age-squared, ethnicity, education, income, marital status, children under 6 years old, official residential status, communist party membership, ownership of device to access internet, ties outside mainland China, urban locality. Standard errors clustered around cities. Excludes respondents surveyed on and before 21 July

Bolded: p<.05

tion has less effect in increasing trust for respondents with insider information.[19] Corroborating Fig. 5, F-tests for the two pairs of coefficients show rising salience after correction increases trust for respondents in cities not exposed to the 2016 vaccine crisis, but the impact for insiders is statistically not different from zero.[20] We also note the positive coefficients on salience, which reassure us that search intensity for the crisis is not itself a measure of distrust, but a measure of citizen curiosity. Due to imbalance among samples over the survey timeline (Appendix 10), we use Coarsened Exact Matching (Blackwell et al., 2009) on all controlled demographic

central government (–0.046). One way to address this is to include interactions of controls with the two city groups. However, as our theory is agnostic to these differences, we prefer a split sample to streamline the analysis. In Appendix 11 we present models that do not split the sample but instead interact salience with the 2016 crisis. These models, like those in Appendix 9, drop the log in the computation of salience and substitute city covariates for city fixed effects.

[19] The positive coefficients on salience do not contradict results in Table 2. The Table 2 analyses on crisis effects include respondents surveyed before and after news of the vaccine crisis broke, permitting us to capture the crisis effect on trust. The analyses of correction presented in Table 3 exclude respondents surveyed before the crisis.

[20] For respondents in cities exposed to the 2016 vaccine crisis, tests yield F-statistics of 1.46 and 1.55, for trust in the center and trust in city government, respectively. See Appendix 12. This exercise of testing full marginal effects assumes that both crisis salience and correction timing are exogenous to trust. If we relax the assumption such that crisis salience may be endogenous to innate city-level trust, exogenous correction timing still ensures the interaction term is unbiased (Bun and Harrison 2019). Looking at the interaction term only, in Appendix 13, we use seemingly unrelated estimation to combine the two models and implement Wald tests (Mize et al., 2019; Weesie, 1999): coefficients on salience*post-correction for trust in both central and city governments in the two types of cities are indeed significantly different.

variables to reweight the samples and rerun the analyses reported in Tables 2 and 3. Results remain mostly significant and aligned with our expectations.[21]

Evidence for Mechanisms

Section "The Impact of Experienced Crisis and Correction on Political Trust" theorized that the 2016 vaccine crisis experience provided memorable insider information about governance failure to residents of cities impacted by it and that, consequently, these insiders more easily recognized in the 2018 crisis a familiar failure and evidence of unkept promises, signifying government untrustworthiness. OLS results presented in Sect. "Results" support predictions about political trust outcomes that the theory yields. This section presents evidence supporting theorized mechanisms and rules out several plausible alternatives.

Salience of 2016 and 2018 Vaccine Crises

If, as we theorize, insider information about a governance failure makes citizens less susceptible to believing the official story and official promises, we expect they will be relatively more inclined to supplement government propaganda with additional information. To test this, we investigate patterns of variation in attention to the vaccine issue for residents of cities impacted by the 2016 crisis and residents of other cities.

We collect different sorts of city-level Baidu Index search data to investigate crisis salience for cities impacted by the 2016 vaccine crisis relative to other cities: (1) search indices for "vaccine" for the one-month period before the 2016 vaccine crisis was first reported on March 18; (2) search indices for "Shandong Vaccine Scandal" immediately after the crisis was first reported; (3) search indices for "vaccine" in the one-year period before our survey began in July 2018; and (4) peak search indices for "vaccine" immediately after the 2018 vaccine crisis was first reported on 21 July. We rank the 63 cities in our survey according to these search indices, with higher ranks connoting higher crisis salience. We expect a rise in rank during crisis peak periods (2) and (4) for cities impacted by the 2016 vaccine crisis. That is, we expect crisis salience for these impacted cities to increase more than for other cities with comparable pre-2016 crisis salience. We estimate regression models for the panel of 63 cities across the four periods, with fixed effects for each period on salience rankings, allowing cities impacted by the 2016 crisis to have distinct coefficients for each of the four periods. Table 4 reports results.

Table 4 shows that before the 2016 crisis, cities impacted by it rank 12.5 places higher in average salience compared to other cities. However, at peak periods of the

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[21] See Appendix 14. We also estimated models that replace the log of salience variable with a measure that drops the log term in the computation of salience and substitutes the square root of relative change in search to reflect our assumed non-linearity of salience. Results, presented in Appendices 15 and 16, are consistent with those reported in Tables 2 and 3.

Table 4 Salience rank for cities impacted by 2016 vaccine crisis across four periods

	Salience Rank
2016 Crisis-Impacted City	**12.532**
	(4.761)
2016 Crisis-Impacted city*2016 Crisis Peak	**6.368**
	(2.449)
2016 Crisis-Impacted City*Pre-2018 Crisis	3.869
	(2.232)
2016 Crisis-Impacted City*2018 Crisis Peak	**5.341**
	(2.526)
Constant	**27.425**
	(2.602)
Period Fixed Effects	yes
Observations	252
R-squared	0.194

Standard errors clustered around cities. Dependent variable is salience rank. All 63 cities surveyed included. Comparison group is pre-2016 crisis salience for "vaccine" in cities not impacted by 2016 crisis. 2016 Crisis Peak denotes salience for "Shandong Vaccine Scandal" after 17 March 2016 to 30 June 2016. Pre-2018 Crisis denotes 1-year average salience for "vaccine" before 2018 crisis. 2018 Crisis Height denotes the city's peak salience for "vaccine" in July 2018

Bolded coefficients: p<0.05

2016 and 2018 crises, they rank 18.9 (12.53 + 6.37) and 17.9 (12.53 + 5.34) places higher in average salience than other cities, respectively.[22]

In sum, residents of cities impacted by the 2016 crisis paid heightened attention to vaccines immediately after that crisis, but this attention diminished in 2017–2018, causing their salience rankings to revert to levels not significantly different from before the crisis. The 2018 vaccine crisis rekindled their attention, causing their average salience ranking to increase again, relative to other cities at the peak of the 2018 crisis.

Ruling Out Alternative Mechanisms

The models we estimate for Sect. "Results" include, as noted in Tables 3 and 4, standard demographic controls and variables that control for some obvious plausible alternatives to our "insider information" theory. For example, we control for young children in the family: respondents with young children very likely pay more attention to the vaccine crises we study here—and may be less trusting of government promises about them. We also control for respondent access to information beyond the official story, via the internet and ties outside mainland China. We find no significant impact on trust for these variables. In this section, we empirically rule out two other plausible confounders that may drive both crisis salience and trust: respondent health concerns and interest in public affairs.

We investigate the impact of these potential confounders by estimating (separately) models that leverage four items on our 2018 survey instrument: (1) self-reported

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[22] See Appendix 17 for models with salience *levels* for "vaccine" as dependent variable.

health condition, (2) self-reported interest in political and social news, and (3) health issues and public affairs (separately) as self-reported topics of interest. In models similar to those reported in Table 2, none of these variables are significant predicters of political trust; nor do they affect results on the impact of insider information in models similar to those reported in Table 3.[23]

Conclusion

In an experimental study, Huang et al., (2023, 1371) conclude that regime legitimacy in China rests in "normal times" on a political trust that is both "willingly granted" and "secured by a gut-level feeling"—but they caution that the reservoir of goodwill might not survive hard times. In this article, we leverage a nationwide face-to-face survey with a vaccine crisis to investigate political trust in China in crisis times, produced by governance failures that caused serious public harm. We show that the crisis reduced political trust. More interesting, we think, are our findings on the subsequent government effort to "fix its mistakes." We show that relevant experience with governance failure affects how citizens update their beliefs that underpin political trust: the correction fails to improve political trust for insiders, with information gained from similar experience, although it is effective for other citizens. Our findings support a theory that insider information from lived experience, direct and personal or felt through face-to-face, day-to-day local interactions, increases attentiveness to similar governance failures and decreases susceptibility to propaganda about government trustworthiness to fix its mistakes. Experience with a similar crisis affects political trust more than a single crisis does.

COVID-19 National Preparedness Collaborators (2022) who studied conditions associated with cross-country variation in that pandemic find infection rates are not explained by pandemic-preparedness indices that measure a state's health security capacity or by regime type, health care coverage, or levels of inequality. Lower infection rates, higher vaccination rates, and adherence to social distancing policies are positively and statistically significantly associated with political trust, however (Ji et al., 2024). Our study identifies a source of trust deficit among Chinese citizens due to recurrent vaccine scandals and suggests a political explanation for observed vaccine hesitancy and low inoculation rate among the elderly during the COVID-19 pandemic (Wang et al., 2023)

We do not think our findings are specific to public health crises. As we note in Sect. "Introduction", failures of regulation, oversight, reporting, and official malfeasance have produced recurrent harmful crises in China in recent decades. Citizens close to those crises have insider information about them. We expect they bring that information to their evaluations of government trustworthiness in an ongoing way. Moreover, although our data do not allow us to draw conclusions about a lasting effect on political trust, our analysis does point to an effect more lasting than on-the-spot political trust: the effectiveness of a government correction suffered long-term damage (in a two-year span) for particular populations. This finding is no less impor-

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[23] See Appendix 18.

tant than spot trust for authoritarian regimes because authoritarian resilience relies on the immediate effectiveness of government responses to stop crisis from prolongation and escalation. In sum, our findings have broad implications for governance in closed authoritarian states, where citizens cannot replace the ruling party at the polls. We agree with Lu et al. (2021) that governance crises do not always imperil popular support for authoritarian regimes. Looking beyond the immediate aftermath of a single crisis, however, we show the importance of true government responsiveness: promises and corrective gestures may work the first time, but without substantive improvement, trust can easily be lost—and is harder to regain.

Data availability Replication data for analyses in this paper is available in Harvard Dataverse. The entire China Internet Survey 2018 dataset, including codebooks and data, will be made available at ICPSR at the University of Michigan. Before its deposit there, data are shared upon request on a case-by-case basis.

Declarations

Competing interests The authors have no relevant financial or non-financial interests to disclose.

Ethics approval This paper analyzes already available data from the China Internet Survey 2018.

Informed consent Informed consent was obtained from all individual participants included in the study.

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