Situational Voluntary Compliance: Adherence to COVID-19 Social Distancing Guidelines in the 2020 Local Outbreak in Beijing*

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Abstract

To mitigate the COVID-19 pandemic many countries have adopted mandatory social distancing measures, but in China, social distancing was implemented only as an advisory guideline. This article seeks to understand whether, and why Chinese citizens adhered to such social distancing advice. The data, derived from a survey in the 2020 local outbreak in Beijing, show that voluntary compliance was hardly influenced by motivational predictors, but was almost exclusively dependent on a single, key situational predictor, namely people's practical capacity

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to follow social distancing. These findings demonstrate that the emphasis on intrinsic and extrinsic motivations in existing compliance research does not do justice to the situational nature of voluntary compliance observed within this particular context. We discuss theoretical implications of these findings for the compliance literature. Moreover, we use these findings to provide (tentative) insight into the compliance challenges that China was facing during the course of the pandemic, and to speculate about ways in which compliance may be enhanced during future pandemic outbreaks in China.

In the global fight against the COVID-19 pandemic, China made remarkable progress. Until the end of its zero COVID policy in 2022, China—the world's most populous country, with a central role in the global economy and intimately tied to the rest of the world, and the center of the outbreak—had somehow been able to control the spread of the disease. In the period after the initial outbreak, China had very few new cases, and—until the end of the zero COVID policy—did not suffer from the large second or third waves that occurred in Europe and the U.S. Also, its mortality has been low: by June 2022, the country ranked only at place 216 (out of 230 countries/regions) in terms of mortality, and far lower than comparably large countries such as India, the US, Russia, or even Germany and Japan.[1] This raises a key question: what has made China successful in mitigating this virus, where other countries have not? Here, there are many aspects one could look at, including China's original lockdown of Hubei province,[2] its testing and detection capacity,[3] its isolation and quarantine policies,[4] its usage of information technology and surveillance,[5] or the population's willingness to wear face masks.[6] The present study, however, focuses on an aspect of pandemic mitigation that has received far less attention for China: social distancing.[7]

    Research has shown that social distancing is a key mitigation measure against the virus,[8] and governments around the world adopted social distancing measures during the first pandemic wave. But whereas many countries adopted a binding social distancing norm, in China social distancing was only an advisory guideline. Moreover, whereas over the course of the pandemic in China many other, more restrictive mitigation measures were repealed (and sometimes reintroduced), social distancing advice has remained in force across both *Edition 8* (May 2021) and *Edition 9* (June 2022) of the country's COVID-19 Prevention and Control Protocols. As such, to understand China's success in combating the pandemic,

an important question is to what extent Chinese citizens voluntarily complied with social distancing guidelines—and moreover, which factors may have explained their tendency to do so. But whereas much research has studied compliance with (mandatory) social distancing measures in other countries (indeed, a recent review revealed over 70 studies from around the globe),[9] little research has done so in China. These limited studies typically do not separate between different preventative behaviors,[10] nor do they zoom in on the different mechanisms that may shape compliant behaviour,[11] according to the general literature on compliance.[12] This study was restricted to the early period of the first pandemic wave (i.e., February 2020), and did not separate social distancing from other precautious behaviors (e.g., hygiene measures, stockpiling). In sum, despite China's success in containing the virus, only little is known of whether (and why) its citizens practiced social distancing. And moreover, because of this, only little is known of the factors that may shape social distancing when doing so is voluntary, in response to an advisory measure—rather than obligatory, in response to a mandatory rule. In light of the compliance challenges that China has faced during the course of the pandemic, it is of great importance to gain insight into these questions.

The present study therefore aims to provide this by means of a study into social distancing in Beijing in July 2020, several months after the first pandemic wave. At this time, in contrast to most of the world, China had not had any new major outbreaks, but it did have several minor instances where clusters developed. During this period, normal social and economic life mostly had resumed, and social distancing was an advisory norm (rather than a mandate). Within this context, our study seeks to understand to what extent Chinese citizens continued to practice social distancing, and which processes led them to do so. Our study thereby aims to illuminate whether, and how compliance with social distancing measures occurs when the requirement to do so is voluntary, rather than mandatory like in other countries. To answer these questions, we conducted a survey that assessed voluntary compliance with social distancing measures, adapted from surveys we conducted in other countries during earlier phases of the pandemic.[13] Our study understands voluntary compliance in relation to the most important theoretical strands from the literature on compliance, rooted in psychology, criminology, sociology, and economics.[14] In doing so, the survey contained the most important compliance variables from the most important theoretical approaches to compliance. In order to obtain a comprehensive understanding of voluntary compliance in this setting, our

study includes both a motivational and situational perspective, thus moving beyond the predominant focus on motivational influences that has occurred in most existing literature of non-enforced compliance.[15] By examining how social distancing is shaped in a setting where this is not mandatory, our study moves beyond existing studies on compliance with mandatory social distancing measures.[16] Moreover, by doing so, our study also aims to contribute to our general understanding of voluntary compliance. Finally, by understanding what shaped voluntary compliance in this setting, our study also aims to provide (tentative) insight into the compliance challenges that China has faced or may face in its fight against the pandemic, and to speculate about ways in which compliance could be increased during the future pandemic outbreaks.

The remainder of the article is structured as follows. First, we outline existing insights about voluntary compliance. Second, we provide an overview of the development of the pandemic and mitigation measures in China by the time of our study, and in Beijing in particular. Third, we outline the methods of our study (including the measurements), and then present the results. We conclude with the discussion and conclusion to outline the implications of our findings, and to link them to the latest developments in China's fight against the pandemic.

1. Voluntary Compliance

Most existing literature on compliance, including most literature on pandemic compliance,[17] has studied rule following and rule violating behavior in a context of binding rules. When such studies use the term voluntary compliance they refer to a situation where governmental actors are able to induce compliance without resorting to enforcement, or when enforcement is only used in a secondary, supporting role.[18] A core idea in such literature is that voluntary compliance results from intrinsic motivation, rather than the threat of enforcement. Tyler has for instance shown that when people substantively agree with the rules, they are also more likely to comply with them.[19] Studies of voluntary tax compliance argue that this originates in trust in the authorities: the more that these are trusted, the better the compliance.[20] And a whole body of work has found that people are more likely to comply when they view the rules and their enforcement as legitimate, which according to such studies originates in their procedural fairness.[21] Rational choice theorists have further argued that voluntary compliance occurs when the benefits minus the costs of

compliance outweigh violation, even when there is no or very little enforcement.[22] As such, most existing approaches to voluntary compliance consider this to originate from people's motivations—most notably intrinsic motivations, but also extrinsic motivations.

Conversely, there has been far less attention in this body of work for how the situation may shape people's voluntary compliance. This is surprising because research shows that in context of binding rules, situational forces may have a pivotal impact on rule following and rule violating behavior. For example, in criminology a large body of work has looked at the opportunities that people have to violate the rules.[23] Furthermore, other scholars have shown how people may violate rules because they lack the capacity to follow them—for instance because they do not know or understand the rules, or because they are practically unable to follow them.[24] Moreover, such research has shown that people's ability for self-control thus may impact their compliance.[25] Of course, the situation does play a prominent role in the literature on choice architecture, which examines how socially desirable behavior can be steered by the design of choices or environments;[26] however, such perspectives are focused more on harnessing people's bounded rationality and willpower than on understanding the constrains on, or opportunities for compliance afforded by the situation. In sum, although research on binding rules demonstrates that situational factors may critically shape people's compliance, there has been little attention for how situational factors may relate to voluntary compliance. By examining how motivational and situational factors contribute to voluntary compliance with social distancing measures, the present research also helps to illuminate this broader question.

To understand how voluntary compliance is shaped by motivational and situational factors in this setting, our study draws on five main theoretical strands from the general literature on compliance. In this way, our study captures some of the most important ideas on what shapes compliance that have been developed in the distinct literatures on this question in psychology, criminology, sociology, and economics. These are (1) rational choice theories, where people comply because the utility of compliance outweighs violation,[27] (2) social theories, where people comply because they are influenced by opinions, values, and behaviors of others,[28] (3) legitimacy theories, where people comply out of a sense of duty that originates in the legitimacy of the legal system,[29] (4) capacity theories, where people comply because they are able to do so,[30] and (5) opportunity theories, where people comply because they do not have the opportunity to violate the rules.[31] The first three theoretical strands are motivational theories, in

that people comply because they are motivated to do so—by the perceived utility of doing so, by social influence, or by the perceived legitimacy of measures. The last two are situational theories, where people comply because the situation makes it easier or harder to do so (capacity), or because it presents them with more or less opportunities for disobeying (opportunity). In the methods section, we outline in detail the key variables that we derived from each of these theories.

2. Pandemic Development and Mitigation Measures in Beijing

Appendix 1 describes the pandemic development, key events, and corresponding measures in Beijing throughout the period until July 30, 2020 (when we ended our survey). By that time there had been 929 confirmed cases in total since the start of the pandemic, which is near the average compared with the number of other provinces in mainland China.[32] In Beijing, a three-tier response level system was adopted since the local outbreak on January 24, 2020, depending on the number of daily new confirmed cases. Level three emergency is the most lenient and encompasses mostly advisory suggestions, whereas level one is the strictest and consists of mandatory measures. By the time that we conducted the survey, Beijing was in transition from a (more stringent) level two to a (more lenient) level three emergency response, in the aftermath of a (limited) outbreak of cases in June.[33]

Rather than a binding measure as adopted in other countries, in China social distancing was an advisory mitigation measure. While public place management offices in many places were mandated to set up "one-meter" lines and signs to facilitate social distancing, citizens were strongly advised to: (1) keep a social distance of more than one meter in public places or when carrying out social activities; (2) line up orderly and keep a one-meter distance at cashiers, scenic spots, and etc. For instance, a one-meter social distance was suggested in the epidemic prevention guidelines for grocery stores and supermarkets, as released by the Beijing Center for Disease Prevention and Control (CDPC) on February 17,[34] and July 22,[35] respectively. The policy also mentioned that social distancing is a precondition for reopening public places and events. On May 21, the CDPC suggested that wearing mask outdoor is voluntary only if one-meter social distance can be maintained.[36] In sum, social distancing was strongly advised in China, but citizens could personally decide whether to adhere to this advice or not, and did not face possible legal sanctions for failure to do so, unlike in other countries.

3. Methods, Measurements, and Results

a. Methods

Our survey aims to assess voluntary compliance with social distancing measures among Beijing citizens, and the motivational and situational processes that may sustain this. To this end, a questionnaire was adopted and translated from prior research on compliance with COVID-19 mitigation measures in the Netherlands and the United States.[37] Compared with these earlier studies, the survey was adapted to fit China's particular context, in which we concluded that some measures would be less clearly understood, less relevant, or too sensitive to elicit valid answers. For this reason, the survey we conducted in Beijing did not measure how participants evaluated the authority response or their procedural fairness (too sensitive), or knowledge and perceived clarity of social distancing measures (less relevant in absence of a binding rule). Furthermore, for our control variables, we did not measure political orientation (not relevant under a single-party system).

To verify the questionnaire's suitability in China, during the period from May 15 to May 22 in 2020, we conducted a pilot study among 91 undergraduate and graduate students (all residing in mainland China) from a local University in Hong Kong. The pilot survey revealed no problems with internal consistency or associations between the variables. We therefore proceeded to conduct the main survey in Beijing.

For the main survey, participants were recruited through the Chinese online survey platform Wenjuanxing (wjx.cn), an exemplar commercial e-survey service platform in China.[38] With more than 2.6 million members, Wenjuanxing has provided survey services for users from over 90 percent of research institutions in China since established in 2006. Prior studies show that Wenjuanxing yields good quality data.[39] In our research, only participants who were 18 years or older and who resided in Beijing were recruited. Using a random sampling strategy, a total of 1,142 participants in Wenjuanxing's database completed the online survey with complete responses during July 14–30, 2020; 118 were not Beijing residents and were hence excluded after IP location screening. To ensure data quality, we manually checked all responses to make sure there were no duplicated cases. The final sample consists of 1,024 valid observations. Respondents spent more than 15 minutes on average in answering the survey questions, a reasonable time considering the length of the

questionnaire. Detailed demographic information can be found in Table 1. Specifically, our final sample is quite young, having an average age of 32.09 years, and 54 percent of the participants are female. Moreover, the majority of participants (78.7 percent) had a college degree or higher, and 81.7 percent was employed at the time of the survey.

Table 1: Descriptive Statistics of Control Variables

	Beijing (*n* = 1,024)	Scale
Age	32.09 (9.28)	
Gender (female)	54%	
Ethnic minority	9.1%	
Size of household	3.75 (2.13)	
Number of children	0.83 (1.76)	
Education		
Primary and middle school	1.4%	
High school degree	19.9%	
College degree	61.5%	
Master's degree and above	17.2%	
Employed	81.7%	
Care professionally for COVID-19 patients	7%	
Socio-economic status, pre-COVID-19	5.36 (1.65)	1–10
Socio-economic status, post-COVID-19	5.49 (1.70)	1–10
Insurance	92.5%	
Health issues placing oneself at risk	9.4%	
Health issues placing others at risk	17.9%	
Trust in science	4.36 (0.72)	1–5
Trust in media	3.99 (0.84)	1–5
Friends or family over 75	49.2%	

Note: Standard deviations are in parentheses.
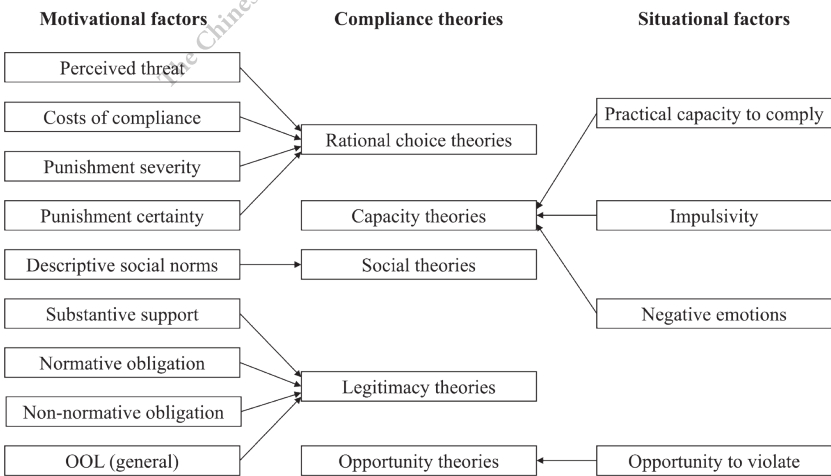
b. Measurements

Dependent Variable

Our main variable of interest was voluntary compliance with social distancing measures, which strongly advise members of the public to keep a safe distance from others. To assess this, we solicited seven items, which asked respondents to indicate to what extent they keep a safe

distance from (1) others outside of their direct household, (2) neigh-bours, (3) colleagues at work, (4) friends and family outside of their direct household, (5) others when grocery shopping, (6) others when going for a walk or exercising, and (7) others when commuting/traveling. The rating is on a Likert scale ranging from "1-never" to "7-always." Participants' responses were aggregated into a scale measure of *compliance with social distancing measures* (α = .83), with higher scores indicating greater compliance.

Independent Variables

To operationalize influences on voluntary social distancing, as explained earlier, the study draws on five main theoretical strands from the general literature on compliance (rational choice theories, social theories, legitimacy theories, capacity theories, and opportunity theories).[40] For each of the theoretical strands, we selected the key variables, which then were operationalized in the survey. Broadly, these variables can be divided into two overarching categories: (1) motivational variables, which shape people's behavior through their motivation to comply, and (2) situational variables, where the situation or personal state that people are in shapes their conduct. Figure 1 below shows each of these constructs and how they relate to the five major compliance theories, as well as how they can be categorized into the two overarching categories of motivational and situational mechanisms.

Figure 1: Mechanisms Shaping Compliance

We adopted the same operationalization of each sub-factor as in the surveys the authors conducted in the United States and the Netherlands in 2020.[41] All the measurements adopted a 7-point Likert scale ranging from "1-strongly disagree" to "7-strongly agree," except for *Impulsivity*, which was measured on a 5-point Likert scale (as this instrument was originally designed).

Motivational Factors

As explained earlier, there are three core theoretical strands about how motivation may shape compliance: rational choice theories, social theories, and legitimacy theories. For each of these, our survey measures one or more of its key variables.

According to rational-choice approaches,[42] decisions to follow (or break) rules are shaped by its costs and benefits: simply put, people will choose to break the rules when the benefits of noncompliance (versus its costs) are greater than the benefits of compliance (versus its costs). As such, our survey examined four aspects relating to the perceived costs and benefits of adhering to social distancing measures. First, people's perceptions of the benefits of social distancing, in terms of their *Perceived threat* of the virus. This was measured by means of three items, which asked them to which extent they believed the coronavirus to be a "major threat" (1) to their "own health," (2) to "the general health," and (3) to "the health of [their] friends and family" (α = .88). According to rational choice theories, compliance should increase the greater the benefits of doing so are perceived to be. Thus, we expected compliance to be greater the higher the perceived threat of the virus. Second, people's perceptions of the *Costs of compliance*.[43] To capture this, five items were solicited: "due to the measures to contain the coronavirus, I will likely … (1) 'lose income,' (2) 'lose my job,' (3) 'not be able to work,' (4) 'not be able to work as effectively as normal,' and (5) 'experience a negative impact on my social life.'" (α = .78). According to rational choice approaches, compliance should decline the greater its costs are. As such, we expected compliance with social distancing measures to decrease the higher that the costs of adhering to such measures were perceived to be. Third, our survey looked at deterrence, or the perception of the costs that people expect to suffer for breaking the rules. Although social distancing measures were neither mandatory nor enforced in China, this does not preclude the possibility that citizens may expect or believe them to be. According to general deterrence theory, people comply more with rules

when punishment is more severe and more certain.[44] To capture this, perceived *Punishment certainty* was measured by means of two items: "how probable is it that the authorities will … (1) 'find out,' and (2) 'punish you' for not following social distancing measures?" (α = .84). Perceived *Punishment severity* was measured with a single item: "How much will you suffer if the authorities punish you" for not following social distancing measures. We expected compliance to be greater the higher the likelihood of punishment was perceived to be, and the higher its perceived severity.

Social theories of compliance look at the social embedding of human conduct and responses to the law.[45] According to such theories, decisions to comply are not just individual, but rather are embedded in a social context, where the norms that apply within this environment shape one's decision to obey the law (or not). To capture this, our study measured perceived *Descriptive social norms* for adhering to social distancing measures within participants' social environment.[46] Participants were asked to indicate to what extent "most people they know keep a safe distance" from others in each of the seven situations included in our dependent variable (i.e., outside of their direct household, from neighbors, etc.; α = .89). Based on social norm theories, we expected compliance to be greater the stronger social norms for adhering to social distancing measures were perceived to be.

Legitimacy theories hold that people's compliance with rules is rooted in their perceptions of the substantive or procedural legitimacy of those measures.[47] Here we first looked at participants' *Moral alignment* with social distancing measures. This captures a substantive legitimacy of rules, where such legitimacy originates in agreement with the substance of the rules. Participants were asked to indicate to what extent they believed that people "should keep a safe distance from others to contain the virus." We expected compliance with social distancing measures to be higher the greater that participants' moral alignment with those measures was. Second, we looked at several factors that reflect people's general obligation to obey the law. This originates in the idea that people may come to think they are obligated to obey rules they do not support substantively, because the rules generally have legitimacy beyond their substance. Research has shown that the higher is people's general perceived duty to obey the law, the more likely it becomes that they will adhere to particular rules.[48] Our survey distinguished three aspects of this obligation. First is a global measure, which captures to what extent

people generally feel that they should follow the law, regardless of the circumstances, and even in situations where it may be justified to break it. To assess this general *Obligation to Obey the Law (OOL general)*, we utilized the 12-item rule orientation scale.[49] Thus, participants were asked to what extent they regard it as acceptable to break a legal rule under certain conditions (e.g., when the rule is against one's moral principles; when the rule is enforced unfairly; when one does not understand the rule, etc.; α = .93). The survey further assessed their *Normative obligation to obey the law* (Normative OOL). This concept refers to people's felt obligation to obey rules based on normative grounds, i.e., based on fair creation and enforcement by legitimate authorities.[50] Three items were used to measure this: (1) "I feel a moral obligation to obey the authorities handling the coronavirus," (2) "I feel a moral duty to support the decisions of the authorities handling the coronavirus, even if I disagree with them," and (3) "I feel a moral duty to obey the instructions of the authorities handling the coronavirus, even when I don't understand the reasons behind them" (α = .77). As a complement to this, the survey also looked at people's *Non-normative Obligation to Obey the Law* (Non-normative OOL). This concept refers to their obligation to follow rules based on non-normative grounds, i.e., based on a sense of coercion.[51] Three items were used to measure this: (1) "People like me have no choice but to obey the authorities handling the coronavirus," (2) "If you don't do what the authorities handling the coronavirus tell you they will treat you badly," and (3) "I only obey the authorities handling the coronavirus because I am afraid of them" (α = .67). For each of these instruments, we expected compliance to be greater among people who feel a higher obligation to obey.

Situational Factors

As outlined before, there are two core theoretical strands about how situations may shape compliance: capacity theories and opportunity theories. For each of these, our survey measures one or more of its key variables.

Capacity theories hold that people's compliance with rules is rooted in their capacity for obeying them. More specifically, such theories hold that people's personal circumstances or states may make it easier or more difficult for them to comply.[52] Our survey captured three aspects of this. First is the *practical capacity to comply*. This is based on a body of work that shows that compliance is less likely when people are unable to follow the rules.[53] We asked participants to indicate to what extent they were

"capable of keeping a safe distance" from others in each of the seven situations included in our dependent variable (i.e., outside of their direct household, from neighbors, etc.; α = .81). We expected compliance to be greater the more that people were practically capable of complying with social distancing measures. As a second aspect of the capacity to follow rules, we looked at states that constrain people's personal ability to control themselves, specifically their *Impulsivity*. Studies have shown that a lack of self-control predicts deviant and rule violating behavior.[54] To capture this, five items were solicited, taken from the 8-item impulse control subscale from the Weinberger Adjustment Inventory (WAI).[55] Sample questions include "I do things without giving them enough thought" and "I stop and think things through before I act" (reverse coded). One item displayed a low item-total correlation (rs < .20) and was therefore eliminated; the remaining four items showed acceptable internal consistency (α = .70). We expected people's compliance to be greater the higher their self-control, and thus the lower their impulsivity. As the final aspect of the capacity to follow rules, we assessed *negative emotional states*. Prior research has shown that when people develop negative emotions, they may turn to deviant conduct to deal with such strain.[56] To capture this, participants were asked to indicate to what extent the coronavirus made them feel (1) "angry," (2) "anxious," (3) "powerless," (4) "depressed," (5) "stressed," and (6) "lonely" (α = .81). We expected compliance to be higher the less that people experienced negative emotions.

Opportunity theories hold that people comply because the situation presents them with more or less opportunities for disobeying (opportunity).[57] This is based on insights from routine activities theory,[58] as well as situational crime prevention,[59] which show that people are more likely to violate rules when they are in a situation where there are easy opportunities to do so. To capture this *Opportunity to violate,* we asked participants to what extent it was "still possible for them to come at an unsafe distance" from others in each of the seven situations included in our dependent variable (α = .91). We expected compliance to be greater the less that people saw opportunities for violating social distancing measures.

Control Variables

Additionally, our survey measured as controls a series of demographic variables that could influence compliance with social distancing

measures: age, gender, nationality, information on residency, employment status, occupation, education, household residents (total number and number of dependents), insurance status, and socio-economic status before and after COVID-19 (using the MacArthur Scale of Subjective Social Status).[60] Moreover, we assessed whether participants provided professional care for coronavirus patients, visited friends or family over the age of 75 on a regular basis prior to the outbreak of the coronavirus, and whether they themselves, or anyone they knew had health issues that might place them at increased risk for the coronavirus. Last, we also control for their trust in traditional media and in scientists as these were shown to be significant predictors of compliance in previous research that was conducted using the same materials in other countries.[61]

c. Results

Descriptive Statistics

Tables 1 and 2 show the descriptive statistics for control variables and voluntary compliance with social distancing measures, respectively. Descriptive statistics for independent variables are shown in Table 3. Generally, Table 2 indicates that Beijing residents reported a relatively high degree of compliance with social distancing measures, despite the fact that these measures were advisory, rather than a mandatory rule.

Table 2: Descriptive Statistics of Compliance Items

	Beijing (*n* = 1,024)	Scale
I keep a safe distance from …		
Others outside of household	5.50 (1.55)	1–7
Neighbors	5.67 (1.23)	1–7
Colleagues at work	5.14 (1.44)	1–7
Friends and family outside household	5.20 (1.49)	1–7
Others when grocery shopping	5.95 (1.14)	1–7
Others when walking or exercising	5.94 (1.11)	1–7
Others in traffic or public transport	5.94 (1.16)	1–7
Compliance scale measure	5.62 (0.92)	1–7

Note: Standard deviations are in parentheses.

Table 3: Descriptive Statistics of Independent Variables

Variables	Beijing (*n* = 1,024)	Scale	*α*
Motivational variables			
Substantive support (moral alignment)	6.41 (0.91)	1–7	NA
Perceived health threat	5.64 (1.21)	1–7	0.88
Normative obligation	5.96 (0.92)	1–7	0.77
Non-normative obligation	3.55 (1.41)	1–7	0.67
Obligation to obey the law (general)	4.63 (1.32)	1–7	0.93
Costs of compliance	4.59 (1.24)	1–7	0.78
Punishment certainty	3.33 (1.81)	1–7	0.84
Punishment severity	3.71 (1.39)	1–6	NA
Descriptive social norms	5.34 (1.04)	1–7	0.89
Situational variables			
Practical capacity to comply	5.88 (0.78)	1–7	0.81
Impulsivity	2.49 (0.86)	1–5	0.70
Opportunity to violate	3.87 (1.44)	1–7	0.91
Negative emotions	4.13 (1.21)	1–7	0.81

Note: Standard deviation are in parentheses.

Correlations

Table 4 shows the correlation matrix of control variables and our dependent variable, voluntary compliance with social distancing measures. Table 5 reports the correlations between the independent variables and compliance.

Regression Analysis

To identify relevant covariates, we first performed an ordinary least-squares (OLS) regression (with robust standard errors), in which all demographic variables were included as the predictors. As shown in Table 6, demographic variables appeared to have limited impact on participants' voluntary compliance with social distancing rules. Greater compliance was associated with greater trust in science and greater trust in media. Compliance was also greater if participants had visited friends or family above the age of 75 before the pandemic, and if they knew fewer people who had health issues that placed them at increased risk from COVID-19. As such, we controlled these four variables in the main analysis.

Table 4: Kendall's Tau Correlations with Control Variables (*n* = 1,024)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.Age																
2.Gender	-.03															
3.Minority	-.01	-.02														
4.Size of household	-.11*	-.08*	-.00													
5.Number of children	.15*	-.10*	-.00	.41*												
6.Education	.03	.07*	.013	-.07*	-.03*											
7.Employed	.38*	.00	.01	-.13*	.09*	.13*										
8.Corona care	-.01	-.01	.02	.08*	.12*	-.02	.03									
9.SES before COVID-19	.09*	.05	.00	-.05	.08*	.21*	.13*	.10*								
10.SES after COVID-19	.08*	.06*	.00	-.03	.09*	.16*	.10*	.07*	.72*							
11.Insurance	.10*	-.00	.04	-.03	.08*	.10*	.21*	-.02	.18*	.15*						
12.Health issue self	.08*	.03	.12*	-.03	.03	-.02	.04	.12*	.03	.01	.00					
13.Health issue other	.06*	.09*	.03	-.10*	-.03	.06*	.05	.03	.07*	.05	.04	.40*				
14.Trust in science	.02	.08*	-.01	.03	-.01	.02	.01	.00	.03	.06*	.05	-.01	-.04			
15.Trust in media	.10*	.07*	-.02	.02	.09*	.02	.07*	.06	.08*	.11*	.03	.01	-.01	.43*		
16.Over 75 Friends/family	.12*	.02	.01	-.03	.02	.08*	.12*	-.00	.12*	.12*	.05	.03	.15*	.05	.01	
17.Compliance	.05*	.03	.02	.011	-.01	.02	.05	.03	.01	.01	.01	-.01	-.06*	.19*	.15*	.06*

*Correlation is significant at the .05 level (2-tailed).

Table 5: Kendall's Tau Correlations with the Independent Variables ($n = 1,024$)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1.Costs of compliance													
2.Perceived threat	.11*												
3.Substantive support	-.00	.25*											
4.Descriptive social norms	.03	.12*	.15*										
5.Negative emotions	.23*	.11*	-.04	-.05*									
6.Punishment certainty	.19*	.03	-.11*	-.01	.09*								
7.Punishment severity	.08*	.09*	.03	.12*	.03	.01							
8.Practical capacity to comply	.01	.19*	.30*	.40*	-.07*	-.07*	.11*						
9.Impulsivity	.10*	-.03	-.16*	-.11*	.17*	.14*	-.02	-.15*					
10.Opportunity to violate	.04	-.04*	-.10*	-.12*	.07*	.16*	-.07*	-.19*	.17*				
11.Normative obligation	-.04	.22*	.31*	.16*	-.06*	-.09*	.07*	-.28*	-.11*	-.03			
12.Non-normative obligation	.10*	-.04	-.12*	-.01	.16*	.11*	.04	-.11*	.15*	.10*	-.09*		
13.OOL (general)	-.08*	.09*	.18*	.10*	-.15*	-.12*	.07*	.18*	-.22*	-.18*	.23*	-.23*	
14.Compliance	.00	.18*	.26*	.31*	-.08*	-.04	.12*	.49*	-.14*	-.15*	.22*	-.08*	.15*

*Correlation is significant at the .05 level (2-tailed).

Table 6: Linear Regression on Compliance by Demographical and Control Variables

Variables	Beijing ($n = 1,024$)	Effect size (partial η^2)
Age	.00 (.00)	.00
Gender (female)	.07 (.06)	.00
Ethnic minority	.08 (.10)	.00
Size of household	.02 (.02)	.00
Number of children	-.02 (.03)	.00
Education	.05 (.03)	.00
Employed	.08 (.08)	.00
Care professionally for COVID-19 patients	.08 (.11)	.00
Socio-economic status, pre-COVID-19	-.02 (.02)	.00
Socio-economic status, change	-.03 (.03)	.00
Insurance	.03 (.11)	.00
Health issues placing oneself at risk	.02 (.11)	.00
Health issues placing others at risk	-.20 (.08)*	.01
Trust in science	.20 (.05)***	.02
Trust in media	.10 (0.4)**	.01
Friends or family over 75	.12 (.06)*	.01
Constant	3.85 (.31)***	.13
R^2	.07	

Robust standard errors in parentheses. *$p < .05$. **$p < .01$. ***$p < .001$.

To assess the effects of the situational and motivational predictors on participants' voluntary compliance with social distancing measures, the second OLS regression (with robust standard errors) was conducted. In this analysis, all situational and motivational predictors were included as the independent variables, and the control variables identified in the previous step were included as covariates.[62] Table 7 shows the results. We find significant positive associations with compliance for *perceived threat*, *substantive support*, *punishment severity*, and *practical capacity to comply*. Other things being equal, participants showed greater compliance with social distancing measures if they perceived the virus as more threatening, were more capable of following these measures, believed more strongly that people should do so, and expected stronger punishment for failure to comply.

Table 7: Linear Regression on Compliance Measure by Independent Variables

Beijing (n = 1,024)	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Effect size (partial η^2)
Constant	4.31(.24)***	1.66(.31)***	.78(.29)**	4.75(.36)***	4.56(.32)***	5.04(.34)***	.19
Controls							
Health issues placing others at risk	-.18(.07)*	-.05(.07)	-.02(.06)	-.03(.06)	-.03(.06)	-.04(.06)	.00
Trust in science	.20(.05)***	.03(.04)	-.01(.04)	-.01(.04)	-.01(.04)	-.01(.04)	.00
Trust in media	.11(.04)**	.04(.04)	.05(.03)	.05(.03)	.05(.03)	.05(.03)	.00
Friends or family over 75	.14(.06)*	-.05(0.05)	.06(.05)	.06(.05)	.05(.05)	.05(.05)	.00
Motivational factors							
Substantive support		.21(.03)***	.10(.03)**	.09(.03)**	.10 (.03)**	.09(.03)**	.01
Perceived threat		.09(.02)***	.06(.02)*	.06(.02)**	.06*(.03)	.06(.02)**	.01
Normative obligation		.06(.03)*	-.01(.03)	-.01(.03)	-.01(.03)	-.02(.03)	.00
Non-normative obligation		-.03(.02)	.01(.02)	.01(.02)	.01(.02)	.01(.02)	.00
OOL (general)		.07(.02)*	.01(.02)	.01(.02)	.01(.03)	.01(.02)	.00
Costs of compliance		-.01(.02)	-.01(.02)	-.01(.02)	-.01(.02)	-.01(.02)	.00
Punishment certainty		.03(.02)	.02(.01)	.02(.01)	.02(.01)	.02(.01)	.00
Punishment severity		.09(.02)**	.05(.02)**	.05(.02)**	.04(.02)**	.05(.02)**	.01
Descriptive social norms		.29(.03)***	.05(.03)	.05(.03)	.05(.03)	.05(.03)	.00
Situational factors							
Practical capacity to comply			.60(.04)***	.58(.04)***	.64 (.05)***	.63(.05)***	.20
Impulsivity			-.05(.03)	-.05(.03)	-.05(.03)	-.05(.03)	.00
Opportunity to violate			-.03(.02)	-.03(.02)*	-.03(.02)	-.03(.02)	.00
Negative emotions			-.03(.02)	-.04(.02)	-.03(.02)	-.03(.02)	.00
Interactions							
Capacity to comply × Perceived threat				-.05(.02)**		-.06(.02)**	.01
Capacity to comply × Social norms					.06(.03)*	.06(.02)**	.01
R²	.06	.27	.43	.44	.44	.44	

Robust standard errors in parentheses. *p < .05. **p < .01. ***p < .001.

Note: robust standard errors are in parentheses. *p < .05, **p < .01, ***p < .001.

## d. Interactions between Variables

Prior research has not only devoted little attention to how situational variables may shape voluntary compliance, it also provides little insight into how motivational and situational variables may interact in doing so. For this reason, we additionally tested how the effect of the motivational variables was affected by the key (significant) situational predictor, capacity. By doing so, we examine whether the effect of respondents' motivation might be contingent on the affordances of the situation (namely, their capacity to comply). We first mean centered the variables of interest, and then created interaction terms by multiplying them. Then, we estimated additional regression models in which these interaction terms were included. Only the models with significant interaction effects are presented (Table 7, Models 4–6).[63]

Our analyses revealed two significant interaction effects involving capacity to comply. As is shown in Model 4, we firstly observed a significant negative interaction effect between compliance capacity and perceived threat (β = -0.05; p < .05). Figure 2(a) plots the interaction. Simple slopes for this effect indicated that perceived threat predicted significantly higher compliance if respondents' capacity to comply was low (β = .06; p < .01), but not when their capacity to comply was high (β = .01; n.s.). Secondly, as is shown in Model 4, we observed a significant interaction effect between compliance capacity and social norms (β = .06; p = .03). This interaction is shown in Figure 2(b). Simple slopes revealed that social norms were more predictive of compliance with social distancing measures when respondents' capacity to comply was high (β = .11; p < .01) than when their capacity to do so was low (β = .05; p < .05).

e. Discussion

Although social distancing is often regarded as a key mitigation measure, previous research provided few indications of the extent to which this has featured in China's effective response to the pandemic prior to the conclusion of the zero COVID policy. The present research allowed us to understand whether (and why) citizens in Beijing have practiced social distancing, in the period after the original outbreak. Moreover, our study thereby illuminated compliance in a setting where social distancing was an advisory norm, rather than a mandatory measure (as in most other countries). By doing so, our findings also help to advance our understanding of the processes that shape voluntary compliance. For these purposes, our study drew from the most important theoretical approaches to compliance, and the key motivational and situational variables that they have related to this outcome.

Figure 2: Interactions between Capacity to Comply and (a) Perceived Threat, and (b) Social Norms
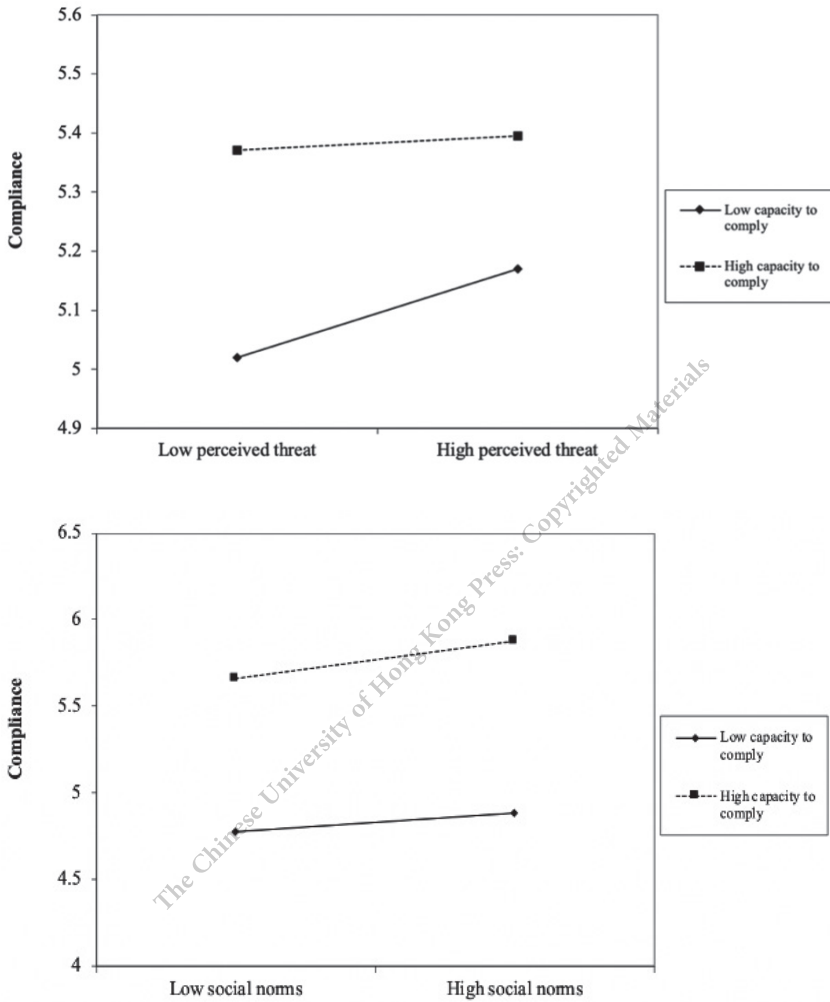
f. Understanding Voluntary Compliance in the 2020 Local Outbreak in Beijing

A first finding is that Beijing citizens reported relatively high levels of compliance with social distancing measures. The observed levels of compliance were not unlike those we observed in other countries (e.g., the U.S. and the Netherlands) during the summer of 2020.[64] This is quite surprising, because at this time, the pandemic was far less active in Beijing, and had almost wholly been suppressed elsewhere in China. Moreover, as noted, social distancing was only an advisory norm in China, and was not enforced in any way. These data therefore show that although social distancing was not a major deliberate part of the policy response to mitigate the pandemic in China, it nevertheless was (reported to be) widely practiced by its citizens in Beijing. And as such, this suggests that there was a situation of voluntary compliance.

Our findings provide insight into what shaped voluntary compliance here. According to previous research, voluntary compliance results from motivational factors, especially intrinsic motivation. [65] The present findings show some results that align with this. To begin with, our findings showed indications that processes relating to legitimacy, as proposed by legitimacy theory, matter for voluntary compliance in this setting. Specifically, our findings revealed that participants adhered more to social distancing measures the more they morally supported these measures. This result is in line with findings on legitimacy from the general literature on compliance, which find that voluntary compliance is greater when people substantively agree with the rules.[66] However, our findings also suggest that extrinsic motives may matter for voluntary compliance in this setting, in line with rational choice theories. Indeed, social distancing was also shaped by its benefits, in that participants complied more the more they regarded the virus as a threat. Moreover, their compliance was also shaped by considerations of the cost of offending, in that participants complied more the more severe they expected to be punished for failure to do so (a noteworthy result because China in fact did not oblige social distancing, or enforce or sanction it— a point to which we return later). In sum, voluntary compliance here was also shaped by more calculative considerations relating to costs and benefits, as proposed by rational choice theories.

Our most important conclusion, however, concerns the role of situational factors. Although compliance research has typically understood

voluntary compliance in terms of motivation, our findings revealed that situational factors in fact were highly influential for respondents' decisions to do so. This was particularly the case for people's practical capacity to comply: the more that people were capable of maintaining a safe distance from others in the settings on which our survey focused, the more they effectively reported doing so. This finding is in line with capacity theories, which suggest that people's personal circumstances and states may shape their ability to follow rules. In fact, capacity to comply did not just predict voluntary compliance in this setting, but in fact was its strongest predictor (at an effect size that far exceeded that of any motivational variable, see Table 8). Our findings thus demonstrate that situational factors can deeply matter for voluntary compliance, thereby substantially expanding a literature that has understood these processes in terms of motivation.

Not only were situational factors more influential for voluntary compliance in this setting, our findings also revealed that situational factors can moderate the effect of motivation. Indeed, threat perceptions only predicted greater compliance when participants' capacity to distance themselves from others was low (and not when their capacity to do so was high), whereas social norms particularly did so when their capacity to distance themselves was high (and less when their capacity for doing so was low). As such, high capacity could compensate for a lack of perceived benefit, while low capacity reduced the beneficial effects of positive social norms. Thus, situations may not only directly shape voluntary compliance, but may also strengthen or weaken the impact of motivational factors. More generally, this suggests that for voluntary compliance (as for compliance with mandatory rules),[67] the mechanisms that have been advanced in the different theoretical strands of the literature may interrelate in more complex ways than has previously been realized.

g. Comparing Voluntary and Mandatory Compliance

The present findings also are informative for understanding social distancing and the processes that sustain this. As noted, in China, social distancing was an advisory norm, as opposed to many other countries where doing so was mandatory. While care should be taken with direct comparisons between countries (due to differences in culture, institutions, pandemic situation, and so forth), such comparisons may nevertheless suggest some preliminary indications of how the processes that sustained (voluntary) social distancing

in China may align with, or differ from, those sustaining (mandatory) social distancing elsewhere. For this purpose, the studies that we have conducted in other countries using the same materials are most directly informative.[68]

In part, the processes that shaped voluntary compliance in Beijing mirrored those involved in social distancing in other countries. Also in the U.S.[69] and in the Netherlands,[70] people's compliance with social distancing measures was contingent on their moral support of such measures; their evaluation of its benefits, in terms of the perceived health threat, and (especially) their capacity to comply with these measures. This underlines that these processes are not just relevant for social distancing when doing so is proscribed by mandatory government measures, but also for voluntary compliance in the absence of such rules. Nevertheless, there also were important differences between the findings observed elsewhere and those in Beijing. In contrast to our studies elsewhere, in Beijing no effects were observed of legitimacy-related factors like normative obligation to obey or rule orientation, capacity-related factors like impulsivity, or social factors like social norms. Whether this reflects differences in statistical power or in the processes relating to voluntary and mandatory compliance is not yet clear.

An even more noteworthy difference concerns the role of punishment. In our surveys in the United States and in the Netherlands, punishment generally did not predict mandatory social distancing.[71] Punishment also did not predict social distancing in a review of studies on (mandatory) social distancing during the first wave period.[72] Yet in the present study in Beijing, social distancing was contingent on perceptions of punishment, specifically those relating to the perceived severity of sanctions for failure to comply. This result is all the more striking because social distancing in fact was not a mandatory rule in China, and thus was not subject to enforcement or sanctions (contrary to in other countries). This finding thus reveals that deterrence can matter for social distancing, even when there is no enforcement. An important question is why punishment perceptions mattered for social distancing in Beijing, and not elsewhere. One possible explanation for this is a spill-over effect, such that strong punishment for some behaviors may spill over to deter other behaviors for which there is no such strong enforcement (i.e., "ultra-general deterrence").[73] In China, this could include both the general legal and political context (i.e., strong state control and usage of repressive sanctions for misconduct), as well as strong enforcement of other (mandatory) mitigation measures against COVID-19. For example, from January to July,

nearly 5,800 people were arrested and around 6,700 were prosecuted for epidemic-related crimes, such as lying about their travel history and violating quarantine orders.[74] The notion that related measures were strictly enforced may also explain why deterrence perceptions did influence voluntary compliance in China, and not mandatory compliance in other countries.[75] Indeed, even though social distancing was compulsory in such countries, it nevertheless was often the case that the likelihood of punishment for violations tended to be low.[76]

More generally, an important question is why motivational factors relating to legitimacy and costs and benefits have not been strong predictors of compliance with social distancing measures, despite extensive support for their relevance for complying in the general literature on compliance.[77] Importantly, this observation applies not just for our present study in China, but also for other studies on social distancing conducted elsewhere in the world.[78] On the one hand, this pattern may relate to the unique setting of the pandemic and the measures to counter it—such as the fact that noncompliance is not readily observable by the authorities, and that in a health crisis such as this, people may regard the effectiveness of policies more important than the fairness of their creation. On the other hand, however, there also are indications that such differences may relate to the extent to which studies have considered the different explanations for compliance that have been proposed in the main strands of the compliance literature. Although many studies on compliance incorporate elements from two, three, and occasionally more theories, they rarely systematically incorporate the core variables from the five main theoretical strands of the compliance literature (i.e., rational choice theories, social theories, legitimacy theories, capacity theories, and opportunity theories).[79] In this way, such studies may overlook important aspects of what shapes compliance, which may affect their conclusions.[80] As such, the observation that motivational factors relating to legitimacy and costs were not strong predictors here may also imply that these variables may interrelate in more complex ways when a broader range of mechanisms is systematically considered (as we have done here).[81]

h. Practical Implications

Care should be taken with generalizing findings from earlier periods to later or future pandemic situations in China, due to the drastic differences in both the pandemic situation and the measures used to counter

it. Nevertheless, our results may provide some tentative explanations for the compliance challenges that China has faced during the course of the pandemic, or may face in the future. To begin with, our findings demonstrate that at the time of our research, fear of the virus and support of mitigation measures fuelled compliance with mitigation measures. With development and deployment of vaccinations and also the less-lethal Omicron variant, Chinese citizens in the later stages of the pandemic had less reason to fear the virus. At the same time, the authorities continued to impose a zero-COVID (Dynamic-Clearance) policy, implemented during later outbreaks in a campaign-type manner,[82] for instance in Shanghai, and to a lesser extent also Beijing.[83] While the policy was successful in reducing infections, severe diseases and mortality, it led to very direct restrictions in citizen basic freedoms in those identified "high-risk" areas and also came with high economic costs. As a result of these developments, it is likely that the perceived threat of the virus declined in the later stages of the pandemic, and also support for the policies, undermining voluntary compliance.[84]

Our finding that perceptions of punishment severity may promote compliance aligns with the observation that strict enforcement may coerce compliance if detection of violations is sufficiently high, even when intrinsic motivation to do so has eroded.[85] However, research does suggest that such extrinsically motivated compliance could have detrimental effects in the long run, by undermining intrinsic motivation to comply (for example when extrinsic measures are repealed).[86] It should be noted, however, that this body of work has developed outside of China: it may well be that China's immense state capacity to implement its policies, in part also by mobilizing mass social control to the neighbourhood level (as has occurred in the implementation of the Dynamic Zero-COVID policies in Shanghai),[87] do mean that longer term coercion is possible, and may persist longer once direct coercion ends. So far, due to the political sensitivity of mitigation compliance during these campaigns, no reliable data on these questions has been gathered. However, future research may be able to assess what role coercion played in the implementation of these policies; how it contributed to achieving compliance; and what its long-term effects were once direct coercion was lifted.

Which avenues do our findings highlight for how compliance could be enhanced? On the basis of the present results, we can only speculate about this. To begin with, our findings underline that moral support and perceived benefits were important for compliance. This could imply that

compliance can be increased if authorities successfully convince citizens of the threat of a pandemic, and the merit of the measures to counter it.[88] In the later stages of the pandemic, and in light of the developments regarding the lethality of the pandemic and the restrictiveness of mitigation policies, convincing citizens of this may not be easy, however. More practical, perhaps, is the observation that having the capacity to comply is critical for compliance. In the present study, participants complied more with social distancing measures if they were capable of doing so— even if they personally saw little benefit in this. What this could imply is that authorities might be able to increase compliance by ensuring that mitigation policies are practically feasible for citizens. This implies that when implementing mitigation measures, authorities should strive to create practical circumstances that enable citizens to comply. In the later stages of the pandemic, "one-meter distancing" became a rule in cities like Beijing and Guangzhou, which mandated public places management units to set up "one-meter lines and signs" to facilitate social distancing. While further research is needed to understand how these processes operated during the later stages of the pandemic and specifically the Dynamic Zero-COVID policy, our findings hint at the importance of measures that support people in their capacity to comply with restrictive measures such as lockdowns—for example by ensuring that they are provided with essential resources for staying at home (e.g., food and other consumables).

i. Limitations

There are several limitations to our research. First, our study of social distancing compliance relies on self-report measures, and as such may be vulnerable to imperfect recall or social desirability bias (as is typically the case for survey research).[89] There are several factors, however, that may help to mitigate such concerns. First, research that has directly looked at social desirability in self-reported compliance with COVID-19 measures has shown only a limited impact of this in online surveys.[90] Furthermore, to avoid social desirability in reported compliance, we followed best practices in asking factual and specific questions that did not indicate that the behavior would be seen as negative, immoral or illegal, and solicited these measures prior to independent variables that might shape these responses (e.g., perceived morality, norms, etc.). Concerns over social desirability may further be mitigated by the notion that social distancing

was not mandatory in China, and our measures thus did not address (more sensitive) illegal behaviors. Finally, reported levels of compliance were high, but not maximal, and moreover, showed variation between settings and individuals (see Table 2). These notions mean that the impact of social desirability on our results may have been relatively limited.

Second, and related to the previous point, by relying on self-reported measures, our study may run the risk of common-method bias (CMB). To mitigate this, we firstly took steps in the design of the survey to reduce response format similarity, for example by including multiple response formats and reverse-coded items. Furthermore, we utilized statistical methods to detect CMB. Results of Harman's single factor test suggest that the total variance of the common factor was 20.57 percent,[91] and thus below the threshold value of 50 percent. In this way, this result also statistically reduces concern over CMB. These points strengthen our confidence in our methods and results. Nevertheless, it would be valuable for future research to include multiple methods, including objective measures of compliant behavior.[92]

Finally, we should note that our sample was relatively young and highly educated, and thus may not be fully representative of the Beijing population, or that of China more generally. As such, the present research provides a valuable, initial glance at these processes in a Chinese context, which should be complemented with insights gained from other studies in different regions, communities, and pandemic stages. Such research may further extend our understanding of these processes by exploring how the variables that shape compliance with (voluntary) social distancing measures during the early stages of the pandemic may align with those that explain compliance with more recent Dynamic Zero-COVID policies, or how these processes may differ in other settings. Moreover, future research could also explore further how voluntary compliance with non-mandatory measures may be shaped by other measures and policies for which there is strong enforcement (i.e., ultra-general deterrence).

4. Conclusion

Like most countries in the world, China has relied on social distancing measures as part of its response to mitigate the COVID-19 pandemic. Yet, in contrast to most other countries, the Chinese social distancing measure was advisory, not mandatory. By studying compliance in this

setting, the present research provides us a unique view into voluntary compliance following a pandemic outbreak. This is relevant for pandemic mitigation, but also more broadly, by providing new empirical insight for the study of voluntary compliance.

Our findings overall show that voluntary compliance in this setting involved not only motivational factors, but also situational factors, especially people's capacity to comply. In this way, voluntary social distancing also had strong parallels with mandatory social distancing in other countries, where situational variables also were highly influential. A striking difference, however, concerned the role of punishment, which significantly predicted compliance in Beijing—even though compliance here was voluntary, and there were no sanctions for social distancing infractions. This result may be due to the fact that in China there generally is strong law enforcement against rule breaking, which may spill over to affect voluntary social distancing.

Beyond social distancing, the present findings have important implications for the existing literature on voluntary compliance. This body of work has been predominantly focused on how motivational factors make people follow the law when there is limited threat of enforcement. However, this literature has not deeply considered the impact of situational factors. By revealing voluntary compliance to be primarily dependent on people's practical capacity to comply, the present findings underline the importance of situational factors. By doing so, the present research offers an enriched perspective on voluntary compliance, which should be further explored in future research. In this approach, the key question then becomes to understand how the regulated behavior takes place in practice, and what can be done to make desired behaviors easier, and undesired behaviors more difficult. For this purpose, the vast literature on situational influences on compliance in criminology and regulatory studies can provide a valuable point of departure.

Appendix 1: Pandemic Development and Mitigation Measures from Jan. 24th to July 20th in Beijing

Date	January 24th	April 29th	June 6th	June 13th	July 20th
			Our pilot survey was carried out during 15-22 May	Our main survey was carried out during 14-30 July	
Key events, confirmed cases	Lockdown period; COVID-19 was officially confirmed as a new type of virus; 36 confirmed cases by Jan 24	No new confirmed cases for the past 14 days; the emergency response level adjusted to level 2; 593 confirmed cases by Apr 29	Only one confirmed case for the past 14 days since the last adjustment, the level of emergency response adjusts to level 3; 594 confirmed cases by Jun 6	A new outbreak in Xinfadi market. The level of emergency response adjusted back to level 2; 731 confirmed cases by Jun 16	No new confirmed cases identified for the past 14 days; the level of emergency response adjust to level 3; 929 confirmed cases by Jul 20
Emergency response level	Level 1	Level 2	Level 3	Level 2	Level 3
Measures implemented	1. Community entry limit 2. Registration and temperature checks upon community entrance 4. People who had been to other cities for the past 14 days need to report their travel history to community workers and doctors 5. Those who visited the "affected area" (Wuhan) within 14 days were required to register and be quarantined at home under medical observation.	1. Mask wearing becomes non-mandatory outdoor except for vulnerable and any environment or place with a distance of less than 1 m from a person with unknown health status 2. Travels to medium and high-risk areas are not recommended	1. Hubei was removed from the "affected area" and temperature taking is no longer required when entering communities 2. Most public places can be reopened with capacity limit, and public activities such as conference, exhibition, sports and performance were allowed to reopen with permission as well	1. Communities restored closed management, temperature check, identity verification, APP code verification, registration upon entry 2. Public places open at 30% capacity; temperature check, code verification and face masks were required for entering 3. Access to and from Beijing were strictly controlled; citizens from any specified middle and high-risk places and especially the Xinfadi market are prohibited from leaving Beijing 4. Meetings or video conferences of less than 100 people can be held under strict compliance with pandemic measures.	1. Special measure of communities are withdrawn 2. Most public places were reopened at 50% capacity, while exhibitions, sports events, performances and cinemas will be gradually reopened with restrictions on population flow
Measures related to social distancing	Lockdown period (no social distancing)	Citizens were advised to keep a safe social distance and avoid crowded places	Social distancing was mentioned being a precondition for reopening public places and events	1. Masks must be worn in close contact less than 1 meter and in crowded, closed and crowded places. 2.Citizens were advised to keep a social distance of more than 1 meter in social activities	1. Masks must be worn in close contact less than 1 meter, in closed and crowded spaces; 2. Encourage frequent hand washing and social distancing

Source: Website of the Beijing government, http://www.beijing.gov.cn/.

Notes

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