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Pathos or logos? How governance legitimacy perception influences individual privacy trade-offs during COVID-19 pandemic

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The COVID-19 pandemic has brought attention to the delicate balance between individual privacy concerns and the governance of public health emergencies. Governments are leveraging a wide range of digital methodologies to acquire individual-level data for purposes such as contact tracing, isolation protocols, and surveillance, all aimed at effectively mitigating the deleterious consequences of the epidemic. However, the surrender of individual health information depends on individuals' perception of the legitimacy of governance. In this research, our objective is to examine how individuals' perceptions of the legitimacy of governance impact their decisions regarding privacy disclosure. This study stands out by dissecting cognitive and moral legitimacy of governance, uniquely examining their influence on individuals' altruistic privacy disclosure during a crisis. Unlike previous research, our approach offers a more nuanced understanding of the interplay between governance legitimacy and privacy concessions. From July 15th to August 14th, 2022, amid the 2022 lockdown in Shanghai, China, this study utilizes surveys with established measurement scales, alongside structural equation modeling (SEM), to explore the relationship between individuals' perceptions of government legitimacy in managing the pandemic and their willingness to compromise health information. The study distinguishes between moral legitimacy (pathos) and cognitive legitimacy (logos). The results find that both cognitive and moral legitimacy positively influence altruism, thus enhancing the efficacy of voluntary disclosure of personal health information to government agencies for pandemic governance. However, it is noteworthy that education level moderates the impact of these two dimensions of legitimacy on altruism. This research provides empirical evidence to enhance our understanding of how different dimensions of citizens' perceptions of governance legitimacy in crisis situations shape their attitudes and behaviors towards privacy trade-offs.

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Introduction

The COVID-19 pandemic has underscored the tension between safeguarding individual privacy and ensuring effective public health governance. Governments rely heavily on access to private information for implementing measures against the virus (Li et al., 2022; Ram and Gray, 2020; Yuan, 2021), raising concerns about privacy breaches and cyber violence (Huang, 2020; Lian et al., 2022; Liang, 2020; Parker et al., 2020). The introduction of the General Data Protection Regulation (GDPR) by the European Union defines the inclusion of personal data such as IP address, geolocation data, and biometric data (Vanberg, 2021). Furthermore, the potential for misuse of collected information has led to criticisms that invasive technologies like digital contact tracing can encroach upon privacy rights, data protection, and other fundamental civil and human rights (Huang, 2020; Singer and Sang-Hun, 2020).

Despite these concerns, individuals have sacrificed their personal privacy for the greater cause of pandemic management. This collective willingness to disclose personal information can be attributed to two approaches. One explanatory approach focuses on the functional dimension, which emphasizes the practical benefits individuals derive from using digital contact tracing technologies. For instance, studies have identified that positive attitudes towards contact-tracing apps are influenced by perceived effectiveness (von Wyl et al., 2021; Zabel et al., 2023) and ease of use (Dowthwaite et al., 2022). Individuals also weigh risks, such as privacy violations, against benefits, such as protection against COVID-19 infection (Hassandoust et al., 2021). Another explanatory approach pertains to the values dimension. Individuals' trust in the government and health authorities has also played a significant role in their decision to voluntarily disclose personal information. Trust serves as a crucial factor in shaping individuals' confidence in the government's ability to handle the crisis. Research has indicated that higher levels of trust in the government, big tech companies, or large hospitality venues increase individuals' likelihood of using COVID-19 digital contact tracing (Dowthwaite et al., 2022). Moreover, individuals perceive contact tracing as contributing to the "greater good" ("Public Attitudes towards COVID-19 Contact Tracing Apps," 2021) and feel a moral obligation based on social norms (Zabel et al., 2023) and social influence (Hassandoust et al., 2021).

While the functional explanatory path sheds light on individuals' disclosure behaviors during the COVID-19 pandemic from an individual pragmatic perspective, the values explanatory path complements this understanding by examining how external factors influence disclosure behaviors. However, the values pathway primarily focuses on how individuals' perceptions are influenced by their evaluations and perceptions of others or institutions, particularly in relation to the use of technology tracking techniques, driven by trust in political institutions and social influence from others who have also disclosed information. This interpretation overlooks the possibility of individuals evaluating the governance legitimacy of the event itself and how this evaluation impacts their perceptions and attitudes. Thus, this paper aims to address this gap in the literature by exploring the role of governance legitimacy evaluation in shaping individuals' perceptions and attitudes towards privacy disclosure during crisis like the COVID-19 pandemic.

Literature review

Pathos or logos? How perceived governance legitimacy influence privacy disclosure.
Legitimacy encompasses the public's willingness to perceive the actions of authorities as valid and appropriate within a socially constructed systems of norms, values, beliefs, and definitions (Lipset, 1959; Suchman, 1995). In the context of crisis management, such as the COVID-19 pandemic, governance legitimacy is vital for the effective functioning of governmental systems (Christensen et al., 2016). The voluntary compliance of the public with government rules and guidelines is essential for an optimal response to the pandemic (Martela et al., 2021). During the COVID-19 period, the perceived legitimacy of health authorities plays a significant role in shaping individuals' belief that following their guidelines is the appropriate and response course of action (Gerber et al., 2021). Therefore, legitimacy can be seen as a measure of the government's ability to elicit compliance with public health orders and directives (Khemani, 2020).

In the context of the pandemic, the government's collection of users' personal privacy information demands a stronger and more stable foundation of government legitimacy. This is necessitated by the highly sensitive nature of the data involved, the unique circumstances of data collection during the COVID-19 outbreak, and the potential adverse consequences of data breaches. Users' willingness to provide this information for effective pandemic management hinges on their perception of the governments' legitimacy. Consequently, this paper proposes the following research hypotheses:

H1a: Cognitive legitimacy has a positive influence on privacy disclosure.

H1b: Moral legitimacy has a positive influence on privacy disclosure.

All for one, or one for all? How altruism mediates the governance legitimacy and privacy disclosure.
Altruistic behavior refers to prosocial acts driven by a genuine intention to benefit others without seeking personal rewards (Feigin et al., 2014). In the context of the COVID-19 pandemic, sharing personal information for pandemic management, while vital, can risk data leaks and social stigmatization, challenging altruistic motives. As the costs and risks of privacy concessions rise, especially in interactions with non-acquaintances, altruistic motivations become less effctive. Therefore, we introduce perceived legitimacy as a vital factor in sustaining altruistic behavior, fostering the belief that adhering to government guidelines during COVID-19 governance is the right course of action (Gerber et al., 2021).

During the COVID-19 pandemic, governments globally have sought the public' support and adherence to various pandemic governance measures. These measures include voluntary compliance with self-isolation protocols, participation in nucleic acid testing, and self-health monitoring (Calvo et al., 2020). Rituals and symbols plays a significant role in constructing narratives that contribute to successful pandemic responses (Jing, 2021). For instance, slogans such as "Fighting the pandemic is everyone's responsibility" effectively communicate the idea that each individual has a duty and obligation to actively engage in pandemic governance. By framing the pandemic response as a symbol of social solidarity, the government reframes individual behaviors, such as providing health information and wearing masks, as acts of altruism rather than self-protection (K. K. Cheng et al., 2022). This framing highlights the importance of collective responsibility and motivates the public to actively participate in pandemic preventive behaviors (Walker, 2022).

In this context, the government plays a role in encouraging individuals to willingly sacrifice their privacy in order to protect public health, thereby promoting a spirit of altruism (Kokkoris and Kamleitner, 2020). By willingly disclosing personal information to the government for crisis management purposes,

individuals contribute to the greater good and prioritize public interests over their own privacy concerns. This notion of moral privacy suggests that privacy is not solely an individual's possession but can be relinquished and governed in certain circumstances, particularly when it conflicts with the interests of others and the broader public values. Building upon these insights, this paper aims to investigate the following research hypotheses:

H2a: Altruism mediates the relationship between cognitive legitimacy and privacy disclosure.

H2b: Altruism mediates the relationship between moral legitimacy and privacy disclosure.

Divergent altruism? How education moderates the impact of governance legitimacy on altruism. Education level can potentially moderate the relationship between legitimacy and altruism for several reasons. Firstly, education equips individuals with critical thinking skills and the ability to evaluate and comprehend the legitimacy of governmental' actions (Matthes and Marquart, 2013; Cao, 2008). Higher levels of education may enable individuals to make more informed judgments regarding the government's initiatives and perceive them as more legitimate. This enhanced perception of legitimacy can positively influence their willingness to disclose personal information. Secondly, education plays a pivotal role in shaping individuals' moral values and altruistic tendencies (White, 2016). Higher levels of education are often associated with increased empathy, social awareness, and a sense of responsibility towards the well-being of others. Individuals with higher education may possess stronger altruistic motivations and a greater inclination to contribute to the collective good. This may extend to sacrificing privacy for the sake of public health, as they understand the potential benefits and importance of sharing personal information for effective crisis management.

Furthermore, education empowers individuals with knowledge about the potential benefits and risks associated with privacy disclosure. Individuals with higher education levels are more likely to possess a deeper understanding of the broader societal implications and the necessity of privacy concessions during crisis events such as the COVID-19 pandemic. This knowledge can influence their decisions-making process and service as a mediator in the relationship between legitimacy perceptions and privacy disclosure. Educated individuals may engage in a more nuanced evaluation of the legitimacy of government actions, considering the potential trade-offs between privacy and public health benefits.

In summary, education level can act as a moderating variable between legitimacy and altruism by exerting its influence through multiple mechanisms. It can shape individuals' perceptions of legitimacy, cultivate their moral values and altruistic tendencies, and equip them with the knowledge to make informed decisions regarding privacy disclosure in the context of pandemic governance. Considering the pivotal role of education, this paper proposes the following research hypotheses:

H3a: Education level moderates the impact of cognitive legitimacy on altruism.

H3b: Education level moderates the impact of moral legitimacy on altruism.

Methods
Data collection. This study employs a survey methodology to examine the research hypotheses. Against the backdrop of

Shanghai lockdown due to the rampage of omicron variant of coronavirus from late March to early June 2020, the survey was designed to examine Shanghai citizens' perception on the governance legitimacy of privacy tradeoff. From July 15th to August 14th 2022, the research team administered the questionnaire using online survey platform wenjuan.com which is one of the largest online research platforms in China. It has a sample library with over 8 million samples and conducts quality inspection and control on the entire sampling process through algorithms and manual procedures. In order to make the sample as representative as possible of the population distribution in Shanghai, we allocated quotas for each district based on the 7th population survey in Shanghai. The quotas for each district were as follows: 22.8% in Pudong District, 46.6% in Puxi (including Minhang, Jingan, Huangpu Putuo, Hongkou, Yangpu, Putuo and Baoshan district), and suburban areas 30.6% (including Jinshan, Chongming, Jiading, Songjiang, and Qingpu districts) (See Fig. 1). These questionnaires underwent a thorough screening process, including attention testing questions, to ensure the reliability of the collected data. We distributed 2583 questionnaires through the platform wenjuan.com, and received a total of 1074 responses, resulting in a questionnaire response rate of 41.58%. After excluding 25 incomplete responses, 36 with completion times less than 10 min, determined based on the platform's assessment of the questionnaire's average completion time and a pilot survey involving six participants, whose average completion time was also around ten minutes, and 5 with incomplete answers to open-ended questions, we obtained a final set of 1008 valid questionnaires.

Measures. The Cronbach alpha coefficient is used to measure the internal consistency of related scales. The Cronbach's alpha coefficients of privacy disclosure, cognitive legitimacy, moral legitimacy, and altruism are 0.83, 0.90, 0.92, and 0.71, respectively. The specific values are explicitly provided in the subsequent sections detailing the measurement of each variable. A higher alpha coefficient indicates better consistency among different items in the scale, meaning greater reliability when measuring the same concept across various items. In this paper, when calculating the alpha coefficient, we used scores from all items within a concept measurement scale. Mean (M) represents the average value, while the standard deviation (SD) is a single numerical value that summarizes the variability within a dataset.

To measure privacy disclosure, we utilized a measurement scale adapted from a previous study (Wang et al., 2021). The scale comprised four items aimed at assessing participants' attitudes towards sharing their health information with pandemic prevention departments. These items focused on the willingness of individuals to disclose information when requested by authorities.The four items are as belows, "I am willing to provide my health and travel history information when asked by pandemic prevention departments." "I am willing to provide my personal pandemic prevention information to relevant authorities." "I am willing to provide more personal pandemic prevention information for the convenience of travel." "I am willing to provide any personal pandemic prevention information if it can help in pandemic control." Participants indicated their level of agreement with these statements using a 5-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree). To create a composite variable, the scores of the four items were averaged. The reliability of the scale was deemed satisfactory ($\alpha = 0.83$), and the majority of respondents expressed agreement with disclosing their information to pandemic prevention departments ($M = 4.01$, $SD = 0.75$).
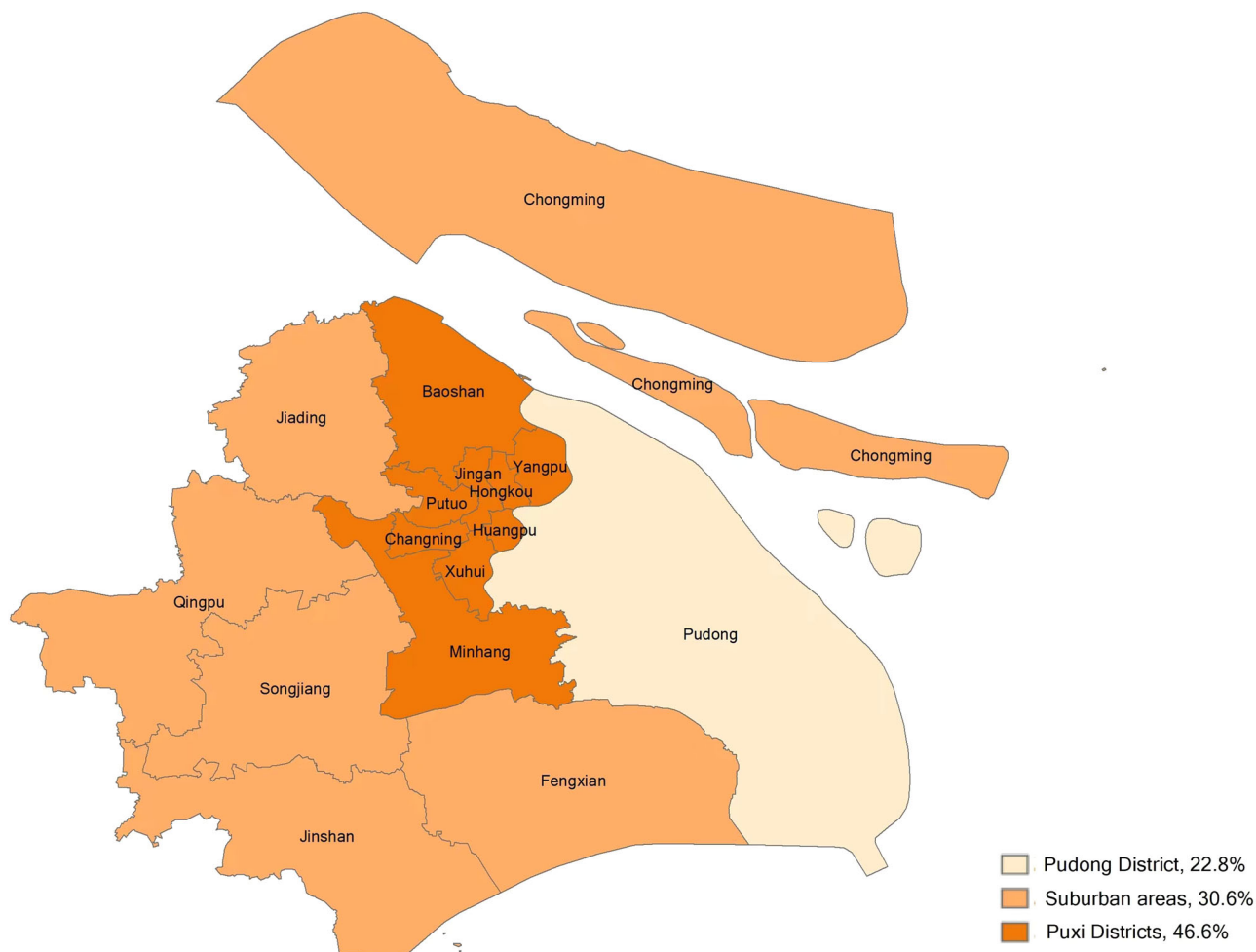
Fig. 1 Sampling distribution in Shanghai ($N = 1008$). Displaying quota sampling distribution in the different areas of Shanghai; the orange represents Pudong district, suburban areas, and Puxi district respectively from light to dark.

To assess the legitimacy of public information collection by authorities during the lockdown, this study utilized a scale derived from prior research on legitimacy (Alexiou and Wiggins, 2019). Two dimensions of legitimacy were assessed: cognitive legitimacy and moral legitimacy. Cognitive legitimacy reflects individuals' passive acceptance and perception that an organization is comprehensible, necessary, or taken for granted. Moral legitimacy pertains to individuals' active evaluation of the extent to which an organization adheres to social norms and shared values for the betterment of society(Alexiou and Wiggins, 2019).

Cognitive legitimacy was measured using a set of six items, "I would like to see institutions collect personal pandemic prevention information" ."I believe it is necessary for institutions to collect personal pandemic prevention information." " Overall, I believe that institutions collecting personal pandemic prevention information serves the purpose of controlling the pandemic." "I believe there are valid reasons for institutions to collect personal pandemic prevention information." "I think institutions collecting personal pandemic prevention information is an important component of overall pandemic control measures." "In general, I believe that the collection of personal information by the pandemic prevention departments serves a purpose in effectively managing the pandemic." Participants rated their agreement with each statement on a 5-point Likert-type scale, ranging from 1 (totally disagree) to 5 (strongly agree). The average score of the six items was calculated to create a composite variable, indicating satisfactory reliability ($\alpha = 0.90$). The findings showed that a

majority of respondents agreed with the notion that the pandemic prevention departments possess cognitive legitimacy in collecting public information for pandemic governance ($M = 3.89$, $SD = 0.79$).

Moral legitimacy was measured using a set of nine items, "Most of the public would agree with the way authorities collect personal pandemic prevention information." "The collection of personal information by pandemic prevention departments adheres to acceptable ethical standards in their field." "The way authorities collect personal pandemic prevention information promotes the public interest." "The public would endorse the policies and procedures for authorities collecting personal pandemic prevention information." "The policies for authorities to collect personal pandemic prevention information are reasonable." "Most people would consider the practice of authorities collecting pandemic prevention information as ethical." "I believe authorities consider public sentiments when collecting personal pandemic prevention information." "Authorities follow regulations when collecting personal pandemic prevention information." "If more organizations adopt such policies and procedures, the world would become a better place." Participants indicated their level of agreement with each statement on a 5-point Likert-type scale, ranging from 1 (totally disagree) to 5 (strongly agree). The scores of the nine items were averaged to create a composite variable, which demonstrated satisfactory reliability ($\alpha = 0.92$). The results revealed that a majority of respondents agreed that the pandemic prevention departments possess moral legitimacy in collecting

Table 1 Descriptive statistics of variables (N = 1008).

Variable Names	Variable types	Frequency(%)	Variable Names	Variable types	Frequency(%)
Gender	Male	495 (49.0)	Districts	Puxi	502 (49.8)
	Female	513 (50.9)		Pudong	233 (23.1)
Age	18–24	133 (13.2)	Annual household income	suburban shanghai	273 (27.)
	25–39	173 (17.2)		below 10,000RMB	1 (0.1)
	30–39	393 (39.0)			
	40–49	126 (12.5)		10,000–50,000RMB	14 (1.4)
	50–59	91 (9.0)			
	60–69	60 (6.0)		50,000–200,000RMB	496 (49.2)
	above 70	32 (3.2)			
Education	Primary School	10 (1.0)		200,000–500,000RMB	349 (34.6)
	Middle School	43 (4.3)			
	High School	133 (13.2)		500,000–10,000,000RMB	134 (13.3)
	Junior college	174 (17.3)			
	Undergraduate	539 (53.5)		Over10,000,000RMB	14 (1.4)
	Graduates	99 (10.8)			

public information for pandemic governance ($M = 3.82$, $SD = 0.74$).

Altruism was measured in this study using a scale adapted from previous research (Feng et al., 2020; Rushton et al., 1981). Three items were employed to assess participants' willingness to assist others during the Covid-19 pandemic. Participants were asked to indicate the degree to which they would be inclined to helpt others in specific situations, including "People can seek my assistance when they encounter difficulties in their lives during the pandemic."

"I have a responsibility for the health of others during the pandemic." "During the pandemic, others can seek help from me if they have health problems." The responses were recorded on a 5-point Likert-type scale, ranging from 1 (totally disagree) to 5 (strongly agree). A composite variable was created by averaging the scores of the three items. The reliability of the scale was satisfactory ($α = 0.71$). The results indicated that a majority of respondents expressed a willingness to help others during the pandemic ($M = 3.88$, $SD = 0.71$).

In this study, education level was examined as a moderating variable. The variable encompassed seven categories, namely primary school, middle school, high school, junior college, undergraduate, master's degree, and doctoral degree. To facilitate the analysis, the education levels were further grouped into two categories: low education level (primary school, middle school, and high school) and high education level (junior college, undergraduate, master's and doctoral degrees). To simplify the analysis, dummy variables were created to represent each education level category.

In addition to the primary variables under investigation (Liu, 2020; Koivula et al., 2023), this study accounted for four control variables in the analysis: gender, age, annual household income level, and media consumption. The respondents' age was divided into three groups: 18−29 years old, 30–39 years old, and 40 years old and above. Similarly, the annual household income levels were categorized into three groups: below 200,000 RMB, 200,000–500,000 RMB, and above 500,000 RMB. These control variables were included to account for their potential influence on the relationship between the main variables of interest.

To assess participants' media consumption during the pandemic lockdown, they were asked to indicate the frequency of their usage of various types of media. The media categories included central media (e.g., People's Daily, CCTV, Xinhua News Agency), national commercial media (e.g., The Caixin, The Paper), Shanghai official media (e.g., Shanghai Post, Dragon TV), Shanghai official media at the district level (such as Shanghai

Street official WeChat groups/blogs), international social media (e.g., Facebook, Twitter, TikTok), international news media (e.g., New York Times, Reuters), and We media (individuals and vloggers focusing on the pandemic in Shanghai, WeChat groups in public communities, phone calls with friends and family). Participants provided their responses on a 5-point Likert-type scale, ranging from 1 (never used) to 5 (several times a day). A composite variable was created by averaging the responses to the nine items, and the scale exhibited satisfactory reliability ($α = 0.80$).

Statistical analysis. The conceptual model was tested using structural equation modeling in R. The model consists of three stages: (1) the effect of cognitive legitimacy and moral legitimacy on privacy disclosure, (2) the mediating effect of altruism on the relationships of legitimacy and privacy disclosure, and (3) the moderating effect of education level on the relationships of legitimacy and altruism.

The demographic characteristics of the sample are presented in Table 1, providing detailed information about the participants in the study. Table 1 illustrates a well-balanced distribution of gender, with women accounting for 50.90% of the sample. The majority of respondents belong to younger age groups, with the largest proportion in the 30–39 age range (39.00%), followed by 25–29 (17.20%), 18–24 (13.2%), 40–49 (12.5%), and 50 and above (18.2%). In terms of education level, 18.5% have completed high school or below, 70.8% have a junior college or bachelor's degree, and 10.8% hold a master's or doctoral degree. Regarding annual household income, 50.7% fall below RMB 200,000, 34.6% fall between RMB 200,000 and 500,000, and 14.7% have an income above RMB 500,000. In terms of housing type, the majority of residents own their house (36%), followed by those who rent a room (32.7%), live in a company or school dormitory (18.9%), share a room with others (11.0%), and reside in other types of accommodations (1.3%). Overall, the sample exhibits a relatively even distribution across various demographic categories.

Control variables were added into each cross-stage path. SEM results for the full model (with the interaction term) showed good fit ($χ2 = 0.135$, $df = 2$, $χ2/df = 67.49$, $P > 0.05$, $CFI = 1.000$, $TLI = 1.014$, $RMSEA = 0.00$, $SRMR = 0.00$). The SEM results are presented in Fig. 2.

Table 2 shows the results of the three stages. In the main effect model, results showed that both cognitive legitimacy ($β = 0.33$, $SE = 0.03$, $P < 0.001$) and moral legitimacy ($β = 0.48$, $SE = 0.04$, $P < 0.001$) had a positive influence on privacy disclosure, lending

support to the first group of hypotheses we proposed. In the mediating effect model, both cognitive legitimacy ($\beta = 0.16$, SE = 0.07, $P < 0.001$) and moral legitimacy ($\beta = 0.18$, SE = 0.06, $P < 0.001$) had a positive influence on altruism; altruism had a positive influence on privacy disclosure ($\beta = 0.08$, SE = 0.02, $P < 0.01$); indirect total is significant ($\beta = 0.03$, SE = 0.01, $P < 0.001$). Thus, the second group of hypotheses were supported. Specifically, altruism serves as a mediator in the relationship between cognitive legitimacy and privacy disclosure, as well as in the relationship between moral legitimacy and privacy disclosure. In the moderating effect model, high education level negatively moderates the relationship between cognitive legitimacy and altruism ($\beta = 0.44$, SE = 0.15, $P < 0.01$); however, high education level positively moderates the relationship between moral legitimacy and altruism ($\beta = -0.43$, SE = 0.15, $P < 0.01$). Hence, the third group of hypotheses were supported.

Based on the Fig. 3, the horizontal axis represents the strength of cognitive legitimacy, and the vertical axis represents altruism. We observe a trend that at higher education levels, the relationship between high cognitive legitimacy and altruism appears to be stronger compared to the link between low cognitive legitimacy and altruism. This observation suggests a potential association between cognitive legitimacy and altruistic behaviors among individuals with higher education. However, further research is needed to confirm and better understand this relationship.
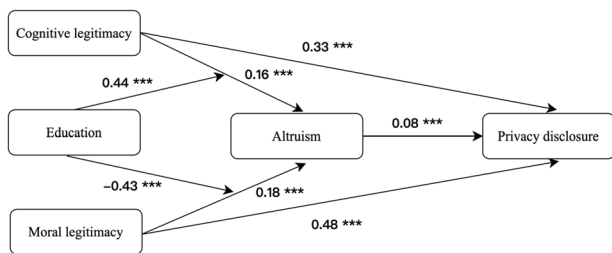
Fig. 2 SEM result with interaction effects of education and legitimacy.
Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Based on the Fig. 4, the horizontal axis represents the strength of moral legitimacy, and the vertical axis represents altruism. In Fig. 3, there seems to be a tendency that among individuals with lower education levels, the impact of low moral legitimacy on altruism is more pronounced than the influence of high moral legitimacy on altruism. This observation hints at a possible connection between moral legitimacy and altruistic tendencies among those with lower educational attainment. Nevertheless, it's essential to note that these are preliminary findings, and additional research is essential to substantiate these observations.

Discussion

On May 5, 2023, WHO Director-General Tedros Adhanom Ghebreyesus announced that COVID-19 no longer constituted a Public Health Emergency of International Concern (PHEIC) (Burki, 2023). In the wake of this announcement, a global narrative unfolds—the return of individuals to their ordinary lives is both a relief and a prelude to a haunting uncertainty. It is against this backdrop of mounting global ambiguities that our journey into understanding the intricacies of personal information disclosure unfolds. This study delves into the intricate mechanisms shaping individuals' willingness to revealing personal information, weaving this puzzle into the core narrative of governance legitimacy. This legitimacy, intricately tied to perceptions of authority, stands as a linchpin in our ability to navigate and respond effectively to potential future crises. While our investigation is anchored in the nuanced data collected during the unique circumstances of the Shanghai lockdown, it unveils a tapestry of insights that extends beyond the immediate context:

Firstly, governance legitimacy emerges as a key determinant influencing individuals' inclination to share personal information with the government for the effective management of a pandemic. Notably, compared to the cognitive legitimacy, moral legitimacy takes precedence to influence the willingness to relinquish privacy, as evidenced by its larger path coefficient, particularly in nations like China where traditional moral and collective values hold significant weight. In such contexts, external perceptions and societal pressures shaped by moral norms and social order overshadow the influence of cognitive legitimacy. This

Table 2 Results of SEM.

$N = 1008$	Model1(Main effect)	Model2 (Mediating effect)		Model3(Moderating effect)	
	Privacy disclosure	Altruism	Privacy disclosure	Altruism	Privacy disclosure
	Estimate (SE)	Estimate (SE)	Estimate (SE)	Estimate (SE)	Estimate (SE)
Altruism			0.08 (0.02)***		0.08 (0.02)***
Cognitive legitimacy	0.33 (0.03)***	0.16 (0.07)**	0.32 (0.05)***	0.12 (0.07)*	0.32 (0.05)***
Moral legitimacy	0.48 (0.04)***	0.18 (0.06)**	0.47 (0.05)***	0.22 (0.07)**	0.47 (0.05)***
Income1	−0.00 (0.04)	−0.19 (0.06)***	0.01 (0.04)	−0.20 (0.07)**	0.01 (0.04)
Income2	0.02 (0.04)	−0.03 (0.06)	0.03 (0.04)	−0.03 (0.07)	0.03 (0.04)
Age1	0.33 (0.03)	0.04 (0.06)	0.03 (0.04)	0.05 (0.06)	0.03 (0.04)
Age2	−0.00 (0.03)	−0.02 (0.05)	−0.00 (0.03)	−0.01 (0.05)	−0.01 (0.03)
Gender (Female)	−0.00 (0.03)	−0.02 (0.04)	−0.04 (0.03)	−0.02 (0.04)	−0.04 (0.03)
Media consumption	0.00 (0.02)	0.16 (0.03)***	−0.01 (0.02)	0.16 (0.03)***	−0.01 (0.02)
Education*Cognitive legitimacy				0.44 (0.15)***	
Education*Moral legitimacy				−0.43 (0.15)***	
Adjusted R-squared	0.67	0.23	0.68	0.23	0.68
Indirect difference			−0.00 (0.01)		
Indirect total			0.03 (0.01)***		
Moderated mediation index (cognitive legitimacy)					−0.03 (0.02)*
Moderated mediation index (moral legitimacy)					0.03 (0.02)*

Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.
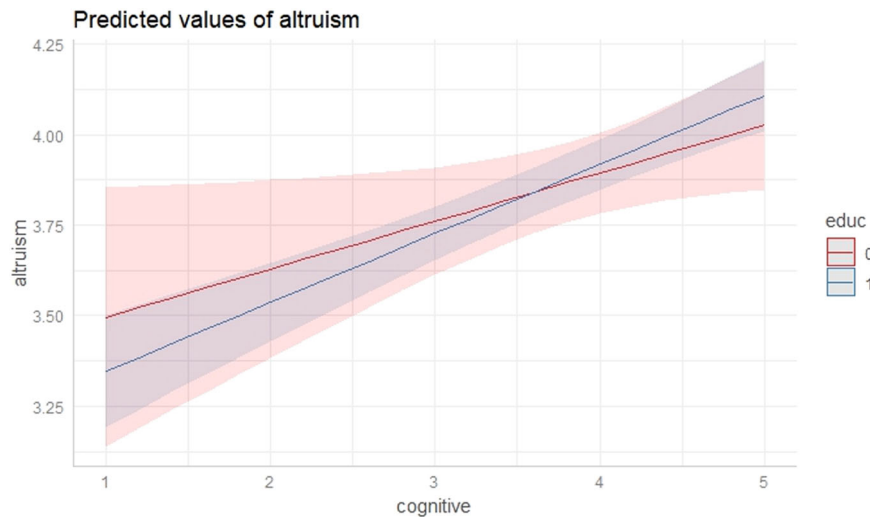
Fig. 3 Interaction plot. Interaction between cognitive legitimacy and education on altruism.
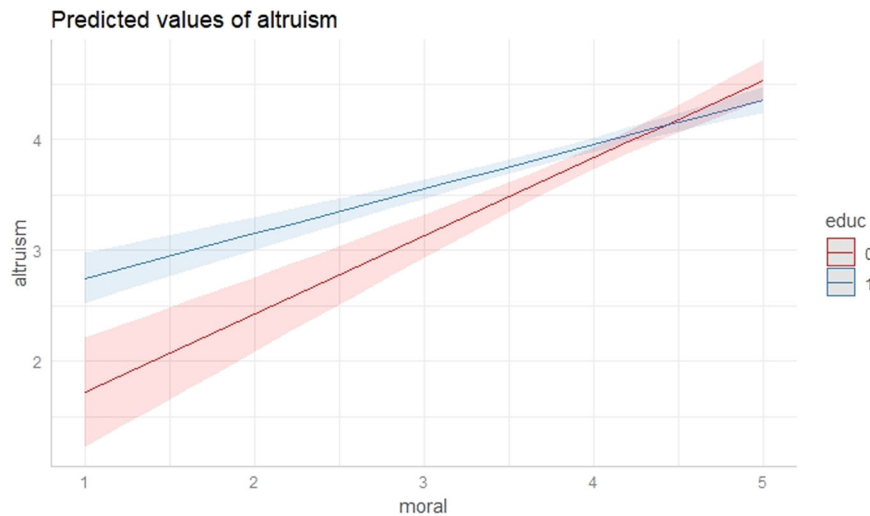
Fig. 4 Interaction plot. Interaction between moral legitimacy and education on altruism.

observation provides indirect insights into the immediate impact of moral imperatives, such as the collective responsibility to wear masks and the importance of mutual assistance in crisis management. Furthermore, this discovery stimulates further exploration, encouraging researchers to extend these conclusions to societies where collectivist moral perspectives remain influential. It prompts an investigation into the intricate causal relationship between moral legitimacy of governance and the willingness to disclose private information, shedding light on the universal applicability of these findings in societies characterized by obvious moral values.

Secondly, altruism serves as a mediator in the intricate interplay between legitimacy and individuals' willingness to disclose personal information. Legitimacy acts as a catalyst that promotes altruistic behavior, thereby fostering the inclination to disclose personal information. Notably, the influence of moral legitimacy on cultivating altruistic behavior surpasses that of cognitive legitimacy. Consequently, individuals are more motivated to divulge personal information for the collective good of effective pandemic governance. Furthermore, this research finding suggests that altruistic strategies in governance legitimacy building might wield significant influence over individuals' willingness and behavioral choices in disclosing privacy, superseding the efficacy

of governance alone. This line of inquiry holds promise for unraveling the intricate dynamics of the cultural roots of governance modes and legitimacy building in crisis management.

Thirdly, among individuals with higher levels of education, cognitive legitimacy emerges as a more powerful factor in fostering altruistic behavior. This phenomenon can be attributed to the enriching effect of higher education on cognitive abilities, critical thinking, and a deeper understanding of modern legal systems and regulations. Those with advanced education are more likely to possess the knowledge and skills necessary to comprehend the significance and benefits of adhering to legal rather than moral norms, thereby influencing their altruistic actions. Hence, cognitive legitimacy has a more significant impact in promoting altruism among individuals with higher education, who show increased receptivity to logical and cognitive justifications for governance legitimacy. Conversely, moral legitimacy has a stronger influence on promoting altruism among individuals with lower levels of education. This can be explained by the powerful influence of traditional and moral values among people who are less educated and more heavily on moral principles and societal expectations when making decisions.

The cumulative research findings bring to the forefront several theoretical considerations and avenues for future research. Firstly,

in societies where traditional values heavily influence behavior, the research highlights that the moral legitimacy of governance may be more significant than cognitive legitimacy in shaping decisions related to pandemic governance and privacy trade-offs (Walker, 2022). This insight calls for further exploration into how public perceptions of governance legitimacy and privacy trade-offs differ across diverse cultural contexts. Future research can provide a deeper understanding of how cultural influences interact with governance structures to shape individual decision-making. Secondly, the robust connection found between perceptions of governance legitimacy, privacy disclosure, and educational levels emphasizes that the level of modernization within a region significantly molds crisis management efficacy (Neblo and Wallace, 2021). Subsequent research could integrate macro-level modernization indicators into the examination of micro-level governance legitimacy and privacy data governance. This holistic approach offers the potential for a multi-dimensional understanding of the mechanisms underlying global crisis management, as exemplified by responses to the COVID-19 pandemic. The third point extends existing privacy management theories. Traditional theories, such as communication privacy management theory, privacy protection motivation theory, and privacy paradox theory, have predominantly focused on micro-level discussions of privacy disclosure and management (Petronio, 2002; Boerman et al., 2021; Kokolakis, 2017). However, the widespread utilization of digital technologies during the COVID-19 pandemic has transformed privacy big data into a cornerstone for public governance (Li et al., 2022; Fahey and Hino, 2020; Martela et al., 2021). As global governance shifts towards greater reliance on privacy big data, the approach to its management is likely to evolve from micro-level protection to governance practices. Thus, future research, building on this study, can pioneer a research focus on "governance-oriented privacy," shedding light on the evolving landscape of privacy management in the context of broader governance strategies.

Conclusion

In summary, this paper examined the intricate interplay of governance legitimacy, cultural dynamics, and educational influences on individuals' responses to privacy trade-offs in times of crises. The discerned prominence of moral legitimacy in culturally grounded societies offers crucial insights into the governing factors steering altruistic behavior. Furthermore, the identified linkages between governance legitimacy perceptions, privacy disclosure, and educational levels underscore the impact of modernization on crisis management efficacy. As we contemplate the trajectory from micro-level privacy protection to governance-oriented practices, this research contributes substantively to theoretical discussions, introducing the concept of "governance-oriented privacy" and enriching our understanding of its role in the realm of global crises.

The present study has several limitations that should be considered. First, the generalizability of the findings may be limited as the study focused on a specific case of a severe lockdown in Shanghai, China in 2022. The results may not fully apply to other regions or contexts that experienced different pandemic control measures or have different cultural backgrounds. Replicating the study in diverse settings would enhance the generalizability of the findings. Second, the reliance on self-reported data introduces potential biases. Participants' willingness to disclose information and their beliefs about legitimacy and altruism were measured through self-report measures, which can be influenced by social desirability bias or memory recall errors. Future studies could incorporate objective measures or behavioral observations to validate the self-reported data. Third, the cross-sectional design of the study limits the ability to establish causal relationships or examine changes over time. The data were collected at a specific point in time, providing only a snapshot of participants' attitudes and behaviors during the pandemic. Conducting longitudinal studies that capture data at multiple time points would provide a more comprehensive understanding of the dynamics between legitimacy, altruism, and other variables. Addressing these limitations in future research would further advance our understanding of the underlying mechanisms in this area.

Data availability

The data analyzed during the current study could be available from the corresponding author on reasonable request.

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XM designed the research, collected and analyze data, wrote and revised the manuscript, and provided funding. YL designed the research, collected data, wrote and revised the manuscript, and provided funding. QH designed the research, collected data, and revised the manuscript. All authors substantially contributed to the completion of the research.

Competing interests

The authors declare no competing interests.

Ethical approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Shanghai University (Date 05/19/2022, No. ECSHU 2022-170).

Informed consent

This study confirmed that informed consent was obtained from all participants and/or their legal guardian.

Additional information

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