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Tolerating Injustice When Feeling in Control: Personal Control Enhances the Link Between Collectivism and Coercion in the Face of Disease Threats

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Supplementary Materials: Data, Materials [see [Index of Supplementary Materials](#)]



Abstract

Amid the COVID-19 pandemic, authorities worldwide imposed coercive regulations aimed at curbing the virus's spread, often at the expense of individuals who were considered potential threats to public health. We argue that individual differences in their support for such actions can be understood from the perspective of an evolved "behavioral immune system". We conducted two studies within the context of the "zero-COVID" policy in Mainland China. Study 1 recruited 819 Shanghai residents during a strict citywide lockdown and found that individuals' collectivistic orientation and personal control over their lives predicted their tolerance of injustices involved in disease-control measures. Moreover, the effect of psychological collectivism was enhanced by personal control. Study 2 ($N = 403$) partly replicated these findings using hypothetical scenarios related to various fictitious viruses. Notably, the effects found in Study 1 only manifested in scenarios involving ambivalent pathogens, which are seldom fatal but highly contagious. Building on the functional flexibility principle of the behavioral immune system theory, we discussed the unique role of ambivalent pathogen signals in generating within-society variability and fine-tuning behavioral immune responses.

Keywords

COVID-19 pandemic, behavioral immune system, justice, personal control, psychological collectivism



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Highlights

- Two studies investigated mechanisms underlying people's judgment of injustice in enforcing disease-control measures during China's "zero-COVID" policy.
- Psychological collectivism led to greater tolerance of injustice, which was even more pronounced when individuals perceived higher personal control.
- In response to various hypothetical scenarios, participants were more tolerant of injustice when faced with viruses with higher fatality rates and greater infectiousness. The psychological collectivism effect and its interaction with personal control were replicated in situations of ambivalent (seldom fatal but highly contagious) disease threats, but not other situations.

During the Coronavirus Disease 2019 (COVID-19) pandemic, the implementation of disease-control measures (e.g., social distancing, contact tracing, and lockdowns) points to the balance between the competing concerns of justice and public health. On the one hand, these measures are essential to protect people's health from infectious diseases with no fully effective cure or vaccine. On the other hand, they also raised concerns about violations of individual freedoms and societal justice (Ranieri et al., 2023), leading to tension between authorities and the public regarding the enforcement of disease-control measures (e.g., Aborisade, 2021; Farrow, 2020). To find "cures" for such societal dysfunctions exposed by the fight against COVID-19, we need to understand the psychological factors that contribute to authoritarian and coercive practices in disease-control measures. The current research examined people's attitudes toward these practices in the context of China's zero-COVID policy through evolutionary perspectives, particularly the behavioral immune system (BIS) theory (Murray & Schaller, 2016; Murray et al., 2013). Within this framework, we sought to explain how justice standards might vary with individual differences in psychological collectivism and personal control under epidemic threats, with practical implications for social justice concerns in public health policymaking.

Collectivism as a Behavioral Immune Mechanism

Humans have evolved two ways to counter the threats of infectious diseases. The physiological immunity system, which comprises many distinct systems and imposes direct somatic costs, serves as a last line of defense against infection. We also possess a set of interconnected motivational, emotional, and cognitive mechanisms aimed at detecting and avoiding infection risks via behavioral and social adjustments, referred to as the BIS (Murray & Schaller, 2016). At the core of the BIS are the mechanisms of pathogen sensitivity, which is linked to disease-prevention motivations due to physiological vul-

nerabilities and the emotion of disgust, which is provoked by nearby sources of disease contamination (Ackerman et al., 2018; Schaller & Murray, 2008).

However, human BIS must extend beyond this “within-individual” pathogen sensitivity mechanism because human society poses an inherent dilemma between the benefits of group living and the epidemic threats of human-to-human transmitting diseases. One solution to this dilemma is a psychological collectivistic orientation that links intragroup and intergroup sociality to pathogen sensitivity and local cues of pathogen prevalence (Fincher & Thornhill, 2012; Murray et al., 2013). Psychological collectivism has been shown to predict perceived disease vulnerability and hypochondriac behavior (i.e., anxiety over one’s health or the possibility of illness; Brown et al., 2014). Further, regional levels of infectious disease threats have been linked to greater social conservatism, authoritarianism, and various “collectivistic” values (e.g., ingroup loyalty, family ties, and obedience; Cashdan & Steele, 2013; Fincher & Thornhill, 2012; see Terrizzi et al., 2013 for a meta-analysis). Recent studies also showed that country-level indicators of collectivism predicted fewer cases of infection during the COVID-19 pandemic (Maaravi et al., 2021), whereas pathogen sensitivity predicted ingroup assortative sociality in terms of prejudices against groups that are associated with disease sources (Dhanani & Franz, 2021; Lantz & Wenger, 2023).

Existing findings also point to potential links among disease threats, collectivistic concerns, and a shift of justice standards toward authoritarianism (i.e., a hierarchical political system wherein high-status individuals or groups impose and asymmetrically enforce laws for lower-status others to observe; Murray et al., 2013). During human evolution, authoritarian practices like an emphasis on conformity and coercive rules might play a crucial role in containing the spread of invisible pathogens in the community (Murray & Schaller, 2016). Even without modern epidemiological knowledge, tribal authorities might still limit the transmission of deadly pathogens that would otherwise decimate or even wipe out the whole tribe by enforcing rules or rituals that separate disease vectors, including patients, and healthy individuals (e.g., banishing or quarantining tribal members who contracted deadly pathogens). From a BIS perspective, it is adaptive for individuals to conform to the authority coordinating such societal disease-prevention measures when facing a high risk of disease infection. Authorities are, therefore, empowered to punish dissenters who endanger public health (Murray et al., 2013). In support of this, elevated regional levels of infectious pathogens (both concurrent and historical) have been linked to various indicators of conformity in different geographical regions (Murray et al., 2011). In one study of 90 small-scale societies from the Standard Cross-Cultural Sample, Murray et al. (2013) showed that societies with higher levels of historical pathogen prevalence tend to have more authoritarian governance systems according to 11 out of 12 indicators of ethnographic observation. Experimental studies have also supported the view that the perceived salience of disease threats causes individuals

to demonstrate greater behavioral conformity and conservative socio-political attitudes (Murray & Schaller, 2012; Wu & Chang, 2012).

Recent findings during the COVID-19 pandemic have also shown that individual-level collectivistic orientation predicted compliance with lockdowns and support for social distancing measures and digital contact tracing (Wang, 2021; Xiao, 2021). These findings suggest that individual differences in psychological collectivism (i.e., prioritizing the needs of societal ingroups and societal goals; Jackson et al., 2006) might function as a proxy of the BIS mechanism and increase individuals' support of society-level disease-prevention efforts. Nevertheless, there is currently a paucity of evidence concerning how collectivism contributes to variations in people's tolerance of authoritarian enforcement of disease-control rules (e.g., quarantining suspected cases of COVID-19). Overall, we sought to test the hypothesis that psychological collectivism is associated with greater tolerance of injustice in disease-control actions.

Personal Control as a Driver for Behavioral Immune Responses

Although psychological collectivism makes collective actions to protect human groups from epidemic threats possible, it would not work without a psychological driver that prompts individuals to seek such risk-elimination goals. We argue that a critical psychological driver for BIS responses is personal control, which represents a fundamental need to perceive important external events as predictable and controllable (Kay et al., 2008). Existing theories on personal control (e.g., compensatory control models) contend that individuals with low personal control are motivated to seek external forces that shield them from randomness and chaos (Kay et al., 2008) and endorse actions that can mitigate or eliminate environmental threats (Thompson, 2020). One way to restore control is through endorsing powerful group authorities (e.g., governmental or religious authorities) that can command collective actions (Fritsche, 2022). Indeed, research has shown that threats to personal control during crises elevate ingroup identification and group-based action intentions (e.g., Agroskin & Jonas, 2013). Past research on the system justification theory has also shown that existential threats that undermine control prompt individuals to defend the legitimacy of their social systems and authorities (reviewed by Kay et al., 2008).

The assumption that people possess the need to dispel external randomness and chaos is central to the compensatory control perspective (Fritsche, 2022; Kay et al., 2008). We argue that this need ultimately stems from the mechanism of life-history tradeoffs (Del Giudice et al., 2015; Yang et al., 2022). With finite bioenergetic resources to invest in various life activities, natural selection should favor environment-contingent plasticity in the development of traits that serve different life functions (e.g., bodily maintenance, growth, mating, and parenting; Del Giudice et al., 2015; Ellis et al., 2009). The resulting fundamental tradeoffs between different somatic and reproductive investments lead to life-history strategies, which are functionally connected to wide-ranging

behavioral and personality traits (Del Giudice et al., 2015). Ackerman et al. (2018) argue that the life-history tradeoff mechanism can modulate BIS activation. The reliance on physiological immunity activation to “manage infection risks” (e.g., those caused by promiscuous sexual behaviors) at the expense of long-term health is consistent with a fast life-history strategy, which typically excels in environments that are dangerous, chaotic, and unpredictable (Ellis et al., 2009). By contrast, investing in BIS activations that eliminate external infection risks is consistent with a slow life-history strategy, which thrives in environments that are safe, stable, and competitive (Ellis et al., 2009).

Therefore, the life-history perspective connects the compensation of personal control to the BIS mechanism. Unlike the compensatory control theory, which presumes a universal need for control, the life-history perspective allows us to consider individual differences in this aspect. Specifically, slow strategists, characterized by greater investment in longevity and future reproductive success (Del Giudice et al., 2015), should possess a stronger drive to eliminate infection threats through investment in BIS responses. There are empirical grounds for assuming trait-level personal control, which contributes to a slow life-history strategy. Past research has shown that people with higher control or mastery over life usually care more for their own health and the future (e.g., Mittal & Griskevicius, 2014; Peterson & Stunkard, 1989). Recent research also found that perceived behavioral control indirectly predicts increased health-protective behaviors (Trifiletti et al., 2022), whereas a lack of control is related to non-adherence to social distancing rules (Hills & Eraso, 2021; see Ranieri et al., 2023 for a review).

Notably, whether higher-control individuals are more likely to endorse authoritarian societal regulations (e.g., mandatory quarantines of suspected patients) should depend on whether they perceive collective authorities as being the locus of agency and group control. From this viewpoint, collectivists are likely to attribute agencies to collective authorities and perceive authoritarian disease-control measures as a source of control. In contrast, individualists are more likely to derive a sense of control over one’s health from the autonomy and freedom they enjoy (Zhu, O, Lu, & Chang, 2020). In general, the perception of group-based control (reflecting a combination of psychological collectivism and personal control) prompts individuals to act adaptively (Fritsche, 2022). Given the aforementioned reasoning, we hypothesized that personal control should be associated with a greater tolerance of injustice in disease-control actions and should enhance the relationship between psychological collectivism and tolerance of injustice.

Functional Flexibility of the BIS in Response to Different Types of Pathogens

Compared with physiological immunity systems, the BIS exhibits greater functional flexibility (Murray & Schaller, 2016). BIS activations are fine-tuned based on the severity and spread of infection threats, so its costs are proportional to its potential benefits. Empirical evidence seems to be in line with this principle. Research has shown that vac-

ination, which reduces perceived vulnerability to infections, contributes to attenuated BIS responses against outgroup infection threats (in terms of xenophobia; Huang et al., 2011). Another study found that individuals primed with pathogen threats, compared with those primed with other threats or neutral stimuli, showed greater conformity to the majority views (Wu & Chang, 2012). Recent research studying internet data during Omicron-variant COVID-19 outbreaks in China showed that the adverse psychological effects are sensitive to the changing nature of the virus (Zhou et al., 2023).

Although BIS responses protect individuals from somatic damages caused by direct exposure to pathogens (Gassen et al., 2018) and hence are considered less costly (Ackerman et al., 2018), exaggerated BIS responses reduce social gregariousness and might incur significant societal costs (e.g., undermining intergroup cooperation and technological innovation; Murray et al., 2013). Therefore, the degree of BIS activation that promotes society-level disease-prevention actions should depend on some crucial features of the pathogen (e.g., fatality and infectiousness) that affect the necessity and effectiveness of these actions. Deadly and infectious pathogens (e.g., SARS) should evoke BIS responses in most individuals regardless of dispositional factors (Ackerman et al., 2018) and lead to unanimous support for drastic disease-control measures despite considerable societal costs. By contrast, high-consequence pathogens with limited means of transmission (e.g., rabies) might evoke individual BIS responses (e.g., avoidance behavior) but seldom warrant large-scale implementation of coercive disease-control measures, as such group-based BIS responses would only bring about negligible benefits. In either case, the feature of the pathogen is unequivocal, so the BIS responses should be insensitive to dispositional factors.

The BIS responses to ambivalent pathogens with high infectiousness and low fatality (much like the Omicron variants of the COVID-19 virus) might be more complicated. A lack of response might cause the pathogen to spread out of control, but a full-blown response would be too costly to be sustainable (for the individual and the society). Facing such ambivalent pathogen threats, people should enact more variable BIS responses that are more sensitive to individual-difference factors like psychological collectivism and personal control. This might explain between-society and within-society variations in people's attitude toward societal prevention against the COVID-19 virus (Zhu et al., 2021) and the links between various individual-difference factors and compliance with COVID-19-prevention measures (e.g., Brouard et al., 2020; Calvillo et al., 2020). In summary, evolved mechanisms of behavioral prevention of disease threats might contribute to variations in justice standards vis-à-vis disease-control actions. Specifically, we proposed a BIS mechanism that involves an interaction between psychological collectivism and personal control. We also highlight the functional flexibility of this mechanism by postulating that the BIS effects should depend on the fatality and infectiousness of the pathogen.

The Current Research

The current research seeks to test five main hypotheses:

Hypothesis 1: Psychological collectivism should be associated with a higher tolerance of injustice in the implementation of disease-control actions.

Hypothesis 2: Personal control should be associated with a higher tolerance of injustice.

Hypothesis 3: Personal control should enhance the effect of psychological collectivism on the tolerance of injustice.

Hypothesis 4: Tolerance of justice should increase with both the estimated fatality and the estimated infectiousness of the disease.

Hypothesis 5: Different combinations of fatality and infectiousness of the pathogen might influence the manifestation of the individual-difference effects involving psychological collectivism and personality control.

We conducted two studies when strict zero-COVID policies were being enforced in China (background information about China's zero-COVID policy and its controversies is included in the Supplementary Material, see [Zhu et al., 2022](#)). Study 1 surveyed Shanghai residents during the citywide lockdown around April and May 2022 and focused on people's attitudes toward authoritarian and unjust actions during the implementation of COVID-19 prevention measures. Study 2 constituted an extension of Study 1 that focused on the appraisal process underlying the activation of the BIS. Specifically, we investigated participants' tolerance of injustice in hypothetical scenarios with outbreaks of fictitious viruses that differ in fatality and infectiousness.

Study 1

Study 1 investigated the roles of psychological collectivism and personal control in people's responses to authoritarian and unjust actions of disease control (tolerance of injustice). In this study, we statistically controlled several variables that might affect BIS responses, including gender (females are more sensitive to disgust-triggering infection risks than males; [Olatunji et al., 2005](#)), age (older age is associated with increased vulnerability to diseases), and two items related to pathogen sensitivity. One item was about family members' disease vulnerability due to existing health conditions, which should increase BIS responsiveness. Another question was about participants' previous COVID-19 infections. Since individuals gain temporary passive immunity against COVID-19 from recent infections ([Kojima & Klausner, 2022](#)), recent infections should mute rather than enhance individuals' BIS responses. Finally, we assessed participants' subjective socioeconomic status (SES), education level, and Shanghai permanent residence status, all of which are expected to reduce their acceptance of authoritarian actions.

Method

Participants

Participants were 819 Chinese adults (455 females and 364 males, $M_{\text{age}} = 31.43$, $SD_{\text{age}} = 11.96$) living in Shanghai for at least two months since March 2022. They were contacted and responded to the survey in late May 2022 (detailed sampling processes, exclusion criteria, and demographic distribution are reported in the Supplementary Material, see [Zhu et al., 2022](#)). Participants received a subject fee of 15 RMB (about 2.25 USD).

A sensitivity power analysis showed that the current sample size allowed us to detect a minimal effect size of $f^2 = .03$ (corresponding to $R^2 = .03$), with the current linear multiple regression model, the standard alpha level of .05, and statistical power of .90. This is smaller than the effect of our current model, indicating a sufficient sample size.

Measures

The current research (both Study 1 and Study 2) is part of a larger research project on psychological responses during the COVID-19 pandemic. Some additional variables in the questionnaires unrelated to the current research and not used in the analyses were not reported here. Findings based on these extra variables overlap very little with the current research and will be reported elsewhere. The full list of measures for both studies (in both English and Chinese) is available on the OSF website (see [Zhu et al., 2022](#)).

Tolerance of Injustice During COVID-19 Responses – Participants were asked to read five hypothetical scenarios related to disease-control measures during the COVID-19 pandemic (an example is: “A pet owner was infected with COVID-19, and there was no available quarantine facility for pets. Disease-control personnel decided to take the pet and ‘humanely’ put it down in order to avoid the spread of the virus.”). These scenarios, inspired by some of the events that occurred during the COVID-19 pandemic, all involved actions that are coercive enforcement of disease-control rules on a certain target group (rather than generalized rules befalling everyone). Participants were told to assume that in each of these cases, the actions were not explicitly against the law. For each scenario, participants rated on 7-point scales to what degree they think the action is (a) necessary, (b) ethically acceptable, and (c) something they are willing to enforce if they are the disease-control personnel. The average ratings of all 15 items constituted the “tolerance of injustice” score, with higher ratings indicating a greater tolerance of injustice (Cronbach’s alpha coefficient was .97).

Psychological Collectivism – Psychological collectivism was measured by a 15-item scale ([Jackson et al., 2006](#)) that assesses various aspects contributing to interdependence within collectives (e.g., organizations): preference for ingroups, reliance on ingroups, concern for ingroups, acceptance of ingroup norms, and prioritization of ingroup goals.

Participants were asked to think about groups to which they currently belong or have belonged to in the past and indicate their agreement with each item (e.g., “I preferred to work in those groups rather than working alone,” “I followed the norms of those groups.”) on a 6-point scale (1 = *strongly disagree*, 6 = *strongly agree*). The average rating across the 15 items constitutes the score of psychological collectivism (Cronbach’s alpha coefficient was .90).

Personal Control — Personal sense of control was assessed using four items adapted from Lachman and Weaver (1998). Participants indicated their agreement with the following statements starting with “in the past three months, I feel that”: (a) I can do just about anything that I really set my mind to; (b) whatever happens in the future mostly depends on me; (c) when I really want to do something, I can always find a way to succeed at it; and (d) whether or not I am able to get what I want is in my own hands. Responses for each item were rated from 1 (*strongly disagree*) to 6 (*strongly agree*). The average rating of the 4 items constituted the score of personal control (Cronbach’s alpha coefficient was .91).

Negative Impact of COVID-19 — We assessed the degree of the negative impact experienced by participants since early 2022. Specifically, they were asked to rate from 1 (*no impact at all*) to 6 (*huge, intolerable impact*) the impact of the COVID-19 crisis and disease-control measures on (a) personal employment and education, (b) interpersonal relationships and social activities, (c) personal well-being in terms of emotional and physical health, (d) family economic condition, (e) family life and routines (including personal hobbies), and (f) family members’ well-being in terms of emotional and physical health. These items were adapted from previous studies on the impacts of the pandemic (e.g., Grasso et al., 2020). The average rating of the 6 items constituted the index of COVID-19 impacts, with higher values indicating more negative experiences (Cronbach’s alpha coefficient was .90).

Vulnerability and Infection — One question assessed whether participants or their families have medical conditions (e.g., chronic disease, pregnancy) that might increase their vulnerability to severe symptoms of COVID-19 (vulnerability). Another question assessed whether participants have personally been infected with COVID-19 (infection) since the beginning of the outbreak in February 2022.

Other Measures — We measured participants’ subjective SES by slightly adapting the standard of the MacArthur scale of subjective social status (Adler et al., 2000). Specifically, participants were asked to place themselves on a 9-rung ladder representing social classes in terms of (1) financial resources (income and wealth), (2) education level, and (3) occupational status, respectively. The average rating of the 3 items comprised the index of subjective SES (Cronbach’s alpha coefficient was .82). Participants also reported

their sex, age, level of education, and whether they were local or non-local residents of Shanghai (permanent residence status).

Results and Discussion

The data of this study are openly available on the OSF website (see [Zhu et al., 2022](#)). Descriptive statistics and correlations among the variables are reported in [Table 1](#). We also examined individual scenarios comprising the tolerance of injustice task (reported in detail in Supplementary Material, see [Zhu et al., 2022](#)). Specifically, we computed average ratings of each scenario and examined their correlations with psychological collectivism and personal control. We also conducted a series of independent sample *t*-tests comparing ratings for each scenario between males and females, between local and non-local residents, and between people who did or did not complete higher education. Although different scenarios elicited different degrees of tolerance of injustice, the ratings for all five scenarios were significantly and positively correlated with psychological collectivism (*r*s ranging from .28 to .30) and personal control (*r*s ranging from .36 to .46). The pattern of ratings concerning gender, permanent residence status, and higher education status was also largely consistent across scenarios. Thus, the following analysis only considered the overall “tolerance of injustice” score.

A linear multiple regression model was tested, with participants’ tolerance of injustice regressed on psychological collectivism, personal control, the interaction term between psychological collectivism and personal control, sex, age, status of permanent residence, education level, subjective socioeconomic status (SES), vulnerability of family members due to pre-existing health conditions (“vulnerability”, recoded with 0 indicating no and 1 indicating yes), participants’ self-report of current or past infections of COVID-19 (“infection”, recoded with 0 indicating never infected and 1 indicating current or past infection) and negative impact of COVID-19. All continuous predictors were mean-centered and only unstandardized regression coefficients are reported in [Table 2](#).

Table 1
Study 1: Descriptive Statistics and Correlations Among Variables

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Age	—										
2. Education Level	-.22**	—									
3. Subjective SES	.01	.18**	—								
4. Sex	.03	-.11*	.10*	—							
5. Vulnerability	.06	.01	.03	.03	—						
6. Infection	.04	-.05	.04	.06	.26**	—					
7. Shanghai Residence	.30**	-.09*	.12**	.09*	-.02	-.05	—				
8. Negative Impact of COVID-19	-.07	.08*	-.11*	-.02	-.06	-.06	-.07	—			
9. Psychological Collectivism	.13**	-.11*	.07	.01	-.01	-.05	.13**	-.02	—		
10. Personal Control	-.06	-.13**	.15**	.04	.09*	.004	.05	-.29**	.34**	—	
11. Tolerance of Injustice	-.18**	-.20**	.04	.10**	.03	-.02	-.07	-.24**	.33**	.48**	—
M	31.43	4.92	5.30	—	—	—	—	3.91	4.29	3.88	3.54
SD	11.96	0.99	1.22	—	—	—	—	1.07	0.74	1.19	1.75

* $p < .01$. ** $p < .001$.

Table 2*Study 1: Results of Linear Regression of Tolerance of Injustice*

Variable	B [99% CI of B]	SE	t
[Constant]	3.91 [3.28, 4.55]	0.32	—
Sex	0.24 [.05, .44]	0.10	2.43*
Age	-0.03 [-.04, -.02]	0.004	-7.00***
Shanghai Permanent Residence	-0.34 [-.60, .08]	0.13	-2.58*
Education Level	-0.26 [-.36, -.15]	0.05	-4.91***
Subjective SES	-0.03 [-.11, .05]	0.04	-0.70
Vulnerability	0.10 [-.24, .44]	0.17	-0.58
Infection	0.19 [-.40, .78]	0.30	-0.63
Impact of COVID-19	-0.25 [-.34, -.15]	0.05	-5.14***
Psychological Collectivism (PSY)	0.53 [.39, .67]	0.07	7.29***
Personal Control (PER)	0.48 [.39, .57]	0.05	10.22***
PSY X PER	0.25 [.16, .34]	0.05	5.29***

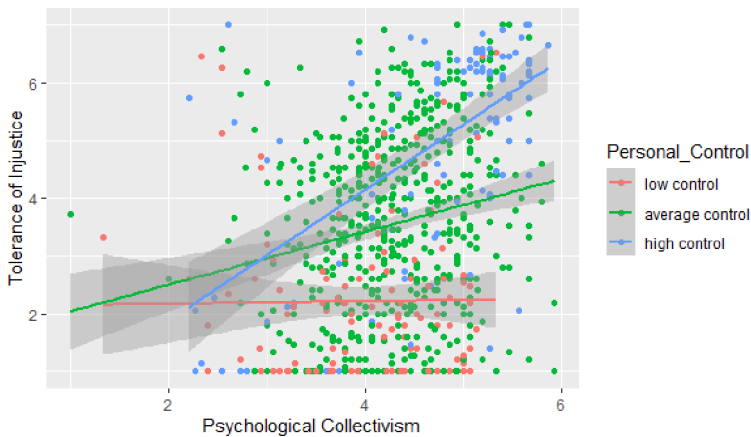
Note. Entries are unstandardized regression coefficients and standard errors (SE). All continuous variables were mean-centered. Categorical variables were recoded: Sex (0 = female, 1 = male), Vulnerability (0 = no vulnerable conditions, 1 = have medical conditions that increase vulnerability to COVID-19), Infection (0 = never infected with COVID-19, 1 = infected with COVID-19 at least once), Shanghai Permanent Residence (0 = non-local, 1 = local).

* $p < .05$. *** $p < .001$.

All predictors accounted for 37% of the variance in tolerance of injustice, $F(11, 807) = 43.20$, $p < .001$. Consistent with the first three hypotheses, we found that both psychological collectivism, personal control, and their interaction term were associated with a higher tolerance of injustice during COVID-19 responses. Personal control moderated the effect of psychological collectivism on tolerance of injustice in the expected direction: Simple slope analysis revealed that the BIS effect of psychological collectivism was stronger among high-control participants who were 1 standard deviation (*SD*) above the mean (simple slope = .83, $t = 9.59$, $p < .001$) than among low-control participants who were 1 *SD* below the mean (simple slope = .23, $t = 2.37$, $p = .018$; illustrated in [Figure 1](#)). In addition, older participants, participants with higher education levels, local Shanghai residents (compared with non-local residents), and participants experiencing greater degrees of negative impact were less tolerant of injustice. Males were more tolerant of injustice than females. The other variables were not significantly associated with tolerance of injustice.

Figure 1

The Results of the Moderation Effect of Personal Control on the Relationship Between Psychological Collectivism and Tolerance of Injustice



Note. Error bands represent 95% confidence intervals.

Overall, the results provided preliminary evidence that a combination of a higher collectivistic orientation and a higher sense of control indeed predicted higher tolerance of injustice, even after controlling for eight other variables. The results also revealed other factors with countering effects: better education and permanent residence status might cause people to care more about social justice and object to its potential erosion by authoritarian practices, whereas direct experiences of hardship during the implementation of zero-COVID policy might cause people to rethink their support for all types of disease-control actions. However, subjective SES, vulnerability, and infection had no significant effects. Overall, our findings supported the view that collectivism as a BIS mechanism might exert an independent effect beyond alternative factors (e.g., resource scarcity or disease vulnerability), contributing to a conservative-authoritarian shift of justice-related values (Terrizzi et al., 2013). However, the current findings by no means render other accounts invalid.

Study 2

According to the functional flexibility principle of the BIS, we expected that pathogens with a high fatality rate and high infectiousness should lead to enhanced behavioral immune effects, causing people to shift their standard of justice in favor of authoritarian and coercive practices. Additionally, the findings of Study 1 regarding the interaction between psychological collectivism and personal control should manifest in a specific

range of disease-threat situations, wherein the necessity and benefits of authoritarian disease-control actions are in debate.

Method

Participants and Design

Participants were 403 Chinese adults (261 females and 139 males, $M_{\text{age}} = 30.54$, $SD_{\text{age}} = 7.54$) recruited through the Credamo online data market. This study was completed in July 2022. The Credamo sampling pool has more than 2.8 million potential respondents in mainland China with diverse backgrounds and demographic characteristics (described in detail at <https://www.credamo.com/#/samples>). Our sample came from 29 out of 31 provinces of the Chinese Mainland (except Qinghai and Tibet), with the largest proportions from Guangdong (15%), Shandong (13%), and Jiangsu (9%). Respondents with valid responses received about 10 RMB (about 1.5 USD) from the Credamo platform.

The study conformed to a 4 X 5 mixed design in which we manipulated the fatality level of the fictitious virus between subjects (4 conditions: very low, low, high, very high) and its infectiousness within subjects (5 blocks: very low, low, high, very high, unknown). Participants were randomly assigned to different fatality conditions. A sensitivity power analysis showed that the sample size of each condition ($n = \sim 100$) allowed us to detect a minimal effect size of $f^2 = .21$ (corresponding to $R^2 = .17$), with the current linear multiple regression model, a Bonferroni-adjusted alpha level of .01, and a statistical power of .80. The current sample is deemed sufficient given the effect sizes of the actual findings.

Measures

Hypothetical Disease Threats Task — Participants were asked to imagine a series of hypothetical scenarios related to the spread of a virus (sharing some characteristics with COVID-19) and the actions taken to control it. Two key aspects of the virus were manipulated to simulate various disease-outbreak situations (the procedure for the development of the material is detailed in the Supplementary Material, see [Zhu et al., 2022](#)). Participants in various conditions face various levels of fatality posed by the virus, with the chance of serious illness or death at 30% (very high), 10% (high), 2% (low), and 0.2% (very low). In each condition, participants were also given information regarding the infectiousness of the virus before each block. In one block, for example, participants were told that a single case would become 2–3 cases (very low infectiousness) in ten days without control. This value was set to be 20–30 (low infectiousness), 200–300 (high infectiousness), 2000–3000 (very high infectiousness), and unknown in the other four blocks, respectively.

In each block, participants responded to the same set of four questions assessing their tolerance of injustice in disease-control actions, which is a simplified version of the Tolerance of Injustice task in Study 1. Specifically, participants were asked to rate different

actions to contain the spread of the hypothetical virus from 1 (*very unacceptable*) to 7 (*very acceptable*). These actions included (1) disposing of pets without the consent of their owners, (2) moving patients with mobility difficulties into a mobile cabin hospital, (3) quarantining a child separately from his/her parents, (4) installing physical barricades to quarantine an apartment building. Cronbach's alpha coefficients ranged from .67 to .89 across conditions and blocks.

Psychological Collectivism — After the Tolerance of Injustice task, participants responded to the same psychological collectivism scale (Jackson et al., 2006) that was used in Study 1 (Cronbach's alpha coefficients ranged from .89 to .93 across different conditions).

Personal Control — Participants responded to the same four-item measure (Lachman & Weaver, 1998) that was used in Study 1 (Cronbach's alpha coefficients ranged from .77 to .86).

Other Measures — Participants reported their subjective SES using the same scales as in Study 1 (Cronbach's alpha coefficients ranged from .85 to .87). They also reported their sex, age, education level, and province of residence.

Results and Discussion

The data of this study are openly available on the OSF website (see Zhu et al., 2022). Three participants were excluded due to incorrect responses to validation items. Detailed demographic information and descriptive statistics are reported in the Supplementary Material (see Zhu et al., 2022).

We first conducted separate ANOVAs on age, subjective SES, psychological collectivism, and personal control across different conditions. The results showed that none of these variables differed across conditions, $F_s \leq 1$, $p_s > .100$. Given the large number of analyses performed, we only report the findings relevant to our hypotheses.

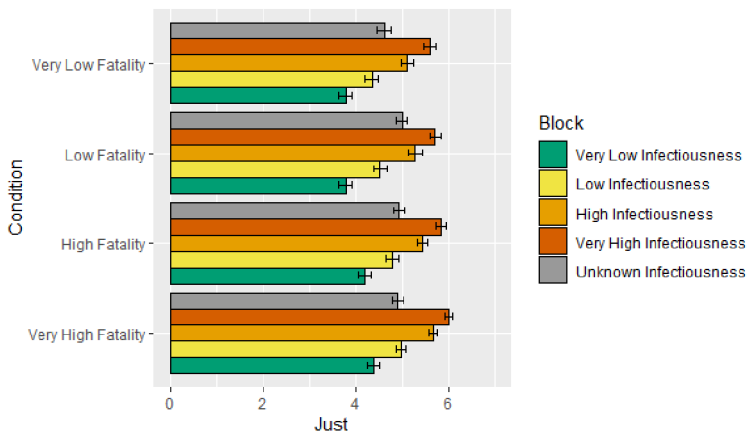
Tolerance of Injustice Contingent on Specific Disease Threats

Individuals' standard of justice did vary by fatality and infectiousness of the fictitious virus (Figure 2). The qualitative pattern is consistent with Hypothesis 4: Conditions with higher fatality elicited higher tolerance of injustice than did conditions with lower fatality. Participants also indicated higher tolerance of injustice in blocks of higher infectiousness than in blocks of lower infectiousness. A 4 (fatality) X 5 (infectiousness) mixed analysis of variance (ANOVA) produced a main effect of fatality, $F(3, 396) = 4.23$, $p = .006$, $\eta_p^2 = .03$, and a main effect of infectiousness, $F(4, 1584) = 260.80$, $p < .001$, $\eta_p^2 = .40$. We also found a weak interaction between fatality and infectiousness, $F(12, 1584) = 1.92$, $p = .028$, $\eta_p^2 = .01$. Separate one-way ANOVAs revealed that fatality conditions only differed from

each other in blocks of very low and low infectiousness. Sidak's post-hoc comparisons showed that in the Very Low Infectiousness Block, tolerance of injustice was higher in the Very High Fatality Condition than in the Low and Very Low Fatality Conditions ($ps = .018$). In the Low Infectiousness Block, tolerance of injustice was higher in the Very High Fatality Condition than in the Very Low Fatality Condition ($p = .005$). See Figure S8 in the Supplementary Materials (Zhu et al., 2022) for interaction patterns across different conditions and blocks.

Figure 2

Study 2: Tolerance of Injustice in Various Conditions and Blocks



Note. Conditions 1–4 represent various levels of fatality the virus poses (30% in Condition 1, 10% in Condition 2, 2% in Condition 3, and 0.2% in Condition 4). Blocks 1–4 represent various levels of “infectiousness” of the variants (2–3 in Block 1, 20–30 in Block 2, 200–300 in Block 3, and 2,000–3,000 in Block 4). In Block 5, all information is unknown. Error bars represent standard errors.

Next, we examined a series of linear multiple regression models with different combinations of fatality and infectiousness of the fictitious virus. In these models, tolerance of injustice was regressed on psychological collectivism, personal control, the interaction between psychological collectivism and personal control, sex, age, and subjective SES (all continuous predictors were mean-centered). Only significant results were described below (statistical significance was determined by the absence of zero in 99% confidence intervals). We found that for only Blocks 3 and 4 (High and Very High Infectiousness) in the Low Fatality and Very Low Fatality Conditions did this model account for significant variances in tolerance of injustice. For other combinations of fatality condition and infectiousness blocks, this model failed to account for significant variance in tolerance of injustice (all $F_s < 2$, $ps > .50$) and all predictors were not significant, $ps > .010$. Therefore, it appeared that psychological collectivism, personal control, and their interaction only

accounted for variations in people's tolerance of injustice in ambivalent situations, but not in completely uncertain situations (unknown fatality and infectiousness) or situations with highly salient or negligible threats. This is consistent with Hypothesis 5.

Consequently, [Table 3](#) only presents the results of the aforementioned linear regression models for four combinations of fatality condition and infectiousness blocks where in the predictors accounted for a significant variance of tolerance of injustice. We found that personal control was consistently associated with higher tolerance of injustice in response to all four ambivalent combinations (Conditions 3 and 4, Blocks 3 and 4). Psychological collectivism was associated with a higher tolerance of injustice in response to very low fatality and high or very high infectiousness (Condition 4, Blocks 3 and 4). Finally, interactions between personal control and psychological collectivism were found in the same situations, indicating that the effect of psychological collectivism in these blocks was enhanced by high personal control. None of the other variables had any significant effect.

Overall, these findings further corroborated the view that disease threats might shift people's judgments of social justice toward greater authoritarianism, as predicted by the BIS theory. Moreover, the magnitude of such shifts is influenced by the specific type of disease threat. Both fatality and infectiousness matter, but the latter seems to matter more. Finally, personal control accounts for a significant variance and moderated the effect of psychological collectivism on tolerance of injustice precisely in situations of ambivalent disease threats, which is quite similar to the case of the Omicron variant of COVID-19, but not in other situations. This might explain why we found similar effects in Study 1.

General Discussion

The current research sought to provide an evolutionary explanation for the connections among the sociopsychological phenomena of disease prevention behaviors, authoritarianism, psychological collectivism, and personal control. Based on the BIS theory ([Murray & Schaller, 2016](#)), we argue that disease threats should shift people's standard of justice towards greater tolerance of authoritarianism and injustice, especially among individuals who scored high in psychological collectivism and personal control. We also argue that these effects should be contingent on the perceived fatality and infectiousness of the pathogens. The findings of two studies conducted during China's zero-COVID period generally supported these hypotheses. Both psychological collectivism and personal control were associated with a greater tolerance of injustice, and psychological collectivism showed a stronger effect for high-control individuals than low-control individuals. These effects held even after controlling demographic variables and variables related to pathogen sensitivity.

Table 3*Study 2: Prediction of Participants' Tolerance of Injustice Across Different Conditions and Blocks*

Variable	B [99% CI of B]	SE	t
Condition 3: Low Fatality; Block 3: High Infectiousness			
[Constant]	5.27 [4.86, 5.68]	0.16	—
Sex	-0.15 [-0.87, 0.56]	0.27	-0.56
Age	-0.03 [-0.09, 0.02]	0.02	-1.68
Subjective SES	0.09 [-0.23, 0.40]	0.12	0.73
Psychological Collectivism (PSY)	0.55 [-0.04, 1.13]	0.22	2.46
Personal Control (PER)	0.54 [0.07, 1.02]	0.18	3.01***
PSY X PER	0.30 [-0.30, 0.90]	0.23	1.31
[Model Summary]	$R^2 = .26, F(6, 93) = 5.29, p < .001$		
Condition 3: Low Fatality; Block 4: Very High Infectiousness			
[Constant]	5.7 [5.32, 6.08]	0.14	—
Sex	-0.17 [-0.83, 0.49]	0.25	-0.69
Age	-0.03 [-0.07, 0.02]	0.02	-1.47
Subjective SES	0.08 [-0.21, 0.37]	0.11	0.70
Psychological Collectivism (PSY)	0.48 [-0.06, 1.02]	0.20	2.35
Personal Control (PER)	0.6 [0.16, 1.03]	0.17	3.59***
PSY X PER	0.37 [-0.18, 0.93]	0.21	1.77
[Model Summary]	$R^2 = .29, F(6, 94) = 6.47, p < .001$		
Condition 4: Very Low Fatality; Block 3: High Infectiousness			
[Constant]	5.01 [4.57, 5.45]	0.17	—
Sex	-0.02 [-0.7, 0.67]	0.26	-0.07
Age	0.002 [-0.04, 0.05]	0.02	0.14
Subjective SES	0.14 [-0.19, 0.46]	0.12	1.11
Psychological Collectivism (PSY)	0.51 [0.01, 1.00]	0.19	2.70**
Personal Control (PER)	0.43 [0.04, 0.81]	0.15	2.88***
PSY X PER	0.55 [0.09, 1.00]	0.17	3.16***
[Model Summary]	$R^2 = .28, F(6, 94) = 6.20, p < .001$		
Condition 4: Very Low Fatality; Block 4: Very High Infectiousness			
[Constant]	5.45 [5.1, 5.8]	0.13	—
Sex	0.05 [-0.5, 0.6]	0.21	0.25
Age	0 [-0.03, 0.04]	0.01	0.27
Subjective SES	0.2 [-0.06, 0.46]	0.10	2.00
Psychological Collectivism (PSY)	0.69 [0.3, 1.09]	0.15	4.59***
Personal Control (PER)	0.39 [0.08, 0.7]	0.12	3.28**
PSY X PER	0.57 [0.2, 0.94]	0.14	4.10***
[Model Summary]	$R^2 = .45, F(6, 94) = 13.02, p < .001$		

Note. PER = personal control, PSY = psychological collectivism, PER x PSY = the interaction between personal control and psychological collectivism. Entries are unstandardized regression coefficients and standard errors (SE). All continuous variables were mean-centered. Sex was recoded: 0 = female, 1 = male.

** $p < .010$. *** $p < .001$.

Two BIS mechanisms might explain the shifts in justice standards in the face of disease threats. An “intergroup” mechanism leads to the avoidance of outgroups who are potential carriers of more dangerous pathogens and is associated with ingroup assortative sociality such as selective germ-avoidance behaviors (O’Shea et al., 2022) and discrimination against groups connected to pathogen sources by association (Dhanani & Franz, 2021; Lantz & Wenger, 2023). However, outsiders as potential carriers of novel pathogens are not the only human target of BIS responses. We argue that local disease threats should trigger an “intragroup” BIS mechanism in the form of an authoritarian shift in people’s social judgments and behaviors (Murray et al., 2013), which diminishes disease transmission risks by sacrificing the freedoms and rights of other group members. Indeed, our finding regarding the association between psychological collectivism and higher tolerance of injustice adds to a growing list of findings linking collective concerns to supportive attitudes toward societal disease-control efforts during the COVID-19 pandemic (e.g., Xiao, 2021; Zhu et al., 2021). Notably, psychological collectivism (or group collectivism) should be distinguished from relational collectivism (Brewer & Chen, 2007). The former emphasizes group-based agency and group control, whereas the latter emphasizes personalized bonds with important others (Brewer & Chen, 2007). Despite being frequently conflated in the literature, these two concepts of collectivism should have different implications for intragroup BIS functions. Disease threats might not lead to an association between relational collectivism and authoritarian actions unless the latter is perceived to affect the welfare of related others directly.

The finding that personal control predicted greater tolerance of injustice in the face of ambivalent disease threats seems to contradict the prediction derived from a compensatory control perspective (Kay et al., 2008), as one might expect that individuals with higher levels of personal control should rely *less* on the protection of collective authorities. However, our findings showed that high levels of personal control *enhanced* the tolerance of injustice among collectivists but not among less collectivistic individuals. How can our findings be reconciled with different theories on personal control (particularly compensatory control models and the evolutionary perspective)? One reason might be that personal control in our studies represents a relatively stable need to shield oneself from external chaos (Kay et al., 2008) rather than a lack of control under the disease threats. Our findings are consistent with recent research showing that low trait-level control is associated with reduced intergroup BIS responses, such as outgroup prejudices (Bukowski et al., 2024). They are also consistent with the theoretical views that link personal control to slow life-history strategies that enhance BIS activation (Ackerman et al., 2018). Individuals with higher trait-level control possess a greater drive to eliminate infectious pathogens before they enter the body. Combined with a strong, group-based collectivistic orientation, this prompts people to resort to authoritarian institutions as a source of group control (Fritsche, 2022) but undermines individuals’ ability to retain control via autonomous actions (Zhu, O, Lu, & Chang, 2020).

Although the current research sought to explain the findings using evolutionary frameworks such as BIS and life history theory, we should caution against blindly applying evolutionary theories without considering the potential “mismatch” between evolutionary contexts from which the BIS mechanisms originated and the modern contexts (Schaller et al., 2015). For example, pathogen transmission over long distances and in huge populations is much easier in contemporary society (Ackerman et al., 2021). Moreover, modern social organizations and institutions generate new BIS response strategies that serve disease-avoidance functions through intragroup processes, which might or might not directly engage the core mechanisms based on disgust sensitivity or perceived vulnerability to diseases (PVD; Duncan et al., 2009; Terrizzi et al., 2013). Indeed, two variables that appear to pertain to pathogen sensitivity (vulnerability and previous infection) did not exert any effect in Study 1. One explanation might be that our participants were mainly concerned with investing in societal interventions that would minimize disease transmission rather than investing in personal BIS responses to mitigate pathogen risks via precautionary behaviors. Unfortunately, this interpretation must be taken with caution. The single-item measure of vulnerability assesses perceived infectability and the possibility of developing severe symptoms but does not capture the germ aversion aspect of PVD (Duncan et al., 2009). Additionally, very few participants (3%) reported having previously been infected. Thus, the lack of pathogen sensitivity effects is possibly due to measurement limitations and the simultaneous consideration of other variables such as age, gender, residence status, education, and the negative impact of the COVID-19 restrictions, all of which were linked to tolerance of injustice in Study 1.

Another key finding is that the effects of psychological collectivism and personal control on the tolerance of injustice were contingent on the type of disease threats, which corroborated the functional flexibility principle of BIS (Murray & Schaller, 2016). Whereas highly deadly and infectious viruses unequivocally enhanced participants' tolerance of injustice, ambivalent pathogens that were low in fatality but high in infectiousness led to a more nuanced pattern—individuals who perceive greater personal control exhibited a higher tolerance of injustice in such situations. The effect of psychological collectivism and its interaction with personal control emerged when facing even more ambivalent (rarely fatal but highly contagious) pathogens, similar to the Omicron variants of COVID-19. Although mild pathogens should not trigger a strong BIS response based on pathogen sensitivity mechanisms, cues of high pathogen infectiousness would cause great external uncertainty and take a toll on the entire society. This uncertainty should prompt individuals with high. Hence, it makes sense that individuals' justice standards should depend on their collectivistic orientation as well as personal control under such ambivalent threats.

The current research is by no means a comprehensive investigation of the effects of BIS on justice standards. We did not delve into the relationship between the intragroup BIS mechanisms and the core BIS mechanisms based on pathogen sensitivity (Schaller &

Murray, 2008) by measuring relevant constructs like PVD (Duncan et al., 2009) or germ aversion (O'Shea et al., 2022). However, research has questioned whether the PVD scores reflect actual immunological vulnerabilities (see Ackerman et al., 2018), and plenty of research following the BIS framework has examined responses to disease threats without measuring these indices. More importantly, not all BIS responses are directly linked to individuals' pathogen sensitivity, especially when diffused cues of epidemic threats overshadow the effectiveness of personal precautions based on pathogen sensitivity mechanisms. This means the limitations of our measures of vulnerability and previous infection should not prevent us from interpreting our other findings in line with the BIS theory.

Additionally, our research's unique timing and cultural context might limit our findings' generalizability. It is possible that our findings are contingent on the Chinese cultural context, which is characterized by greater readiness to accept power differences and authoritarian practices. Recent research has also shown that the effects of COVID-19 threats on different aspects of authoritarianism vary across different countries (Bilewicz et al., 2023). China's zero-COVID policies might also influence participants' tolerance of injustice, as people might seek to justify existing policies to avoid cognitive dissonance. As a future direction, cross-cultural investigations can be utilized to ascertain whether contextual factors like culture and policy backgrounds would influence people's standard of justice in the face of disease threats.

Finally, our findings have important implications for public health policymaking. Specifically, societal disease-control actions such as lockdowns should be guided by the principle of proportionality, given that coordinating collective actions and imposing authoritarian rules entail significant societal costs (Murray et al., 2013). Moreover, transparent decision-making and clear, equitable, and reciprocal communication regarding restrictive measures are crucial for public support, especially when the extent of harm and risks caused by a pathogen is uncertain (Ranieri et al., 2023).

Conclusion

The evolved BIS can explain a general shift in individuals' standard of justice in favor of authoritarian practices to minimize disease infection. Indeed, we found that people showed greater authoritarian shifts in their standard of justice if they are high in both psychological collectivism and personal control and face more deadly and/or more rapidly spreading pathogens. Further, we showed that ambivalent pathogen signals engendered more fine-grained individual differences in justice standards related to disease-control actions. This might contribute to within-society disagreements regarding disease-control measures and the boundary between individual rights and the power of authority (Zhu, Hawk, & Smetana, 2020; Zhu et al., 2021). Such disagreements might lead to increasingly complex and fine-tuned BIS responses in human society beyond what is afforded by the rudimentary pathogen sensitivity mechanisms.

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Competing Interests: The authors have declared that no competing interests exist.

Author Contributions: *Nan Zhu*—Idea, conceptualization | Data management (storage, curation, processing, etc.) | Design planning | Data analysis | Writing | Feedback, revisions. *Yang Li*—Idea, conceptualization | Design planning | Feedback, revisions. *Lei Chang*—Feedback, revisions | Funding to conduct the work.

Ethics Statement: This research was reviewed and approved by the ethics panel of the Department of Psychology at the University of Macau (Approval Code: 2022-12). Before participating in the study, all participants read an information sheet about the study and their rights and gave their informed consent.

Data Availability: The data of the studies are openly available on the OSF website (see [Zhu et al., 2022](#)).

Supplementary Materials

For this article, the following Supplementary Materials are available (see [Zhu et al., 2022](#)):

- Datasets for Studies 1 and 2 (including variables not reported in the current paper)
- A figure depicting the overall theoretical model for the larger research project to which the current paper is linked
- List of measures used in Studies 1 and 2 (including measures not reported in the current paper)
- A document containing additional information for the current paper, including: Background information about the 2022 Shanghai lockdown, controversies related to the zero-COVID policy in China, and controversies of disease control strategies around the world; details of sampling methods, demographic information of the participants (Figures S1–S5), and detailed analyses of individual scenarios of the Tolerance of Injustice Task in Study 1 (Table S1); detailed demographics (Figures S6 and S7) and descriptive statistics (Table S2) of Study 2; development of the material for the Hypothetical Disease Threats Task in Study 2, figures depicting the interaction patterns between personal control and psychological collectivism across different blocks and conditions (Figure S8).

Index of Supplementary Materials

Zhu, N., Li, Y., & Chang, L. (2022). *Cultural, control, and Covid-19 restrictions* [Data, measures, supplemental figures and tables]. OSF. <https://osf.io/3zvrh>

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