Empirical Research Paper

Personality and Social Psychology Bulletin
1–18

DOI: 10.1177/01461672211037138
journals.sagepub.com/home/pspb
SAGE

Psychology and the Threat of Contagion: Feeling Vulnerable to a Disease Moderates the Link Between Xenophobic Thoughts and Support for Ingroup-Protective Actions

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Abstract

The widespread threat of contagious disease disrupts not only everyday life but also psychological experience. Building on findings regarding xenophobic responses to contagious diseases, this research investigates how perceived vulnerability to a disease moderates the psychological link between people's xenophobic thoughts and support for ingroup-protective actions. Three datasets collected during the time of Ebola ($N = 867$) and COVID-19 ($Ns = 992$ and 926) measured perceived disease risk, group-serving biases (i.e., xenophobic thoughts), and support for restrictive travel policies (i.e., ingroup-protective actions). Using correlational and quasi-experimental analyses, results indicated that for people who perceive greater disease risk, the association between group-serving bias and restrictive policy support is weakened. This weakened association occurred because people who felt more vulnerable to these diseases increased support for ingroup-protective actions more strongly than xenophobic thoughts. This research underscores the importance of understanding the impact of threats on psychological *processes* beyond the impact on psychological outcomes.

Keywords

disease threat, vulnerability, xenophobia, group protection, public policy

Received April 22, 2021; revision accepted July 14, 2021

There are times in history when events dramatically change the course of lived experience. Sometimes, these changes only become clear with the advantage of history, but other times, rapid societal changes are apparent. The time from February 2020 to March 2020 represents such a dramatic and rapid change. In February, most people in the United States did not feel highly vulnerable to COVID-19. Despite awareness of the growing number of cases in China and epidemiologists' warnings, America, as a nation, did not act as if it was an American problem. Parades commenced, conferences happened, and community lockdown seemed an exotic notion. In less than 1 month, the world changed. By March 2020, no American could say that COVID-19 was another country's problem, and people began to feel genuinely vulnerable.

Beyond the drastic disruption of everyday life, what psychologically follows from such widespread threats of contagious diseases is the societal problem of xenophobia (Fincher et al., 2008). The threat of Ebola stirred fear toward West Africans and support for closing national borders (Poletto et al., 2014). Similarly, the threat of COVID-19 led to ethnocentric sentiments and negative feelings toward Chinese and other outgroups (e.g., Jews and immigrants) in the United States along with support for policies to keep outsiders from America (Lee, 2020; Oster, 2020). Indeed, xenophobia, fear and shunning of outsiders, is a well-documented response to the spread of infectious disease as documented through historical (White, 2020) and psychological analyses (Fincher et al., 2008).

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Yet, although the association between disease threat and xenophobia has been well documented (e.g., Faulkner et al., 2004; Murray et al., 2011), little research has investigated how perceived vulnerability as a response to the acute threat of specific diseases influence processes involving xenophobia. In this research, we examined the relationship between xenophobic thoughts, such as group-serving biases (e.g., ethnocentrism and prejudice against outgroups), and support for ingroup-protective actions, such as policies restricting entry and movement of those coming from high-risk regions (e.g., travel bans) and whether this relationship is moderated by perceived vulnerability to exogenous threats from contagious diseases. We examine this question with people's responses to Ebola in 2014 (Study 1) and COVID-19 at two time points in 2020 (Studies 2a and 2b) by considering perceived vulnerability to the respective diseases as both an individual difference and a contextual factor.

Xenophobic Responses to Disease Threats

Shunning strangers and outsiders can protect one's group from the introduction of dangerous pathogens. The presence of pathogens tends to increase xenophobic tendencies, such as ethnocentrism and prejudice toward outgroup members (Faulkner et al., 2004; Kim et al., 2016; Navarrete & Fessler, 2006; O'Shea et al., 2020), essentially compelling people to psychologically equate outsiders with ingroup members who show visible signs of infection (Petersen, 2017). These xenophobic responses are theorized to serve group-protective functions because it could limit the introduction of a novel pathogen into one's group (Fincher et al., 2008). Xenophobic responses seem to be target-specific and stronger toward outgroups that are unfamiliar (Faulkner et al., 2004), from pathogen-rich regions (Ji et al., 2019), or associated with a specific disease (Moran et al., 2021). It should be noted that in response to a real and acute pandemic, xenophobic responses may be generalized (Kim et al., 2016; Moran et al., 2021). Moreover, those who, in general, have greater sensitivity and aversion to pathogens show particularly strong xenophobic responses (e.g., Ji et al., 2019).

In these studies, xenophobia has been conceptualized and measured as both group-serving thoughts, such as ethnocentrism and prejudice (e.g., Faulkner et al., 2004; Navarrete & Fessler, 2006), and support for ingroup-protective actions, such as ingroup-protective policies and intolerance for behavioral openness (e.g., Moran et al., 2021; Mortensen et al., 2010; Schaller & Murray, 2008). When considering these responses to disease threats, a functional distinction can be made between xenophobic thoughts and support for ingroup-protective actions (through either direct engagement of action or support of collective actions). Individuals' xenophobic *thoughts* in response to perceived threats, such as outgroup derogation and ethnocentrism, may serve the function of motivating ingroup-protective actions (e.g., Faulkner et al., 2004). However, these thoughts in isolation are unlikely to provide actual protection to individuals or groups. In contrast, actions or supporting collective actions have the *potential* to address directly large societal problems.

Individuals' thoughts may be the psychological precursors to such actions (Ajzen, 1991). Yet, research on consistency between thoughts and actions demonstrates how the degree of such consistency varies across situations and personal experiences (e.g., Ajzen et al., 2019; Fazio & Roskos-Ewoldsen, 2005). The present research aimed to identify a novel factor—a sense of vulnerability—that could impact the strength of the association between thoughts and action.

Vulnerability, Xenophobic Thoughts, and Support for Ingroup-Protective Actions

Many factors can strengthen or weaken links between thoughts and actions. For example, attitudes that are more accessible are more predictive of behavior (Fazio & Williams, 1986) as are attitudes based on direct experience with the attitude object (Fazio & Zanna, 1978). In addition, sociocultural factors impact the link, such as individualism/collectivism and socioeconomic status (SES). For example, more collectivistic and lower SES people show weaker links between their beliefs about environmental crises and their willingness to support pro-environmental actions, compared to their less collectivistic and higher SES counterparts (Eom et al., 2016, 2018; Sherman et al., 2021). Little extant research has investigated the role of perceived vulnerability to exogenous diseases in moderating the link between people's thoughts and support for actions. Thus, we examine the role of vulnerability in the context of xenophobic responses (i.e., group-serving thoughts and support for ingroup-protective actions).

In an ordinary range of situations, people, at least in Western cultural contexts (cf. Heine & Lehman, 1997), are motivated to maintain psychological consistency between beliefs and actions (Aronson, 1999; Gawronski, 2012). This equilibrium, however, may be disrupted when people feel highly vulnerable to disease and see the acute necessity of taking certain actions to protect themselves. In these situations, one possibility is that people continue to maintain psychological consistency, either because support for ingroup-protective actions are outcomes of increased xenophobic thoughts, consistent with such models as the theory of planned behavior (Ajzen, 1991), or because xenophobic thoughts follow to justify xenophobic actions (consistent with cognitive dissonance theory; Aronson, 1999). In fact, previous research (e.g., Sivacek & Crano, 1982) has found that vested interest, a related concept, increases attitude–behavior consistency.

The present research, however, considers another possibility: When feeling acutely vulnerable, people may compromise psychological consistency to support protective actions regardless of their beliefs. Sometimes, actions are perceived to be a protective clash with existing beliefs, and people may weigh the potential benefits of those actions over the costs of compromised psychological consistency. The psychological question that we address, then, is whether or not supporting such actions is accompanied by corresponding changes in xenophobic thoughts. We propose that the presence of strong threats can serve as sufficient justification for people to support actions that are not compatible with their beliefs (Festinger & Carlsmith, 1959), and thus, there is no reason for people to further justify actions by changing their thoughts, especially because changing xenophobic thoughts may contradict core values.

Some indirect evidence exists for this idea of weakened psychological consistency under threat. One study (Roskos-Ewoldsen et al., 2004) showed that for females, the temporal proximity of breast cancer, presumably associated with an increased sense of vulnerability, decreased the accessibility of attitudes toward breast self-exams, and intentions to perform the exams increased with no associated increase in attitude accessibility. Similarly, when primed with a proximal time perspective, people saw themselves as more pragmatic and less idealistic, eschewing their ideals, than when primed with a distal time perspective (Kivetz & Tyler, 2007). Building on these ideas, we predicted that people who feel more vulnerable to a contagious disease would show a weaker association between their xenophobic thoughts and support for ingroup-protective actions. We also predicted that this dissociation occurs because the feeling of vulnerability compels people to increase support for ingroup-protective actions to a greater degree than increasing their xenophobic thoughts.

Overview

In the present research, we focus on group-serving bias (xenophobic thoughts) and support for restrictive travel policies (ingroup-protective actions) in response to perceived risk to a specific disease (perceived vulnerability) among Americans. Study 1 is a reanalysis of existing data collected with a nationally representative sample during the Ebola scare in the United States in 2014 (Kim et al., 2016). Studies 2a and 2b were conducted early in the COVID-19 pandemic, mid-February and mid-March 2020. In these studies, we examine whether the perceived risk of the respective diseases moderates the relationship between group-serving bias and support for restrictive travel policies. In addition, given that the risk of COVID-19 was viewed as relatively low in the United States during Study 2a, and relatively high during Study 2b, we conducted additional quasi-experimental analyses to further understand the role of risk and supplement the individual difference approach. In all studies, we focus on individuals' support for national policies that aim to limit the entry to the United States and the mobility of people coming from high-risk regions.

We had two research aims. First, we examine whether the perceived risk to specific diseases, both as an individual difference factor and as a contextual factor, moderates the relationship between group-serving thoughts and support for restrictive travel policies. We predicted that those who feel more at risk would show weaker associations between group-serving thoughts and policy support. Second, we examine whether the weakened association is due to a greater increase in support for protective policies, relative to an increase ingroup-serving thoughts. We predicted that the increase in restrictive policy support among those who feel higher disease risk (vs. those who feel less risk) would be greater in magnitude than the increase ingroup-serving thoughts.

Data, code, and materials for all studies including additional scales for other research purposes not used in the present analyses are available on OSF (osf.io/x7cb9/). The study and analysis plan were not preregistered.

Study 1

Study 1 tests these predictions with a nationally representative U.S. sample obtained during the Ebola scare (using the dataset from Kim et al., 2016). We tested whether the self-reported perceived risk to Ebola moderates the link between group-serving bias and support for restrictive national travel policies. We assessed support for restrictive travel policies designed to protect the nation by specifically restricting the entry and mobility of people from high-risk regions—whether the policies are necessarily protective or not.

Method

Sample. A sample of $N = 1{,}000$ that reflected U.S. general population characteristics was constructed through YouGov (https://today.yougov.com/) who used the full 2010 American Community Survey (U.S. Census Bureau, 2014) as a sampling frame and matched respondents on gender, age, race, education, religion, political ideology, and political interest (see Kim et al., 2016 for method details). We excluded participants with missing values on key or control variables. This listwise deletion resulted in a final sample of 867 participants; demographic breakdown: gender (50.7% female, 49.3% male), age ($M = 46.55$, $SD = 16.69$), and ethnicity (69.7% White, 10.8% Black, 10.4% Hispanic, 5.0% Asian, 2.0% Mixed, 0.9% Native American, 0.9% Other, 0.3% Middle Eastern).

Measures and Materials. Consenting participants completed an online survey on "Public Perception of Ebola" with items in the following order:

Table 1. Descriptive Statistics and Bivariate Correlations Among Main and Control Variables in Study 1.

Variables		*M (SD)*	1	2	3	4	5	6	7	8	9
1	Group-serving bias	0.00 (0.79)	—								
2	Restrictive policy support	2.22 (0.69)	.383***	—							
3	Perceived risk	2.18 (0.83)	.274***	.367***	—						
4	Political ideology	3.03 (1.08)	.433***	.353***	.189***	—					
5	Age	46.55 (16.69)	.054	.148***	−.061†	.187***	—				
6	Income	5.38 (3.14)	−.121***	−.132***	−.174***	−030	.110**	—			
7	Education	3.19 (1.46)	−.234***	−.206***	−.152***	−.167***	−.022	.378***	—		
8	Ethnicity (non-White)	30.3%	−.010	−.012	.177***	−.065†	−.196***	−.093**	−.081*	—	
9	Gender (female)	50.7%	−.065†	.072*	.045	−.073*	−.015	−.069*	−.010	.073*	—

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Ebola information. To ensure that participants were similarly informed about the disease, they were first presented with basic information about Ebola, including the symptoms, cause, and history of the disease (adapted from Centers for Disease Control and Prevention [CDC], 2014).

Perceived risk of Ebola. To measure the perceived risk of Ebola, nine questions were adapted from the Perceived Risk of HIV Scale (Napper et al., 2012). These questions were divided into three sets: (a) personal risk (e.g., "I feel vulnerable to Ebola infection"), (b) local community risk (e.g., "I feel that people in my local community are vulnerable to Ebola infection"), and (c) risk to country (e.g., "I feel that my country is vulnerable to outbreak of Ebola"). All items were assessed on 5-point scales anchored at 1 (*strongly disagree*) to 5 (*strongly agree*). The scores of all 3 sets were averaged to form a composite ($M = 2.18$, $SD = 0.83$, $\alpha = .91$).[1]

Group-serving bias. We operationalize xenophobic thoughts through several measures of group-serving bias, assessing both outgroup derogation and ingroup favoritism. Outgroup derogation was assessed with two measures, allowing examination of target specificity of xenophobic responses (e.g., Ji et al., 2019; Moran et al., 2021), although that was not a central question of the research: (a) prejudice toward West Africans and (b) prejudice toward undocumented immigrants as a measure of generalized outgroup derogation in addition to the derogation of a threat-specific target outgroup. Participants rated their feelings toward the groups with 6 items, 3 positive (acceptance, sympathy, and warmth) and 3 negative (fear, disliking, and hostility). The scales ranged from 1 (*I do not feel this emotion at all*) to 8 (*I feel this emotion strongly*) (Stephan et al., 1998). Prejudice was the average of negative items and reverse-coded positive items; higher scores indicated greater prejudice toward the groups (West Africans: $M = 3.27$, $SD = 1.37$, $\alpha = .72$; undocumented immigrants: $M = 4.06$, $SD = 1.72$, $\alpha = .80$).

Ingroup favoritism was operationalized as ethnocentrism and was assessed with 2 items from the American Ethnocentrism Scale ("People in the United States could learn a lot from people from other countries" and "Lifestyles in other countries are just as valid as in the United States." [reverse]; Neuliep & McCroskey, 1997). The scales ranged from 1 (*strongly disagree*) to 7 (*strongly agree*), with higher numbers indicating greater ethnocentrism ($M = 2.87$, $SD = 1.30$; $r = .48$, $p < .001$). For group-serving bias, a composite was created with these three elements standardized ($M = 0.00$, $SD = 0.79$, $\alpha = .69$).[2]

Restrictive travel policy support. Participants indicated their support for petitions for five restrictive travel policies related to Ebola, such as travel ban and quarantine (e.g., "A travel ban so that no planes can enter the United States from nations with high risk of Ebola."). Participants were given three choices: (a) "No, I would not sign the petition"; (b) "I support the policy, but do not wish to sign the petition"; or (c) "Yes, I would sign the petition in support of the policy" that formed the measure of policy support ($M = 2.22$, $SD = 0.69$, $\alpha = .91$), with higher numbers indicating stronger support.

Demographic covariates. Political ideology was assessed on a 5-point scale from 1 (*very liberal*) to 5 (*very conservative*). Seventy-one participants indicated "Not Sure" and were assigned 3 (*moderate*) for analyses ($M = 3.03$, $SD = 1.08$). Education was measured with six categories (no high school: 6.5%, high school graduate: 36.7%, some college: 21.9%, 2-year college graduate: 9.2%, 4-year college graduate: 17.4%, postgraduate degree: 8.3%, *Median* = some college). Annual family income was measured with 16 categories, from less than US$10,000 to more than US$500,000 per year (*Median* = $40,000–$49,999).

Results

Descriptive statistics and bivariate correlations among the main and control variables in Study 1 are presented in Table 1.

Perceived Risk, Group-Serving Bias, and Support for Restrictive Travel Policies. Using multiple regression, we first examined the interaction between perceived risk and group-serving

Table 2. Multiple Regression Examining the Interaction Between Group-Serving Bias and Perceived Risk on Restrictive Policy Support in Study 1.

	Model 1 (without covariates)			Model 2 (with covariates)		
Variable	*b*	*SE*	95% CI	*b*	*SE*	95% CI
Intercept	2.239	0.021	[2.197, 2.281]	1.794	0.101	[1.595, 1.993]
Ethnicity				−0.066	0.045	[–0.154, 0.023]
Age				0.005***	0.001	[0.003, 0.008]
Gender				0.123**	0.040	[0.044, 0.202]
Education				−0.037*	0.015	[–0.066, –0.007]
Income				−0.007	0.007	[–0.021, 0.006]
Political ideology				0.105***	0.021	[0.063, 0.147]
Group-serving bias	0.261***	0.027	[0.207, 0.314]	0.182***	0.029	[0.125, 0.239]
Perceived risk	0.241***	0.026	[0.190, 0.292]	0.230***	0.026	[0.179, 0.281]
Group-serving bias × perceived risk	−0.106***	0.031	[−0.167, −0.045]	−0.082**	0.031	[−0.142, −0.022]

Note. Unstandardized coefficients shown; gender was dummy-coded (0 = *male*, 1 = *female*); ethnicity was dummy-coded (0 = *White*, 1 = *non-White*).
CI = confidence interval; *SE* = standard error.
*$p < .05$. **$p < .01$. ***$p < .001$.

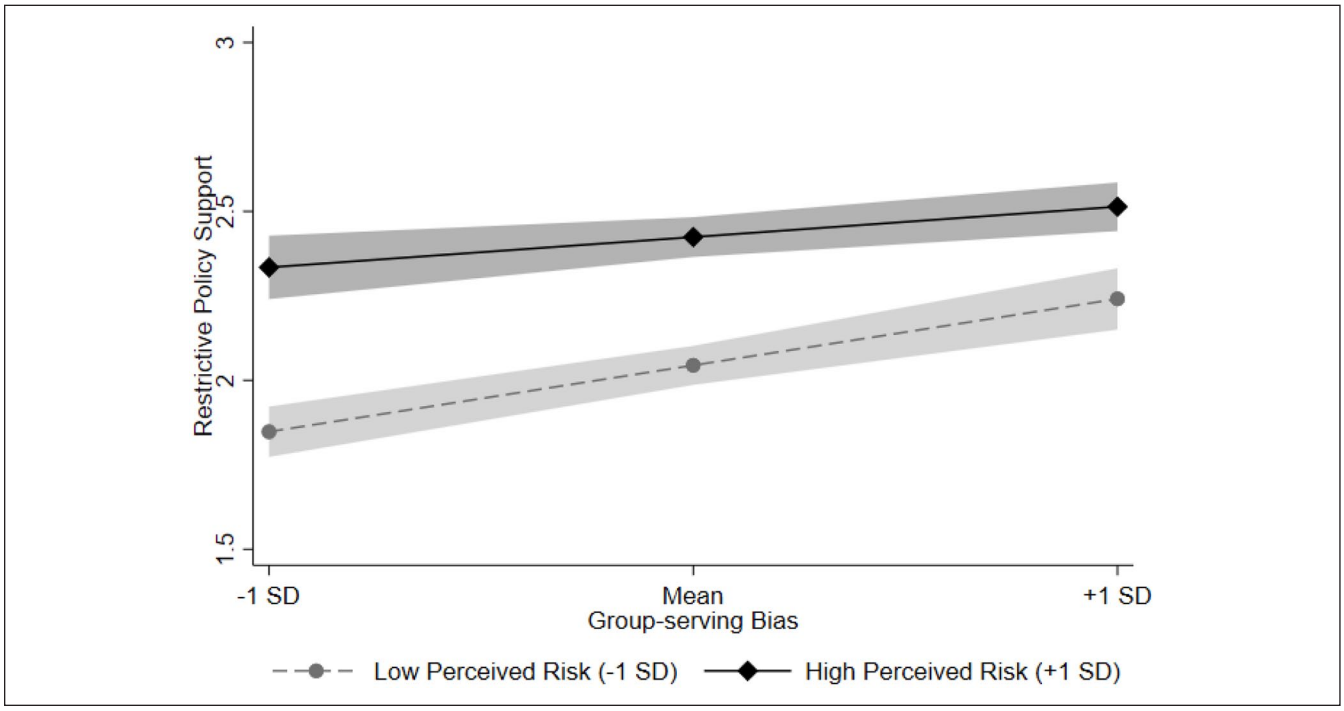

Figure 1. Restrictive policy support as a function of group-serving bias and perceived risk in Study 1. Shaded areas indicate continuous 95% confidence intervals.

bias on support for restrictive travel policies. Demographic covariates (i.e., ethnicity, age, gender, education, income, and political ideology; same as Kim et al., 2016) were included in the analysis. There was a main effect of perceived risk such that those who perceived themselves as being more at risk for Ebola were more supportive of restrictive policies. There was also a main effect of group-serving bias such that those who were more group serving were more supportive of restrictive policies (see Table 2).

These two main effects were qualified, however, by a significant interaction, $\beta = -.077$, $b = -0.082$, $SE = 0.031$, $t(857) = -2.70$, $p = .007$, 95% confidence interval [CI] = [−0.142, −0.022] (see Figure 1). Among those who perceived higher risk (+1 *SD* above the mean), group-serving bias predicted support for restrictive policies less strongly, $\beta = .130$, $b = 0.114$, $SE = 0.038$, $t(857) = 2.97$, $p = .003$, CI = [0.039, 0.190], than among those who perceived lower risk (−1 *SD* below the mean), $\beta = .284$, $b = 0.250$,

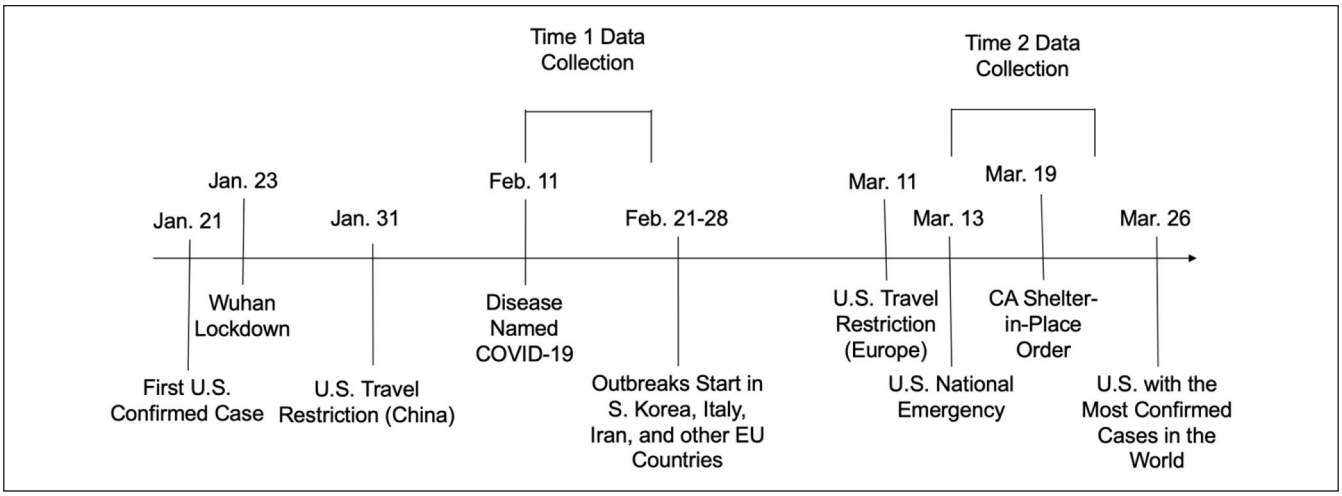

Figure 2. Sample collection periods in the context of the COVID-19 timeline (based on D. B. Taylor, 2020).

$SE = 0.039$, $t(857) = 6.48$, $p < .001$, CI = [0.174, 0.326]. The pattern and significance of this interaction remained consistent with or without covariates.[3]

For the second aim, using linear mixed-model analyses, we examined whether perceived risk was associated with restrictive policy support more strongly than with group-serving bias. Using the same covariates, there was a significant interaction between perceived risk and outcome type (group-serving bias vs. restrictive policy support), $\beta = .093$, $b = 0.113$, $SE = 0.046$, $z = 2.47$, $p = .013$, CI = [0.023, 0.202]. Specifically, the association between perceived risk and restrictive policy support was stronger, $\beta = .293$, $b = 0.354$, $SE = 0.037$, $z = 9.58$, $p < .001$, CI = [0.282, 0.427], than the association between perceived risk and group-serving bias, $\beta = .200$, $b = 0.242$, $SE = 0.037$, $z = 6.53$, $p < .001$, CI = [0.169, 0.314]. The interaction remains consistent without covariates.

Discussion

These results provide initial support for our hypotheses. First, group-serving bias, a xenophobic psychological response, was less predictive of support for restrictive travel policies among people who felt more at risk for Ebola than among people who felt less at risk. Second, this weakened association was driven by the fact that those who felt greater risk increased their support for restrictive policies more than their group-serving bias.

Study 1 was conducted in the context of one specific disease with a particular political backdrop that originated in a relatively unfamiliar region that does not typically lead to strong intergroup feelings with the United States. Thus, it is important to examine the replicability of the findings of Study 1 in a context that differed on these factors. In 2020, the COVID-19 pandemic presented this context.

Study 2

Study 2 examined the main hypotheses in two samples of Americans in response to COVID-19. COVID-19 differs from Ebola in several important ways. COVID-19 originated in China, a more familiar country to Americans and became an extremely high threat in the United States. Moreover, nationalism had become much more pronounced in the United States when the COVID-19 outbreak occurred (e.g., Giroux, 2017). A different administration and political party controlled U.S. federal policy, which may have led to differences in how policies were evaluated (Van Boven et al., 2018) and the extent to which xenophobic sentiment was willingly expressed (Crandall et al., 2018). Given these differences that may impact the degree to which people hold their xenophobic thoughts and/or are willing to express their thoughts through the support of ingroup-protective policies, testing our hypotheses in the context of COVID-19 provides a strong test of the robustness of the hypotheses.

Study 2 includes two studies conducted in the United States that are virtually identical except for some specific information related to COVID-19 (noted in the methods), reflecting rapid changes in how society viewed and learned about COVID-19. Study 2a was conducted in February 2020, a time period *before* COVID-19 made a large impact on the lives of Americans. Americans were fully aware of the virus, and the government already imposed travel restrictions against China (January 31, 2020), but there were only 15 confirmed cases of COVID-19 in the United States as of February 17. Study 2b was conducted in March 2020 when COVID-19 had become a major problem in the U.S. On March 11, the World Health Organization declared COVID-19 a pandemic, and on March 13, the U.S. government declared a National Emergency (D. B. Taylor, 2020; see Figure 2). We conducted these two studies to test the replicability of the main findings regarding the moderating role of

individual difference in perceived risk to COVID-19 in two different contexts that present different societal levels of risk.

Study 2a

Method

Sample. The sample was collected using Amazon Mechanical Turk, February 11 to 17, 2020, a time period before COVID-19 made a large impact on the lives of Americans. The sample size was determined a priori based on Study 1 (i.e., $N = 1{,}000$).

Sample was collected from 1,040 participants. We excluded 48 participants who failed attention check items or who had missing data on key/control variables, leaving 992 participants; demographic breakdown: gender (52.8% female, 47.2% male), age ($M = 39.63$, $SD = 12.97$), and ethnicity (78.4% White, 8.8% Black, 4.7% Hispanic, 4.4% Asian, 2.4% Multiethnic, 0.5% Native American, 0.5% other, 0.2% Middle Easterner).

Measures and Materials. Consenting participants completed an online survey on "Social attitudes." All measures are adapted from Study 1 to refer to COVID-19.

COVID-19 information. To ensure that participants were similarly informed about the disease, participants were presented a passage containing factual information on the coronavirus, adapted from the CDC (2020a). The content of information reflected the typical usage at the time. The presented CDC information focused on the origin of the disease (Wuhan, China; CDC, 2020a). Thus, the description reflected the content, and the term "Wuhan virus" appeared throughout the survey as that was a lay term colloquially used at that time[4] (the official name of the disease COVID-19 was given on February 11, 2020, after the study was launched; see Figure 2).

Perceived risk of COVID-19. Perceived risk of COVID-19 was assessed with nine questions divided into three sets (as in Study 1): (a) perceptions of personal risk ("I feel vulnerable to Wuhan Virus."); (b) perceptions of local community risk (e.g., "I feel that people in my local community are vulnerable to Wuhan Virus."), and (c) perceptions of risk to the country (e.g., "I feel that my country is vulnerable to an outbreak of Wuhan Virus."). All items were assessed on appropriately worded 5-point scales. The scores of the three sets were averaged ($M = 2.43$, $SD = 0.84$, $\alpha = .91$).

Group-serving bias. To assess group-serving bias among Americans, we measured both outgroup derogation and ingroup favoritism with three components (as in Study 1): (a) prejudice toward Chinese (i.e., an outgroup primarily associated with COVID-19); (b) prejudice toward undocumented immigrants (i.e., an outgroup not associated with COVID-19); and (c) American ethnocentrism (i.e., ingroup favoritism). Participants rated their feelings toward the two outgroups with 6 items identical to those used in Study 1 (and identical 8-point scales). Prejudice was the average of negative items and reverse-coded positive items; higher scores indicated greater prejudice toward the two groups (Chinese: $M = 2.75$, $SD = 1.43$, $\alpha = .82$; undocumented immigrants: $M = 3.44$, $SD = 1.83$, $\alpha = .89$). Ethnocentrism was assessed with 2 items used in Study 1 ($M = 2.22$, $SD = 1.18$; $r = .66$, $p < .001$). A composite was created with the three elements standardized ($M = 0.00$, $SD = 0.82$, $\alpha = .76$).[5]

Restrictive policy support. Participants indicated their support for five restrictive policies. All of these policies would limit access to or mobility in the United States among individuals coming from targeted foreign locations. Participants indicated support for each policy by using a 3-point scale: 1 (*No, I do not support this policy*), 2 (*Yes, I support the policy in general, but it is too restrictive*), or 3 (*Yes, I support the policy fully and think it should be implemented*). The policies included travel bans and quarantines (e.g., "A travel ban so that no planes can enter the United States from China"; "A ban from public schools of children who have returned from China."). The five items formed the measure of restrictive policy support ($M = 2.35$, $SD = 0.55$, $\alpha = .81$), with higher numbers indicating stronger support.

Demographic measures. Political ideology, gender, age, ethnicity, education, and income were measured. Political ideology was assessed on a 5-point scale from 1 (*very liberal*) to 5 (*very conservative;* $M = 2.73$, $SD = 1.16$). Education was measured with six categories (no high school: 0.3%, high school graduate: 12.3%, some college: 21.4%, 2-year college degree: 12.2%, 4-year college degree: 40.6%, postgraduate degree: 13.2%; *Median* = 4-year college degree). Annual family income was measured with 12 categories, from less than US$10,000 to more than US$150,000 per year (*Median* = $50,000–$59,999).

Results

Descriptive statistics and bivariate correlations among the main and control variables in Study 2a are presented in Table 3.

Perceived Risk, Group-Serving Bias, and Support for Restrictive Travel Policies. To test our first aim, we examined the interaction between perceived risk and group-serving bias on support for restrictive policies. The results including demographic covariates (i.e., ethnicity, age, gender, education, income, and political ideology) are described below. The main results remained consistent without covariates. There was a significant main effect, as those who perceived themselves to be more at risk to the disease were more supportive of restrictive policies. There was also a main effect of group-serving bias, as those who had higher group-serving biases were more supportive of restrictive policies (see Table 4).

Table 3. Descriptive Statistics and Bivariate Correlations Among Main and Control Variables in Study 2a.

Variables		M (*SD*)	1	2	3	4	5	6	7	8	9
1	Group-serving bias	0.00 (0.82)	—								
2	Restrictive policy support	2.35 (0.55)	.327***	—							
3	Perceived risk	2.43 (0.84)	.129***	.246***	—						
4	Political ideology	2.73 (1.16)	.525***	.331***	.046	—					
5	Age	39.63 (12.97)	.014	.170***	−.010	.101**	—				
6	Income	6.19 (3.12)	.078*	.056†	−.011	.108**	−.014	—			
7	Education	4.20 (1.28)	−.031	−.043	−.002	−.058†	.034	.314***	—		
8	Ethnicity (non-White)	21.6%	−.062†	−.047	.093**	−.082*	−.203***	−.012	.009	—	
9	Gender (female)	52.8%	−.120***	.107**	.027	−.057†	.125***	−.074*	.046	−.015	—

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

As in Study 1, we observed a significant interaction between perceived risk and group-serving bias on support for restrictive policies, $\beta = -.061$, $b = -0.048$, $SE = 0.021$, $t(982) = -2.26$, $p = .024$, CI = [−0.089, −0.006] (Figure 3). When perceived risk was high (+1 *SD*), group-serving bias predicted restrictive policy support less strongly, $\beta = .146$, $b = 0.098$, $SE = 0.028$, $t(982) = 3.50$, $p < .001$, CI = [0.043, 0.152], than when perceived risk was low (−1 *SD*), $\beta = .267$, $b = 0.178$, $SE = 0.029$, $t(982) = 6.09$, $p < .001$, CI = [0.121, 0.236].

For our second aim, we examined whether perceived risk was associated with restrictive policy support more strongly than with group-serving bias. Including the same covariates, we found a significant interaction between perceived risk and outcome type (group-serving bias vs. restrictive policy support), $\beta = .117$, $b = 0.139$, $SE = 0.043$, $z = 3.21$, $p = .001$, CI = [0.054, 0.224]. Consistent with Study 1 and predictions, the association between perceived risk and restrictive policy support was stronger, $\beta = .230$, $b = 0.272$, $SE = 0.033$, $z = 8.17$, $p < .001$, CI = [0.207, 0.338], than the association between perceived risk and group-serving bias, $\beta = .113$, $b = 0.133$, $SE = 0.033$, $z = 4.00$, $p < .001$, CI = [0.068, 0.199]. The interaction remains consistent without covariates.

Discussion. People who felt more at risk of COVID-19 showed a weaker association between their group-serving bias and support for policies because perceived risk was more strongly predictive of support for restrictive actions than group-serving bias. Thus, Study 2a replicated the findings from Study 1 in a different disease and political context. As the situation with COVID-19 changed rapidly after Study 2a was conducted, we examined whether this relationship would hold for the same disease when objective risk increased in Study 2b.

Study 2b

Method

Sample. The sample was collected using Amazon Mechanical Turk, March 13 to 20, 2020 ($N = 1{,}003$), when COVID-19 became a major problem in the United States. The sample size was determined a priori as in Study 2b (i.e., $N = 1{,}000$). A total of 77 responses were excluded from the analyses due to failed attention checks or missing data on key/control variables, yielding the final sample size of 926; demographic breakdown: gender (55.9% female, 44.1% male), age ($M = 38.28$, $SD = 12.28$), and ethnicity (78.1% White, 8.3% Black, 6.0% Hispanic, 4.4% Asian, 2.2% multiethnic, 0.8% Native American, and 0.2% other).

Measures and Materials. Measures and Materials are identical with Study 2a with a few noted exceptions.

COVID-19 information. Participants read a passage about basic factual information on the coronavirus, adapted from the Centers for Disease Control (CDC, 2020b). Information in the passage was updated to be consistent with current CDC information. We also changed the term to "Coronavirus" from "Wuhan Virus" and used it throughout the survey to be consistent with the way the disease was colloquially called in March.

Perceived risk of COVID-19. We measured perceived risk of COVID-19 using the same nine questions divided into three sets as in Studies 1 and 2a, with updated terms (e.g., "I feel vulnerable to Coronavirus."). The scores of the three sets were averaged ($M = 3.49$, $SD = 0.80$, $\alpha = .89$).

Group-serving bias. To assess group-serving bias among Americans, we used the same three scales used in Study 2a: (a) prejudice toward Chinese ($M = 2.67$, $SD = 1.48$, $\alpha = .85$), (b) prejudice toward undocumented immigrants (to measure more generalized prejudice; $M = 3.27$, $SD = 1.78$, $\alpha = .89$), and (c) American ethnocentrism (i.e., ingroup favoritism; $M = 2.17$, $SD = 1.14$, $r = .71$, $p < .001$). A composite was created with the three elements standardized ($M = 0.00$, $SD = 0.82$, $\alpha = .76$).[6]

Restrictive policy support. Participants indicated their support for five group-restrictive policies related to coronavirus using the same 3-point scale. Although the content

Table 4. Multiple Regression Examining the Interaction Between Group-Serving Bias and Perceived Risk on Restrictive Policy Support in Study 2a.

	Model 1 (without covariates)			Model 2 (with covariates)		
Variable	*b*	*SE*	95% CI	*b*	*SE*	95% CI
Intercept	2.351	0.016	[2.319, 2.383]	1.833	0.084	[1.667, 1.998]
Ethnicity				−0.009	0.039	[–0.085, 0.067]
Age				0.006***	0.001	[0.003, 0.008]
Gender				0.137***	0.032	[0.076, 0.199]
Education				−0.020	0.013	[–0.045, 0.006]
Income				0.008	0.005	[–0.002, 0.019]
Political ideology				0.093***	0.016	[0.062, 0.124]
Group-serving bias	0.202***	0.020	[0.164, 0.241]	0.138***	0.022	[0.094, 0.182]
Perceived risk	0.136***	0.019	[0.099, 0.174]	0.137***	0.019	[0.101, 0.174]
Group-serving bias × perceived risk	−0.061**	0.022	[–0.104, –0.018]	−0.048*	0.021	[–0.089, –0.006]

Note. Unstandardized coefficients shown; Gender was dummy-coded (0 = *male*, 1 = *female*); ethnicity was dummy-coded (0 = *White*, 1 = *non-White*). *$p < .05$. **$p < .01$. ***$p < .001$.

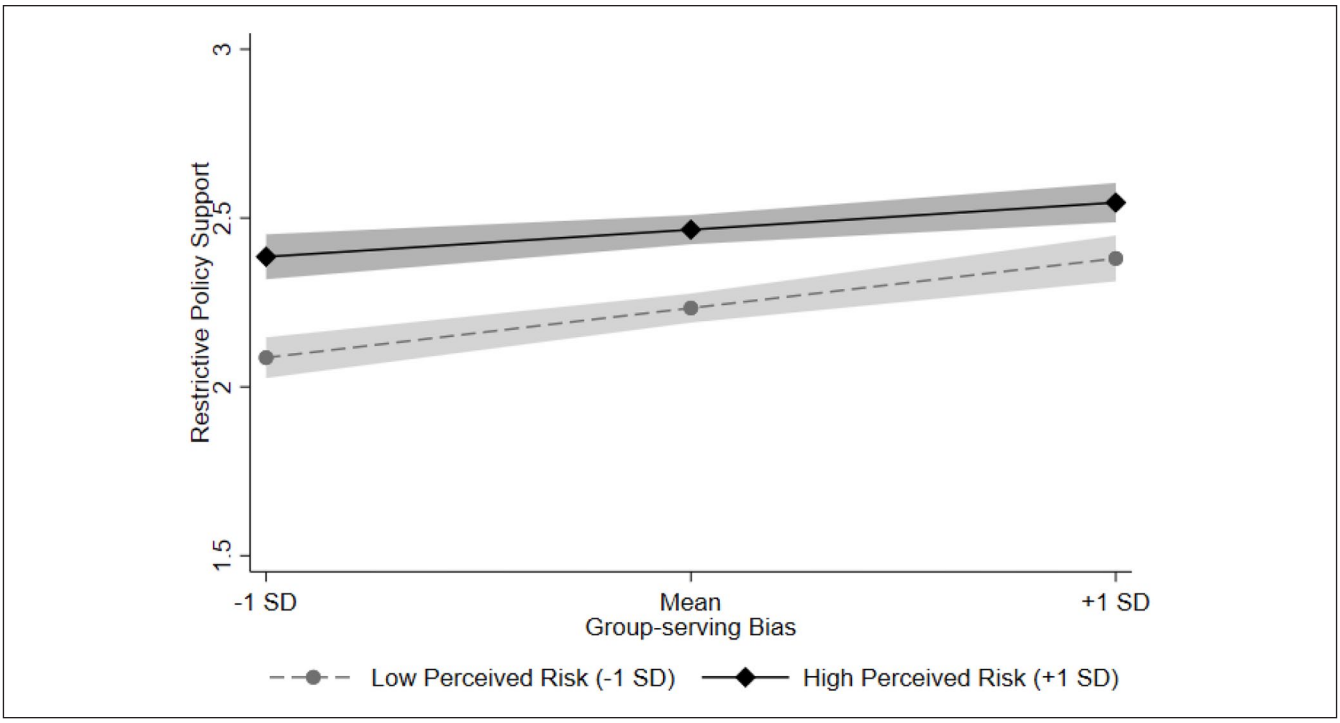

Figure 3. Restrictive policy support as a function of group-serving bias and perceived risk in Study 2a. Shaded areas indicate continuous 95% confidence intervals.

of the policies was identical with the ones used in Study 2a, there was one notable change in the target of the policy. In Study 2a conducted in February 2020, the policies were exclusively about China. To reflect real changes in the national policy on travel restriction and public perception that occurred in early March 2020, the policies were revised to say "regions with high risk of Coronavirus (i.e., Italy, China, Iran, South Korea, Germany. . .)." The 5 items formed the measure of policy support ($M = 2.59$, $SD = 0.47$, $\alpha = .80$), with higher numbers indicating stronger support for the policies.

Demographic measures. Political ideology, gender, age, ethnicity, education, and income were measured. Political ideology was assessed on a 5-point scale from 1 (*very liberal*) to 5 (*very conservative;* $M = 2.74$, $SD = 1.13$). Education was measured with six categories (no high school: 0.5%, high school graduate: 10.4%, some college: 22.5%, 2-year college

Table 5. Descriptive Statistics and Bivariate Correlations Among Main and Control Variables in Study 2b.

Variables	*M (SD)*	1	2	3	4	5	6	7	8	9
1 Group-serving bias	0.00 (0.82)	—								
2 Restrictive policy support	2.59 (0.47)	.117***	—							
3 Perceived risk	3.49 (0.80)	−.152***	.245***	—						
4 Political ideology	2.74 (1.13)	.462***	.113***	−.289***	—					
5 Age	38.28 (12.28)	.091**	.095**	−.073*	.152***	—				
6 Income	6.46 (3.15)	.053	.041	−036	.113**	.053	—			
7 Education	4.26 (1.28)	−.015	−.065*	.034	−.028	.026	.326***	—		
8 Ethnicity (non-White)	21.9%	.021	−.003	.041	-.063†	−.157***	-.093**	.031	—	
9 Gender (female)	55.9%	−131***	.143***	.132***	−.021	.071*	-.036	−.064†	−.024	—

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 6. Multiple Regression Examining the Interaction Between Group-Serving Bias and Perceived Risk on Restrictive Policy Support in Study 2b.

	Model 1 (without covariates)			Model 2 (with covariates)		
Variable	*b*	*SE*	95% CI	*b*	*SE*	95% CI
Intercept	2.588	0.015	[2.559, 2.617]	2.336	0.080	[2.181, 2.494]
Ethnicity				0.018	0.036	[−0.052, 0.088]
Age				0.003*	0.001	[0.001, 0.005]
Gender				0.105***	0.030	[0.047, 0.164]
Education				−0.032**	0.012	[–0.055, –0.008]
Income				0.008†	0.005	[–0.001, 0.018]
Political ideology				0.055***	0.015	[0.026, 0.085]
Group-serving bias	0.092***	0.018	[0.056, 0.128]	0.060**	0.020	[0.021, 0.100]
Perceived risk	0.161***	0.019	[0.125, 0.198]	0.176***	0.019	[0.139, 0.214]
Group-serving bias × perceived risk	−0.047*	0.020	[–0.087, –0.007]	−0.045*	0.020	[–0.085, –0.006]

Note. Unstandardized coefficients shown; Gender was dummy-coded (0 = *male*, 1 = *female*); ethnicity was dummy-coded (0 = *White*, 1 = *non-White*).
*$p < .05$. **$p < .01$. ***$p < .001$.

degree: 11.7%, 4-year college degree: 39.1%, post-graduate degree: 15.9%; *Median* = 4-year college degree). Annual family income was measured with 12 categories, from less than US$10,000 to more than US$150,000 per year (*Median* = US$50,000–US$59,999).

Results. Descriptive statistics and bivariate correlations among the main and control variables in Study 2b are presented in Table 5. Although the general pattern of these correlations is similar as in Study 2a, the correlation between perceived risk and group-serving bias was significantly negative. We explore this relationship in the main analyses.

Perceived Risk, Group-Serving Bias, and Support for Restrictive Travel Policies. We replicated the findings from Studies 1 and 2a. First, those who perceived themselves to be more at risk of the disease were more supportive of restrictive policies (see Table 6), and those who had higher group-serving biases were more supportive of restrictive policies. Moreover, once again, we observed a significant interaction between perceived risk and group-serving bias on support for restrictive policies, $\beta = -.064$, $b = -0.045$, $SE = 0.020$, $t(916) = -2.27$, $p = .023$, CI = [−0.085, −0.006] (Figure 4). When perceived risk was high (+1 *SD*), group-serving bias predicted support for restrictive policies less strongly, $\beta = .042$, $b = 0.024$, $SE = 0.025$, $t(916) = 0.95$, $p = .343$, CI = [−0.026, 0.074], than when perceived risk was low (−1 *SD*), $\beta = .170$, $b = 0.097$, $SE = 0.026$, $t(916) = 3.70$, $p < .001$, CI = [0.046, 0.148]. Surprisingly, among those who perceived higher risk, the link between group-serving bias and support for policies was not significant. The main results remained consistent without covariates.

Second, consistent with Studies 1 and 2a, there was a significant interaction between perceived risk and outcome type (group-serving bias vs. restrictive policy support) with the same covariates, $\beta = .397$, $b = 0.494$, $SE = 0.052$, $z = 9.53$, $p < .001$, CI = [0.393, 0.596]. The association between perceived risk and restrictive policy support was highly significant, $\beta = .344$, $b = 0.428$, $SE = 0.039$, $z = 11.02$, $p < .001$, CI = [0.352, 0.505]. In contrast, there was no association (in fact a marginally negative association) between perceived risk and group-serving bias, $\beta = -.053$, $b = -0.066$,

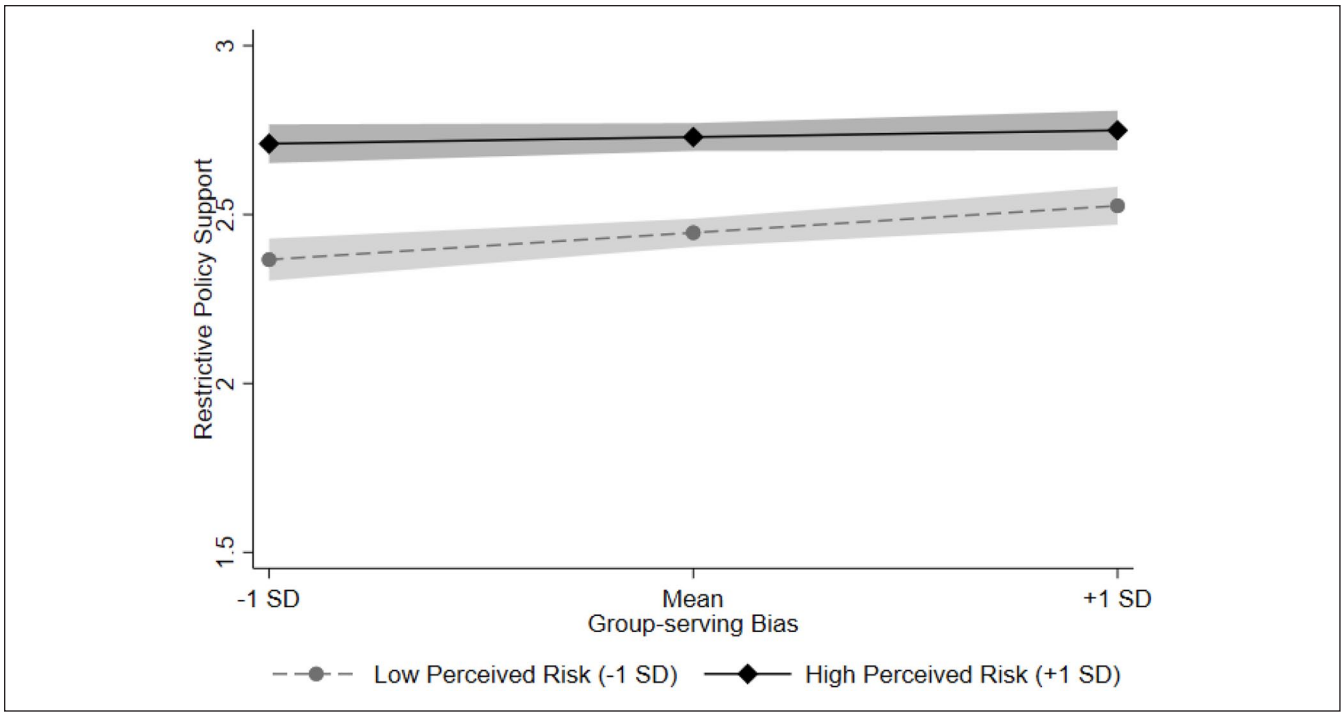

Figure 4. Restrictive policy support as a function of group-serving bias and perceived risk in Study 2b. Shaded areas indicate continuous 95% confidence intervals.

$SE = 0.039$, $z = -1.69$, $p = .090$, CI = [−0.142, 0.010]. These results were consistent with or without covariates.

Analysis of Temporal Context

Taking advantage of the fact that the datasets include responses at two time points representing lower and higher risk of COVID-19 in the United States, we conducted additional exploratory tests of the theoretical model comparing the two datasets from Studies 2a and 2b, adopting a quasi-experimental approach. The analyses serve two main purposes. First, it provides the opportunity to examine convergent support for the model by testing contextual vulnerability, rather than individual difference measure of vulnerability. We examined whether the difference in the actual risk of COVID-19 in America between February and March 2020 would moderate the association in the same way as individual differences in perceived risk. Second, it provides a quasi-experimental test of the hypothesis. Given the correlational nature of the studies, it is unclear whether the moderation by perceived risk observed in Studies 1, 2a, and 2b was due to unmeasured correlates of risk perception, such as personality and affect intensity (Duncan et al., 2009). Comparing temporal contexts, although still non-experimental, tests moderation by the societal level of vulnerability independent of individual perception of vulnerability, and hence, presents a clearer examination.

Extending the individual difference findings to the societal level of risk led to the theoretical model in Figure 5. First, we examine whether the link between group-serving bias and restrictive policy support is weaker when the threat of COVID-19 arrived with full force in the United States (March) than when the threat was relatively low in the United States (February). Second, we examine whether the weakened association during a high-threat time would be due to a selective increase in support for restrictive policies rather than group-serving bias. Third, we examine whether the timing difference would be mediated by differences in perceived risk of COVID-19 between the two time points.

Interaction Between Time and Group-serving Bias on Restrictive Policy Support. We tested whether the extent to which group-serving bias predicts support for restrictive policies differed between the low-threat period (February) and the high-threat period (March). We ran a multiple regression with group-serving bias (mean-centered), time (dummy-coded: 0 = *low-threat period*, 1 = *high-threat period*), and their interaction as predictors and restrictive policy support as the outcome. Ethnicity, age, gender, education, income, and political ideology were entered as control variables.

There was a main effect of time such that people supported restrictive policies more during the high-threat period than the low-threat period. There was also a main effect such that people who had greater group-serving biases were more

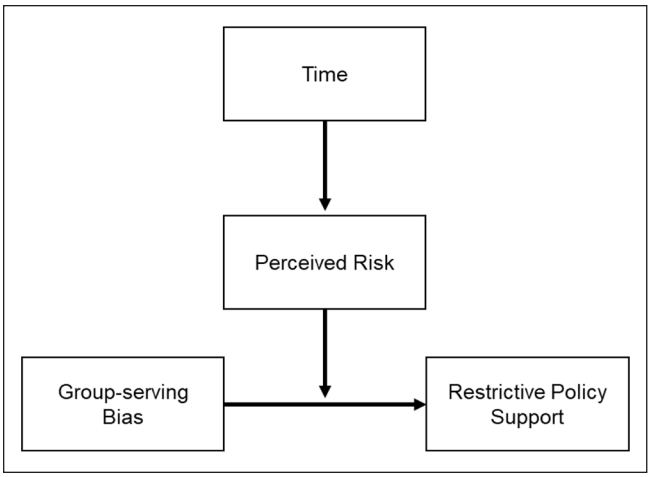

Figure 5. Theoretical model examining the moderating effect of time on the association between group-serving bias and support for restrictive policies as mediated by the perceived risk of COVID-19.

supportive of restrictive policies (see Table 7). Finally, there was a significant interaction between time and group-serving bias on support for restrictive policies, β =−232, $b = -0.149$, $SE = 0.027$, $t(1908) = -5.54$, $p < .001$, CI = [−0.201, −0.096]. During the low-threat period, group-serving bias significantly predicted support for restrictive policies, β = .284, $b = 0.182$, $SE = 0.020$, $t(1908) = 8.97$, $p < .001$, CI = [0.142, 0.222], whereas it did not during the high-threat period, β = .052, $b = 0.034$, $SE = 0.021$, $t(1908) = 1.62$, $p = .105$, CI = [−0.007, 0.074]. The significance and the direction of the interaction remain consistent with or without covariates (see Figure 6).

These results are consistent with the individual difference findings between people who perceived lower versus higher risk of Ebola (Study 1) and COVID-19 (Study 2a and 2b): At the context level, when COVID-19 became a high threat, group-serving bias became less predictive of support for restrictive policies, compared to when COVID-19 was a low threat.

Difference in Change ingroup-Serving Bias and Restrictive Policy Support Across Time. We also examined whether the weakened association during a high-threat time would be due to a selective increase in support for restrictive policies, rather than group-serving bias. To test this, we examined changes ingroup-serving bias and restrictive policy support between time points. We conducted a 2 (time: *low-threat period versus high-threat period;* between-subjects factor) × 2 (type of response: *group-serving bias versus restrictive policy support;* within-subjects factor) mixed-model analysis of variance. Standardized scores were used for group-serving bias and restrictive policy support with the same demographic covariates.

The results support the hypothesis and revealed a significant interaction between time and type of xenophobic response, $F(1, 1910) = 102.36$, $p < .001$, $\eta_p^2 = .051$. Pairwise comparisons using Sidak correction indicated that support for restrictive policies significantly increased from the low-threat period ($M = -0.23$, $SD = 1.04$) to the high-threat period ($M = 0.24$, $SD = 0.89$), $F(1, 1910) = 120.19$, $p < .001$, $\eta_p^2 = .059$. In contrast, group-serving bias marginally *decreased* from the low-threat period ($M = 0.04$, $SD = 1.00$) to the high-threat period ($M = -0.04$, $SD = 1.00$), $F(1, 1910) = 3.35$, $p = .067$, $\eta_p^2 = .002$. Figure 7 presents the pattern of the results. Neither the significance nor the pattern of the interaction changed when the demographic covariates were not included, $F(1, 1916) = 94.54$, $p < .001$, $\eta_p^2 = .047$.

Mediated Moderation: Perceived Vulnerability as a Psychological Mediator. We reasoned that being in a context where the COVID-19 threat is high would increase the perception of participants' own risk of the disease. Thus, we tested whether the perceived risk of COVID-19 explained the moderating role of time on the association between group-serving bias and restrictive policy support. Specifically, we used a mediated moderation model in which time predicted the perceived risk of COVID-19, which in turn moderated the association between group-serving bias and restrictive policy support. We included the interaction term between time and group-serving bias on restrictive policy support to examine whether the magnitude of the interaction effect involving time decreased and the interaction involving perceived risk significantly predicted the outcome variable. Satisfying these two conditions would indicate that perceived risk is mediating the moderation effect of time (Muller et al., 2005; see Eom et al., 2018, for analytic approach).

The mediated moderation effect was significant, β = −.077, $b = -0.050$, $SE = 0.015$, CI = [−0.078, −0.021]. Reflecting the objective changes in American life during the time periods, people perceived greater risk of COVID-19 in the high-threat period than in the low-threat period, β = 1.073, $b = 1.052$, $SE = 0.038$, $t(1910) = 28.06$, $p < .001$, CI = [0.978, 1.125]. Perceived risk, in turn, moderated the association between group-serving bias and support for restrictive policies, β = −.072, $b = -0.047$, $SE = 0.015$, $t(1906) = -3.23$, $p = .001$, CI = [−0.076, −0.019]. Group-serving bias predicted restrictive policy support less strongly when perceived risk was high (+1 *SD*), β = .124, $b = 0.079$, $SE = 0.029$, $t(1906) = 2.74$, $p = .006$, CI = [0.023, 0.136], than when perceived risk was low (−1 *SD*), β = .268, $b = 0.172$, $SE = 0.021$, $t(1906) = 8.12$, $p < .001$, CI = [0.130, 0.213]. Importantly, the interaction between group-serving bias and time on restrictive policy support became nonsignificant, β = −.082, $b = -0.053$, $SE = 0.030$, $t(1906) = -1.74$, $p = .083$, CI = [−0.113, 0.007] (see Figure 8).

This mediated moderation model remained significant whether or not we controlled for the demographic covariates

Table 7. Multiple Regression Examining the Interaction Between Group-Serving Bias and Time on Restrictive Policy Support in Combined Study 2.

	Model 1			Model 2		
Variable	*b*	*SE*	95% CI	*b*	*SE*	95% CI
Intercept	2.339	0.016	[2.308, 2.370]	1.983	0.061	[1.863, 2.102]
Ethnicity				0.020	0.027	[–0.033, 0.074]
Age				0.004***	0.001	[0.003, 0.006]
Gender				0.145***	0.022	[0.101, 0.189]
Education				−0.024**	0.009	[–0.042, –0.006]
Income				0.008*	0.004	[0.001, 0.015]
Political ideology				0.057***	0.011	[0.035, 0.079]
Group-serving bias	0.218***	0.019	[0.181, 0.255]	0.182***	0.020	[0.142, 0.222]
Time	0.256***	0.023	[0.211, 0.300]	0.254***	0.022	[0.210, 0.297]
Group-serving bias × time	−0.151***	0.028	[–0.205, –0.097]	−0.149***	0.027	[–0.201, –0.096]

Note. Unstandardized coefficients shown; gender was dummy-coded (0 = *male*, 1 = *female*); ethnicity was dummy-coded (0 = *White*, 1 = *non-White*); and time was dummy-coded (0 = *low-threat period*, 1 = *high-threat period*).
*$p < .05$. **$p < .01$. ***$p < .001$.

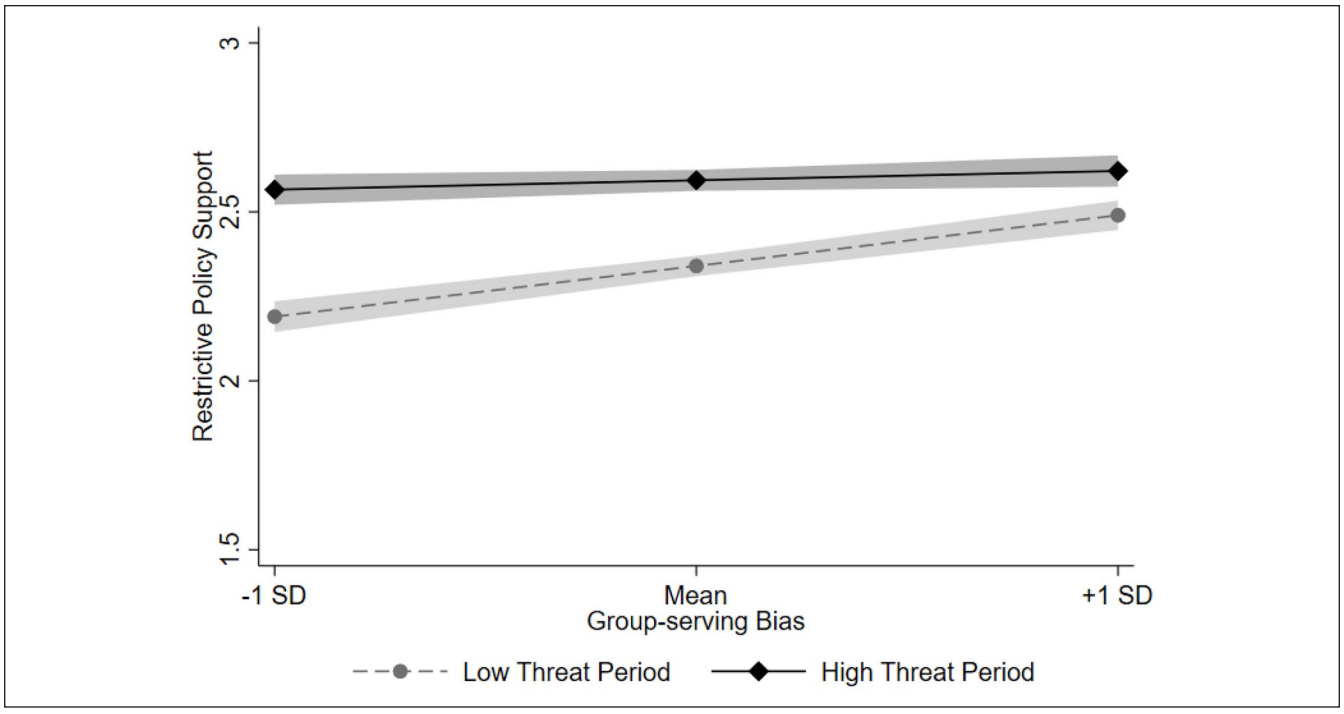

Figure 6. The association between group-serving bias and restrictive policy support in low-threat period and high-threat period. Shaded areas indicate continuous 95% confidence intervals.

(see Table 8). These results support the idea that it is the perception of risk that explains the moderation of time on how strongly group-serving bias predicts restrictive policy support.

Discussion

Study 2 replicated the same pattern of results in Study 1 in a different disease context of COVID-19. Leveraging the fact that the same studies were conducted in these two time periods, we conducted additional quasi-experimental analyses. Although the study remains nonexperimental, this analysis allowed a test of vulnerability as a psychological response to an external threat, beyond a purely individual difference factor.

The fact that support for restrictive policies increased during the high-threat time period is noteworthy. Such restrictions can be protective if they are implemented prior to a

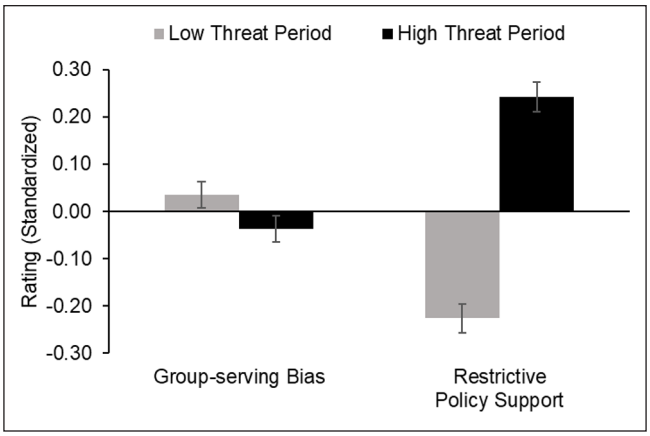

Figure 7. Estimated means of group-serving bias and restrictive policy support in low-threat period and high-threat period. Error bars indicate standard errors.

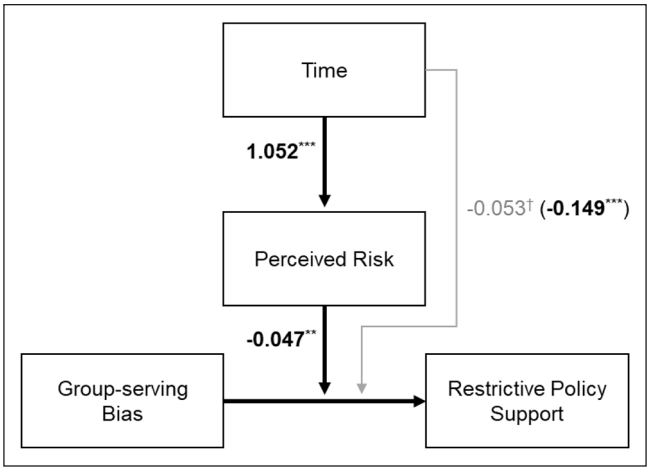

Figure 8. Mediated moderation model examining whether the perceived risk of COVID-19 mediates the effect of time on the association between group-serving bias and support for restrictive policies. Unstandardized coefficients are shown. Black lines represent significant paths ($p < .05$), and the gray line represents the nonsignificant path ($p > .05$). Ethnicity, age, gender, education, income, and political ideology were entered as control variables.
***$p < .001$, **$p < .01$, †$p < .10$.

disease being introduced to a community. However, given that COVID-19 was already rapidly spreading within the United States in March 2020, the actual effectiveness of policies to keep the disease out of the nation was in all likelihood minimal (Kraemer et al., 2020), and organizations, such as the World Health Organization (2020), continued to recommend against implementing travel-related restrictions (see Chinazzi et al., 2020 for the effectiveness of travel restrictions). Interestingly, it was not until early April that the U.S. government began recommending face covering, decisively more effective protection. Thus, it is unlikely that people's increased support for such policies during the high-threat period was based on scientific and evidence-based recommendations but rather was likely based on their intuitions as to what felt protective.

General Discussion

Summary and Theoretical Implications

Using three datasets, each with approximately 1,000 Americans, representing two diseases and three distinctive time points, the present research found that perceived vulnerability to Ebola and COVID-19 weakens the association between xenophobic thoughts and support for ingroup-protective actions. Moreover, results show that this dissociation between group-serving bias and restrictive policy support occurred because when facing a high level of threat, participants responded with increased support for restrictive policies and with a relatively small increase in the conceptually related response of group-serving biases. This pattern was consistent whether the vulnerability was operationalized as an individual difference in subjective risk perception or as an objective level of disease threat in the environment.

Facing a high threat of disease, people tend to become more xenophobic, and this tendency is well documented in the psychological research literature (Faulkner et al., 2004). However, the present research is the first set of studies that distinguishes between psychological and pragmatic responses. Moreover, this research adds to the rich body of literature on psychological responses to pathogens by testing the role of individual difference in acutely experienced vulnerability to a specific real disease (vs. general perceived vulnerability to disease; Duncan et al., 2009). When we do so, an interesting picture emerges. The increase in xenophobic thoughts was relatively mild. As a matter of fact, in Study 2, the level of group-serving bias did not differ between when the threat of COVID-19 was low and when it was high. And yet, people's willingness to support restrictive travel policies was considerably higher when the threat was high. That is, when facing such a threat, even individuals who held relatively low xenophobic beliefs were willing to support policies restricting the entry and mobility of targeted others, *despite* their beliefs.

The consistency (and inconsistency) between xenophobic thoughts and actions raises two additional points to discuss. First, the motivation for psychological (in)consistency is neither inherently desirable nor problematic. However, in this particular case of disease threat and xenophobia, it is alarming that when people felt that they were highly vulnerable, even those who held low xenophobic thoughts became willing to endorse ineffective and potentially discriminatory ingroup-protective policies when the majority of cases in the United States were occurring because of community transmission.

Table 8. Multiple Regression From the Mediated Moderation Model Examining Whether Perceived Risk to COVID-19 Mediates the Effect of Time on the Association Between Group-Serving Bias and Support for Restrictive Policies in Combined Study 2.

	Model 1 Criterion: Perceived risk				Model 2 Criterion: Restrictive policy support			
	Model 1A: *Without covariates*		Model 1B: *With covariates*		Model 2A: *Without covariates*		Model 2B: *With covariates*	
Variable	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Intercept	−0.510	0.026	−0.370	0.101	2.420	0.017	2.040	0.059
Ethnicity			0.116*	0.046			0.002	0.026
Age			−0.002	0.002			0.005***	0.001
Gender			0.124**	0.038			0.124***	0.022
Education			0.009	0.016			−0.025**	0.009
Income			−0.002	0.006			0.008*	0.004
Political ideology			−0.070***	0.017			0.073***	0.011
Group-serving bias					0.173***	0.020	0.126***	0.021
Time	1.057***	0.038	1.052***	0.038	0.090***	0.026	0.079**	0.026
Group-serving bias × time					−0.053†	0.031	−0.053†	0.030
Perceived risk					0.148***	0.013	0.157***	0.013
Group-serving bias × perceived risk					−0.054***	0.015	−0.047**	0.015

Note. Unstandardized coefficients shown; Gender was dummy-coded (0 = *male*, 1 = *female*); Ethnicity was dummy-coded (0 = *White*, 1 = *non-White*); Time was dummy-coded (0 = *low-threat period*, 1 = *high-threat period*).
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

At the same time, it may be possible to use this knowledge to foster desirable behavioral changes. The present studies indicate that restrictive policy support is *not necessarily* accompanied by more problematic and counterproductive negative feelings toward outgroup members. People in Western cultures often infer corresponding attitudes from others' behaviors (Jones, 1979). However, specific policy support is influenced by other factors beyond individuals' personal beliefs, such as norms and situational framing (Eom et al., 2018; Van Boven et al., 2018). Adding to this body of literature, the current results show that when the need is great, people may be willing to overcome their existing beliefs and values to support a policy solution for societal problems, and this may have implications for other areas that require policy solutions, such as climate change. The current findings suggest that at least some of the oft-observed xenophobic actions, or support for such actions, may not be deeply rooted in personal conviction. Thus, these problematic xenophobic tendencies may be avoidable if compelling and genuinely effective problem-solving policies are presented.

Finally, the present research introduces a novel theoretical moderator of attitude–behavior consistency. Many reviews of attitude–behavior consistency (e.g., Ajzen et al., 2019; Glasman & Albarracin, 2006) have focused on factors such as attitude accessibility (Fazio & Williams, 1986) as moderators of the link between attitudes and behavior, finding that attitudes that are more accessible are more predictive of behavior. The present research is interesting to consider in that context, as it suggests that intergroup attitudes may have been less accessible for people who are experiencing heightened threat. Attitude accessibility, then, may be an important variable to consider in future examinations of the role of vulnerability in the link between thoughts and actions—it may be that when threat is extremely high, people's attitudes toward outgroups are less accessible and, potentially, that their feelings of vulnerability become more accessible. The present research adds vulnerability to a list of potential moderators of the link between beliefs and actions, such as cultural values, religiosity, and SES (Eom et al., 2019).

Limitations and Future Questions

There are some limitations in the present study. First, the outcome variables were indicators of support for policy (willingness to sign petitions) and not actual behaviors. Policy support is a meaningful dependent variable, given the nature of the threat. Nevertheless, research should examine the generalizability of the current findings in different threat contexts and look at more concrete actions such as voting or discriminatory behaviors. Second, the studies are nonexperimental. The difference in how much individuals subjectively feel vulnerable to a particular disease may reflect other third-factor variables. To reduce this concern, Study 2 included a comparison of two time points. This quasi-experimental analysis, while still non-experimental, reduces concern that the current results are driven by person confounds. Although there are experimental methods to manipulate the level of the psychological experience of vulnerability, such as priming the salience of pathogens, the opportunity to investigate the role of an emerging and potentially severe disease threat is

(we hope) rare. Thus, we argue that the current set of studies provide an ecologically valid analysis of the phenomenon.

Third, this study examines only Americans' responses, and thus, another limitation is that it cannot directly speak to responses of other countries' to COVID-19. However, there are similar dissociations between values/ideology and policy support occurring, at least, in other Western countries (e.g., discussions of policies that seemingly contradict national values, such as the value of privacy and governmental use of contact tracing in Europe). Beyond questions of generalizability, cultural differences in psychological (in)consistency merit further discussion.

In fact, the temporal differences found in the study may guide the understanding of geographical sociocultural differences. Sociocultural analyses of psychology have identified patterns of cultural differences that mirror the present findings. Certain sociocultural environments are characterized by the chronic presence of threats. Collectivism has been theorized to be a cultural response to the high prevalence of disease threat in a given environment (Fincher et al., 2008). In more collectivistic cultures, individuals' beliefs predict choices and policy support less strongly than in less collectivistic cultures (Savani et al., 2008).

Another sociocultural factor, SES, has a similar influence. Scarcity of resources, a defining characteristic of social class (Kraus et al., 2011), is also a form of threat. The beliefs of lower SES individuals do not predict their actions and policy support as strongly as they do for higher SES individuals (Eom et al., 2018). Analogous findings between the current research and these sociocultural psychological studies suggest that temporal and historical differences are sociocultural differences.

Finally, our findings may seem contradictory to some existing findings, such as the effect of vested interest on increasing attitude-behavior consistency (Sivacek & Crano, 1982) and other theories that emphasize the motive for cognitive consistency (Aronson, 1999; Gawronski, 2012). One potential reason is that the present research captured psychological responses to an acute and massive threat. It is possible that people change their support for actions more quickly than their attitudes in such situations. That is, when people face an acute threat, they may support actions that appear protective without changing their beliefs at first, but as they continue to support such actions, they may gradually change their beliefs to restore psychological consistency. A long-term follow-up study could be fruitful.

Conclusion

Societal threats, such as disease, scarcity, and social instability, are ecological factors that underlie diversity in human psychology. Leveraging an unusually great shared threat and rapid temporal change, the present research suggests how a sense of vulnerability, either as an individual difference factor or as a shared response to contextual threat, may lead individuals to support collective actions that could be inconsistent with their thoughts. This serves as a reminder of a classic lesson from social psychology: How "good" people may engage in problematic acts if a situation compels them to do so. However, the research also shows that changing individuals' support for collective actions may be considerably easier than changing their thoughts and values when the contextual and psychological needs are great. This understanding may be useful to promote societally desirable actions. The current studies present slices of very specific historical moments and demonstrate how rapidly psychological processes can change in response to social conditions, giving reason to both despair and hope.

Acknowledgments

We would like to thank Cheryl Wakslak and members of UCSB Culture Lab for commenting on earlier versions of this article.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was supported by National Science Foundation Award #BCS-1823824.

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Supplemental Material

Supplemental material is available online with this article.

Notes

1. In all studies, we ran the main model with self-risk and group-risk measures separately. The results are highly consistent in terms of both the pattern of findings and statistical significance. We speculate that the scope of threat (i.e., epidemic and pandemic) leads individuals to think of personal risk as a part of the collective risk.
2. Additional analyses in which each of these three components are treated separately show consistent and significant patterns across targets that vary in connection to the threat. However, the model using ethnocentrism was not significant (see Online Supplemental Materials for full results).
3. We report the other contrasts—the association between perceived risk and support for policies at high and low levels of bias—of all studies in the Online Supplemental Materials.
4. Although the virus was described in terms commonly expressed at the time, we also recognize the problematic aspects of using a region to label a viral disease (for discussion see Su et al., 2020).

5. Additional analyses that examined these three components separately show consistent patterns across the three measures, but the model using prejudice toward Chinese was marginally significant and ethnocentrism was not significant (see Online Supplemental Materials).
6. Additional analyses in which each of these three components were treated separately show a consistent pattern, but the model using prejudice toward both out groups was not significant (see Online Supplemental Materials).

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