Fear of Ebola:

The Influence of Collectivism on Xenophobic Threat Responses

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Abstract

In response to the Ebola scare in 2014, many people evinced strong fear and xenophobia. The present study, informed by the pathogen prevalence hypothesis, tested the influence of individualism and collectivism on xenophobic response to the threat of Ebola. A nationally representative sample of 1,000 Americans completed a survey and indicated their vulnerability to Ebola, efficacy to protect oneself from Ebola, and xenophobic tendencies. Overall, the more vulnerable people felt, the more they exhibited xenophobic responses, but this relationship was moderated by individualism and collectivism. People who were high in individualism and low in collectivism exhibited stronger xenophobic reactions than their counterparts when they felt more vulnerable to Ebola. This relationship was mediated by efficacy to protect oneself. State-level collectivism and individual-level value orientation yielded analogous results. Collectivism—and the set of practices and rituals associated with collectivistic cultures—may serve as psychological protection against the threat of disease.
Ebola and Cultural Values

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“Health officials leading the fight against Ebola in Sierra Leone say fear, fatigue and denial are allowing the virus to continue to spread (BBC, 2015).”

In July 2015, less than a year after the Ebola outbreak in Western Africa, officials in Sierra Leone described the role of psychological factors in preventing eradication of the disease. For both those on the front lines of the Ebola outbreak in West Africa as well as those in low-risk areas such as the United States, news of the outbreak, accompanied by truly gruesome images, sowed much fear, xenophobia, and social division. With the progress of globalization and the increasing interconnectedness of human populations, infectious diseases such as Ebola are increasingly likely to emerge (Institute of Medicine, 2009), prompting need to understand how people respond psychologically and behaviorally to the fear of disease.

Although it makes obvious sense to increase vigilance and engage in self-protective health behaviors when facing such potential health risks, most health experts maintained that outside of the directly affected regions in West Africa, the actual risk of contracting Ebola was extremely low (CDC, 2014a). Nonetheless, the degree to which people responded to the news was vastly disproportionate to the actual risk. In less impacted parts of the world, the cost of Ebola was not the disease itself, but the negative psychological and behavioral effects to individuals and society incited by fear.

Risks from the environment are omnipresent for all living organisms; thus, psychological research has extensively investigated the threat responses to both social and nonsocial kinds of
risks. People have predictable threat responses, including psychological defensiveness (Howell & Shepperd, 2012; Maddux & Rogers, 1983; Sherman, Nelson, & Steele, 2000) and xenophobic tendencies (Faulkner, Schaller, Park, & Duncan, 2004; Murray, Schaller, & Suedfeld, 2013; Navarette & Fessler, 2006). However, not everyone responds in the same manner, and psychological factors, such as the personal relevance of a health risk (Liberman & Chaiken, 1992) and self-esteem (Harmon-Jones et al., 1997) shape people’s threat responses.

In this paper, we examine how individualistic–collectivistic orientation moderates xenophobic responses to perceived vulnerability from Ebola. Collectivism is a cultural orientation in which individuals’ needs are prioritized over those of the group, and individualism is a cultural orientation in which individuals’ needs are subordinated to those of the group (Triandis, 1989). We examine this moderator as both an individual difference factor and a socio-cultural factor (i.e., state-level collectivism; Vandello & Cohen, 1999).

The present work builds on the pathogen prevalence hypothesis that addresses the link between collectivism and disease threat. It posits that people who live in regions where pathogens are prevalent show increased collectivistic, group-protective behaviors. In high pathogen prevalence regions, there is greater conformity and xenophobia, a fear or hatred of strangers and foreigners, manifested in avoidance of social or romantic interactions with outgroup members, and adherence to cultural traditions, such as food preparation or hygiene rituals (Faulkner et al., 2004; Murray et al., 2013; Murray, Trudeau, & Schaller, 2011; for review, see Schaller, Murray, & Bangerter, 2015). These group-protective practices associated with collectivism are theorized to protect people in a community from the introduction of foreign pathogens and disease transmission (Falkner et al., 2004; Murray et al., 2011).
These studies primarily examine collectivistic tendencies as outcomes from risks of diseases. In the present research, we investigate how collectivism, once established, influences individuals’ responses to disease risks. Given that xenophobic behaviors characterize collectivists’ normative behavioral pattern, it may seem intuitive to expect that collectivists would respond to acute vulnerability to deadly disease with particularly strong xenophobia. However, it is also possible that collectivism may serve as a psychological buffer against disease threats. Because collectivism offers a behavioral mechanism to cope with potential risks of foreign pathogens, when people feel more vulnerable to diseases like Ebola, collectivists may feel that they and their group possess greater ability to protect themselves than non-collectivists. Collectivistic orientations may fulfill psychological needs for control that arose in response to perceived disease risks. According to this idea of collectivism serving as a buffer, although collectivism is typically associated with group protective xenophobic behaviors (Faulkner et al., 2004), collectivism may paradoxically reduce xenophobic reactivity to perceived vulnerability, and weaken the association between the extent to which people perceive themselves as unable to protect themselves from threatening diseases and the extent to which they exhibit xenophobia towards outsiders. By contrast, individualists tend to alienate themselves from their group by highlighting their uniqueness and separateness from others (Kim & Markus, 1999; Triandis & Gelfand, 1994). Thus, people with individualistic orientations may lack such a psychological buffer, and when they feel highly vulnerable to disease, respond with greater increase in xenophobia than less individualistic people, because individualism does not equip them with the same group-protection efficacy.

The Ebola outbreak in 2014 offered a unique opportunity to develop and test a model linking cultural orientation and perceived vulnerability for disease with defensive responses.
First, Ebola was a risk that evoked intense fear and threat responses around the world, and public awareness was spread fairly evenly across the United States as a result of the worldwide media attention (Kumparak, 2014). Second, the Ebola outbreak had a relatively clear origin and consequently was viewed, for Americans, as a danger emanating from foreign origin (CDC, 2014a), allowing people self-justification for xenophobic responses, such as imposing travel bans to limit the behaviors of out-group members.

We draw on health psychological theory to formulate a theoretical model of psychological responses to Ebola. According to protection motivation theory (Rogers & Prentice-Dunn, 1997), which builds upon stress appraisal theory (Lazarus & Folkman, 1984), the threat of a health risk depends on a number of psychological factors, including one’s perceived vulnerability to risk and efficacy in the ability to cope with the risk. Following this theorizing, we measured individuals’ perceived vulnerability to Ebola risk and their protection efficacy—their belief that they and their groups could protect themselves from Ebola. Applying this theory to the current work, when people perceive high vulnerability of Ebola but feel lower efficacy to protect themselves from it, they would experience psychological threat. Collectivism, then, may promote the sense of efficacy to protect one’s self from Ebola, and thus, we consider protection efficacy as a mediator to account for xenophobic reactions to perceived vulnerability to Ebola.

We operationalized cultural orientation in two ways to investigate the independent influence of individualism and collectivism at both the individual and the group levels. First, we investigated how individual level collectivism and individualism as assessed by self-report on scales (Oyserman, Coon, & Kemmelmeier, 2002) impact the relationship between perceived vulnerability of Ebola and xenophobia. Although the pathogen prevalence hypothesis centers on group-level protection, the buffering influence of collectivism could extend to individually held
collectivism orientation. People often overestimate how much those around themselves share their beliefs and values (Ross, Greene, & House, 1977). This false-consensus effect has been used to explain cultural consensus (Triandis, 1996). Thus, collectivists may assume others around themselves also engage in similar group protective behaviors, independently of the actual tendencies of the community. It was predicted that everyone, regardless of collectivism and individualism, would show a positive association between perceived vulnerability of Ebola and xenophobic tendency, but this positive association would be attenuated for those with high collectivism and for those with low individualism. It was also predicted that this relationship would be mediated by protection efficacy.

Second, we tested how the level of collectivism in one’s cultural context moderates the relationship between vulnerability and xenophobia. Participation and engagement in a local cultural context profoundly impacts how people feel, think, and behave, independent of individuals’ values and beliefs (Kitayama, 2002). In terms of responses to the risks of contagious diseases, the pathogen prevalence hypothesis leads to the prediction that one’s susceptibility to infection is affected not only by one’s own behavior, but also by the behavior of others in the community. Therefore, psychological protection against infection may be offered— independently of one’s own orientation—by being surrounded by other people who ascribe to collectivism and conform to traditions designed to protect the ingroup, similar to the notion of herd immunity (Murray et al., 2011). Living in a collectivistic cultural context in which others engage in group-protective behaviors may provide psychological herd protection.

We operationalized cultural context as the US state in which participants resided. Each US state varies in its level of collectivism (Vandello & Cohen, 1999), and it was predicted that people residing in states with higher levels of collectivism should exhibit less pronounced
xenophobia reactions to higher perceived vulnerability of Ebola than people residing in states with lower levels of collectivism. These predictions are tested with a nationally representative sample of US residents during a heightened period of concern about Ebola, December 2014 (BBC, 2014).

**Method**

*Creation of Representative National Sample.* The commercial public survey research firm, YouGov (YouGov, 2015), was employed to construct a sample stratified to reflect US general population characteristics from their large pool of opt-in participants during a two-week period (December 11–23, 2014). Sample size was set a priori at $N = 1000$. YouGov interviewed 1,134 respondents who were then matched down to a sample of 1,000 to produce the final dataset to reflect US population characteristics. YouGov matched respondents to a sampling frame on gender, age, race, education, region, political ideology, and political interest, constructed by stratified sampling from the full 2010 American Community Survey (US Census Bureau, 2014; see Supplemental Online Material (SOM) for sample description.)

*Procedure*

Participants indicated their consent to complete an on-line survey on “Public Perception of Ebola.” The questionnaires they completed appeared in the following order (other measures included in the survey are described in SOM).

*Individualism/Collectivism.* The individualism/collectivism items were adapted from Oyserman et al. (2002; see also Oyserman & Lauffer, 2002; Triandis & Gelfand, 1998). Participants responded on a 7-point scale anchored at 1 (Strongly Disagree) and 7 (Strongly Agree) how much they agreed or disagreed with fourteen statements. Six statements were drawn from scales assessing individualism ($\alpha = 0.76$; e.g., “It is better for me to follow my own ideas...
than to follow those of anyone else.”) Eight statements were drawn from scales assessing
collectivism (\(\alpha = 0.81\); e.g., “Learning about the traditions, customs, values, and beliefs of my
family is important to me”).

*Ebola Information.* To ensure that they were similarly informed about the disease, we
presented participants a passage about basic information on Ebola, adapted from the Centers for
Disease Control and Prevention (CDC, 2014b) web page. The passage provided neutral, factual
information about Ebola and described symptoms, cause, and history of the disease.

*Perceived Vulnerability to Ebola Risk.* Nine questions were adapted from the Perceived
Risk of HIV Scale (Napper, Fisher, & Reynolds, 2012), a scale specifically designed to measure
perceived risk of a contagious disease, and made relevant to Ebola. Three sets of three items
assessed perceptions of personal risk (e.g., “I feel vulnerable to Ebola infection”), perceptions of
local community risk (e.g., “I feel that people in my local community are vulnerable to Ebola
infection”), and perceptions of risk to country (e.g., “I feel that my country is vulnerable to
outbreak of Ebola”), \(\alpha = 0.92\). All items were completed on 5-point scales with higher numbers
indicating greater vulnerability.

*Perceived Protection Efficacy from Ebola.* Participants responded to six items: two items
assessing perceived personal protection efficacy (e.g., “I feel confident that I can protect myself
from Ebola”), two items assessing community protection efficacy (e.g., “I feel confident that my
local community can protect itself from Ebola”), and two items assessing country protection
efficacy (e.g., “I feel confident that my country can protect itself from Ebola”), \(\alpha = 0.82\). All
items were completed on 7-point scales anchored at 1 (Strongly Disagree) and 7 (Strongly
Agree).

* We included these different levels to explore the possibility of personal or group level concerns functioning
differently. However, there was no difference among them. The fact that they cohere so strongly together
underscores the inherently collective nature of Ebola risk.
Xenophobia. Xenophobia was assessed with four indicators. Two indicators assessed outcomes directly related to Ebola: prejudice toward West Africans, and support for restrictive travel policies. The other two indicators assessed more generalized xenophobic tendencies: prejudice toward undocumented immigrants, and ethnocentrism. To assess the prejudice toward West Africans and undocumented immigrants, participants rated their feelings (e.g., fear and acceptance; 6 items, 3 positive and 3 negative) toward the groups on scales ranging from 0 (“I do not feel this emotion at all”) to 7 (“I feel this emotion strongly”; Stephan, Ybarra, Martinez, Schwarzwald, & Tur-Kaspa, 1998); prejudice was the average of the negative minus positive items; higher scores indicated greater negativity ($\alpha \geq 0.83$ for composites based on target groups and valence). Participants then indicated their support for five policies related to Ebola, such as a travel ban (see SOM Table S1 for all items). Participants were given three choices: 1) “No I would not sign the petition”; 2) “I support the policy, but do not wish to sign the petition”; or 3) “Yes, I would sign the petition in support of the policy” that formed the measure of policy support ($\alpha = 0.91$), with higher numbers indicating more support for restrictive travel policies. Ethnocentrism was assessed with two items ($r = 0.50$) from the American Ethnocentrism Scale (e.g., “People in the United States could learn a lot from people from other countries”; Neuliep & McCroskey, 1997) anchored at 1 (Strongly Disagree) to 7 (Strongly Agree) (reverse coded).

Demographics. Having already completed most basic measures through YouGov, participants completed a limited number of demographic measures. Ideology was assessed on a 5-point scale from 1 (Very Liberal) to 5 (Very Conservative). Participants could also indicate

† The scale included two additional items on positive evaluation of the U.S. (e.g., “Life in the United States is much better than most other places”), but the model fit was poor when the factor included this component; thus, the latent factor included only items on evaluation of other countries.
Not Sure (N = 91); rather than dropping such participants, we assigned them a 3 (Moderate) score for analytical purposes.‡

State-Level Variables. We used the collectivism index score from Vandello and Cohen (1999; for other research using this index, see Allik & Realo, 2004; Harrington & Gelfand, 2014). Vandello and Cohen created an 8-item index score based on concrete state-level behavioral indicators of collectivism (e.g., percentages of people living alone, and households with grandchildren in them). The index score ranges from 31 (Montana) to 91 (Hawaii). We assigned index scores based on participants’ states of permanent residence. This index is unidimensional and does not have an individualism counterpart.

Results

Using prejudice against West Africans, prejudice against undocumented immigrants, American ethnocentrism, and policy support for out-group exclusion, we created a latent variable of xenophobic tendency using exploratory and confirmatory factor analyses (see SOM for description of construction of latent variable).

Analyses with Collectivism and Individualism at the Individual Level

Individualism and collectivism measured at the individual level are theorized to be orthogonal (Singelis, 1994). In the present dataset, individualism and collectivism were positively correlated ($r = .33$), and thus, simultaneously entered as separate factors. Because collectivism has been associated with political conservatism, and individualism with political liberalism (Haidt, 2012; Talhelm et al., 2015), political conservatism was included as a covariate.

‡ Seven people indicated they had traveled to West Africa and 32 indicated they had friends or family who had traveled to West Africa; excluding their data did not change the pattern of results.
We first examined the relationship between individualism, collectivism, and perceived vulnerability to Ebola. We conducted a multiple regression analysis where the dependent variable was the vulnerability composite, and the two predictors were individualism and collectivism. Collectivism was associated with more perceived vulnerability ($\beta = 0.30$, $b = 0.22$, 95% Confidence Interval (CI) for $b$: [0.18, 0.27], $p < 0.001$) whereas, individualism was associated with less perceived vulnerability ($\beta = -0.07$, $b = -0.06$, 95% CI: [-0.002, -0.11], $p = 0.04$).

To test the main hypothesis, we then ran a Structural Equation Model (SEM) with collectivism, individualism, perceived vulnerability, and the interactions of perceived vulnerability with collectivism and individualism as predictors, and the xenophobia latent variable as the outcome. First, we report the role of collectivism. There was no significant main effect of collectivism on xenophobia ($\beta = -0.05$, $b = -0.06$, 95% CI: [-0.14, 0.02], $p = 0.12$).

There was a main effect of perceived vulnerability such that greater perceived vulnerability predicted greater xenophobia ($\beta = 0.27$, $b = 0.44$, 95% CI: [0.34, 0.54], $p < 0.001$), consistent with the pathogen prevalence hypothesis. However, collectivism moderated this main effect, as indicated by a significant interaction between collectivism and perceived vulnerability on xenophobia ($\beta = -0.09$, $b = -0.12$, 95% CI: [-0.20, -0.03], $p = .007$; see Figure 1a). At low levels of collectivism (-1 SD), greater perceptions of vulnerability predicted greater xenophobia ($\beta = 0.34$, $b = 0.47$, 95% CI: [0.39, 0.55], $p < 0.001$). However, among those high in collectivism (+1 SD), the relationship between perceived vulnerability and xenophobia was attenuated ($\beta = 0.20$, $b$
= 0.27, 95% CI: [0.21, 0.34], p < 0.001). As Figure 1a illustrates, examining the estimated means at high levels of perceived vulnerability (+1 SD) indicates that those high in collectivism showed significantly lower levels of xenophobia ($M = .19$, $SD = .04$, 95% CI: [.12, .27]) than those low in collectivism ($M = .45$, $SD = .05$, 95% CI: [.35, .56]), $t = -3.98$, $p < .001$.

Figure 1a. Interaction between perceived vulnerability and collectivism (individual level) on xenophobia, taken from SEM analysis.

Next, we report the role of individualism. There was a main effect of individualism ($\beta = -.08$, $b = -.12$, 95% CI: [-.21, -.03], $p = .01$) such that lower individualism was associated with greater xenophobia. However, this main effect was qualified by a significant interaction between individualism and perceived vulnerability ($\beta = .06$, $b = 0.10$, 95% CI: [0.002, 0.20], $p = 0.046$).

Mirroring the results from collectivism, among those high in individualism (+1 SD), greater perceptions of vulnerability predicted greater xenophobia ($\beta = .32$, $b = 0.44$, 95% CI: [0.36, 0.47]).

** For the description of analyses confirming the linear relationship, see supplemental materials.
0.51], \( p < 0.001 \)). Among those low in individualism (-1 SD), the relationship between perceived vulnerability and xenophobia was attenuated (\( \beta = .22, b = 0.30, 95\% \text{ CI} : [0.23, 0.37], p < 0.001 \); see Figure 1b). Examining the estimated means indicates that among those low in perceived vulnerability (-1 SD), those low in individualism showed significantly greater xenophobia (\( M = -0.13, SD = .04, 95\% \text{ CI} [-.23, -.05] \)) than those high in individualism (\( M = -.43, SD = .04, 95\% \text{ CI} [-.51, -.35] \)), \( t=4.66, p < .001 \). As Figure 1b indicates, the main effect of individualism on xenophobia is driven by people who perceive low vulnerability. Among those who perceive high vulnerability, people who are high in individualism are just as xenophobic as people low in individualism. Although high individualists are less xenophobic by default (i.e., when perceived vulnerability is low), they respond to increased perception of vulnerability with greater increase in xenophobic tendencies than low individualists.

Figure 1b. Interaction between perceived vulnerability and individualism (individual level) on xenophobia, taken from SEM analysis.
Next, we tested whether the effects of 1) the perceived vulnerability and collectivism interaction and 2) the perceived vulnerability and individualism interaction on xenophobia were mediated by protection efficacy. A confirmatory factor analysis of the items measuring perceived vulnerability to Ebola and protection efficacy supported the distinction of them as two factors (see SOM).

**Figure 2.** SEM examining whether the interactions between perceived vulnerability and cultural orientations on xenophobic tendencies are mediated by protection efficacy. Note that three theoretically-justified paths were added to improve overall model fit: a path predicting restrictive policy support directly from perceived vulnerability, a path predicting prejudice to West Africans directly from political ideology, and correlated errors between prejudice to immigrants and restrictive policy support. Values are standardized path coefficients, and black bold lines are significant $p < .01$, grey lines are non-significant, $p > .05$.

We conducted a SEM (see Figure 2), which provided a generally acceptable fit to the model ($\text{CFI} = 0.94$; $\text{RMSEA} = 0.07$; $\chi^2(21) = 130.68$; $\text{SRMR} = 0.04$). In this model, lower perceptions of protection efficacy predicted greater levels of xenophobia ($\beta = -0.15$, $b = -0.15$, $95\% \text{ CI} : [-0.23, -0.08]$, $p < 0.001$). This model allowed an examination of the extent to which the
total effect of perceived vulnerability and its interactions with collectivism and individualism on xenophobia were explained by decreased protection efficacy. In this model, perceived vulnerability and its interactions predicted xenophobia via two paths: one direct, and the other indirectly mediated through protection efficacy. The total effect (direct plus indirect) of perceived vulnerability and its interaction with collectivism was $\beta = -0.10, b = -0.12, 95\% \text{ CI: } [-0.20, -0.04], p = 0.004$. The indirect mediated path through protection efficacy significantly predicted xenophobia ($\beta = -0.02, b = -0.03, 95\% \text{ CI: } [-0.05, -0.01], p = 0.001$) and the direct path was also significant ($\beta = -0.07, b = -0.09, 95\% \text{ CI: } [-0.17, 0.01], p = 0.032$). Thus, the joint influence of perceived vulnerability and collectivism on xenophobia was partially mediated by protection efficacy. The total effect of perceived vulnerability and its interaction with individualism was significant ($\beta = 0.07, b = 0.10, 95\% \text{ CI: } [0.03, 0.20], p = 0.044$). However, the indirect path mediated by protection efficacy was significant ($\beta = 0.02, b = 0.02, 95\% \text{ CI: } [0.01, 0.04], p = 0.006$), and the direct path was not significant ($\beta = 0.05, b = 0.08, 95\% \text{ CI: } [-0.02, 0.17], p = 0.13$). Thus, the overall joint influence of perceived vulnerability and individualism on xenophobia in this model including protection efficacy was significant, and this influence was significantly mediated by protection efficacy (for alternative mediational models, see SOM).

In summary, at the individual level, both high individualism and low collectivism independently served as aggravating factors in driving xenophobic tendency when people perceived high vulnerability to Ebola. Moreover, this moderation was mediated by lower protection efficacy, suggesting that xenophobia is a response of people who perceive relatively low ability to protect themselves from the threat of contagious disease.

Analyses with the State Level Collectivism Index.

We next leveraged the large national sample, and operationalized cultural context as the
particular state that participants resided in. We conducted analyses paralleling those of collectivism at the individual level, but with state-level scores of collectivism entered into the model as well as individual-level collectivism scores. In these models participants were nested within states, so we report standard errors and significance tests that adjust for the clustering of participants within states. Our first model predicted xenophobia from the interaction between perceived vulnerability and the Collectivism Index Score of one’s state of residence. As in earlier models predicting xenophobia, we included political ideology as a covariate. There was no significant main effect between Collectivism Index Score and xenophobia ($\beta = -0.01$, $b = -0.002$, 95% CI: [-0.001, 0.001], $p = 0.63$. Similar to prior analyses, increased perceived vulnerability predicted increased xenophobia ($\beta = 0.28$, $b = 0.09$, 95% CI: [0.06, 0.11], $p < 0.001$). This relationship was moderated by the Collectivism Index Score $\beta = -0.08$, $b = -0.003$, 95% CI: [-0.004, -0.002], $p = 0.027$). People from states with low collectivism scores (-1 SD) showed a stronger relationship between perceived vulnerability and xenophobia ($\beta = 0.36$, $b = 0.44$, 95% CI: [0.36, 0.52], $p < 0.001$) than people from states with high collectivism scores (+1 SD; $\beta = 0.20$, $b = 0.31$, 95% CI: [0.24, 0.39], $p < 0.001$). At the state level, low collectivism amplified the impact of perceived vulnerability on xenophobic tendencies, controlling for individual-level collectivism.

In summary, collectivism at the state level moderated xenophobic responses to Ebola risk. This analysis not only validates the Vandello and Cohen (1999) index of state-level collectivism by providing analogous results as an individual-level collectivism index, but also provides support for the idea that a collectivistic context in which others engage in group-protective behaviors can provide something akin to psychological herd protection. Finally, given that the influence of state-level collectivism was above and beyond individual-level collectivism,
this pattern demonstrates the independent influences of individual-level and collective state-level cultural orientation in shaping psychological responses to the threat of Ebola.

Discussion

People who perceive themselves to be more vulnerable to Ebola are more xenophobic, not only toward issues directly relevant to the Ebola threat, but also in more generalized forms. More importantly, although perceived vulnerability uniformly is associated with increased xenophobia, the association was weaker among high collectivists. These results showed that collectivism predicted lower psychological reactivity to perceived vulnerability. We found support for the prediction that low collectivism (and high individualism) would amplify self-defensive reactions thusly: when those with less collectivistic or more individualistic orientations perceived a greater vulnerability to Ebola, they reported lower sense of efficacy to protect themselves from the risk and exhibited relatively high xenophobic tendencies, compared with their counterparts. The same pattern of results emerged with both individual differences in cultural orientation, and state-level cultural orientation. Although the results are correlational and usual caveats about causal inference apply, being in a more collectivistic context—regardless of an individual’s level of collectivism—may afford psychological protection from the threat of Ebola, and attenuate xenophobia among those who perceive high vulnerability to the disease.

It is also intriguing that although high collectivism and low individualism appeared to function similarly, there was a subtle difference in where the variance of cultural orientation is manifested. The difference in high and low collectivism emerged when perceived vulnerability is high, whereas the difference in high and low individualism emerged when perceived vulnerability is low. This is consistent with the idea that collectivism is a response mechanism to disease vulnerability (Fincher, Thornhill, Murray, & Schaller, 2008), and thus, its functionality
becomes clearer in the face of disease vulnerability. However, individualism may be afforded by a lack of such vulnerability. The typical association between individualism and low xenophobia is found only when there is low perceived vulnerability, but when vulnerability increases, high individualists become just as xenophobic as low individualists.

Although it was not a central part of the model, high collectivism was associated with a greater perceived vulnerability to Ebola. One possible reason for this relationship is that people respond to perceived vulnerability by becoming more collectivistic, consistent with the pathogen prevalence hypothesis (Fincher et al., 2008). However, given the state-level analyses, where collectivism index was assessed prior to the outbreak of Ebola, it is unlikely that collectivism is entirely a response to perceived vulnerability to Ebola. However, future research that manipulated perceptions of vulnerability would strengthen the causal claims of the model.

The present findings suggest there are at least two ways in which cultural value orientation influences the psychological functioning of individuals. One is through the values and beliefs people develop through personal upbringing and experiences, and the primary focus of psychology. However, an independent source of influence may impact individuals’ psychology and behavior: engagement in local socio-cultural contexts that have their own cultural orientation can influence individuals’ responses to social information. As such, the collectivism index (Vandallo & Cohen, 1999) is based on concrete behavioral indicators of collectivism, rather than values. Thus, the index is likely to capture the typical social structure of each state that gives rise to high or low collectivism orientations. Our study provides further support to the idea of collective construction of psychology (Kim & Markus, 1999).

By considering cultural orientation as a moderator, the present study highlights the underlying psychological mechanism of defensive threat responses. People who are most
psychologically vulnerable to a focal stressor typically show the most pronounced threat response, exhibiting, for example, the greatest sympathetic nervous system activation when confronting relevant stressors (Sherman, Bunyan, Creswell, & Jaremka, 2009). In the present study, those who were most psychologically isolated from others—the people with relatively less collectivistic and more individualistic orientation—showed the strongest xenophobic reactivity to the threat of Ebola. The sense of belongingness and social connection that collectivism provides—along with the rituals and practices that have evolved to protect against infectious diseases (Murray et al., 2011)—may serve as a buffer against risks people often face and provide a foundation for resilience. This information suggests that one way to reduce counterproductive defensiveness and overreactions in situations involving contagious disease may be to afford people the opportunity to affirm themselves (Sherman & Cohen, 2006). In other words, the threat of isolation may be best countered by affirmations that remind people of their belonging (Shnabel, Purdie-Vaughns, Cook, Garcia, & Cohen, 2013) and help them maintain connections with others (Burson, Crocker, & Mischkowski, 2012).

Although there are many distinctive features that make the case of Ebola unique, the knowledge gained from the current research may be generalized to other cases involving high-profile diseases. For example, within the past decade many parts of the world showed similar panic responses over Swine Flu, the West Nile virus outbreak, SARS, MERS, and the Zika virus. Although the actual risk varies greatly by region, the potential for fear to exacerbate the disaster exists in all areas of the world (Nossiter, 2014).

In a column in the New York Times during the height of the Ebola panic, David Brooks (2014) noted the relationship between the individualistic culture of the United States and its response to Ebola: “Fear isn’t only a function of risk; it’s a function of isolation. We live in a
society almost perfectly suited for contagions of hysteria and overreaction.” The present research shows that the fear and resulting xenophobia such diseases may elicit are perhaps “a function of isolation” (Brooks, 2014) heightened by individualistic thinking without collectivistic connections. Brooks’s (2014) commentary about fear as a function of isolation turns out to be more accurate than possibly even he had imagined. Psychological isolation, one condition of an individualistic way of life, indeed worsens the fear of risks that humans have faced and will continue to face. Perhaps one antidote to such “contagions of hysteria and overreaction” (Brooks, 2014) is a dose of belonging and a sense of connection.
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Supplemental Online Material


Creation of Representative National Sample. As noted in main text, YouGov matched respondents to a sampling frame on gender, age, race, education, region, political ideology, and political interest, constructed by stratified sampling from the full 2010 American Community Survey (US Census Bureau, 2014). The process used weighted sampling with replacements (using the person weights on the public use file). Voter registration status and turnout were matched to this frame using the November 2010 Current Population Survey (US Census Bureau, 2010) and political interest and party identification were matched to the frame from the 2007 Pew Religious Life Survey (Pew Research Center, 2008). Participants were given points within the YouGov system to complete the study. The median time to complete the survey was approximately 15 minutes.

Sample Description. The sample was 52.1% female, 47.9% male. In terms of ethnicity, the sample was 70.3% White, 11.1% Black, 9.7% Hispanic, 4.8% Asian, and 4.1% other. Ages ranged from 18 to 90, with an average age of 46.46 (SD = 17.05). In terms of education, 6.3% had not completed high school, 37.6% had completed high school, 47.5% had some college or completed college, and 8.6% had post-graduate education. Median family income was in the $40,000-$49,000 range. Of participants, 33.1% resided in the Southern United States, 25.8% in the Western United States, 22.2% in the Midwestern United States, and 18.9% in the Northeast United States. Americans reported generally high levels of individualism (M = 5.39, 95%
Confidence Interval (CI): [5.31, 5.47]), and moderate levels of collectivism (\(M = 4.52\), 95% CI: [4.44, 4.60]).

Creating the Latent Variable of Xenophobia. An initial exploratory factor analysis showed that the four components of xenophobia loaded onto a single factor (the eigenvalue of the first factor was 1.50, and all other factors had eigenvalues of less than zero). This structure was replicated in a confirmatory factor analysis, which showed that a one-factor model provided an excellent fit, after adding a correlated error term between prejudice toward immigrants and support for restrictive policies (CFI = 1.00; RMSEA = 0.00; \(\chi^2(1) = 0.24, ns^{±±}\)).

Descriptive Statistics and Simple Correlations among Variables. Table S1 presents descriptive statistics for key outcome measures and Table S2 presents correlations among the variables in Figure 2 structural equation model.

Identification of Potential Covariates. We identified potential covariates by examining the socio-demographic factors that correlated with our predictors (individualism and collectivism) and explained unique variance in the outcome (xenophobia). Greater collectivism was associated with more conservative political ideology (\(r = 0.21, p < 0.001\)), older age (\(r = 0.14, p < 0.001\)), and being of a race other than White (\(r = 0.13, p < 0.001\)). Greater individualism was associated with being female (\(r = 0.09, p < 0.01\)), and older age (\(r = 0.06, p < 0.05\)). Xenophobia was significantly correlated with conservative political ideology (\(r = .069, p < 0.001\)), older age (\(r = .

\[^{±±}\) Several classes of fit indices exist, so it is recommended to use a variety to assess model fit (Byrne, 1994). CFI values above 0.90 represent acceptable fit. RMSEA values below 0.08 represent acceptable fit. Chi-square values are highly sensitive to sample size, and values less than 3 times the degrees of freedom are generally viewed as showing acceptable fit.
0.09, \( p < 0.01 \), male gender (\( r = 0.07, p < 0.05 \)), lower education (\( r = -0.23, p < 0.001 \)), and lower income (\( r = -0.11, p < 0.001 \)). However, in a multivariate model, only political ideology and education uniquely predicted xenophobia. Because education was not correlated with collectivism, we only retained political ideology as a covariate in the primary analyses. However, neither the pattern nor significance of results changes if we do not control for ideology.

Moreover, when we conducted an additional regression with age, gender, education status, race, and political ideology all entered as controlling variables, the focal interactions of collectivism X perceived vulnerability (\( b = -0.09 \), 95% CI: [-0.13, -0.04], \( p < 0.001 \)) and individualism X perceived vulnerability (\( (b = 0.08 \), 95% CI: [0.02, 0.13], \( p = 0.006 \)) remain significant.

**Additional data collected.** A number of additional questions were included in the survey that may be the subject of future reports but were not part of the present theoretical model. The survey included subsets of measures of general psychological well-being: the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983); the Brief Symptom Inventory (Derogatis & Spencer, 1993); a subset of a measure of individual difference in how vulnerable people feel in contracting diseases in general: the Perceived Vulnerability to Disease Scale (Duncan, Schaller, & Park, 2009); and the Hypochondria Test about Ebola symptoms (adapted from http://www.ocdla.com/hypochondria-test.html). We also included an exploratory measure to assess interest in donating to the charity Doctors Without Borders.

Confirmatory Factor Analysis: Perceived Vulnerability and Protection Efficacy

In our paper, we argue that perceived efficacy for protection from Ebola (protection efficacy) (which is used as a mediator) is a different construct than perceived vulnerability to Ebola risk (which is used as a predictor). In support of this argument is data from a confirmatory factor analysis of the items measuring perceived vulnerability and protection efficacy. We analyzed two models in which the 9 indicator items of perceive vulnerability loaded onto a latent factor of perceived vulnerability, and the 6 indicator items of protection efficacy loaded onto a latent factor of protection efficacy. In one model, the latent factors of perceived vulnerability and protection efficacy were allowed to freely correlate. This model provided decent fit to the data (CFI = 0.94; RMSEA = 0.09; $\chi^2(81) = 673.12$; SRMR = 0.08) and the standardized correlation between protection efficacy and perceived vulnerability was -.54, p < .001, indicating that they are distinct variables. In another model, the covariance between the two constructs was constrained to -1, essentially modeling the two constructs as a single construct. In this model, the fit was significantly poorer than the first model, difference $\chi^2(1) = 38.83$, p<.001 (model CFI = 0.94; RMSEA = 0.09; $\chi^2(82) = 711.96$; SRMR = 0.09). Thus, the model that represents perceived vulnerability and protection efficacy as separate constructs provided a significantly better fit to the data than the model that viewed them as a single construct.
Test of the Linear Relationship among Key Variables

We examined the nature of the relationships between key variables in several ways to test whether they were linear or not. We first visually inspected the data and there was no asymptotic effect of collectivism. We then tested for whether the linear relationship best explains the data, or whether the data are better explained by a squared or cubic relationship among the predictors. We tested whether collectivism X perceived vulnerability-squared and collectivism X perceived vulnerability-cubed were significant when entered into the regression. They were not. Only the linear collectivism X perceived vulnerability interaction was significant. We then tested whether perceived vulnerability X collectivism-squared or perceived vulnerability X collectivism-cubed was significant. Again, only perceived vulnerability X collectivism was significant. Thus, the linear relationship proposed in the paper best explained the patterns of data.

Examination of Alternative Mediational Models

We examined two alternative mediational models to account for the interactive relationship between collectivism and perceived vulnerability and xenophobia: perceived stress and physical symptoms. That is, rather than high collectivists perceiving higher protection efficacy under conditions of high perceived vulnerability than low collectivists, it could be that low collectivists are experiencing more stress and physical symptoms, prompting their xenophobia. Protection efficacy was by far the strongest mediator (46.7% of total effect explained), whereas the other two variables did not account for significant variance. Below, we report two other alternative models identical to the model presented in Figure 2, with the exception that one model included perceived stress in place of protection efficacy as the mediator.
and the other model included physical symptoms in place of protection efficacy as the mediator.

*Perceived stress as mediator.* The alternative model that included perceived stress as a mediator had the poorer fit to the data compared to the model in Figure 2 that included protection efficacy as a mediator (CFI = 0.86; RMSEA = 0.09; $\chi^2(24) = 228.43$; SRMR = 0.054). In this alternative model, the collectivism x perceived vulnerability indirect effect was statistically significant ($b = .02, SE = .008, t = 2.45, p = .014$) but not as strong in magnitude as the indirect effect described in the paper when protection efficacy was the mediator. The individualism x perceived vulnerability indirect effect was not significant in this alternative model ($b = -.01, SE = .01, t = -.98, p = .33$).

*Physical symptoms as mediator.* The alternative model that included physical symptoms as a mediator had similar fit as the alternative model that included perceived stress as a mediator (CFI = 0.86; RMSEA = 0.09; $\chi^2(24) = 219.55$; SRMR = 0.054). In this alternative model, the collectivism x threat indirect effect was statistically significant ($b = -.02, SE = .01, t = 2.86, p = .004$) but not as strong in magnitude as the indirect effect described in the paper when protection efficacy was the mediator. The individualism x threat indirect effect was also significant in this alternative model ($b = -.01, SE = .01, t = -2.04, p = .042$), but also not as strong as the indirect effect described in the paper when protection efficacy was the mediator.

*Conclusion.* The model that included protection efficacy as the mediator provided best fit to the data, and the indirect paths of collectivism X perceived vulnerability and individualism X perceived vulnerability on xenophobia were strongest in magnitude when protection efficacy was included as the mediator.
Table S1. Descriptive statistics: Weighted means (using YouGov’s weights for national representativeness) for perceived vulnerability to Ebola (green); protection efficacy for Ebola (orange); support for different restrictive policies (blue); American Ethnocentrism (pink); prejudice against West Africans (purple); and prejudiced against undocumented immigrants (grey).

<table>
<thead>
<tr>
<th>Measure</th>
<th>Weighted Mean (Range)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived vulnerability to Ebola risk</td>
<td>2.22 (1 to 5)</td>
<td>2.16, 2.27</td>
</tr>
<tr>
<td>Perceived efficacy for protection from Ebola (protection efficacy)</td>
<td>4.56 (1 to 7)</td>
<td>4.48, 4.64</td>
</tr>
<tr>
<td>Travel ban from Liberia, Sierra Leone, Guinea</td>
<td>2.03 (1 to 3)</td>
<td>1.97, 2.09</td>
</tr>
<tr>
<td>Mandatory 21-day quarantine for people coming from Liberia, Sierra Leone, Guinea</td>
<td>2.22 (1 to 3)</td>
<td>2.16, 2.28</td>
</tr>
<tr>
<td>Mandatory 21-day quarantine for all health care workers who had direct contact</td>
<td>2.41 (1 to 3)</td>
<td>2.36, 2.46</td>
</tr>
<tr>
<td>Mandatory 21-day quarantine for all US military personnel who return from Liberia, Sierra Leone, Guinea</td>
<td>2.34 (1 to 3)</td>
<td>2.28, 2.39</td>
</tr>
<tr>
<td>A ban from public schools of children who return from Liberia, Sierra Leone, Guinea</td>
<td>2.12 (1 to 3)</td>
<td>2.07, 2.18</td>
</tr>
<tr>
<td>American Ethnocentrism</td>
<td>2.91 (1 to 7)</td>
<td>2.82, 3.00</td>
</tr>
<tr>
<td>Prejudice against West Africans</td>
<td>-1.17 (-4.5 to 3.5)</td>
<td>-1.26, -1.07</td>
</tr>
<tr>
<td>Prejudice against Undocumented Immigrants</td>
<td>-0.35 (-4.25 to 3.6)</td>
<td>-0.46, -0.24</td>
</tr>
</tbody>
</table>
Table S2. Zero-order correlations among variables included in structural equation model (Figure 2 in main text).

<table>
<thead>
<tr>
<th></th>
<th>Individualism</th>
<th>Collectivism</th>
<th>Perceived Vulnerability</th>
<th>Prejudice Efficiency</th>
<th>Prejudice to West Africans</th>
<th>Prejudice to Immigrants</th>
<th>American Ethnocentrism</th>
<th>Restrictive Policy Support</th>
<th>Ideology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individualism</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Collectivism</td>
<td>0.33</td>
<td>1.00</td>
<td></td>
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<tr>
<td>Perceived Vulnerability</td>
<td>0.05</td>
<td>0.27</td>
<td>1.00</td>
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</tr>
<tr>
<td>Prejudice Efficiency</td>
<td>0.11</td>
<td>-0.11</td>
<td>-0.56</td>
<td>1.00</td>
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<tr>
<td>Prejudice to West Africans</td>
<td>-0.10</td>
<td>0.04</td>
<td>0.31</td>
<td>-0.28</td>
<td>1.00</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Prejudice to Immigrants</td>
<td>-0.03</td>
<td>0.10</td>
<td>0.25</td>
<td>-0.29</td>
<td>0.56</td>
<td>1.00</td>
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<tr>
<td>American Ethnocentrism</td>
<td>-0.16</td>
<td>0.05</td>
<td>0.14</td>
<td>-0.21</td>
<td>0.38</td>
<td>0.42</td>
<td>1.00</td>
<td></td>
<td></td>
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<tr>
<td>Restrictive Policy Support</td>
<td>0.14</td>
<td>0.22</td>
<td>0.38</td>
<td>-0.30</td>
<td>0.30</td>
<td>0.42</td>
<td>0.23</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Ideology</td>
<td>-0.01</td>
<td>0.21</td>
<td>0.20</td>
<td>-0.21</td>
<td>0.25</td>
<td>0.47</td>
<td>0.31</td>
<td>0.35</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note. All correlations > .11 are significant at p < .001.