RUNNING HEAD: Perceived Vulnerability to Disease and Ideology

Infection and Ideology:

Perceived Vulnerability to Disease Predicts Political Conservatism

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Abstract

Recent research on the behavioral immune system suggests that perceived vulnerability to disease is associated with greater ingroup preference, conformity, and support for established cultural practices. However, little of this research has looked at the implications of perceived vulnerability to disease for an orientation linked to many of the above outcomes: ideology. In two studies, we test the hypothesis that perceived vulnerability to disease should be associated with greater political conservatism. In Study 1, we find a relationship between perceived vulnerability to disease and increases in conservatism over time. In Study 2, we use data from the World Values Survey to demonstrate that perceived vulnerability to disease predicts a stronger preference for the political right in a large sample of respondents from a wide variety of nations. Together, these results suggest that the consequences of the behavioral immune system may extend to abstract identifications like ideology.

Evolutionary approaches to social and political psychology suggest that various psychological mechanisms developed in response to the adaptive challenges humans encountered in the ancestral environment (Cosmides & Tooby, 2013). In particular, the adaptive utility of avoiding pathogens and infectious disease may have been especially important for reproductive fitness over the course of human history, and recent evidence reveals the presence of a "behavioral immune system" aiding this goal (Schaller, Park, & Faulkner, 2003). For example, much research suggests that people negatively evaluate and avoid individuals with physical characteristics indicating illness and individuals from unfamiliar outgroups likely to carry pathogens they lack immunity to (Faulkner, Schaller, Park, & Duncan, 2004). Importantly, the extent to which behavior and attitudes are affected by interpersonal, intergroup, and situational cues connoting the threat of disease depends on individual differences in perceived vulnerability to disease (PVD; Duncan, Schaller, & Park, 2009). Building on earlier research dealing with the political implications of objective disease prevalence (Thornhill, Fincher, & Aran, 2009) and disgust sensitivity (Tybur, Merriman, Hooper, McDonald, & Navarrete, 2010), we argue and present evidence that greater perceptions of vulnerability to disease are associated with greater political conservatism.

Pathogen Avoidance and the Behavioral Immune System

Pathogens constituted a major threat to the survival of human populations throughout history. Indeed, some scholars have estimated that infectious diseases accounted for more loss of human life than all wars, non-infectious diseases, and natural disasters combined (Inhorn & Brown, 1990). In contrast to other threats to human welfare (e.g., intergroup violence), disease-causing parasites are largely imperceptible, and the origin and means of transmission of disease were largely unknown prior to relatively recent scientific advancements (Murray & Schaller,

2012). As such, traits facilitating the detection and avoidance of infectious pathogens may have conferred evolutionary benefits to humans living in ancestral environments, leading to their retention through natural selection (Schaller et al., 2003). These adaptations are hypersensitive and attuned to general cues that signaled a high risk of infection, and collectively they suggest the existence of a *behavioral immune system* that evolved as a means to protect individuals and groups against the spread of illness (Schaller & Duncan, 2007; Tybur et al., 2010).

Evidence abounds for the operation of this system in response to both the objective presence and the subjective perceptions of infectious threats in one's environment. At the broadest level, geographical differences in the prevalence of infectious disease can account for cross-cultural variation in a variety of traits and tendencies. For example, assortative sociality, intergroup differentiation, and outgroup avoidance are more likely to be observed in areas with high disease prevalence (Fincher & Thornhill, 2008, 2012). Schaller and Murray (2008) further demonstrated that disease prevalence promotes a cautious personality orientation characterized by lower extraversion and openness to experience as well as more restricted sexual behavior. Finally, "binding" moral intuitions (ingroup/loyalty, authority/respect, and purity/sanctity) that help preserve ingroup cohesion are exhibited to a greater degree than "individualizing" moral intuitions (harm/care and fairness/reciprocity) in countries with higher historical disease prevalence (van Leeuwen, Park, Koenig, & Graham, 2012).

Individual differences in the subjective perception of disease threats have similarly been implicated in a broad range of social and political phenomena. For example, members of subjectively foreign social groups, particularly those with unfamiliar hygienic and food preparation customs, may have been more likely to transmit infectious disease than members of one's own social group in the ancestral environment (Fincher & Thornhill, 2008). Thus,

avoidance of members of such outgroups may have developed as an adaptive response to the threat of disease, particularly during periods of pathogen vulnerability (e.g., Navarette, Fessler, & Eng, 2007). Consistent with this interpretation, individual differences in the tendency to perceive and be wary of disease threats predict avoidant and exclusionary attitudes toward members of outgroups (Faulkner, et al., 2004). In addition, individuals higher in PVD tend to harbor more prejudicial attitudes toward groups bearing physical cues that denote poor health (Welling, Conway, DeBruine, & Jones, 2007). In general, these tendencies encourage adherence to social norms that protect the ingroup and defend the cultural *status quo*. Indeed, conformity tends to increase when disease is objectively prevalent (Murray, Trudeau, & Schaller, 2011), when the threat of disease is salient (Wu & Chang, 2012), and among individuals chronically high in PVD (Murray & Schaller, 2012).

Disease Vulnerability and Political Ideology

Thus, survival in the ancestral environment may have been facilitated by the presence of behavioral norms, social attitudes, and cultural practices that promote group-centrism, conformity, and the preservation of established social practices. In turn, we argue that the ensemble of tendencies activated by perceived vulnerability to disease may have implications for a more abstract type of identification: ideological self-placement. Specifically, we argue that PVD should be associated with political conservatism. Current work on the motivational foundations of ideology offers two especially important bases for this prediction. First, many of the immediate behavioral immune system goals activated by PVD align very closely with the values and moral goals associated with political conservatism (e.g., Caprara & Zimbardo, 2004; Jost, Federico, & Napier, 2009; van Hiel & Mervelde, 2004). For example, the group-centrism elicited by PVD shares a natural resonance with the emphasis on ingroup loyalty associated with

conservatism (Graham, Haidt, & Nosek, 2009; Jost et al., 2009). Moreover, the emphasis on conformity and adherence to established norms produced by PVD mirrors the premium conservatism places on social cohesion and the preservation of traditional lifeways and structures (Federico, Fisher, & Deason, 2011; Goren, 2012; Schwartz, 2007; Thorisdottir, Jost, Liviatan & Shrout, 2007).

Second, beyond serving these value-based goals, current perspectives on ideology argue that conservatism (like all ideological positions) serves even deeper psychological needs. In particular, Jost, Glaser, Kruglanski, and Sulloway (2003) suggest that political conservatism is motivated by a general need to reduce threat and uncertainty. According to this perspective, conservatism serves these needs by resisting changes to the *status quo* that produce instability, disorder, and unforeseen harms. Insofar as vulnerability to disease represents a fundamental existential threat, then we should expect it to have the same conservative political implications as other kinds of threats considered by the literature on the psychological bases of ideology (Hibbing, Smith, & Alford, 2014; Jost et al., 2009). In other words, PVD may encourage conservatism not only by directly activating goals that align with the value content of conservatism, but also by heightening a general sense of threat.

To our knowledge, prior research has not directly investigated the relationship between PVD and political ideology. However, research generally suggests that a related construct—disgust sensitivity—is associated with conservative social attitudes, identifications, and voting behavior (e.g., Eskine, Kacinik & Prinz, 2011; Inbar, Pizarro, Iyer, & Haidt, 2012; Smith, Oxley, Hibbing, Alford, & Hibbing, 2011; but see Tybur et al., 2010). Of course, while disgust sensitivity and PVD are certainly related, they are distinct. Specifically, disgust can be elicited in response to pathogen cues (Haidt, McCauley, & Rozin, 1994), but also in response to moral and

sexual cues (Tybur, Lieberman, & Griskevicius, 2009). Moreover, disgust is an inadequate representation of perceived disease vulnerability in that it fails to directly tap feelings of subjective infectability (Duncan et al., 2009). Disgust sensitivity measures (e.g., Haidt et al., 1994; Olatunji et al., 2007) also focus on susceptibility to disgust as a general affective response, whereas PVD is conceptualized more specifically as a constellation of personal beliefs about infectability *and* the negative emotion elicited by perceptions of susceptibility to infection. Thus, our main hypothesis remains unexamined.

Current Studies

In the two studies that follow, we test the general hypothesis that PVD is related to conservative ideological self-placement. In Study 1, we test our hypothesis by examining changes in ideology over time using data from a two-wave survey. In Study 2, we examine our hypothesis using a large, comparative dataset comprised of representative samples of citizens from 43 different nations that included a measure closely corresponding to PVD. In both studies, we control for competing psychological determinants of ideological self-placement.

Study 1

Participants, Procedure, and Measures

As noted above, Study 1 took the form of a two-wave study aimed at testing our general hypothesis by examining whether initial differences in PVD predicted changes in conservatism over time. Participants were undergraduate students enrolled in psychology courses at the University of Minnesota (N = 261; 205 females and 56 males; mean age = 19.97, SD = 2.96). Based on prior experience, we aimed for at least 250 participants; recruitment was stopped once we reached the number of sign-ups that would permit this goal to be reached. Participants volunteered for the study in exchange for extra credit in one or more of their psychology courses.

Upon registration, all participants were emailed a link to an online survey for the first wave of the study (T1) and instructed to complete it immediately after providing informed consent. Two days after completing T1, participants received an email prompt with a link to a second online survey (T2). All participants completed both surveys between October 10 and November 5, 2012. Upon completion of the T2 survey, participants were thanked for their participation and awarded their extra credit points. Below, we describe our measures. Besides age, all measures were rescaled to run from 0-1 for easier comparison and estimation of effect sizes.

Perceived vulnerability to disease (PVD). This was assessed using a 15-item measure at T1 developed and validated by Duncan, Schaller, and Park (2009). The PVD scale assesses individual differences in persistent concerns about susceptibility to infectious disease. Participants responded to each item on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale. Responses were then averaged. Higher scores indicate higher PVD (α = .82; M = .45, SD = .14).

Ideology. This was assessed at T1 and T2 using a single item asking respondents to place themselves on a 7-point scale ranging from "very liberal" to "very conservative." Higher scores indicate greater conservatism (T1: M = .38, SD = .25; T2: M = .38, SD = .25).

Affective preference for conservatives over liberals. Global evaluations of liberals and conservatives were assessed at T2 using 101-point feeling thermometers ranging from 0 ("positive") to 100 ("negative"). Responses were reversed so higher scores indicated more positive evaluations, and evaluations of liberals were subtracted from those of conservatives. The resulting differences were recoded to run from 0-1. Higher scores indicate a higher relative preference for conservatives relative to liberals (M = .38, SD = .25).

Needs for certainty and security: Need for cognitive closure. As a control for needs for certainty and security, we included a consistent psychological predictor of ideological self-

placement in previous work: the *need for cognitive closure*, which reflects a desire for certainty and a preference towards firm, unchanging answers to questions (Jost et al., 2003). The need for cognitive closure was assessed at T1 using a shortened, 14-item version of Webster and Kruglanski's (1994) original scale. Participants rated their agreement with each item on a 6-point scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). Higher scores indicate greater need for closure (α = .82; M = .45, SD = .13).

Demographics and other background variables. We also included three demographic controls, measured at T1. One was a standard demographic measure: *age* (in years). Moreover, given research showing greater conservatism among men (e.g., Sidanius & Pratto, 1999), we considered *gender* (0 = female, 1 = male), and in light of work connecting higher income to conservatism (e.g., Gelman, 2009), we also assessed *family income* (11-point scale, in increments of $10,000). Given that all participants were college students, we do not control for education in Study 1 like we do in Study 2 below.

Results

Bivariate analyses. If our basic prediction is correct, we should first find that perceived vulnerability to disease at T1 has a bivariate relationship with conservatism at T2. The data bear this out: the coefficient for the regression of T2 ideology on PVD measured at T1 was significant, b = .23, β = .13, p = .033. Reinforcing this, the coefficient for the regression of affective preference for conservatives over liberals at T2 on T1 PVD was also significant, b = .27, β = .15, p = .013.

Multivariate analyses. However, to provide a more formal test of our hypothesis for Study 1, we regressed T2 ideology on T1 ideology, age, gender, income, need for cognitive closure, and PVD. Since the lagged T1 measurement of the dependent variable, the

demographics, and need for closure are included as controls in this analysis, the coefficient for PVD represents the *change* in conservatism over time associated with differences in PVD (Finkel, 1995), net of demographics and pre-existing individual differences in a major "competing" psychological predictor of ideological self-placement (i.e., needs for certainty and security, as indexed by the need for closure). The results of this analysis are summarized in the "Model 1" column of Table 1; exact *p*-values are given in the table. Not surprisingly, lagged T1 ideology predicts T2 ideology ($p<.001$). Income also had a marginally significant effect, with respondents higher in family income indicating a greater conservative shift ($p = 0.056$). As predicted, T1 PVD was associated with conservatism at T2 net of the controls, $b = .09$, $\beta = .05$, $p<.05$. Given the 0-1 coding of all variables, this estimate means that a change in PVD from its lowest to its highest value is associated with a T1 to T2 change in conservatism corresponding to 9% of the full range of the latter, net of the controls.

To conceptually replicate this finding, we examined a second dependent variable: T2 affective preference for conservatives over liberals. This variable was regressed on the same set of predictors used above. Since we do not have a lagged T1 measure of affective preference for conservatives over liberals, the PVD coefficient in this model does not formally indicate the change in affective preference associated with PVD; however, it does predict differences in affect toward conservatives and liberals net of baseline (T1) ideology and the controls. With this in mind, the results for "Model 2" in Table 1 indicate that greater conservatism at T1 was significantly associated with an affective preference for conservatives over liberals at T2 ($p<.001$). The coefficient for income was also significant ($p<.05$), such that respondents with higher family income showed a stronger affective preference for conservatives over liberals. Consistent with our hypothesis, T1 PVD significantly predicted T2 affective preference for

conservatives over liberals net of the controls, $b = .16$, $\beta = .09$, $p<.01$. Given the 0-1 variable codings, this means that a change in PVD from its lowest to its highest value is associated with a net change in T2 affective preference for conservatives over liberals corresponding to 16% of the full range of the variable.

Table 1

Perceived Vulnerability to Disease, Ideology, and Affective Preference for Conservatives over Liberals (Study 1)

	Model 1: T2 Ideology			Model 2: T2 Affective Preference		
Predictor	*b*	SE	*p*	*b*	SE	*p*
T1 ideology	0.93***	(0.02)	<0.001	0.84***	(0.03)	<0.001
Age	-0.0001	(0.002)	>0.250	0.003	(0.003)	>0.250
Gender	-0.002	(0.01)	>0.250	0.03	(0.02)	0.163
Family income	0.03†	(0.02)	0.056	0.05*	(0.03)	0.036
Need for cognitive closure	0.05	(0.04)	0.203	-0.002	(0.06)	>0.250
Perceived vulnerability to disease	0.09*	(0.04)	0.017	0.16**	(0.06)	0.006
Intercept	-0.05†	(0.03)	0.081	-0.06	(0.05)	0.185
F (degrees of freedom)	360.88 (6, 248) ***			122.77 (6, 246) ***		
Adjusted R^2	0.895			0.744		
N	255			253		

Note. Entries are ordinary least-squares regression coefficients and standard errors. All independent variables were measured at T1.

†p<.10. *p<.05. **p<.01. ***p<.001.

Study 2

Data and Measures

The data for Study 2 come from Wave 5 of the World Values Survey (WVS; World Values Survey Association, 2009), collected between 2005 and 2008 in 58 nations. The full sample consisted of 83,975 respondents. The study took a representative sample of respondents in each participating nation; interviews were face to face and administered in all languages spoken by at least 15% of a nation's population. We used data from only the 43 nations that administered all items we needed for our analyses, leaving a final sample size of N = 60,485. The nations included in this final sample were: Andorra, Australia, Brazil, Bulgaria, Canada, Chile, Taiwan, Cyprus, Ethiopia, Finland, Georgia, Germany, Ghana, Hungary, India, Indonesia, Japan, Jordan, South Korea, Mali, Moldova, Morocco, Norway, Peru, Poland, Romania, Rwanda, Viet Nam, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Trinidad and Tobago, Turkey, Ukraine, Egypt, United States, Burkina Faso, Uruguay, Serbia and Montenegro, and Zambia. The final sample was 52.2% female and 47.8% male, with a mean age of 42.05 (SD = 16.70). Our measures are described below; full data and documentation can be found at http://www.worldvaluessurvey.org/WVSDocumentationWV5.jsp. As in Study 1, all measures aside from age were rescaled to run from 0-1.

Perceived vulnerability to disease (PVD). Two WVS items were used to generate a proxy measure of PVD. These items were prefaced with, "In 2000, world leaders agreed on a number of programs to solve the most serious global problems. I'm going to read out some of these problems." The first item read, "I would like you to indicate which of these problems you consider the most serious one for the world as a whole." The second item read, "Which of these problems do you consider the most serious one in your own country?" The problems listed were:

"people living in poverty and need," "discrimination against girls and women," "poor sanitation and infectious diseases," "inadequate education," and "environmental pollution." The target response for our purposes was "poor sanitation and infectious diseases." Respondents were given a PVD score of 0 if they gave this response to neither item, 0.5 if they gave it in response to one item, and 1 if they gave it in response to both items. Higher scores indicate higher PVD (M = .09, SD = .21).

Ideology. This was assessed using a single item: "In political matters, people talk of 'the left' and 'the right.' How would you place your views on this scale, generally speaking?" Respondents answered on a ten-point scale ranging from 1 (*left*) to 10 (*right*). Higher scores indicate greater conservatism (M = .52, SD = .27).

Needs for certainty and security: Conservation values. As a control for needs for certainty and security, we use an index of support for *conservation values*. Values were measured using items from the WVS version of the Schwartz Portrait Values Questionnaire (Schwartz, 2007). In the full instrument, respondents were presented with a series of 10 descriptions of people and were asked, "would you please indicate for each description whether that person is very much like you, like you, somewhat like you, not like you, or not at all like you?" The response options formed a six point scale ranging from 1 (*very much like me*) to 6 (*not like me at all*). We used only the three items for values in the conservation cluster: security, conformity, and tradition. Values in this domain relate especially closely to needs for certainty and security, and they reflect a motivational concern for safety, social order, and uniformity (Schwartz, Caprara, & Vecchione, 2010). Importantly, support for conservation values relate relatively strongly to the need for closure (Duckitt & Sibley, 2009), making them an excellent proxy for needs for certainty and security. The items were: "Living in secure surroundings is

important to this person; to avoid anything that might be dangerous" (security), "It is important to this person to always behave properly; to avoid doing anything people would say is wrong" (conformity), and "Tradition is important to this person; to follow the customs handed down by one's religion or family" (tradition). Responses to the items were averaged and recoded so that higher scores indicated greater endorsement of conservation values (α = .63; M = .72, SD = .21).

Demographics and other background variables. For the reasons discussed in Study 1, we again included several demographic controls: *age* (in years), *gender* (0 = female, 1 = male), and *income decile* (recoded 0-1). Besides income, we also included two additional indices of socioeconomic status. *Education* was represented in terms of four categories using three dummy variables: some secondary education (no degree) or less, completed secondary but no university, some university but no degree, and university degree; the first category served as the reference group. *Subjective social class* was assessed using a self-report item allowing respondents to sort themselves into one of five categories: lower class, working class, lower middle class, upper middle class, and upper class. The variable was represented in the analyses using four dummy variables, with lower class as the reference group.

Nation-level variables. To control for national differences pertinent to health and quality of life, we included two nation-level controls: each nation's 2005 *gross domestic product* (GDP) and United Nations *Human Development Index* (HDI; United Nations Development Program, 2005).

Results

Bivariate analysis. Again, to examine the simple bivariate relationship between PVD and conservatism, we used a multilevel linear mixed model to regress ideology on the proxy measure of PVD. In this model, individuals (level 1) were nested in nations (level 2); both the

intercept and the slope for PVD were allowed to vary randomly across level-2 units. As predicted, this model revealed a significant relationship between PVD and conservatism, b = 0.02, β = 0.02, p = 0.002.

Multivariate analysis. To provide a more controlled test, we also conducted a multivariate analysis of the relationship between PVD and conservatism. In this analysis, ideology was regressed on PVD, along with age, gender, income decile, education, and subjective social class, and conservation values at the respondent level, and each country's GDP and HDI at the nation level. The intercept and the slopes for all respondent-level variables were specified as random effects varying across level-2 units. The results are shown in Table 2; exact p-values are shown in the table. As the estimates indicate, higher income was associated with greater conservatism (p<0.001); the social-class dummies indicated a similar trend, though most of the indicators do not suggest significant differences vis-à-vis the reference group. Moreover, compared to those with some secondary education or less, all education groups except for those who only completed secondary school were less conservative (ps at least <0.01). Consistent with prior research, being male and endorsement of conservation values were also associated with conservatism (ps<0.001). At the nation level, respondents from countries higher in GDP were less conservative (p<0.05). Most importantly, PVD was significantly associated with conservatism (b = 0.02, p<0.01); slopes for the full sample and for each individual nation are displayed in Figure 1. Despite the inclusion of numerous controls, the magnitude of the PVD effect was virtually the same as it was in the bivariate analysis; the multivariate estimate indicates that a shift in PVD from its lowest to its highest value is associated with a change in conservatism corresponding to 2% of the full range of ideology. Though this may seem small in absolute terms (due to the 0-1 scaling of the variables), it is meaningful in relative terms: the

Table 2

Perceived Vulnerability to Disease and Ideology (Study 2, WVS Wave 5)

	Ideology		
Predictor	*b*	SE	*p*
Respondent-level variables (Level 1)			
Age	0.0003	(0.0002)	>0.250
Gender (1 = male)	0.01***	(0.004)	0.001
Income decile	0.05***	(0.01)	<0.001
Education: Completed secondary, no university	-0.01†	(0.01)	0.071
Education: Some university, no degree	-0.02**	(0.01)	0.002
Education: University degree	-0.04***	(0.01)	<0.001
Subjective social class: Working class	-0.01†	(0.01)	0.078
Subjective social class: Lower middle class	0.01	(0.01)	0.224
Subjective social class: Upper middle class	0.02*	(0.01)	0.034
Subjective social class: Upper class	0.03†	(0.02)	0.084
Conservation values	0.07***	(0.02)	<0.001
Perceived vulnerability to disease (PVD)	0.02**	(0.01)	0.004
Nation-level variables (Level 2)			
Gross domestic product	-0.18*	(0.07)	0.011
Human development index	-0.04	(0.08)	>0.250
Intercept	0.52***	(0.05)	<0.001
-2 × log-likelihood	364.68		
Wald χ^2 (degrees of freedom)	101.68 (14) ***		

Note. Entries are unstandardized estimates and standard errors from a multilevel linear mixed model. The reference group for the three education dummies is "some secondary education (no degree) or less," and the reference group for the four subjective social class dummies is "lower class." Number of level-1 units = 43,042; number of level-2 units = 43.

†p<.10. *p<.05. **p<.01. ***p<.001.

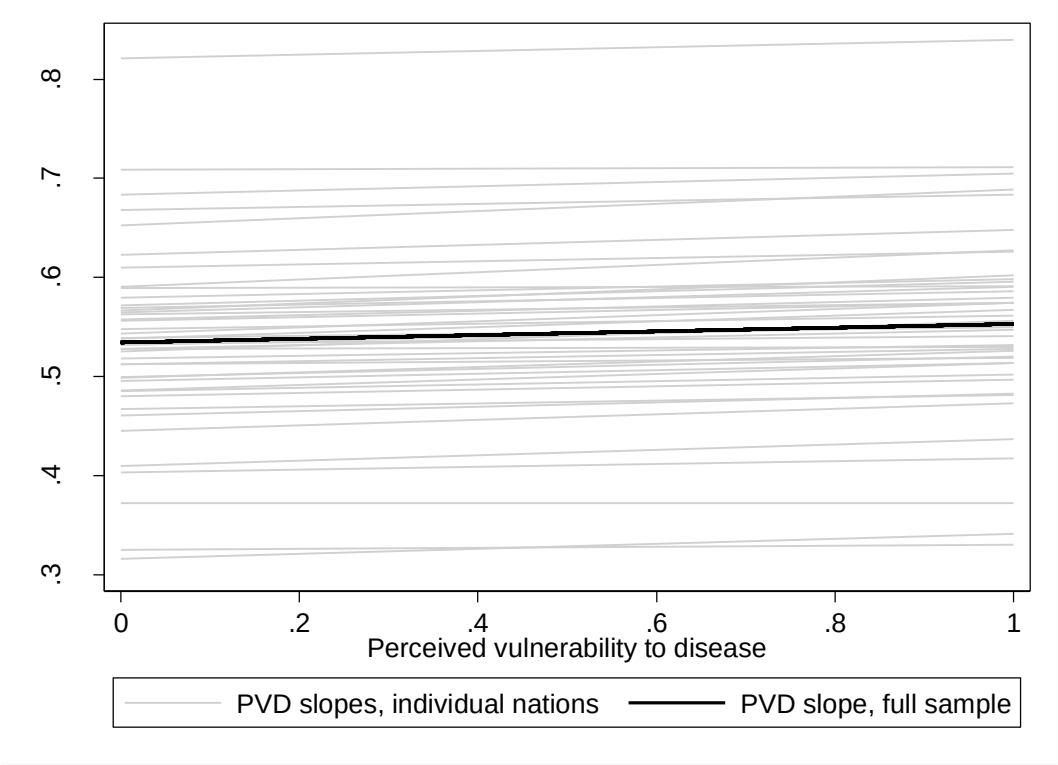

Figure 1. Slopes for the relationship between perceived vulnerability to disease (PVD) and ideology for individual nations and the full sample. Figure based on estimates from Table 2 (Study 2, WVS Wave 5).

largest coefficient for a respondent-level variable was 0.07, and the average absolute value of all respondent-level coefficients was 0.023. Thus, in a large multinational sample, our hypothesis received further support.

Robustness checks. Our key result was robust across numerous alternate model specifications and estimation procedures. First, adding a control for a second major value determinant of ideology—*self-transcendence*, which captures benevolence and universal moral concern for human well-bring (Schwartz, 2007)—did not eliminate the effect of PVD. Second, adding a nation-level control for the prevalence of disease-causing pathogens (*combined parasite stress*; Fincher & Thornhill, 2012) as a nation-level control did not eliminate the effect of PVD either. Finally, in order to be sure that the relatively high number of cases with missing values for ideology (n = 13,601) was not leading to biased results via a sample-selection effect, we re-estimated our basic model using Heckman's estimator for sample selection (Long, 1997). The selection model for this analysis included several variables likely to predict non-response: income, the education dummies, political interest, recent political participation, and an indicator of whether the respondent belonged to a political party. To account for the nested nature of the data, both the ideology equation and the selection equation contained fixed effect dummy variables for nation, and robust standard errors clustered by state were used in all tests on coefficients. This model indicated an effect for PVD that was virtually identical in terms of magnitude and statistical significance.[3]

General Discussion

In these studies, we extend prior work on the social implications of the behavioral immune system by examining the relation between subjective perceptions of disease vulnerability and ideological self-placement. Consistent with the expectation that the perceived

prevalence of pathogens activates motivational goals and values congruent with conservatism, Study 1 found that perceived vulnerability to disease was associated with increases political conservatism over time and a stronger tendency to evaluate conservatives more positively than liberals net of baseline political beliefs. Extending this finding, Study 2 found that PVD was also related to a greater preference for the political right in a large representative survey of respondents from a wide variety of nations. In both cases, our results were robust to controls for relevant demographic characteristics and competing psychological determinants of ideology.

Together, our findings address a major gap in our understanding of the behavioral immune system's social implications. Although PVD has been shown to predict conformity (Murray & Schaller, 2012; Wu & Chang, 2012) and exclusionary outgroup attitudes (Faulkner et al., 2004), the current studies are the first to provide direct evidence for a relationship between PVD and ideological conservatism. Given the relatively abstract nature of ideology as an identification (Jost et al., 2009), they suggest that the operation of the behavioral immune system may also have consequences for outcomes less concrete and socially immediate than ingroup bias or conformity. Methodologically, they provide a more precise look at the relationship between the behavioral immune system and ideology than studies that rely solely on disgust sensitivity as an indicator of pathogen avoidance, which have yielded inconsistent findings (Tybur et al., 2009). By relying on a more direct indicator of pathogen avoidance that accounts for both the subjective perceptions of susceptibility to infection and related affective responses, our results help clarify the connection between the functioning of the behavioral immune system and ideology.

Despite the strength of our evidence, our studies are not without their limitations. First, our correlational data cannot provide decisive evidence for a causal link between PVD and

ideology. That said, our inclusion of a lagged indicator for our dependent variable does allows us to model *change* in conservatism across time as a function of PVD and overcome some of the bias potentially introduced by feedback effects (Finkel, 1995). Second, in Study 2, we were only able to use a simple proxy measure of PVD from the World Values Survey, rather than the validated scale employed in Study 1(Duncan et al., 2009). Nevertheless, the WVS items measure perceptions closely related to those included in the PVD scale, leaving us with confidence in their face validity; the similarity of our results across the two studies (and two very different samples) also testifies to the correspondence between the two measures.

The evidence we present for a relationship between PVD and conservatism also has a number of broader implications, both for society as a whole and for future research. Like other threats (e.g., Jost et al., 2003, 2009), increased attention to public health concerns associated with infectious disease—both in communications from political elites and in media coverage—may have the potential to produce a conservative shift in public opinion and ideological sympathies. Such changes in the salience of disease threat may have both a main effect on conservatism, as well as a moderating effect in which they activate individual differences in PVD and produce especially large ideological shifts among those who feel chronically susceptible to infection. Given the tendency for pathogen prevalence to produce especially strong reactions against cultural outgroups and those who fail to conform to dominant social norms (e.g., Schaller et al. 2003; Thornhill & Fincher, 2012), we might also expect these effects to be especially strong when disease threats are associated with "foreign" groups (e.g., West Africans in the case of Ebola) or "non-normative" groups (e.g., gay men in the case of HIV). These questions await future research.

Author Contributions

C.M. Federico generated the research question, and all authors contributed to the study concept and design. Testing and data collection were performed by J. Appleby. C.M. Federico performed the data analysis, and all authors contributed to interpreting the results. All authors contributed to the manuscript and approved the final version for submission.

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Notes

1 These results are available upon request.