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Disease avoidance and ethnocentrism: the effects of disease vulnerability and disgust sensitivity on intergroup attitudes

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Abstract

Extending a model relating xenophobia to disease avoidance [Faulkner, J., Schaller, M., Park, J. H., & Duncan, L. A. (2004). Evolved disease-avoidance mechanisms and contemporary xenophobic attitudes. Group Processes & Intergroup Relations, 7(4), 333–353.], we argue that both inter- and intragroup attitudes can be understood in terms of the costs and benefits of interacting with the in-group versus out-groups. In ancestral environments, interaction with members of the in-group will generally have posed less risk of disease transmission than interaction with members of an out-group, as individuals will have possessed antibodies to many of the pathogens present in the former, in contrast to those prevalent among the latter. Moreover, because coalitions are more likely among in-group members, the in-group would have been a potential source of aid in the event of debilitating illness. We conducted two online studies exploring the relationship between disease threat and intergroup attitudes. Study 1 found that ethnocentric attitudes increase as a function of perceived disease vulnerability. Study 2 found that in-group attraction increases as a function of disgust sensitivity, both when measured as an individual difference variable and when experimentally primed. We discuss these results with attention to the relationships among disease salience, out-group negativity, and in-group attraction.

Keywords: Coalition formation; Disgust sensitivity; Fear of death; In-group; Out-group; Intergroup bias; Prejudice

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> Ethnocentrism is the technical name for this view of things where one's own group is the center of everything, and all others are scaled and rated with reference to it. . .Sentiments are produced to correspond. Loyalty to the in-group, sacrifice for it, hatred and contempt for outsiders, brotherhood within, warlikeness without—all group together, common products of the same situation.
>
> W.G. Sumner, 1906

1. Introduction

The inclination to view members of other ethnic groups as not quite human is a persistent theme in the ethnographic and historical literatures that record the dynamics of intergroup relations (cf. Chagnon, 1992; Goldhagen, 1996; Lee, 1984; Markel & Stern, 2002; Suedfeld & Schaller, 2002). Such dehumanizing inclinations have often been interpreted as a necessary precursor to more hostile actions towards out-group members (Bandura, 1999). Often, members of foreign out-groups are compared to animals associated with disease transmission such as cockroaches, maggots, flies, rats, lice, and other parasites (Suedfeld & Schaller, 2002). Likened to vectors of harmful contagious pathogens, ethnic out-group members are often the targets of blame for disease outbreaks and are even sometimes extinguished with symbolic rationalizations that follow a disease model (e.g., "Jewish vermin," "Tutsi cockroaches," etc.), leading to the contemporary euphemism for genocide, "ethnic cleansing."

Although a sizeable literature exists on the dehumanization of out-group members, until recently, relatively little attention has been paid to the empirical study of the connection between pathogen avoidance and ethnocentrism. Building on a budding body of work in this area (Kurzban & Leary, 2001; Park, Faulkner, & Schaller, 2003), Faulkner, Schaller, Park, & Duncan (2004) recently proposed a model linking disease avoidance and xenophobia, where negativity toward the out-group reflects an adaptive strategy to avoid possible disease vectors. This strategy is thought to be linked to evolved psychological mechanisms designed to facilitate the learning and detection of cues that heuristically identify the possible presence of contagious disease. Since out-group members are more likely to carry pathogens to which members of the in-group have not yet developed immunity, avoidance of out-groups can be adaptive when the threat of disease is salient. Likewise, members of foreign groups are more likely to engage in practices that violate local cultural rules adapted by a process of cultural evolution to protect in-group members from locally prevalent pathogens. Reasoning along these lines, Faulkner et al. (2004) predicted that people who feel most vulnerable to contagious diseases should react most negatively to subjectively foreign out-groups. Across several studies of Canadian undergraduates, the authors demonstrated that participants who felt vulnerable to disease contagion either chronically (as a stable individual difference measure) or temporally (as a result of exposure to a disease-salient prime) reacted more negatively towards out-groups, displaying increased opposition to foreign immigration to Canada.

1.1. The present research

In this paper, we build on the theory proposed by Faulkner et al. (2004), replicating their work and extending their disease-avoidance model of intergroup attitudes. In doing so, we emphasize the adaptive utility of in-group attraction, and confront competing explanations for the findings. Previously, we have argued that in-group bias, in part, reflects the workings of a system of psychological mechanisms designed to maintain or create important coalitional ties when adaptive challenges arise that can be effectively addressed by social support (Navarrete, Kurzban, Fessler, & Kirkpatrick, 2004). Correspondingly, we propose here that the threat of disease can be viewed as one of many such coalition-relevant adaptive challenges and should therefore be expected to elicit not only negativity toward out-groups but also attraction toward the in-group.

Like others who have commented on the relationship between disgust and intergroup relations (e.g., Rozin & Royzman, 2001), Faulkner et al. (2004) emphasize only the importance of negativity toward out-groups. Yet, there are principled reasons to suspect that in-group attraction may be just as important as out-group avoidance when considering the psychological states that affect adaptive responses to disease threat. Indeed, some authors have argued that positive in-group identification may precede out-group hostility as a fundamental psychological feature of intergroup attitudes and that it may be the dimension of intergroup bias most relevant to individual interests of survival and reproductive success (e.g., Brewer, 1999, 2001).

In addition to attending to group membership as an index of disease risk, psychological mechanisms that address this threat might be expected to focus on group membership due to the importance of alliances during times of illness or hardship. In small-scale societies such as those that prevailed for most of human history, allies provision the sick and their dependents, provide care, and protect them from predators and enemies (Sugiyama, 2004). Because alliances are more common within than across group boundaries, questions of group membership and cultural similarity can be expected to be salient when disease threatens, as individuals are well served by attitudes that increase their ability to both enhance and extend existing coalitions. Since networks of alliances are the only health insurance policy available in small-scale societies, it follows that, when the likelihood of illness increases, individuals should be motivated to ensure both that their premiums are paid and that their coverage is extensive. Cognizance of shared cultural norms facilitates coordination and alignment of goals; hence, cooperative groups and coalitions are often formed on the basis of common cultural affiliation (McElreath, Boyd, & Richerson, 2003). Thus, we not only expect people to be motivated to avoid out-groups in response to disease threats but also to find the in-group more attractive. We therefore expect circumstances involving the threat of disease to be situations during which the two sides of the ethnocentric impulse—both in-group attraction and out-group avoidance—should be enacted.

From this perspective, disease salience elicits increased normative attitudes regarding the in-group primarily because in ancestral environments, when disease was present or likely, avoiding out-group members and successfully acquiring increased social support would have had significant fitness consequences. Hence, although Faulkner et al. (2004) model of disease

avoidance and intergroup attitudes emphasizes only the xenophobic aspect of adaptive coalitional computation, we seek to also highlight the adaptive utility of in-groups in times of disease threat, leading us to predict that the disease-avoidance system will trigger both out-group negativity and enhancement of positive social evaluation of the in-group.

We conducted two studies designed to test our theory of disease and intergroup bias while confronting alternative explanations to which work in this area is potentially subject. In framing the interpretations of our results, we follow the insights of Faulkner et al. (2004) in holding that, although the evolved psychological mechanisms underlying the ability to respond adaptively to disease threats may be universal, there is considerable individual variation in the extent to which people may feel subjectively vulnerable to disease or sensitive to particular kinds of disease-relevant stimuli. Such variation may stem from a variety of sources, including (a) genetic variation that has not been eliminated by natural selection (due to genetic drift, gene flow, mutation, or stochastic environmental variation); (b) differences in the developmental histories through which genetic propensities are expressed; (c) differences in the salience of the out-group–disease connection in internalized cultural models; or (d) differences in the actual threat of disease in the present or recent past. These trait or state differences can be exploited to provide natural variation along which to predict (a) avoidance of and negativity toward foreign out-groups and (b) increased liking of and attraction toward the in-group.

2. Study 1

In Study 1, we test the notion that intergroup bias should rise as a function of individual differences in perceived vulnerability to disease (PVD) using study participants outside of a university context. To do so, we accessed a broad sample of US citizens via the World Wide Web. In designing the study, we took care to ensure that the valence properties of our independent and dependent measures would not inadvertently lead to our desired effects. If both the independent and dependent measures employed tap into negatively valenced psychological states (disease salience and negativity toward out-groups), any positive associations found may occur not because xenophobic prejudice is importantly underlaid by disease avoidance but rather simply because negatively valenced psychological states tend to be correlated with other negatively valenced states (Lewin, 1935). When a negatively valenced independent variable (disease worries) is experimentally induced or is measured as a stable trait, that state may then correlate with another negatively valenced state (negative evaluations of social groups) because of mood effects that may have little to do with the specific content of the independent variable. In order to avoid this pitfall, we sought to employ a measure of prejudice that does not merely assess hostility or avoidance of out-groups but rather speaks to Sumner's original view of ethnocentrism as an attitude combining the positive attraction of the in-group with the relative negativity of the out-group.

Prejudicial attitudes have been found to be related to death anxiety (Adorno, Frenkel-Brunswick, Levinson, & Sanford, 1950; Altemeyer, 1996; Jost, Glaser, Kruglanski, & Sulloway, 2003; Pyszczynski, Solomon, & Greenberg, 2003), raising the possibility that the

relationship between disease salience and intergroup attitudes lies in a link between disease fears and death anxiety—since disease can sometimes lead to death, disease-related psychological states may give rise to death-related states, and the relationship between disease and intergroup attitudes may have more to do with the psychological mechanisms that address existential fears than with evolved system designed to be sensitive to the specific cues of pathogen threat. We therefore employed a methodology designed to allow us to statistically control for such potentially confounding effects.

2.1. Methods

2.1.1. Participants

Study participants were recruited through postings to psychological or political Web sites and discussion boards (list available on request) between January and November 2004. Participation was anonymous, and no compensation was offered.

Two hundred and eighty-one participants completed the survey. In order to reduce noise in the data and to ensure proper analytical validity of our measures, only observations in which participants completed every item in the survey were included. To increase the likelihood that participants were naive to the hypotheses, observations in which the participant claimed to have an advanced education beyond the bachelor's degree level were also excluded. To increase the likelihood that participants identified with the United States as an in-group, only individuals who identified themselves as US citizens were retained in the sample. To conform to the stipulations of our university's human subjects protection committee's guidelines regarding age requirements for voluntary participants, data for subjects younger than 18 years were excluded. This resulted in a final sample of 90 participants (23 men and 69 women), ranging in age from 18 to 61 years (M=26.4, S.D.=9.6).

2.1.2. Materials and procedure

Participants completed an online form designed with RiddleMeThis questionnaire software, which was configured so that participants were unable to change their answers to items on previously completed pages. Potential data from the same source could not be excluded since all participants were anonymous, and neither IP addresses nor any other identifying computer information were recorded.

Participants were initially presented with two questions gauging their level of patriotism. These items were "My identity as an American is important to me" and "I am proud to be an American" and were measured on a nine-point Likert scale (anchored at 5) from "Strongly Disagree" to "Strongly Agree." Participants then completed measures of ethnocentrism, disease vulnerability, and fear of death, in that order. Ethnocentrism was measured using the American Ethnocentrism Scale (Neuliep & McCroskey, 1997; e.g., "Life in the United States is much better than in most other places" and "Most other countries are backward compared to the United States"). Subjectively assessed disease vulnerability was measured using the PVD Scale developed by Faulkner et al. (2004) (e.g., "I prefer to wash my hands soon after shaking someone's hand" and "I have a history of susceptibility to infectious diseases"). Fear of death was assessed using the Collett-Lester Fear of Death Scale (Lester, 1990; e.g., "I would avoid

death at all costs" and "I am disturbed by the shortness of life"). These scales were all measured on nine-point Likert scales. The survey concluded with a series of demographic questions regarding age, gender, citizenship, education, political orientation (liberal to conservative; 1 = liberal, 9 = conservative), and for whom the participant voted in the November 2, 2004 US presidential election.

2.2. Results and discussion

2.2.1. Measurement

To affirm the validity of the American Ethnocentrism Scale in our sample, we conducted correlational analyses between the participants' mean ethnocentrism score against their mean levels of patriotism, self-described conservatism, and whether the participant voted for the Republican candidate in the November 2004 election. The product–moment correlations between American Ethnocentrism and each of the measures were as follows: (a) patriotism: $r=.58$, $p<.0001$; (b) conservatism: $r=.48$, $p<.0001$; and (c) voted for Bush: $r=.61$, $p<.0001$.

Factor analyses for the Fear of Death scale, PVD scale, and the American Ethnocentrism scale all yielded single-factor solutions for each measure. Cronbach's α reliability ratings for the scales were .87, .80, and .91, respectively.

2.2.2. Disease vulnerability and ethnocentrism

In assessing our predictions that (1) study participants' subjectively assessed vulnerability to disease would be positively related to their level of ethnocentrism and (2) the relationship between disease vulnerability and ethnocentrism would not be explicable in terms of mortality salience, we first conducted pairwise correlations among the variables. The correlational analyses revealed that both PVD and fear of death (FOD) were positively associated with ethnocentrism (PVD: $r=.28$, $p=.009$; FOD: $r=.24$, $p=.02$). Not surprisingly, PVD and FOD were also correlated ($r=.22$, $p=.04$), raising the possibility that the relationship between PVD and ethnocentrism may indeed be caused by the mortality-salient nature of disease vulnerability.

To explore whether death fears are at the root of the relationship between disease vulnerability and ethnocentrism, we conducted a partial correlation analysis where ethnocentrism was the dependent variable and PVD and FOD were the independent covariates. Consistent with our expectations, the results of the analysis revealed that even when the effects of death fears were partialled out ($r=.19$, $p=.07$), PVD was significantly correlated with ethnocentrism (PVD partial $r=.23$, $p=.03$).

These results provide further evidence for the hypothesis that PVD predicts prejudicial attitudes. The generalizability of this conclusion is enhanced by the facts that (a) these findings replicate those of Faulkner et al. (2004) in a somewhat different cultural and environmental context than that in which the authors conducted their studies and (b) a different measure of intergroup bias was used, one which captures both out-group avoidance and in-group attraction. Of key importance, these results are not explicable in terms of psychological processes that may be elicited by the mortality-salient nature of disease. In sum, these results are consistent with our claim that subjectively assessed vulnerability to

pathogens can be viewed as an adaptively patterned feature of the mind that provides the individual with the emotive and attitudinal tools both to avoid categories of individuals posing a disease threat and to seek out others who may offer much needed coalitional support when pathogen threats arise. We test this last claim more pointedly in the next study.

3. Study 2

As in our first study, we wanted to confirm that intergroup attitudes change as a function of disease salience in a subject sample obtained outside of a university context using a broad sample of Internet users. In our second study, we extend the evidence that psychological mechanisms that vary with respect to chronic individual differences may be similarly responsive to temporal situational variables. As Faulkner et al. (2004) note, contextual information that implies increased vulnerability to pathogens might also amplify avoidance of categories of people associated with disease. Even when the contextual stimuli do not explicitly implicate out-group members as the cause, they may nevertheless trigger negative responses to out-groups as a heuristic form of pathogen avoidance. This leads to the prediction that intergroup attitudes should be sensitive to both chronic individual differences and temporally manipulated disease-relevant stimuli; we test this hypothesis as well in the present study.

In testing these hypotheses, we wanted to use related but different measures from those employed by Faulkner et al. (2004)—measures that speak more directly to the constructs that contact our theoretical claims. Consistent with our premise that in-group attraction is an important adaptive response to disease threat, we hypothesize that the psychological mechanisms responsible for pathogen avoidance will also generate in-group positivity. Therefore, we used two dependent measures of intergroup attitudes that explicitly distinguish positivity toward the in-group from negativity toward the out-group in order to unambiguously examine the effects of disease threat on each construct. In order to clarify the measurement of these concepts, we used participants' evaluations of (1) an in-group member who praises the in-group and (2) an out-group member critical of the in-group.

At least as importantly, we also employed the use of an independent variable that goes deeper than merely assessing individuals' subjectively assessed, conscious perceptions of vulnerability to disease. One could argue that such explicit assessments of the robusticity of one's immune system may be too far removed from the hypothesized mechanisms posited by the disease-avoidance model—a model that assumes the existence of computational machinery devoted to the detection of heuristic cues of pathogen threat. Given that the emotional experience of disgust can be interpreted as a psychological signal indicating some immediate threat of contamination or contagion, we hypothesized that disgust might act as the visceral cue that provides the motivation for changes in intergroup attitudes and behavioral prophylaxis. Therefore, we used a measure of disgust sensitivity towards semantically described yet emotionally laden, potentially pathogen-rich behaviors or circumstances—the Disgust Scale (Haidt, McCauley, & Rozin, 1994).

3.1. Methods

3.1.1. Participants

Recruitment and exclusionary criteria were identical to those in Study 1. Data were collected during the months of November and December of 2004. As in Study 1, participation was anonymous, and no compensation was offered. Four hundred seventy-eight people began the survey. Data for 224 participants were excluded from the analyses, resulting in a final sample of 254 participants (72 men and 182 women), ranging in age from 18 to 64 years (M=25.2, S.D.=9.3).

3.1.2. Materials and procedure

Participants were initially presented with the two patriotism questions described in Study 1. Participants were randomly assigned to one of two conditions: participants assigned to the disgust-salient experimental condition were presented with 21 questionnaire items with potential disgust eliciting content extracted from the Disgust Scale (Haidt et al., 1994); and participants in the control condition did not complete the disgust items, and instead, were directed immediately to the dependent measures.

The Disgust Scale includes items such as "I probably would not go to my favorite restaurant if I found out that the cook had a cold" and "You are about to drink a glass of milk when you smell that it is spoiled." Since social psychological research has shown that intergroup bias can occur when one's corporeal death is made salient, and the Disgust Scale includes several items that measure disgust towards death-related themes (potentially priming death related thoughts), the death-related items were removed.

To assess intergroup attitudes, participants read and evaluated two essays. The first essay presented the negative opinions of a foreigner critical of the United States and its citizens, and the second essay presented a positive appraisal of the United States and its values, putatively written by an American citizen. Following each essay, participants were prompted with items from the Interpersonal Judgment Scale (IJS; Byrne, 1971). Participants were asked on a nine-point scale (−4 to +4) to what extent they thought the author was likeable, intelligent, knowledgeable, moral, mentally well adjusted, and truthful and the extent to which the participant would want to work with the author. The scale was anchored at a neutral value of 0, with the numerical values corresponding to specific appraisals of negativity (e.g., "I would definitely not like to work with the author") and positivity (e.g., "I would definitely like to…"). The survey concluded with a series of demographic questions.

3.2. Results

3.2.1. Measurement

The variables of intergroup bias were calculated as follows: in-group attraction for each participant was measured by calculating the mean IJS score for each participant toward the pro-American author. Since the scale was anchored at zero (0), this produced a numerical score that indicated the extent to which participants positively evaluated the in-group over and above a neutral score. Out-group negativity was calculated in an identical fashion, with

the exception that the measure was directed toward the anti-American foreigner. This yielded a score that measured the extent to which participants negatively rated the out-group below a level of neutrality.

Reliability tests on the IJS scales for the pro- and anti-American targets produced Cronbach's reliability ratings of .89 and .80, respectively. Chronic disgust sensitivity was assessed using the participant's mean score on the Disgust Scale (α=.82).

To increase the confidence that our dependent variables were in fact measuring some degree of identification with America as an in-group, we conducted correlational analyses between the sum of the two patriotism items and the two dependent measures. The product–moment correlations between patriotism and each of the measures were as follows: (a) in-group attraction: r=.27, p<.0001; (b) out-group negativity: r=−.39, p<.0001.

Mean levels of in-group attraction and out-group negativity were significantly above and below the level of neutrality on the IJS scale (see column totals in Table 1), suggesting that we were in fact measuring differently valenced assessments between the two constructs. When compared in terms of the difference between their raw IJS averages, in-group attraction (M=6.5, S.D.=1.1) was greater than out-group negativity (M=4.0, S.D.=1.5) (t=12.64, p<.0001). Likewise, the mean distance between in-group attraction and the neutral point on the scale was greater than the mean distance away from neutrality for out-group negativity (t=10.91, p<.0001). In-group attraction and out-group negativity were correlated (r=−.24, p<.0001).

3.2.2. Temporal disease salience and intergroup bias

Contrasts between the experimental condition and the control revealed that exposure to the Disgust Scale increased participants' overall attraction toward the American target but that the increase in negativity toward the foreigner did not reach significance (Table 1).

3.2.3. Chronic disgust sensitivity and intergroup bias

To assess the prediction that chronic disgust sensitivity towards potential vectors of pathogens would be related to intergroup bias, we tested the relationship between the disgust sensitivity and the intergroup attitudes scores for the 126 participants in the experimental condition who completed the Disgust Scale. Consistent with our predictions, our analyses revealed that disgust sensitivity was positively correlated with in-group attraction (r=.29, p=.0008) and predicted more negativity toward the out-group (r=−.24, p=.006).

Table 1
Results of analyses with descriptive statistics for Study 2

	In-group attraction				Out-group negativity				
Condition	*M*	S.D.	*β*	t	*M*	S.D.	*β*	t	*n*
Control	1.47	1.35	–	13.29**	−.21	1.88	–	−.85	127
Experimental condition	1.88	1.14	.32	2.55*	−.41	1.86	−.11	1.27	126
Total	1.67	1.26	–	21.07**	−.31	1.87	–	−2.63*	253

t Statistics for the control group and the combined totals reflect contrasts against a value of zero (neutrality). β and *t* for the experimental condition are compared to the control. Values for in-group attraction and out-group negativity range from −3.1 to 4, and −4 to 3.6, respectively. *p<.01., ** p<.001.

3.3. Discussion

Study 2 demonstrated that disgust sensitivity towards semantic primes indexing potential avenues of disease transmission is correlated with intergroup bias when measured as a chronic individual difference trait. Employing different independent and dependent measures from those used by Faulkner et al. (2004), this study replicates, in a broad sample of US Internet users, the basic finding that both temporal and chronic disease salience are related to negativity towards foreigners, although the temporal effect did not reach significance for out-group negativity.

We extended these basic findings to show that the attractiveness of in-groups significantly increases as a function of chronic and temporal disease salience. As measured on the Disgust Scale, participants' disgust sensitivity scores reliably predicted their preference for an American target over a foreign one, and these scores were positively correlated with participants' attraction to the American target. Likewise, after exposure to the Disgust Scale, participants increased their preference for the American over the foreigner and increased their attraction to the American when compared to baseline levels of participants in a control group.

4. General discussion

Taken together with the findings of other researchers (Faulkner et al., 2004; Park et al., 2003; Schaller, 2003), our results provide evidence that intergroup bias is, in part, moderated by features of the mind designed to enact approach and avoidance mechanisms for negotiating adaptive intergroup relations in a way that would attenuate disease threat. These mechanisms allow for a kind of coalitional computation that predisposes people to negatively evaluate individuals who, by virtue of their categorization as out-group members, are perceived to be potential carriers of pathogens or parasites. Importantly, these findings are not explicable in terms of psychological processes that putatively buffer existential death anxiety, nor are they likely to be due to the negative valence properties of disease salience.

Going beyond previous work in this area, our studies provide evidence indicating that the response to situations of possible pathogen transmission is not limited to an "avoidant" psychology of negativity toward out-group foreignness but also includes an "approach" psychology directed towards in-groups, making it more likely that individuals could garner the social support needed for either staying healthy, recovering from illness, or staying safe from predators or conspecifics when one might be particularly vulnerable to harm.

It is known that self-report measures of disgust sensitivity have only modest correlations with behavioral measures of this trait (Rozin, Haidt, McCauley, Dunlop, & Ashmore, 1999). To be sure, similar limitations may apply to declarative assessments of perceived vulnerability to disease when compared with actual immunovulnerability. Accordingly, with the caveat that constraints on the ecological validity of our measures may be such that our results should be considered preliminary, taken together, our findings are consistent with the contention that humans possess psychological mechanisms that shape reactions to adaptive challenges in

ways that would have been fitness-enhancing under ancestral conditions. Specifically, human psychological mechanisms both motivate prophylactic behavior aimed at reducing exposure to disease and adjust behavior as a function of the need to improve one's chances of receiving coalitional support, generating output in the form of attitudes congruent with the culture of the group with which one identifies.

In agreement with Faulkner et al. (2004), we would like to point out that our approach in no way precludes the role of experience, social learning, and cultural evolution (sensu Boyd & Richerson, 1985) in the development of the psychological mechanisms responsible for the intergroup attitudes and emotions that function to allay disease threat. Through direct experience and socially transmitted history, cultures could come to the conscious or nonconscious knowledge that the most virulent pathogen threats often come from out-group members and that an individually adaptive response could mean avoiding out-groups and embracing the in-group. This information could then be passed down intergenerationally, becoming a part of the collective unconscious implicitly socialized as part of normal developmental processes wherein individuals inherit this knowledge but may have no idea whence its origin. Because of the adaptive utility of this information, selection operating at the cultural group level would then make it likely that the psychology of individuals living in extant groups would reflect the association between disease threat and intergroup attitudes.

Whether the psychological mechanisms posited here are products of domain-general learning mechanisms operating on information that emerged through cultural evolution or reliably develop from a psychological system designed by natural selection to address the specific adaptive challenge of disease threat, we believe that a disease-avoidance perspective provides a potentially rich source of hypotheses concerning the cognitive and emotional underpinnings of intergroup relations. This approach may also be of some utility in reaching a more general understanding of group or culturally shared conventions, beliefs and moral systems, and why violations of socially shared moral norms might be connected to moral emotions such as disgust (Rozin, Haidt, & McCauley, 1999). Moral violations are often not violations of some objective code of universal ethics but of group-based convention (Haidt, Koller, & Dias, 1993). Out-group members often violate norms because of their lack of familiarity with them or their lack of motivation to conform to them. Since norm violators are often foreigners, and, as our research suggests, the categorization of "foreigner" is psychologically connected to the emotion of disgust, disease-avoidance mechanisms may have given rise to the association between norm violations and feelings of disgust. Such speculations suggest that the scope of investigations addressing disease threat, emotions, and intergroup relations is potentially large indeed.

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