Title: Infectious disease prevalence, not race exposure, predicts implicit and explicit racial prejudice across the USA

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Abstract: What factors increase racial prejudice? Across the US, increased exposure to Black Americans has been hypothesized to increase White Americans' prejudicial attitudes towards Black Americans. Here we test an alternative explanation: People living in regions with higher infectious disease rates have a greater tendency to avoid out-groups because such avoidance reduces their perceived likelihood of contracting illnesses. Consistent with this parasite-stress hypothesis, we show that both White and Black individuals (N > 77,000) living in US states in which disease rates are higher, display increased implicit (automatic) and explicit (conscious) racial prejudice. These results survived the inclusion of several individual and state level controls previously used to explain variability in prejudice. Furthermore, showing disease-related primes to White individuals with strong germ aversion increased their explicit, but not implicit, anti-Black/pro-White prejudice. Domestic out-groups, not just foreigners, may therefore experience increased overt forms of prejudice when disease rates are high.

Keywords: Parasite Stress Theory, Behavioral Immune System, Implicit Association Test, Racial Prejudice, Bayesian Racism

Word Count: 4,971

Infectious diseases have been a leading cause of human death worldwide throughout much of history, and hence strategies to minimize their impact have evolved (Dobson & Carper, 1996; Jones et al., 2008). One such strategy is an immunological response to salient threats - the immune system reacts to protect itself from invading pathogens (Chaplin, 2010). Other strategies, such as hypervigilance towards out-groups, reflect the operation of the Behavioral Immune System (BIS) which evolved to protect an individual from exposure to infectious diseases and potentially threatening stimuli (e.g., decaying food or infected individuals: Murray & Schaller, 2016; Schaller & Park, 2011). Based on the BIS framework, the parasite-stress hypothesis (Thornhill & Fincher, 2014) predicts that: (a) people will tend to avoid apparently infected individuals (Crandall & Moriarty, 1995; Kurzban & Leary, 2001), and (b) increasing disease salience (e.g., with disease-related picture primes) will increase prejudice towards groups that are associated with diseases (e.g., old people: Duncan & Schaller, 2009; Park, Faulkner, & Schaller, 2003; Park, Schaller, & Crandall, 2007), especially among those with high germ aversion (Makhanova, Miller, & Maner, 2015).

The parasite-stress hypothesis also predicts that people exposed to more diseases will avoid, and express more negative attitudes towards, dissimilar others such as people with foreign accents (Reid et al., 2012) or from distant regions (Faulkner, Schaller, Park, & Duncan, 2004; Navarrete & Fessler, 2006) because of their potentially different pathogens. Lastly, it predicts that when infectious diseases are salient, increased prejudice will be expressed towards groups with different physical features (e.g., skin color) even if these groups are from the local region because individuals treat unfamiliar appearance as an infectious disease cue.

For example, if a White American encounters a Black American and a Black Briton at a bus stop, they will likely classify both as out-group members (Cosmides, Tooby, & Kurzban,

2003). This disaffiliation classification will become more pronounced when disease rates are high, and hence expressions of prejudice will increase towards out-group members. If the two Black individuals initiate a conversation, the White American can then use another feature (accent) to reassess these individuals' group membership. Consequently, if disease rates are low, the Black American may get reclassified as an ingroup member relative to the Black Briton, but if disease rates are high, both Black individuals will likely remain out-group members. To our knowledge, the prediction that disease prevalence may explain variability in prejudice across the US has never been tested. Instead, researchers have mainly used race exposure as the crucial variable to account for variability in race related prejudice across the US (Putnam, 2007; Rae, Newheiser, & Olson, 2015; Taylor, 1998).

According to one idea about variation in prejudice - the contact hypothesis (MacInnis & Page-Gould, 2015; Pettigrew & Tropp, 2006) - increased exposure to out-groups reduces prejudice towards those groups. Consistent with this hypothesis, Black individuals in US states who have more contact with White people are *less* prejudiced towards Whites (Rae et al., 2015). However, inconsistent with the contact hypothesis, White individuals who have more contact with Black Americans are *more* prejudiced towards Blacks (Putnam, 2007; Rae et al., 2015; Taylor, 1998). But why is there this discrepancy between Blacks' and Whites' attitudes towards their outgroups? Post-hoc explanations have used differential group status (i.e., Whites' higher status position relative to Blacks' position across the US) as a potential mechanism for this discrepancy (Rae et al., 2015). For example, exposure to more low status members in society is expected to generate greater animosity towards those members (Rae et al., 2015), while being exposed to more higher status group members is believed to increase positive dispositions towards them (e.g., Jost, Banaji, & Nosek, 2004).

Crucially from a parasite-stress perspective, disease rates are typically higher in US states that have more Black Americans (Eppig, Fincher, & Thornhill, 2011; Hotez, 2008) due, in part, to more warm and humid climates in those states. Additionally, Black Americans have higher rates of infectious diseases relative to White Americans (Richardus & Kunst, 2001). The increased anti-Black prejudice typically shown by White Americans in states with large Black populations may, therefore, reflect the operation of an adaptive BIS which is stronger than any prejudice-reducing effects of contact. Here, our first study contrasts the race exposure prediction with the parasite-stress prediction, and tests whether race exposure or parasite stress is better at predicting increases in race-related prejudice across the US for both Black and White respondents (Study 1). An experimental study (Study 2) was also used to test the prediction that being primed with diseases increases anti-Black/pro-White prejudice among White participants, especially for those with strong germ aversion.

Study 1

We used a secondary dataset from Project Implicit which had over 1.5 million participants. The dataset included measures of individuals' explicit (conscious) attitudes and implicit (automatic) associations towards racially-defined in-groups and out-groups. An advantage of examining implicit as well as explicit attitudes is that participants may behave in a socially desirable manner when reporting attitudes explicitly; such tendencies are especially problematic when socially sensitive topics such as racial prejudice are concerned (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). The current study used similar dependent variables and covariables as Rae et al. (2015), with an additional parasite stress independent variable (rates of infectious disease) and a Bayesian racism dependent variable included. The added benefit of our approach, in comparison to Rae et al. (2015), is that we used multilevel analysis rather than simple linear

regression of aggregated state-level scores. Multilevel analysis groups individual responses, which provides a more nuanced analysis because individuals' variability in responding within a region is considered, in addition to regional variation (Pollet, Tybur, Frankenhuis, & Rickard, 2014).

Method

Participants: The sample consisted of volunteers who completed the Race Implicit Association Test (IAT) on the Project Implicit website (https://implicit.harvard.edu/implicit/) between 2006 and 2013. We used these years because in 2006 Project Implicit added a racial identifying question and data were only available up to 2013 when the analysis began. Analyses were restricted to Black and White participants within the 50 US states because these were the focal groups in the Race IAT. We used standard IAT analytic procedures to remove inappropriate IAT scores (Greenwald, Nosek, & Banaji, 2003) which resulted in approximately 2% of the sample being removed. To facilitate reporting, we performed separate analyses on White (N > 355,000) and Black respondents (N > 77,000) within the US (see supplementary Table 1 for a full description of demographics). The large sample size ensures strong statistical power. The dataset we used is available for public use (https://osf.io/y9hiq/: see Xu, Nosek, & Greenwald, 2014, for details).

Materials & Procedure

Implicit bias: All participants completed the Race IAT with "African American" and "European American" as the category labels and "Good" and "Bad" as the valence labels. These labels appeared at the top of the screen. The stimuli included greyscale pictures of Black and White individuals as well as positive (e.g., Glorious, Wonderful) and negative (e.g., Terrible, Horrible) words. These stimuli were presented successively to participants at the center of their screen. On each trial, participants were required to sort the stimulus into the appropriate category using the correct key press. If a correct response was given, the stimulus disappeared, and a new stimulus

appeared after 400 milliseconds (ms). If an incorrect response was given, a red "X" appeared directly below the stimulus and both remained until the correct response was given.

In one of the two critical blocks, participants had to press the E key on a computer keyboard if a "good" word or a picture of a White person appeared and press the I key if a "bad" word or a picture of a Black person appeared. In the other critical block, participants pressed E if a "good" word or a picture of a Black person was shown and pressed I key for a "bad" word or a picture of a White person. The order of the sorting task was randomized across participants. The assumption underlying the IAT is that participants will make faster and more accurate responses when those responses are congruent with their current beliefs than when they are not. Participants' implicit biases were measured using IAT *D*-scores (Greenwald et al., 2003).

Explicit (bipolar) bias: Participants used a 7-point Likert scale to respond to the question "Which statement best describes you?": (1) I strongly prefer African Americans to European Americans – (4) I like European Americans and African Americans Equally – (7) I strongly prefer European Americans to African Americans. A relative explicit feeling thermometer score was also calculated by subtracting the Black feeling thermometer score (0 = coldest feelings, 5 = neutral, 10 = warmest feelings) from the White feeling thermometer score. This explicit feeling thermometer dependent variable showed similar results to the explicit bipolar score (see supplementary materials). Participants that completed these explicit questions also completed the Race IAT.

The *Bayesian racism scale* (Uhlmann, Brescoll, & Machery, 2010) is a 15-item measure that measures beliefs relating to the appropriateness of discriminating against individuals based on stereotypes about their racial group. The scale does not specifically refer to Black and White Americans and therefore, it measures racism towards several racial groups (e.g., Asians, Native

Americans, Arabs, etc.). The scale includes items such as "When the only thing you know about someone is their race, it makes sense to use your knowledge of their racial group to form an impression of them" and "If it will increase profits, it makes sense to use statistics about the performance of different racial groups". Each item was rated on a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). Each participant in the sample was randomly allocated between 1 – 4 items from the possible 15. Therefore, we created a composite score based on the items the respondents answered and we followed an approach used by Bianchi (2016), who used the same dataset[1]. For each item, a z-score was derived, and then the composite score was created by averaging the z-scores for each item a participant responded to. Most of the participants that completed the items from the Bayesian racism scale also completed the explicit questions and the Race IAT.

Disease rates across US states: Fincher and Thornhill (2012) developed a measure of disease rates across the 50 US states. This measure aggregates all infectious diseases reported by the US Centers for Disease Control (CDC; available at www.cdc.gov) for the years 1993 to 2007 for each state, divides the number of diseases by state population, and transforms the result into a z-score thus representing a disease prevalence score for each state[2].

Control variables: For the US state analysis, five individual level control variables were used. These included political ideology (1 = strongly liberal to 7 = strongly conservative), religious

[1] Comparable findings emerge when we calculated each participant's mean score.

[2] Shrira, Wisman, & Webster (2013) developed a measure that only included the 8 most common infectious diseases across the 50 US states. The results of analyzes using this measure were similar to those using Fincher and Thornhill's (2012) disease measure reported here.

belief (1 = not at all religious to 4 = strongly religious), gender (dummy coded: 0 = female & 1 = male), age and education level (dummy coded: 0 = as far as completion of high school, 1 = any educational accreditation after high school). For the US analysis, the state level controls included median income (logged), state inequality, land population density per square mile, whether a state was previously part of the Confederacy, the percentage of US citizens, non-Black to White exposure and race exposure (Black to White exposure). Median income, inequality, population density, percentage citizens, non-Black to White exposure and race exposure used the American Community Survey 5-year estimates (2008-2012)[3].

Race Exposure: Based on the acknowledgment by Rae et al., (2015, p.537) that their race exposure index "may seem incomplete as an index of exposure to racial out-groups as it ignores the possibility that apparently diverse locales may be divided into homogeneous subregions", we developed a race exposure index that estimated both race diversity and segregation within a state. Focusing exclusively on diversity or segregation within a region cannot adequately capture race exposure (Holloway, Wright, & Ellis, 2012), hence the necessity for our new race exposure index. To create our state level race exposure index, we used the logged ratio of White Americans living in a state relative to Black Americans (see Alba, Rumbaut, & Marotz, 2005; Rae et al., 2015) and then this ratio was multiplied by 1-(state segregation/100). State segregation scores ranged from 0 (complete integration) to 100 (complete segregation) where the value indicates the percentage of Black Americans within a state that would need to move for them to be distributed exactly like White Americans (e.g., as the percentage of Black people needing to move decreases, state

[3] A reviewer indicated that overall government expenditure for each state, but especially health care expenditure could better explain variability in racial prejudice. Regardless, the effects of parasite stress remain robust when these two variables are added to the model.

segregation scores decrease, see https://www.psc.isr.umich.edu/dis/census/segregation.html; Frey & Myers, 2005). Therefore, lower scores on the Race Exposure index indicate more Black exposure for both White and Black respondents while also accounting for state segregation scores. In Supplementary Tables 8-17 we present alternative analyses using different methods to estimate effects of out-group exposure; results largely support parasite-stress theory. For the non-Black to White exposure index, we could not accurately estimate segregation because of the multiple racial groups included. Therefore, this index only used the number of White Americans living in a state relative to non-Black Americans.

Analysis: We used multilevel analysis. We grouped participants by US state; we used the SPSS linear mixed model function, and the model included a random intercept term at the US state level. We conducted three separate analyses, and the dependent variables for each analysis were Race IAT D-scores, explicit (bipolar) bias scores and Bayesian racism scale scores. We added all the independent variables included in the model as fixed effects. We used z-scores throughout to allow for comparisons of the relative magnitude differences between the independent variable's fixed effects estimates.

Results

Consistent with the parasite-stress hypothesis, the multilevel analysis revealed that White participants (N > 702,000) residing in states with higher disease prevalence showed a greater anti-Black/pro-White bias in both their implicit (t = 3.87, p < .001) and explicit attitudes (t = 4.90, p < .001, Figure 1A and Figure 1B). This finding survived the inclusion of controls for individual level variables (age, gender, education, political ideology, religious belief) and state level variables (median income, inequality, race exposure, population density, confederate state). Also, Black participants (N > 149,000) living in states with higher disease rates showed a greater anti-

White/pro-Black bias. This effect held for both implicit (t = -4.29, p < .001) and explicit attitudes (t = -5.02, p < .001) even after the control variables were included (Figure 2A and Figure 2B). Finally, in line with parasite-stress theory and after applying the controls, both White (N = 356,561) and Black (N = 77,173) participants living in states with higher disease rates displayed stronger Bayesian racism (t = 5.83, p < .001, t = 5.12, p < .001, Figure 1C and Figure 2C, respectively). In Tables 1 – 3 we present the full models, including all the individual and state level controls, of disease rates predicting implicit and explicit prejudice for both White and Black participants including Bayesian racism (see Supplementary Table 2 - 7 for additional statistical information). Readers can find details of the results concerning the individual and remaining state level controls, including all the additional analyses mentioned above, in the supplementary materials.

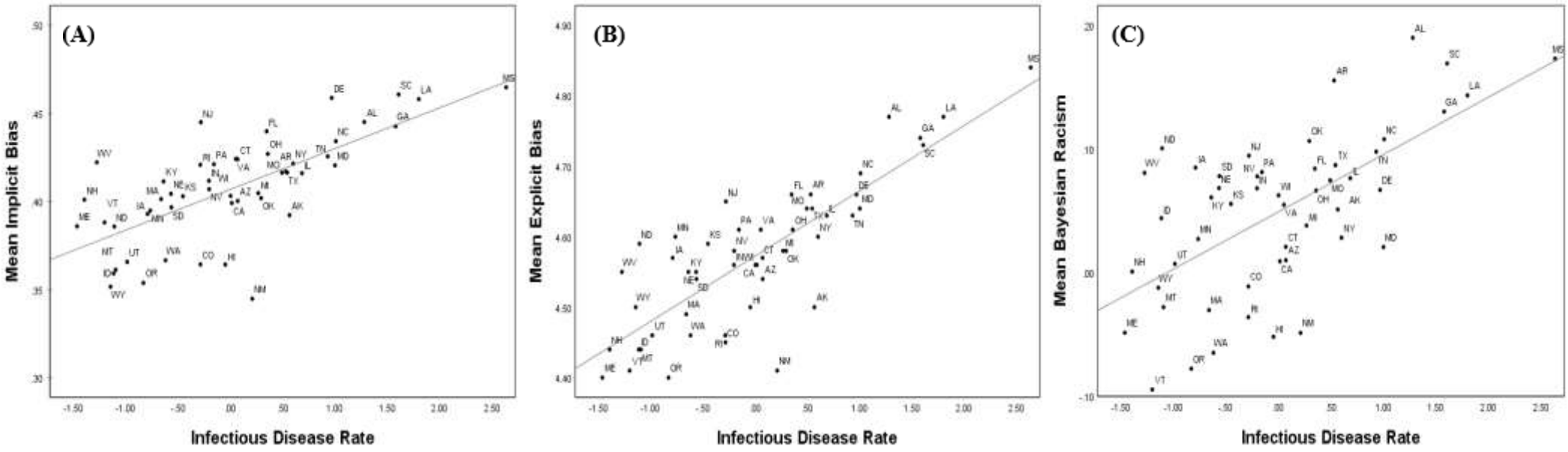

Figure 1: White respondents' state level mean implicit **(A),** explicit **(B)** and Bayesian racism **(C)** scores as predicted by rates of infectious diseases after controlling for 5 individual and 7 state level controls, with a line of best fit included. Scores were coded such that higher numbers indicate a greater anti-Black/outgroup prejudice.

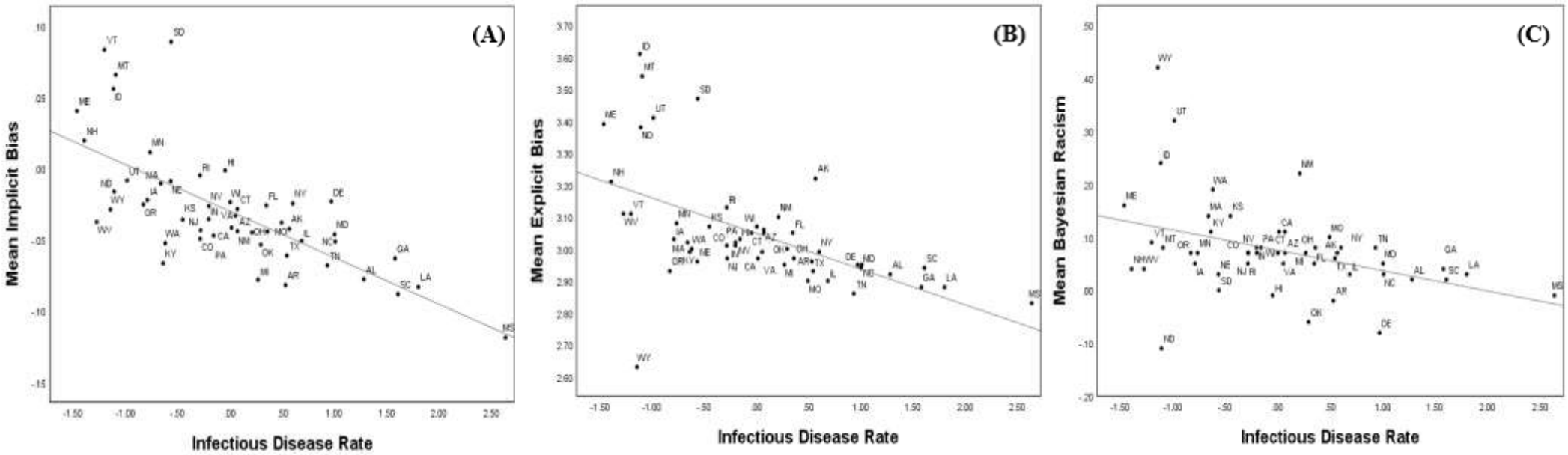

Figure 2: Black respondents' state level mean implicit **(A),** explicit **(B)** and Bayesian racism (**C**) scores as predicted by rates of infectious diseases after controlling for 5 individual and 7 state level controls, with a line of best fit included. Scores were coded such that lower numbers indicate greater anti-White/outgroup prejudice.

Table 1: Summary of Multilevel Analysis for Variables Predicting US State Level Scores for White Participants.

Predictor	White Implicit Attitudes (N = 735,119)			White Explicit Attitudes (N = 702,815)		
	B(est.)	*SE B*	*t*	*B(est.)*	*SE B*	*t*
Disease Rates	**0.019**	**0.003**	**6.270*****	**0.065**	**0.011**	**5.900*****
Political Ideology	0.023	0.000	74.919***	0.104	0.001	143.310***
Religious Belief	-0.012	0.001	-22.593***	-0.056	0.001	-43.843***
Gender	0.023	0.001	23.553***	0.177	0.002	77.668***
Age	0.000	0.000	4.560***	0.001	0.000	12.636***
Education	-0.005	0.001	-4.594***	0.076	0.003	30.464***
Median Income	0.038	0.049	0.769	0.077	0.178	0.432
State Inequality	0.161	0.173	0.933	0.282	0.634	0.445
Population Density	0.000	0.000	3.674**	0.000	0.000	0.557
Confederate State	0.001	0.007	0.186	-0.012	0.026	-0.461
Percentage Citizens	0.001	0.001	0.848	0.002	0.004	0.420
Non-Blacks to Whites	0.046	0.010	4.718***	0.086	0.033	2.616*
Race Exposure	-0.005	0.010	-0.531	-0.067	0.036	-1.890

Note: For the dependent variables, *higher* numbers indicate a greater anti-Black/pro-White bias. For the independent variables, higher numbers on each variable indicate more diseases, conservatism, more religious, male, older, more education, higher income, more inequality, higher population density, a non-confederate state, more US citizens, more White relative to non-Black exposure, more White relative to Black exposure. Individual level controls are in italics.

†p<.10, *p<.05, **p<.01, ***p<.001.

Table 2: *Summary of Multilevel Analysis for Variables Predicting US State Level Scores for Black Participants.*

Predictor	Black Implicit Attitudes (N = 155,038)			Black Explicit Attitudes (N = 149,551)		
	B (est.)	*SE B*	*t*	*B (est.)*	*SE B*	*t*
Disease Rates	**-0.017**	**0.004**	**-3.958*****	**-0.053**	**0.011**	**-4.758*****
Political Ideology	-0.002	0.001	-2.435*	0.048	0.002	20.298***
Religious Belief	-0.012	0.001	-9.352***	-0.050	0.004	-12.747***
Gender	0.015	0.002	6.149***	0.173	0.007	23.811***
Age	-0.002	0.000	-20.580***	-0.012	0.000	-40.125***
Education	0.017	0.002	6.784***	-0.081	0.007	-10.976***
Median Income	0.121	0.072	1.672	-0.068	0.194	-0.352
State Inequality	-0.134	0.232	-0.578	-0.301	0.614	-0.490
Population Density	0.000	0.000	-0.174	0.000	0.000	1.065
Confederate State	-0.008	0.008	-0.935	-0.030	0.022	-1.371
Percentage Citizens	0.000	0.002	0.032	-0.002	0.004	-0.374
Non-Blacks to Whites	0.003	0.018	0.143	-0.025	0.051	-0.498
Race Exposure	0.010	0.014	0.722	0.095	0.036	2.661*

Note: For the dependent variables, *lower* numbers indicate a greater anti-White/pro-Black bias. For the independent variables, higher numbers on each variable indicate more diseases, conservatism, more religious, male, older, more education, higher income, more inequality, higher population density, a non-confederate state, more US citizens, more White relative to non-Black exposure, more White relative to Black exposure. Individual level controls are in italics.

†p<.10, *p<.05, **p<.01, ***p<.001.

Table 3: *Summary of Multilevel Analysis for Variables Predicting US State Level Scores.*

Predictor	White Bayesian Racism (*N* = 356,561)			Black Bayesian Racism (*N* = 77,173)		
	B (est.)	*SE B*	*t*	*B (est.)*	*SE B*	*t*
Disease Rates	**0.038**	**0.008**	**5.049*****	**0.030**	**0.007**	**4.159*****
Political Ideology	0.082	0.001	81.051***	0.053	0.002	21.345***
Religious Belief	-0.027	0.002	-14.913***	0.019	0.004	4.531***
Gender	0.109	0.003	34.287***	0.082	0.008	10.745***
Age	-0.004	0.000	-28.255***	-0.002	0.000	-5.938***
Education	-0.062	0.003	-17.808***	-0.056	0.008	-7.187***
Median Income	-0.221	0.121	-1.820	-0.109	0.129	-0.842
State Inequality	-0.092	0.423	-0.217	-0.280	0.380	-0.738
Population Density	0.000	0.000	1.726	0.000	0.000	1.685
Confederate State	0.000	0.017	-0.013	0.000	0.012	0.019
Percentage Citizens	0.002	0.003	0.871	-0.002	0.003	-0.541
Non-Blacks to Whites	0.044	0.026	1.670	-0.028	0.040	-0.691
Race Exposure	-0.002	0.024	-0.078	0.026	0.020	1.329

Note: For the dependent variables, *higher* numbers indicate stronger Bayesian Racism. For the independent variables, higher numbers on each variable indicate more diseases, conservatism, more religious, male, older, more education, higher income, more inequality, higher population density, a non-confederate state, more US citizens, more White relative to non-Black exposure, more White relative to Black exposure. Individual level controls are in italics.

†p<.10, *p<.05, **p<.01, ***p<.001.

Discussion

This study is the first to show that disease rates predict both implicit and explicit racial prejudice among both White and Black respondents across the USA. Even when controlling for race exposure, previously purported to increase implicit and explicit racial prejudice across the US (Rae et al., 2015), we find that disease rates consistently predicted increases in racial prejudice while race exposure did not. Furthermore, disease rates remained the best (most consistent across all the analyses) environmental factor predicting racial prejudice after all the remaining control variables used in Rae et al. (2015) were included in the analysis. The substantial impact that the individual level factors have on prejudice should also be acknowledged (see supplementary materials).

Study 2

Prior research has shown that being exposed to White faces results in White participants liking Black people less (Smith, Dijksterhuis, & Chaiken, 2008) and being exposed to faces from a different race reduces negative biases towards that race (Zebrowitz, White, & Wieneke, 2008). These findings are difficult to reconcile with Rae et al.'s, (2015) race exposure findings, and consequentially, the face exposure findings are more in line with contact hypothesis. To date, no research has used an experimental approach to test the hypothesized causal link between disease prevalence and racial prejudice. In this pre-registered replication (https://osf.io/fwse8/) of Supplementary Study (SS) 1, we hypothesized that White participants primed with disease images will show higher levels of anti-Black/pro-White biases compared with participants primed with control images (furniture and buildings). We also included a terror threat priming condition because previous research has shown that such priming can increase prejudice, conservative worldviews (Van de Vyver, Houston, Abrams, & Vasiljevic, 2016), and aggressive thoughts

(Benjamin, Kepes, & Bushman, 2018). This condition allowed us to test whether any threat to a persons' life increased racial prejudice or if the effect (if present) is specific to disease threats. Our second hypothesis aimed to extend SS2 by showing that an individual's perceived vulnerability to disease (PVD; Duncan & Schaller, 2009) (especially an individual's germ aversion, Makhanova et al., 2015) will moderate the disease threat priming effects, such that those with high germ aversion will show stronger explicit and implicit prejudice compared to those with low germ aversion.

Method

Participants: The final sample included 588 US Amazon Mechanical Turk (MTurk) participants (275 were male). Each participant was randomly allocated to either the control (202), disease threat (184) or the terror threat condition (202). The mean age of the sample was 42.75 years (SD = 12.85), and 543 participants had at least a college diploma. The sample was slightly religious (M = 1.94, SD = 1.07) and politically moderate (M = 4.32, SD = 1.85). See https://osf.io/fwse8/ for all exclusion criteria, data, and materials.

Materials

Demographic information: We collected participants' gender, age, race, country of residence, state of residence, educational level, political ideology, and religious belief via an online questionnaire.

Disease, terror and control images: The disease threat images consisted of 30 images of mold, feces, and people with infections. We sourced 20 of the images from previous research that used pathogen primes (Schaller, Miller, Gervais, Yager, & Chen, 2010; Wu & Chang, 2012). 10 of these images had White individuals with chicken pox, cuts or who were coughing or sneezing etc. 10 images of Black individuals with infections/diseases were added and closely matched the

10 images of White people. The remaining 10 images were non-human such as mold and feces. The control images included 15 images of buildings and 15 images of single furniture items against a white background. For the terror threat condition, 30 images of terrorist attacks (e.g., 9/11, Madrid's ETA bombings) were used and were matched for the proportion of Black and White individuals across the set. For the three conditions, the order of the images was the same for each participant, and this order was maintained for the two-time points when the images were shown.

Prime feedback: To ensure the disease and terror threat primes differed from the control primes, participants had to respond to the questions "How unpleasant or disturbing did you find the images?", "How disgusted did the images make you feel?", and "How fearful did the images make you feel?" Each item used a 1-7 Likert scale, and higher scores indicate more aversive responses. The full results from these analyses can be found in the supplementary materials. In summary, for all three questions, the mean scores on each question were significantly different from one another ($ts > 2.64$, $ps < .009$) across the three priming conditions. Terror threats consistently showed the highest scores for all three of the questions, followed by disease threat and the control condition showed the lowest unpleasantness, disgust and fear responses.

The *PVD* scale (Duncan & Schaller, 2009) is a 15-item measure addressing participants' perceived vulnerability to infectious diseases. The PVD scale has two subscales: Perceived Infectability (PI, $\alpha = .92$) and Germ Aversion (GA, $\alpha = .76$), with each item using a 1-7 Likert scale. The PI subscale measures an individual's perception of their likelihood of contracting an infection and includes items such as "If an illness is going around, I will get it" and "My immune system protects me from most illnesses that other people get". The GA subscale measures an individual's fear of encountering potential pathogens and includes items such as "I prefer to wash my hands pretty soon after shaking someone's hand" and "It does not make me anxious to be

around sick people". Previous research has shown GA, but not PI, to increase the likelihood of White participants categorizing Black individuals as more dissimilar to them (Makhanova et al., 2015) and GA to increase explicit, but not implicit, pro-White/anti-Black prejudice (see SS2).

Implicit and explicit biases: The exact same IAT, explicit (bipolar) question, and explicit feeling thermometer questions used by Project Implicit described in Study 1 above, were used in the current study (Study 2). We calculated the relative explicit feeling thermometer score by subtracting the Black feeling thermometer score from the White feeling thermometer score.

Procedure: The design included a between-subject variable called prime type that had three levels: control, disease threat, and the terror threat. To begin the online experiment, participants had to verify they were consenting adults. Next, they completed demographic information and were randomly allocated to one of the three priming conditions. Participants were then presented with a set of images related to their priming condition. They scrolled through these images for as long as they wanted but a minimum of 30 seconds elapsed before participants could continue to the explicit questions.

Following these questions, participants viewed the same images previously shown for at least another 30 seconds and had to complete the three priming questions below all the images. Then they completed the Race-IAT. Next, participants responded to a memory question to ensure they viewed the images, followed by the PVD scale and finally, they were thanked and debriefed. The full experiment can be viewed at http://psychologyboss.com/SPPS2019/tdc.html

Results

Our first hypothesis did not directly replicate SS1. Using a one-way between subject ANOVA, the main effects of prime-type (control, terrorism, disease) for IAT D-scores, explicit bipolar scores, and the explicit thermometer scores were not significant ($Fs < 1.18$, $ps > .31$).

However, our second hypothesis did directly replicate SS2. Using PROCESS (Hayes, 2017) to test for moderating effects, the predicted interactions between prime-type and GA for the explicit bipolar scores (t = 2.09, p = .04), and the explicit feeling thermometer scores (t = 2.76, p < .01) were significant (see Table 4 and Figure 3 for the model predicting the explicit feeling thermometer scores). As shown in Figure 3, participants in the disease prime-type condition with high GA showed the strongest anti-Black/pro-White biases. Importantly, these interactions were only shown for the GA subscale and not the PI subscale or Total PVD scale. This interaction likely only occurred for GA because as expected, GA is more strongly related to prejudice (see Table 5 for the correlational analysis of the variables used in Study 2). Like SS2, the significant interaction between condition and GA did not extend to the implicit IAT D-scores (t = 0.64, p = .52).

Table 4: *Linear model of predictors of explicit prejudice (explicit thermometer scores)*

Predictor	*B (est.)*	*SE B*	*t*	*p*	*95% CI Lower*	*95% CI Upper*
Constant	1.870	0.932	2.006	.045	0.039	3.701
Prime-type	-0.993	0.428	-2.323	.021	-1.833	-0.153
Germ Aversion	-0.251	0.213	-1.181	.238	-0.668	0.166
Prime-type × Germ Aversion	0.2672	0.097	2.758	.006	0.077	0.457

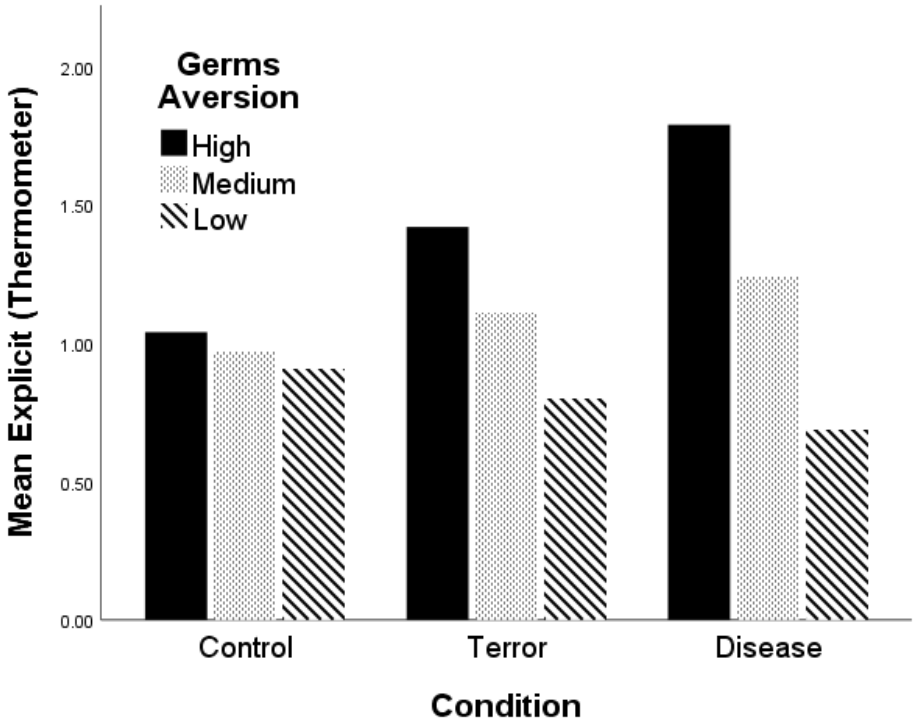

Figure 3: Bar chart of the regression of explicit anti-Black/pro-White biases at three levels of GA across the three conditions in Study 2.

Table 5: Correlational matrix of the variables in study 2

	IAT	Explicit Bipolar	Explicit Thermometer	Gender	Age	Political	Religion	Perceived Infectability	Germ Aversion	PVD Total
IAT	—									
Explicit (Bipolar)	0.285***	—								
Explicit (Thermometer)	0.259***	0.790***	—							
Gender	0.059	0.060	0.071	—						
Age	0.120**	0.052	0.042	-0.093*	—					
Political	0.182***	0.280***	0.306***	0.107**	0.134**	—				
Religiosity	0.118**	0.089*	0.083*	-0.069	0.145***	0.439***	—			
Perceived Infectability	0.049	0.084*	0.019	-0.152***	-0.085*	-0.080	-0.017	—		
Germ Aversion	0.108**	0.155***	0.155***	-0.137***	-0.017	0.033	0.116**	0.324***	—	
PVD Total	0.093*	0.143***	0.099*	-0.178***	-0.066	-0.035	0.054	0.849***	0.774***	—

Note: High scores on the IAT and explicit measures indicate a stronger anti-Black/pro-White bias, as well as stronger germ aversion and perceived infectability. Political ideology: 1=Strongly Liberal to 7= Strongly Conservative. Religious belief: 1= not at all religious to 4= strongly religious. Gender: 0 = Female, 1 =Male.

* p < .05, ** p < .01, *** p < .001

Discussion

This pre-registered study is the first to show that infectious disease primes increase explicit, but not implicit, anti-Black/pro-White biases among White participants with strong germ aversion (GA). A weaker but similar trajectory was also shown in the terror threat condition, even though participants rated the terror primes as evoking more fear and disgust than the disease primes. This finding further emphasizes the impact that diseases can have on explicit prejudice. This study did not directly replicate Supplementary Study (SS)1 in which the disease primes increased both implicit and explicit anti-Black/pro-White biases. The major differences between the current study and SS1 are: (1) the current study used paid MTurk participants versus Reddit volunteers, (2) the MTurk participants were older and less liberal than the Reddit sample and lastly, (3) the MTurk sample here contained only US participants whereas the Reddit sample SS1 did not restrict nationality (41% of the sample were not from the US). Importantly, the current study did directly replicate SS2's findings.

General Discussion

Our findings are consistent with the hypothesis that living in regions with higher disease rates (Study 1), especially among those with strong GA (Study 2) will increase anti-out-group/pro-in-group racial prejudice. Both Black and White residents in US states with higher disease rates displayed stronger Bayesian racism as well as racial prejudice at both the implicit and explicit level. These effects remained after controlling for important individual and state level factors often used to explain prejudice. For example, greater diversity (Putnam, 2007) and conflict over limited resources (Baumeister & Bushman, 2010; Carvacho et al., 2013) have previously been used to explain racial prejudice in the US. However, compared with race exposure, percentage of US citizens, non-Black to White race exposure (a proxy for diversity), median income and inequality

(a proxy for limited resources), infectious disease rates were the best and most consistent environmental predictor of implicit and explicit prejudice and Bayesian racism.

Although the individual level variables in Study 1 showed stronger overall effects than the state level variables in each of the analyses, no consistent patterns emerged for the individual level variables for both the White and Black respondents in terms of their implicit, explicit and Bayesian racism scores. Importantly, none of the individual level factors completely explained all the variance in each analysis and therefore, future work should consider infectious disease rates when developing models of prejudice. Similarly, none of the state level factors, apart from disease rates, showed any consistent pattern when predicting racial prejudice (see supplementary materials for full details).

A core argument of this paper is that a third untested variable (i.e., infectious diseases) causes the association between Black race exposure and higher racial prejudice among White people across the US, reported by Rae et al., (2015). However, we still cannot rule out the possibility that another untested variable better explains the association between infectious disease rates and racial prejudice. The experimental findings showing that disease/infection primes increase anti-Black/pro-White biases among White individuals (SS1), especially those with strong GA (Study 2 and SS2), strengthens our correlational findings, yet caution is necessary. SS1 showed the effect for only White participants, and Study 2 and SS2 showed it only on the explicit scales for White participants with strong GA. We would expect similar findings for Black participants, such that those with strong germ aversion will show increased anti-White/pro-Black biases when primed with disease images. It would be beneficial for future work to show this effect.

Additionally, implicit prejudice is linked to more subtle forms of prejudice, while explicit prejudice is often related to more overt forms of prejudice (Ajzen, Fishbein, Lohmann, &

Albarracín, 2018). Therefore, the experimental studies indicate that disease threats may increase more observable forms of aggression or disdain towards racial outgroups, especially for those with high GA. This disdain has the potential to lead to policies (i.e., segregation and reduced medical expenditure/research) that could exacerbate health inequalities between minority and non-minority groups (Nelson, 2002). These inequalities could further increase infectious disease rates, especially among disadvantaged groups.

Our studies underline the importance of parasite-stress theory and behavioral immune system research by demonstrating that infectious diseases are an influential factor in explaining variability in racial prejudice across the US. We expect that contact with outgroups will have the most beneficial effects when infectious diseases are low. Conversely, if outgroup contact occurs when infectious disease rates are high, comparable outcomes to the negative-contact literature are expected (i.e., negative contact will weigh more than positive contact resulting in more racial prejudice: Barlow et al., 2012; Graf, Paolini, & Rubin, 2014). Our research also suggests that disease outbreaks (e.g., Ebola; Beall, Hofer, & Schaller, 2016; Inbar, Westgate, Pizarro, & Nosek, 2016; Kim, Sherman, & Updegraff, 2016) might be an important contributor to heightened prejudice towards ethnic out-groups. Similarly, refugees and undocumented immigrants often originate from regions with high disease rates which could be vital in explaining the race-motivated attacks or social segregation that these groups often experience.

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Acknowledgments: This research was supported by a Department of Psychology PhD Studentship from the University of Warwick, and an EU Marie Curie Global Fellowship (No.794913) awarded to B. O'Shea. The authors would like to thank members of Mahzarin Banaji's lab for their useful discussions relating to this work, Osiris Rankin, and Steve Durack for feedback on early drafts of the manuscript. Datasets are available at (https://osf.io/hyxyz/).

Supplementary materials:

Table S1: Demographic characteristics of the participants from Project Implicit's Race IAT (Years: 2006-2013)

	White US Respondents (*N*= 1,213,085)		Black US Respondents (*N*=225,556)	
Characteristic	*N*	%	*N*	%
Political Identification (M±SD)	3.72 ± 1.68		3.53 ± 1.48	
Religiosity				
Not at all Religious	124,212	10.20	13,826	6.10
Slightly Religious	308,447	25.40	45,629	20.20
Moderately Religious	313,282	25.80	85,686	38.00
Strongly Religious	134,659	11.20	50,756	22.60
Missing	332,485	27.40	29,659	13.10
Gender				
Female	693,685	57.20	147,573	65.40
Male	513,665	42.30	76,913	34.10
Missing/Other	5,735	0.50	1,070	0.50
Age in Years (M±SD)	27.58 ± 12.20		29.41 ± 11.63	
Education				
High School Graduate or below	723,054	59.60	141,080	62.50
Anything above High School	480,413	39.60	82,437	36.50
Missing	9,618	0.80	2,039	0.90
Reason for Visiting Project Implicit				
Assignment for School	409,645	33.80	85,354	37.80
Recommendation of Teacher	54,737	4.50	12,057	5.30
Recommendation of Friend	33,816	2.80	5,283	2.30
Other	280,530	23.20	47,079	21.00
Missing	433,357	35.70	75,783	33.60

Table S2: Summary of Multilevel Analysis for Variables Predicting US State Level Implicit Bias Scores Among White Participants (*N* = 735,119).

Predictor	*B (est.)*	*SE B*	*df*	*t*	*95% CI Lower*	*95% CI Upper*
Intercept	0.401	0.002	38.005	191.913***	0.397	0.405
Disease Rates	**0.019**	**0.003**	**47.396**	**6.270*** **	**0.013**	**0.025**
Political Ideology	0.038	0.001	733094.207	74.919***	0.037	0.039
Religious Belief	-0.011	0.001	715974.430	-22.593***	-0.012	-0.010
Gender	0.011	0.000	735087.492	23.553***	0.010	0.012
Age	0.002	0.001	730527.784	4.560***	0.001	0.003
Education	-0.002	0.001	733577.513	-4.594***	-0.003	-.001
Median Income	0.002	0.003	45.197	0.769	-0.004	0.008
State Inequality	0.003	0.003	42.644	0.933	-0.003	0.009
Population Density	0.010	0.003	44.491	3.674**	0.004	0.015
Confederate State	0.000	0.002	41.064	0.186	-0.004	0.005
Percentage Citizens	0.004	0.004	49.363	0.848	-0.005	0.012
Non-Blacks to Whites	0.013	0.003	79.655	4.718***	0.008	0.019
Race Exposure	-0.001	0.002	43.441	-0.531	-0.006	0.003

Note: For the dependent variable, *higher* numbers indicate a greater anti-black/pro-white bias. For the independent variables, higher numbers on each variable indicate more diseases, conservatism, more religious, male, older, more education, higher income, more inequality, higher population density, a non-confederate state, more US citizens, more white relative to non-black exposure, more white relative to black exposure. Z-scores were used to allow for comparisons of the relative magnitude differences between the independent variables fixed effects estimates. Individual-level controls are in italics.

†p<.10, *p<.05, **p<.01, ***p<.001.

Table S3: Summary of Multilevel Analysis for Variables Predicting US State Level Explicit Bias Scores Among White Participants (*N* = 702,815).

Predictor	*B (est.)*	*SE B*	*df*	*t*	*95% CI Lower*	*95% CI Upper*
Intercept	4.545	0.008	44.691	580.876***	4.529	4.561
Disease Rates	**0.065**	**0.011**	**50.009**	**5.900*** **	**0.043**	**0.087**
Political Ideology	0.171	0.001	702612.360	143.310***	0.169	0.173
Religious Belief	-0.052	0.001	700053.291	-43.843***	-0.054	-0.050
Gender	0.088	0.001	702812.309	77.668***	0.085	0.090
Age	0.015	0.001	702217.728	12.636***	0.013	0.018
Education	0.038	0.001	702694.814	30.464***	0.035	0.040
Median Income	0.005	0.011	48.406	0.432	-0.017	0.026
State Inequality	0.005	0.011	47.329	0.445	-0.017	0.027
Population Density	0.005	0.010	48.222	0.557	-0.014	0.025
Confederate State	-0.004	0.009	46.392	-0.461	-0.022	0.014
Percentage Citizens	0.006	0.015	50.592	0.420	-0.024	0.037
Non-Blacks to Whites	0.025	0.009	66.831	2.616*	0.006	0.043
Race Exposure	-0.015	0.008	47.878	-1.890	-0.031	0.001

Note: For the dependent variable, *higher* numbers indicate a greater anti-black/pro-white bias. For the independent variables, higher numbers on each variable indicate more diseases, conservatism, more religious, male, older, more education, higher income, more inequality, higher population density, a non-confederate state, more US citizens, more white relative to non-black exposure, more white relative to black exposure. Z-scores were used to allow for comparisons of the relative magnitude differences between the independent variables fixed effects estimates. Individual-level controls are in italics.

†p<.10, *p<.05, **p<.01, ***p<.001.

Table S4: Summary of Multilevel Analysis for Variables Predicting US State Level Bayesian Racism Among White Participants (*N* = 356,561).

Predictor	*B (est.)*	*SE B*	*df*	*t*	*95% CI Lower*	*95% CI Upper*
Intercept	0.018	0.005	36.868	3.607**	0.008	0.028
Disease Rates	**0.038**	**0.008**	**50.526**	**5.049*** **	**0.023**	**0.053**
Political Ideology	0.135	0.002	355388.243	81.051***	0.132	0.138
Religious Belief	-0.025	0.002	344362.991	-14.913***	-0.028	-0.021
Gender	0.054	0.002	356501.091	34.287***	0.051	0.057
Age	-0.047	0.002	353716.456	-28.255***	-0.050	-0.043
Education	-0.031	0.002	355554.403	-17.808***	-0.034	-0.027
Median Income	-0.013	0.007	48.407	-1.820	-0.028	0.001
State Inequality	-0.002	0.007	43.372	-0.217	-0.017	0.013
Population Density	0.011	0.007	46.046	1.726	-0.002	0.024
Confederate State	0.000	0.006	41.510	-0.013	-0.012	0.012
Percentage Citizens	0.009	0.011	54.810	0.871	-0.012	0.031
Non-Blacks to Whites	0.013	0.008	102.068	1.670	-0.002	0.027
Race Exposure	0.000	0.005	44.327	-0.078	-0.011	0.010

Note: For the dependent variable, *higher* numbers indicate stronger Bayesian Racism. *Note:* For the independent variables, higher numbers on each variable indicate more diseases, conservatism, more religious, male, older, more education, higher income, more inequality, higher population density, a non-confederate state, more US citizens, more white relative to non-black exposure, more white relative to black exposure. Z-scores were used to allow for comparisons of the relative magnitude differences between the independent variables fixed effects estimates. Individual-level controls are in italics.

*p<.05, **p<.01, ***p<.001.

Table S5: Summary of Multilevel Analysis for Variables Predicting US State Level Implicit Bias Scores Among Black Participants (*N* = 155,038).

Predictor	*B (est.)*	*SE B*	*df*	*t*	*95% CI Lower*	*95% CI Upper*
Intercept	-0.029	0.003	36.856	-9.333***	-0.036	-0.023
Disease Rates	**-0.017**	**0.004**	**42.580**	**-3.958*** **	**-0.025**	**-0.008**
Political Ideology	-0.003	0.001	155026.593	-2.435*	-0.006	-0.001
Religious Belief	-0.011	0.001	154729.024	-9.352***	-0.014	-0.009
Gender	0.007	0.001	155024.766	6.149***	0.005	0.010
Age	-0.025	0.001	154207.103	-20.580***	-0.028	-0.023
Education	0.008	0.001	154742.092	6.784***	0.006	0.011
Median Income	0.008	0.005	49.172	1.672	-0.002	0.017
State Inequality	-0.002	0.003	40.660	-0.578	-0.009	0.005
Population Density	-0.001	0.004	41.370	-0.174	-0.008	0.007
Confederate State	-0.003	0.004	30.071	-0.935	-0.011	0.004
Percentage Citizens	0.000	0.006	50.280	0.032	-0.012	0.012
Non-Blacks to Whites	0.001	0.005	140.512	0.143	-0.009	0.010
Race Exposure	0.002	0.003	34.449	0.722	-0.004	0.008

Note: For the dependent variable, *lower* numbers indicate a greater anti-white/pro-black bias. For the independent variables, higher numbers on each variable indicate more diseases, conservatism, more religious, male, older, more education, higher income, more inequality, higher population density, a non-confederate state, more US citizens, more white relative to non-black exposure, more white relative to black exposure. Z-scores were used to allow for comparisons of the relative magnitude differences between the independent variables fixed effects estimates. Individual-level controls are in italics.

*p<.05, **p<.01, ***p<.001.

Table S6: Summary of Multilevel Analysis for Variables Predicting US State Level Explicit Bias Scores Among Black Participants (*N* = 149,551).

Predictor	*B (est.)*	*SE B*	*df*	*t*	*95% CI Lower*	*95% CI Upper*
Intercept	3.052	0.008	28.507	370.313***	3.035	3.069
Disease Rates	**-0.053**	**0.011**	**31.816**	**-4.758*** **	**-0.076**	**-0.030**
Political Ideology	0.078	0.004	149526.550	20.298***	0.071	0.086
Religious Belief	-0.047	0.004	148860.425	-12.747***	-0.054	-0.039
Gender	0.086	0.004	149506.359	23.811***	0.079	0.093
Age	-0.149	0.004	147645.693	-40.125***	-0.156	-0.141
Education	-0.040	0.004	148959.553	-10.976***	-0.047	-0.033
Median Income	-0.004	0.013	37.595	-0.352	-0.030	0.021
State Inequality	-0.004	0.009	29.975	-0.490	-0.023	0.014
Population Density	0.010	0.010	30.302	1.065	-0.009	0.030
Confederate State	-0.013	0.010	21.773	-1.371	-0.033	0.007
Percentage Citizens	-0.006	0.016	37.711	-0.374	-0.038	0.026
Non-Blacks to Whites	-0.007	0.014	108.018	-0.498	-0.034	0.020
Race Exposure	0.021	0.008	23.641	2.661*	0.005	0.037

Note: For the dependent variable, *lower* numbers indicate a greater anti-white/pro-black bias. For the independent variables, higher numbers on each variable indicate more diseases, conservatism, more religious, male, older, more education, higher income, more inequality, higher population density, a non-confederate state, more US citizens, more white relative to non-black exposure, more white relative to black exposure. Z-scores were used to allow for comparisons of the relative magnitude differences between the independent variables fixed effects estimates. Individual-level controls are in italics.

†p<.10, *p<.05, **p<.01, ***p<.001.

Table S7: Summary of Multilevel Analysis for Variables Predicting US State Level Bayesian Racism Among Black Participants (*N* = 77,173).

Predictor	*B (est.)*	*SE B*	*df*	*t*	*95% CI Lower*	*95% CI Upper*
Intercept	-0.069	0.005	25.086	-13.061***	-0.080	-0.059
Disease Rates	**0.030**	**0.007**	**19.811**	**4.159***	**0.016**	**0.044**
Political Ideology	0.086	0.004	77099.086	21.345***	0.079	0.094
Religious Belief	0.017	0.004	75370.295	4.531***	0.010	0.025
Gender	0.041	0.004	77098.303	10.745***	0.033	0.048
Age	-0.023	0.004	74295.424	-5.938***	-0.031	-0.015
Education	-0.028	0.004	75409.778	-7.187***	-0.035	-0.020
Median Income	-0.007	0.008	22.522	-0.842	-0.024	0.009
State Inequality	-0.004	0.006	16.171	-0.738	-0.015	0.007
Population Density	0.010	0.006	19.105	1.685	-0.002	0.022
Confederate State	0.000	0.005	11.440	0.019	-0.010	0.010
Percentage Citizens	-0.006	0.010	20.572	-0.541	-0.026	0.015
Non-Blacks to Whites	-0.007	0.011	57.149	-0.691	-0.028	0.014
Race Exposure	0.006	0.004	10.687	1.329	-0.003	0.014

Note: For the dependent variable, *higher* numbers indicate stronger Bayesian Racism. For the independent variables, higher numbers on each variable indicate more diseases, conservatism, more religious, male, older, more education, higher income, more inequality, higher population density, a non-confederate state, more US citizens, more white relative to non-black exposure, more white relative to black exposure. Z-scores were used to allow for comparisons of the relative magnitude differences between the independent variables fixed effects estimates. Individual-level controls are in italics.

*p<.05, **p<.01, ***p<.001

Individual and state level controls (Study 1): We first describe results concerning individual-level controls. Considering first white participants across the US, conservative, less religious and older males displayed higher implicit and explicit anti-black/pro-white biases (*t*s > 4.56, *p*s < .001). All these findings are consistent with previous literature (Hodson & Dhont, 2015), except that research normally finds that amongst white participants *more* religious people express higher prejudice. Similar findings were obtained when predicting Bayesian racism scores, except that younger participants displayed more Bayesian racism. This finding might be driven by the fact that a high proportion of participants completed the Race IAT for University course credits or assessments for school (Nosek et al., 2007). In contrast, the majority of the older participants volunteered without any such incentive and hence may have had more open/less prejudicial attitudes.

Amongst black participants, older and more religious people, and females displayed stronger implicit and explicit anti-white/pro-black biases (*t*s > 6.15, *p*s < .001). At the implicit level, black conservatives showed stronger anti-white/pro-black biases ($t = 2.44$, $p < .05$), while at the explicit level, conservatives showed weaker anti-white/pro-black biases ($t = 20.30$, $p < .001$). Regarding Bayesian racism, more religious, conservative and younger black male participants showed the strongest Bayesian racism.

Focusing on implicit attitudes, less educated white respondents showed the highest prejudice towards black people ($t = -4.59$, $p < .001$), while for explicit attitudes, less educated respondents showed the lowest prejudice towards black people ($t = 30.46$, $p < .001$). For black participants, a similar change in directionality was observed for education. For example, less educated respondents displayed stronger implicit anti-white/pro-black biases ($t = 6.78$, $p < .001$), while less educated respondents expressed lower explicit anti-white/pro-black biases ($t = -10.98$,

$p < .001$). Therefore, for both black and white respondents, those with less education explicitly expressed more egalitarian views, while with the implicit measure, the opposite findings were obtained.

A post-hoc explanation for the education findings is that those with less education are more likely to live in deprived areas where they are exposed to various out-groups of a similar social status. This increased contact might reduce their explicit prejudice towards these outgroups to allow for peaceful co-existence. However, evolved survival mechanisms (e.g., disease avoidance) may be amplified in deprived environments to protect the individual and their in-group from potential threats (e.g., pathogens). The Bayesian racism results were more in line with previous literature in that less educated respondents (both black and white) displayed stronger racism.

Now turning our attention to the state level controls, we find that white participants living in states with higher population densities displayed stronger implicit anti-black/pro-white biases. Being in close proximity to others requires people to interact out of necessity rather than personal choice and often personal space is violated (Veitch & Arkkelin, 1995). These effects can heighten stress and may contribute to the higher implicit prejudice shown. However, since population density did not increase prejudice in any other analysis, it is unlikely to be a crucial factor in understanding race relations across the US.

Consistent with the contact hypothesis (MacInnis & Page-Gould, 2015; Pettigrew & Tropp, 2006), black participants living in states where exposure-to-whites is higher, showed weaker explicit anti-white/pro-black biases ($t = 2.66$, $p = .014$). Race exposure did not influence the implicit or the Bayesian racism scores, of either the black or white participants and the explicit scores of white participants. These findings strongly challenge the notion that race exposure increases prejudice.

For only white participants and only on the implicit and explicit dependent measures, we find that respondents living in regions that would expose them to more non-black minority groups expressed weaker anti-black/pro-white prejudice. This finding might be explained using the extended contact literature (Zhou, Page-Gould, Aron, Moyer, & Hewstone, 2018), such that, knowing that in-group members have cross-group friends with minority groups, can improve attitudes toward these groups. All other state level variables were non-significant.

Table S8: Disease Rates (higher numbers indicate a greater anti-black/pro-white bias) and Race Exposure (Ratio of Whites to Blacks (logged) Accounting for Segregation (lower scores indicate more black exposure)) Predicting US State Level Scores.

Predictor	White Implicit Attitudes			White Explicit Attitudes		
	B (est.)	*SE B*	*t*	*B (est.)*	*SE B*	*t*
Disease Rates	0.018	0.004	5.02***	0.082	0.011	7.72***
Race Exposure	-0.031	0.012	-2.53*	-0.051	0.037	-1.36
-2 Log Likelihood	1063071.879			2676569.922		

†p<.10, *p<.05. **p<.01. ***p<.001.

Table S9: Disease Rates (higher numbers indicate a greater anti-black/pro-white *bias) and Race Exposure (Ratio of Whites to Blacks (not logged) Accounting for Segregation (lower scores indicate more black exposure)) Predicting US State Level Scores.*

Predictor	White Implicit Attitudes			White Explicit Attitudes		
	B (est.)	*SE B*	*t*	*B (est.)*	*SE B*	*t*
Disease Rates	0.016	0.004	4.44***	0.078	0.011	6.98***
Race Exposure	-0.001	0.000	-2.64*	-0.001	0.000	-1.76†
-2 Log Likelihood		1063079.716			2676577.039	

†p<.10, *p<.05. **p<.01. ***p<.001.

Table S10: Disease Rates (higher numbers indicate a greater anti-black/pro-white *bias) and Black Exposure (Proportion of Blacks to the Total State Population Accounting for Segregation (lower scores indicate more black exposure)) Predicting US State Level Scores.*

Predictor	White Implicit Attitudes			White Explicit Attitudes		
	B (est.)	*SE B*	*t*	*B (est.)*	*SE B*	*t*
Disease Rates	**0.005**	**0.005**	**0.93**	**0.043**	**0.016**	**2.65***
Black Exposure	**-0.406**	**0.109**	**-3.74****	**-1.114**	**0.322**	**-3.47****
-2 Log Likelihood		**1063061.002**			**2676556.432**	

Note: For Supplementary Table 8-10, scores in **bold** highlight the model with the best fit based on -2 Log Likelihood.

†p<.10, *p<.05, **p<.01, ***p<.001.

Table S11: Disease Rates (higher numbers indicate a greater anti-black/pro-white bias) and Black Exposure (Proportion of Blacks to the Total State Population Accounting for Segregation (lower scores indicate more black exposure)), including the Interaction Predicting State Level Scores.

Predictor	White Implicit Attitudes			White Explicit Attitudes		
	B (est.)	*SE B*	*t*	*B (est.)*	*SE B*	*t*
Disease Rates	**0.007**	**0.005**	**1.31**	0.045	0.016	2.84**
Black Exposure	**-0.661**	**0.137**	**-4.82*****	-1.154	0.427	-3.60**
Disease*Exposure	**0.156**	**0.056**	**2.80****	0.256	0.173	1.48
-2 Log Likelihood		**1063057.508**			2676555.925	

Note: Comparing Supplementary Table 10 (no interaction) with Supplementary Table 11 (interaction), we find that including the interaction between disease rates and black exposure improves the model. Using the conservative Schwarz's Bayesian Criterion (BIC), we show that there is strong evidence of an improved fit for the model including the interaction at the implicit level (Table 11 BIC = 1063085.22 versus Table 10 BIC = 1063088.71) but not at the explicit level (Table 11 BIC = 2676583.55 versus Table 10 BIC = 2676584.06). Therefore, the significant interaction term at the implicit level highlights the fact that white respondents living in states with higher disease rates and lower exposure to black people display a higher anti-black/pro-white prejudice. This finding is in line with contact hypothesis. Including the interaction term for black respondents did not improve the fit of the respective models.

†p<.10, *p<.05. **p<.01. ***p<.001.

Table S12: Disease Rates (higher numbers indicate a greater anti-black/pro-white bias) and Race Exposure (Ratio of Whites to Blacks (logged) Accounting for Segregation (higher scores indicate more white exposure)) Predicting US State Level Scores.

Predictor	Black Implicit Attitudes			Black Explicit Attitudes		
	B (est.)	*SE B*	*t*	*B (est.)*	*SE B*	*t*
Parasite Stress	-0.025	0.004	-6.71***	-0.076	0.011	-6.98***
Race Exposure	0.008	0.014	0.61	0.086	0.039	2.20*
-2 Log Likelihood		222945.764			603433.464	

†p<.10, *p<.05. **p<.01. ***p<.001.

Table S13: Disease Rates (higher numbers indicate a greater anti-black/pro-white bias) and Race Exposure (Ratio of Whites to Blacks (not logged) Accounting for Segregation (higher scores indicate more white exposure)) Predicting US State Level Scores.

	Black Implicit Attitudes			Black Explicit Attitudes		
Predictor	*B (est.)*	*SE B*	*t*	*B (est.)*	*SE B*	*t*
Parasite Stress	-0.021	0.004	-5.35***	**-0.054**	**0.010**	**-5.45*** **
Race Exposure	0.001	0.00	2.79**	**0.007**	**0.001**	**5.88*** **
-2 Log Likelihood		222945.439			**603411.302**	

†p<.10, *p<.05. **p<.01. ***p<.001.

Table S14: Disease Rates (higher numbers indicate a greater anti-black/pro-white bias) and White Exposure (Proportion of Whites to the Total State Population Accounting for Segregation (higher scores indicate more white exposure)) Predicting US State Level Scores.

Predictor	Black Implicit Attitudes			Black Explicit Attitudes		
	B (est.)	*SE B*	*t*	*B (est.)*	*SE B*	*t*
Parasite Stress	**-0.026**	**0.003**	**-7.76*** **	-0.083	0.010	-8.65***
White Exposure	**0.000**	**0.000**	**-0.04**	0.220	0.117	1.88†
-2 Log Likelihood		**222943.883**			603432.543	

Note: For Supplementary Table 12-14, scores in **bold** highlight the model with the best fit based on -2 Log Likelihood.

†p<.10, *p<.05, **p<.01, ***p<.001.

Table S15: Disease Rates (higher numbers indicate a greater Bayesian racism) and Race Exposure (Ratio of Whites to Blacks (logged) Accounting for Segregation (lower scores indicate more black exposure)) Predicting US State Level Scores.

Predictor	White Bayesian Racism			Black Bayesian Racism		
	B (est.)	*SE B*	*t*	*B (est.)*	*SE B*	*t*
Disease Rates	0.040	0.010	3.96***	0.035	0.007	5.40***
Race Exposure	-0.026	0.035	-0.73	-0.021	0.022	-0.93
-2 Log Likelihood		1352097.151			258722.475	

†p<.10, *p<.05. **p<.01. ***p<.001.

Table S16: Disease Rates (higher numbers indicate a greater Bayesian racism) and Race Exposure (Ratio of Whites to Blacks (not logged) Accounting for Segregation (lower scores indicate more black exposure)) Predicting US State Level Scores.

Predictor	White Bayesian Racism			Black Bayesian Racism		
	B (est.)	*SE B*	*t*	*B (est.)*	*SE B*	*t*
Disease Rates	0.040	0.011	3.69**	0.032	0.007	4.45***
Race Exposure	-0.000	0.001	-0.64	-0.000	0.001	-0.40
-2 Log Likelihood		1352105.528			258729.288	

†p<.10, *p<.05. **p<.01. ***p<.001.

Table S17: Disease Rates (higher numbers indicate a greater Bayesian racism*) and Black/White Exposure (Proportion of Blacks to the Total State Population Accounting for Segregation (lower scores indicate more black exposure for white participants)/Proportion of Whites to the Total State Population Accounting for Segregation (lower scores indicate more white exposure for black participants)) Predicting US State Level Scores.*

Predictor	White Bayesian Racism			Black Bayesian Racism		
	B (est.)	*SE B*	*t*	*B (est.)*	*SE B*	*t*
Disease Rates	**0.019**	**0.016**	**1.18**	**0.034**	**0.006**	**5.91*****
Black/White Exposure	**-0.58**	**0.326**	**-1.78†**	**0.131**	**0.064**	**2.06†**
-2 Log Likelihood	**1352090.108**			**258717.617**		

Note: For Supplementary Table 15-17, scores in **bold** highlight the model with the best fit based on -2 Log Likelihood.

†p<.10, *p<.05, **p<.01, ***p<.001.

Additional analyses: Assumption of independence (Study 1)

To test for the potential of spatial autocorrelation (i.e., scores/errors close in space are more correlated than scores/errors far in space) within the data which would violate the assumption of independence, we performed the Durbin-Watson test using linear regression and included all the state level (environmental) factors in each analysis. All the Durbin-Watson scores lay between 1.61 and 2.54 which indicates that the assumption of independence was not violated (scores should be close to 2 and not under 1 or above 3; Field, 2009).

The full analysis of the explicit thermometer results can be viewed at https://osf.io/pn2by/ under the file name 'S1 explicit therm.spv'. Free software is available online to view output files for SPSS.

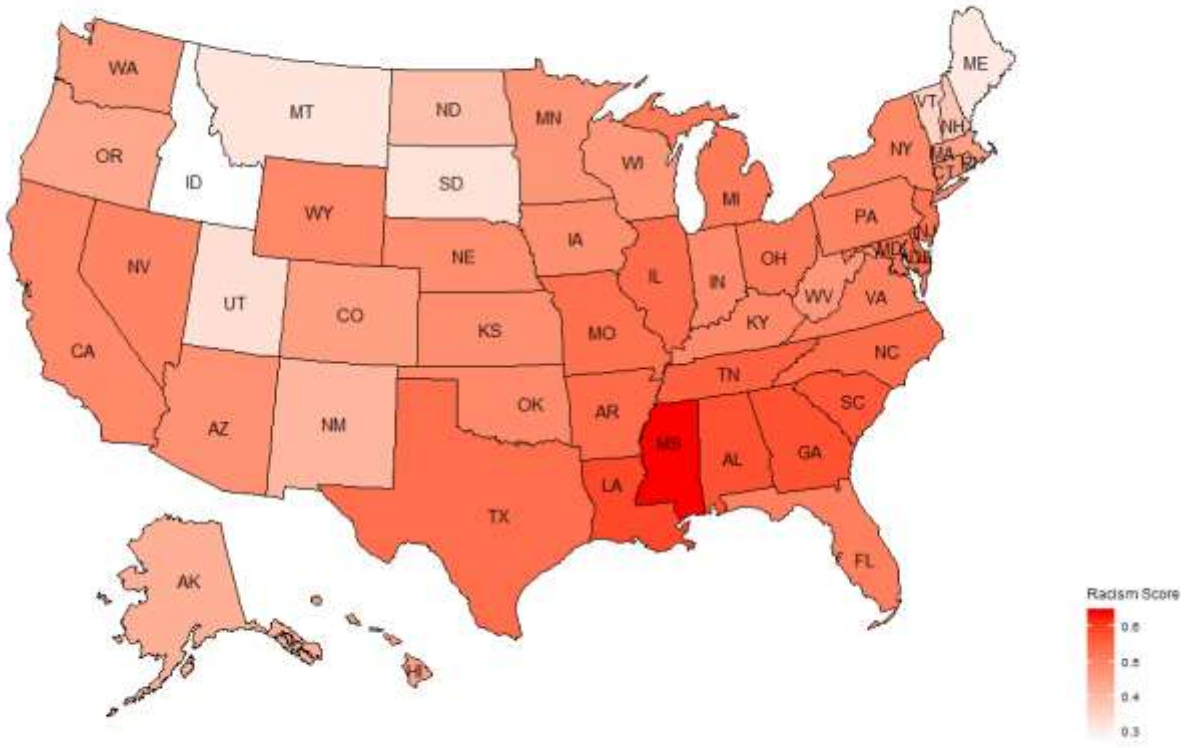

Figure S1: Each US state showing both White and Black respondent's averaged implicit (IAT) and explicit (bipolar) scores. Redder states indicate stronger anti-outgroup/pro-ingroup biases.

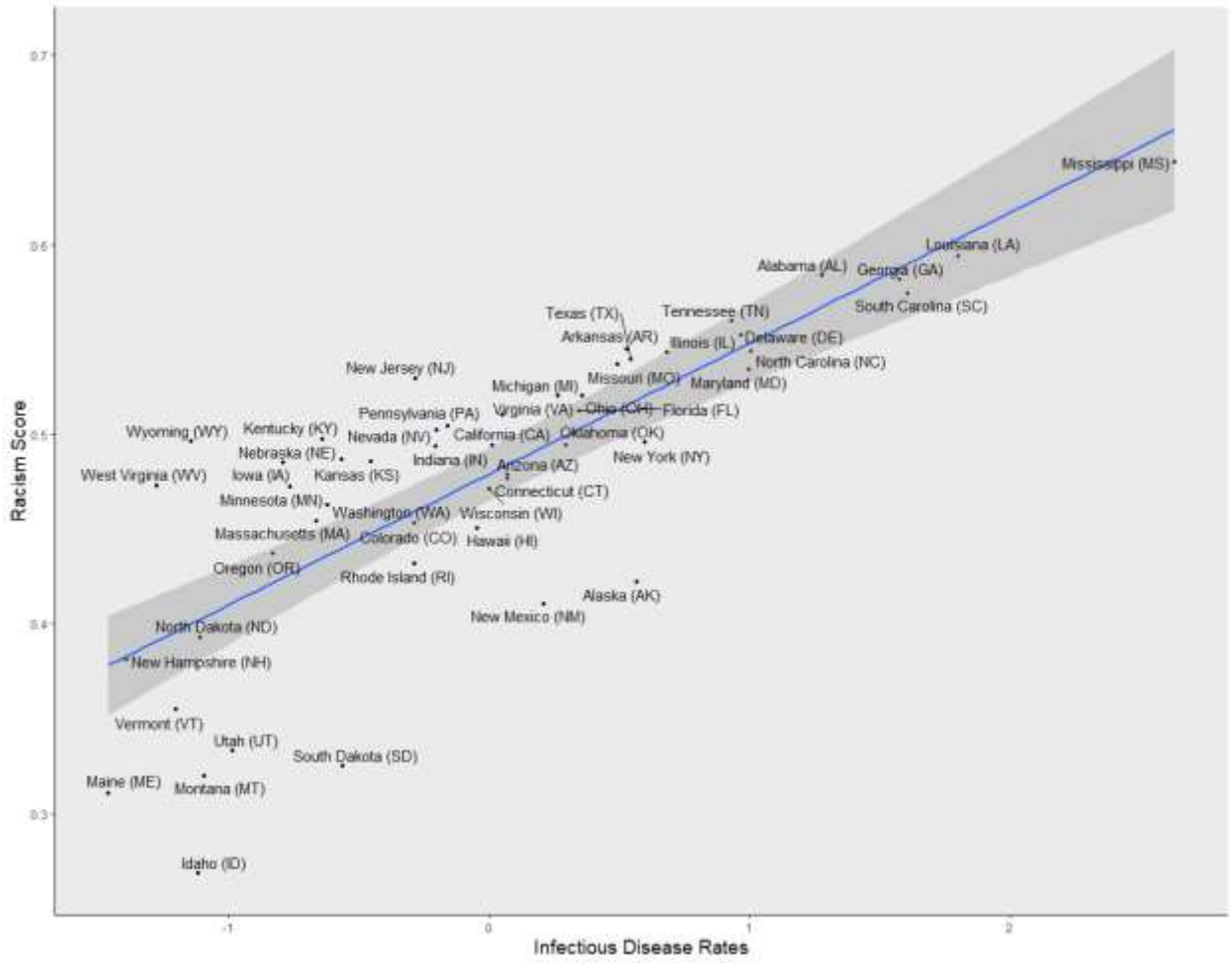

Figure S2: Both White and Black respondents' averaged implicit (IAT) and explicit (bipolar) scores in each US state predicted by infectious disease rates (Fincher & Thornhill, 2012). (r = .79).

Additional analyses: (Study 2)

The full analysis of the three prime questions can be viewed at https://osf.io/pn2by/ under the file name '3 priming questions.spv'

Table S18: *Linear model of predictors of explicit prejudice (explicit Bipolar scores)*

Predictor	*B (est.)*	*SE B*	*t*	*p*	*95% CI Lower*	*95% CI Upper*
Constant	4.852	0.451	10.758	0.000	3.966	5.738
Prime-Type (condition)	-0.355	0.207	-1.718	0.086	-0.760	0.051
Germ Aversion	-0.051	0.102	-0.499	0.618	-0.252	0.150
Prime-Type × Germ Aversion	0.094	0.047	2.014	0.045	0.002	0.186

Table S19: *Linear model of predictors of explicit prejudice (implicit IAT D-scores)*

Predictor	*B (est.)*	*SE B*	*t*	*p*	*95% CI Lower*	*95% CI Upper*
Constant	0.302	0.163	1.855	0.064	-0.018	0.622
Prime-Type (condition)	-0.04	0.075	-0.575	0.566	-0.1890	0.104
Germ Aversion	0.014	0.037	0.365	0.715	-0.059	0.087
Prime-Type × Germ Aversion	0.011	0.017	0.641	0.522	-0.022	0.044

For all the other additional analyses mentioned in the main report, see files on Open Science Framework (https://osf.io/hyxyz/).

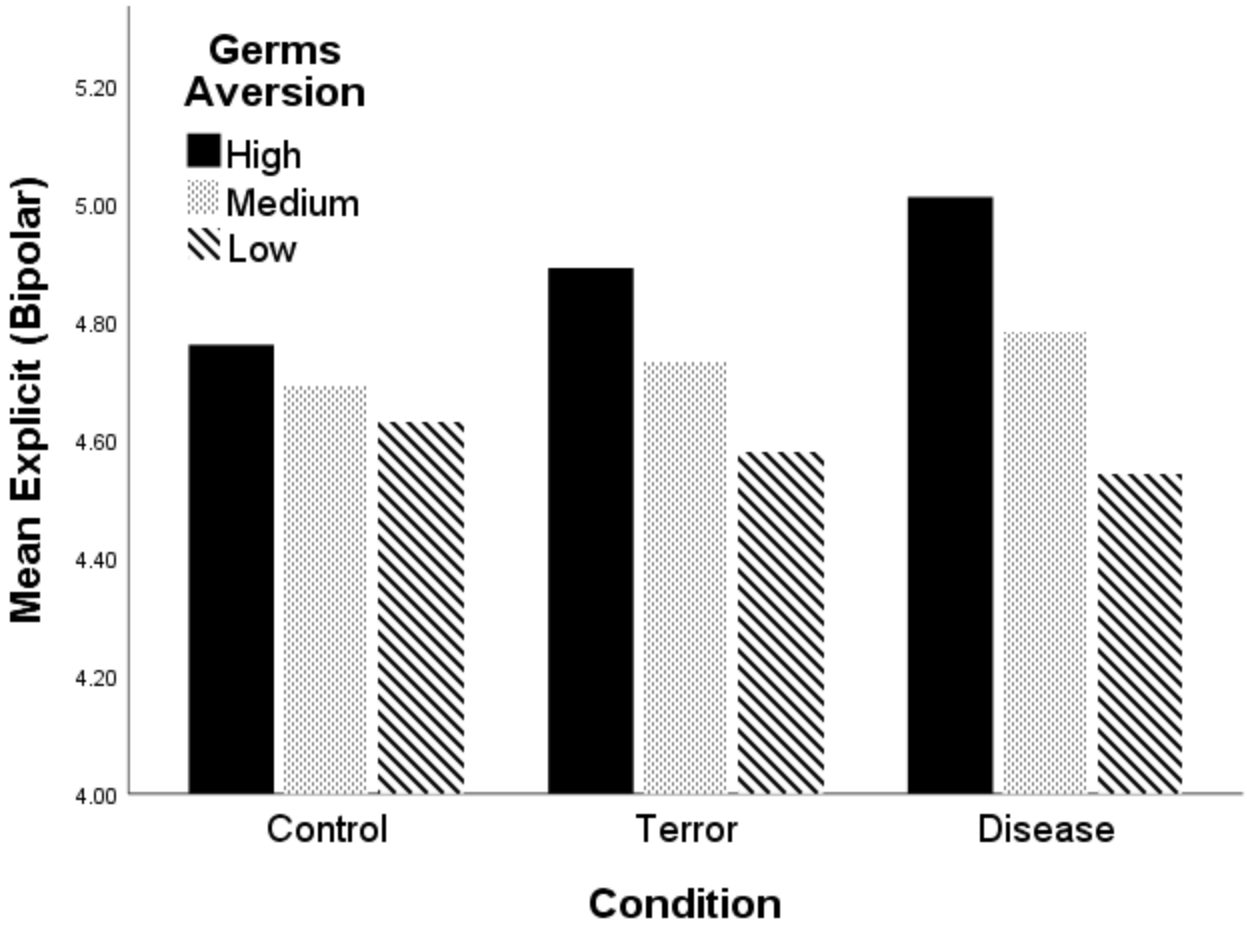

Figure S3: Bar chart of the regression of explicit (Bipolar) anti-black/pro-white biases at three levels of GA across the three prime-types in Study 2 of the main report.

Supplementary Study 1

Supplementary Study (SS)1 was collected before the pre-registered study in the main manuscript. SS1's procedure was the same as the pre-registered study, apart from one, rather than three, priming feedback question being collected, and the Private Body Consciousness (PBC) scale (Miller, Murphy, & Buss, 1981) was used instead of the Perceived Vulnerability to Disease (PVD; Duncan & Schaller, 2009) scale. The PBC scale was used because it had fewer items (5 versus 15) and the PBC scale had previously been shown to moderate the effects of disgust (Petrescu & Parkinson, 2014; Schnall, Haidt, Clore, & Jordan, 2008)

Method

Participants were recruited through a social media platform dedicated to performing online surveys or experiments (see https://www.reddit.com/r/SampleSize/; Jamnik & Lane, 2017). All participation was voluntary but, as an incentive, each participant could view their implicit bias score at the end of the experiment. Data were gathered between the 3rd of March and the 6th of April, 2016, which was based on an a priori decision to collect data for a month and that at least 100 participants were required to be in each of the three prime-types. Overall, 525 participants completed the experiment. However, 74 were removed from the final analysis because "White" was not selected as their race. A further 57 were removed because they did not respond correctly to the memory question (N=7), they had already previously completed the experiment (N=34), they selected "other" as their gender (N=12), their accuracy on the IAT was below 70% (N=2), or they responded faster than 300 ms and/or slower than 10,000 ms on >10% of the IAT trials (N=2).

The final sample included 394 participants (224 were male) and each one was randomly allocated to either the control (130 participants), disease threat (138 participants) or the terror threat condition (126 participants). 231 participants from the US completed the experiment; the remaining participants were mainly from large Western countries such as Canada, Australia and

the UK. The mean age of the sample was 24.3 years (*SD* = 6.29), and 338 participants had at least a college diploma. The sample was mainly non-religious/slightly religious (*M* = 1.39, *SD* = .81) and liberal (*M* = 2.54, *SD* = 1.48).

Materials

Demographic information: The same as Study 2 in the main report.

Implicit and Explicit biases: The same as Study 2 in the main report.

Disease, terror and control images: All the images and exposure procedure were the same as Study 2 in the main report. A one-way Analysis of Variance (ANOVA) revealed a main effect of how disturbing/unpleasant participants found the images across the three conditions (control: *M* = 1.11, *SD* = .47, terror: *M* = 4.99, *SD* = 1.21, disease: *M* = 5.04, *SD* = 1.05), $F(2, 389) = 705.69$, $p < .001$, $\eta_p^2 = .78$. LSD tests showed that both disease and terrorism images were reported as being significantly more disturbing/unpleasant than the control images, *t*s > 33.58, *p*s < .001, *d* > *4.22*. No significant difference was found between the disease and terrorism images, $t(262) = .37$, $p = .71$. Therefore, both threat conditions induced similar aversive reactions using the single item questions.

Private Body Consciousness (PBC) scale (Miller, Murphy, & Buss, 1981) is a 5-item measure addressing participants' awareness of internal physical sensations. Items included "I'm very aware of changes in my body temperature" and "I know immediately when my mouth or throat gets dry". Each item was rated on a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). The internal reliability of this scale was .62.

Procedure: The design included a between-subject variable called prime type that had three levels: control, disease threat and the terror threat. To begin the online experiment, participants had to verify they were consenting adults. Next, they completed demographic

information and were randomly allocated to one of the three priming conditions. Participants scrolled through their respective images for as long as they wanted but a minimum of 30 seconds elapsed before participants could continue to the explicit questions.

Following these questions, participants viewed the same images previously shown for at least another 30 seconds and were asked, "The images were disturbing and unpleasant?" below all the images. Then they completed the Race-IAT. Next, participants responded to a memory question to ensure they viewed the images, as well as a question asking if they had previously completed the experiment. An item asking how recently they have had a cold or flu was included, and they then completed the PBC scale. Finally, they were thanked and debriefed.

Results

Explicit (Bipolar) results: There was a significant effect of prime type (control, terrorism, disease) on the explicit measure, $F(2, 379) = 3.57$, $p = .029$, $\eta_p^2 = .02$. Consistent with parasite-stress theory, Fisher's LSD test showed significantly stronger anti-Black/pro-White biases with the disease primes ($M = 4.62$, $SD = .88$) compared with the control primes ($M = 4.37$, $SD = .64$, $t(245.83) = 2.63$, $p = .009$, $d = .34$). Significantly higher anti-Black/pro-White biases were also shown with the terror primes ($M = 4.58$, $SD = .86$) compared with the control primes, $t(255.81) = 2.17$, $p = .031$, $d = .29$. The disease and terror threat conditions did not differ, $t(255) = .39$, $p > .25$. Similar results were found for the explicit thermometer scores.

Implicit results: For the implicit IAT D-scores, there was a significant difference between priming conditions, $F(2, 391) = 5.43$, $p < .01$, $\eta_p^2 = .03$. LSD tests showed that there was a significantly stronger anti-Black/pro-White bias with the disease primes ($M = .42$, $SD = .36$), than with the terrorism primes ($M = .29$, $SD = .35$, $t(262) = 2.90$, $p < .01$, $d = .37$) and the control primes

(*M* = .29, *SD* = .41, *t*(266) = 2.84, *p* < .01, *d* = .34).There was no significant difference between the control and terrorism prime conditions, *t*(254) = .12, *p* > .25 (see Figure S4).

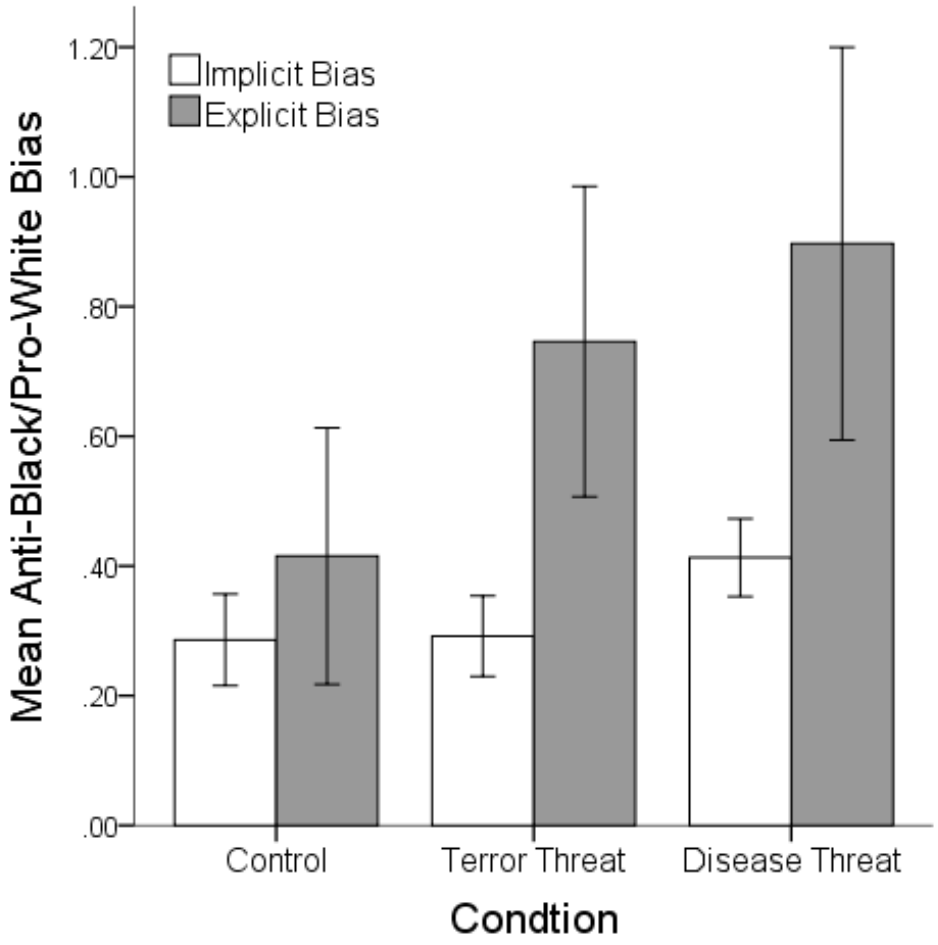

Figure S4: Mean implicit and explicit anti-Black/pro-White bias across the three conditions. Error bars show 95% confidence intervals. Explicit bias (prejudice) is higher in both the disease and terror threat conditions compared to the control. In the disease threat condition, implicit bias is higher than in both the terror threat and the control conditions.

Moderations and correlations: The PBC scale scores did not moderate the effects of implicit or explicit prejudice across the three priming conditions (*t*s < 1.33, *ps* > .183). See Table S20 for the correlation matrix of the variables used in SS1.

Discussion

This study was the first to show that infectious disease primes increased implicit and explicit anti-Black/pro-White biases among White participants. However, at the explicit level, both the disease and terror threat primes increased prejudice. This effect suggests that at a conscious level, any reminder of threats to an individual's life can create hypervigilance towards racial outgroups. For this sample, the selective effect of disease threats, but not terror threat, was shown for implicit anti-Black/pro-White biases. The PBC scale scores did not moderate any of the explicit or implicit bias scores. Therefore, when specifically addressing racial prejudice, the germ aversion scores of the PVD scale, rather than the PBC scale scores, appear to be more effective at showing moderating effects.

Table S20: Correlational matric of the variables in SS1 (Experiment)

	Implicit	Explicit	Gender	Education	Age	Political	Religious	Illness	PBC
Implicit	—	0.196***	0.094	-0.051	-0.041	0.139**	-0.001	0.055	0.041
Explicit		—	0.173***	-0.061	-0.003	0.287***	-0.069	-0.045	0.041
Gender			—	-0.119*	-0.058	0.126*	0.011	-0.019	-0.118
Education				—	0.271***	-0.036	0.098	-0.042	-0.014
Age					—	-0.145**	0.034	-0.056	-0.013
Political						—	0.289***	-0.010	-0.077
Religious							—	0.030	0.002
Illness								—	0.091
PBC									—

* p < .05, ** p < .01, *** p < .001

Supplementary Study 2

Supplementary Study (SS)2 was collected before the pre-registered study in the main manuscript and SS1 above. SS2 used the same procedure as the pre-registered study, apart from not including priming feedback questions, there was no terror threat condition, and the disease threat condition only included the 20 disease images from previous research that used pathogen primes (Schaller, Miller, Gervais, Yager, & Chen, 2010; Wu & Chang, 2012). These disease threat primes did not include any images of black individuals with infectious diseases. The control condition also had only 20 images.

Method

Participants were recruited through https://www.reddit.com/r/SampleSize/. All participation was voluntary but, as an incentive, each participant could view their implicit bias score at the end of the experiment. Data were gathered for one month. Overall, 363 participants completed the experiment. However, 63 were removed from the final analysis because "White" was not selected as their race. A further 14 were removed because they did not respond correctly to the memory question (N = 6), they selected "other" as their gender (N = 6), their accuracy on the IAT was below 70% (N = 1), or they responded faster than 300 ms and/or slower than 10,000 ms on >10% of the IAT trials (N = 1).

The final sample included 286 participants (172 were male) and each one was randomly allocated to either the control (140 participants) or the disease threat condition (146 participants). 188 participants from the US completed the experiment and the remaining participants were mainly from large Western countries such as Canada and the UK. The mean age of the sample was 26.36 years (SD = 8.60), and 245 participants had at least a college diploma. The sample was mainly non-religious/slightly religious (M = 1.34, SD = .74) and liberal (M = 2.65, SD = 1.42).

Materials

Demographic information: The same as Study 2 in the main report.

Implicit and Explicit biases: The same as Study 2 in the main report.

Disease and control images: The disease threat images consisted of 20 images of mold, feces, and people with infections. We sourced 20 of the images from previous research that used pathogen primes (Schaller et al., 2010; Wu & Chang, 2012). The control images included 10 images of buildings and 10 images of single furniture items against a white background.

PVD scale (Duncan & Schaller, 2009) is a 15-item measure addressing participants' perceived vulnerability to infectious diseases. The PVD scale has two subscales: Perceived Infectability (PI, α = .93) and Germ Aversion (GA, α = .77).

Procedure: The design included a between-subject variable called prime-type (condition) that had two levels: control and disease threat. To begin the online experiment, participants had to verify they were consenting adults. Next, they completed demographic information and were randomly allocated to one of the priming conditions. Participants scrolled through their respective images for as long as they wanted but a minimum of 30 seconds elapsed before participants could continue to the explicit questions.

Following these questions, participants viewed the same images previously shown for at least another 30 seconds before completing the Race-IAT. Next, participants responded to a memory question followed by the PVD scale. Finally, they were thanked and debriefed.

Results

An independent sample t-tests showed a significant effect of prime type for the explicit thermometer measure, $t(284) = 3.10$, $p = .002$, $d = .04$; control: $M = .54$, $SD = 1.48$; disease: $M = 1.15$, $SD = 1.85$), a marginally significant effect for the explicit bipolar measure $t(284) = 1.82$, $p = .070$, $d = .02$; control: $M = 4.48$, $SD = .85$; disease: $M = 4.66$, $SD = .86$), and a non-significant effect for the IAT D-score, $t(284) = 1.25$, $p = .214$, $d = .015$, control: $M = .28$, $SD = .38$, disease: $M = .33$, $SD = .35$),

Using PROCESS (Hayes, 2017) to test for moderating effects, we find a significant interaction between condition and GA for the explicit thermometer scores (t = 2.18, p = .03), and a marginally significant interaction for the explicit bipolar scores (t = 1.80, p = .073; see Table S21, Table S22, Figure S5, and Figure S6 for the model predicting explicit anti-black/pro-white biases). As shown in Figure S5 and Figure S6, participants in the disease condition with high GA, showed the strongest anti-Black/pro-White biases. No significant interaction was found between prime-type and GA for the implicit IAT D-scores (t = 1.21, p = .228, see Table S23). Table S24 shows the correlational analysis of the variables used in Study 2. Importantly, germ aversion scores are more strongly related to implicit and explicit prejudice than PI scores.

Table S21: *Linear model of predictors of explicit prejudice (explicit Thermometer scores)*

Predictor	*B (est.)*	*SE B*	*t*	*p*	*95% CI Lower*	*95% CI Upper*
Constant	0.018	0.498	0.036	0.971	-0.962	0.998
Prime-Type (condition)	-0.883	0.670	-1.317	0.189	-2.203	0.436
Germ Aversion	0.144	0.133	1.082	0.280	-0.118	0.406
Prime-Type × Germ Aversion	0.377	0.173	2.179	0.030	0.036	0.718

Table S22: Linear model of predictors of explicit prejudice (explicit Bipolar scores)

Predictor	*B (est.)*	*SE B*	*t*	*p*	*95% CI Lower*	*95% CI Upper*
Constant	4.23	0.258	16.428	0.000	3.723	4.737
Prime-Type (condition)	-0.455	0.346	-1.314	0.190	-1.137	0.227
Germ Aversion	0.069	0.069	1.001	0.318	-0.066	0.204
Prime-Type × Germ Aversion	0.161	0.089	1.803	0.073	-0.015	0.337

Table S23: Linear model of predictors of explicit prejudice (implicit IAT D-scores)

Predictor	*B (est.)*	*SE B*	*t*	*p*	*95% CI Lower*	*95% CI Upper*
Constant	0.255	0.113	2.258	0.025	0.033	0.476
Prime-Type (condition)	-0.131	0.152	-0.863	0.389	-0.43	0.168
Germ Aversion	0.007	0.03	0.238	0.812	-0.052	0.066
Prime-Type × Germ Aversion	0.047	0.039	1.208	0.228	-0.03	0.124

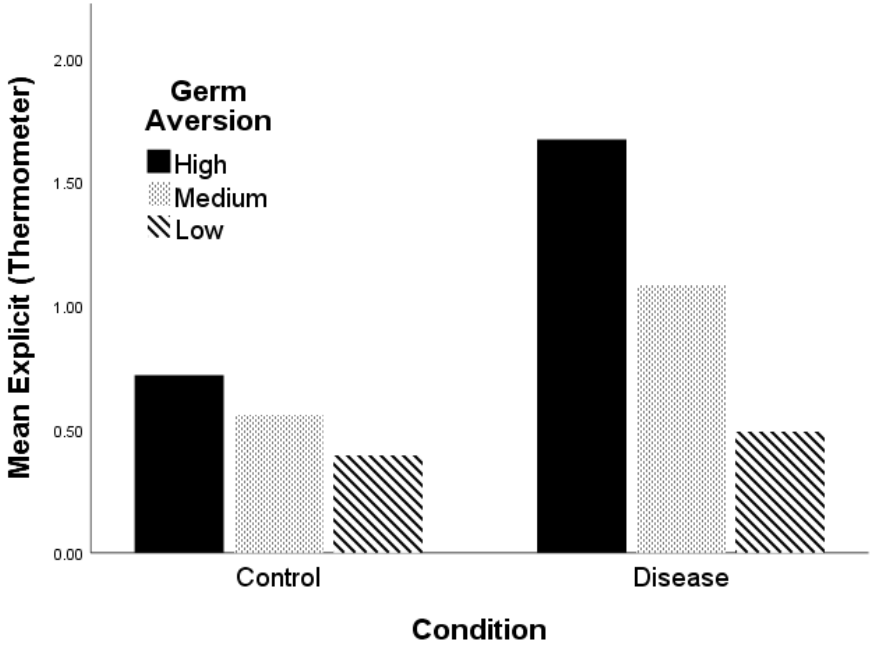

Figure S5: Bar chart of the regression of explicit (Thermometer) anti-Black/pro-White biases at three levels of GA across the two prime-types in SS2.

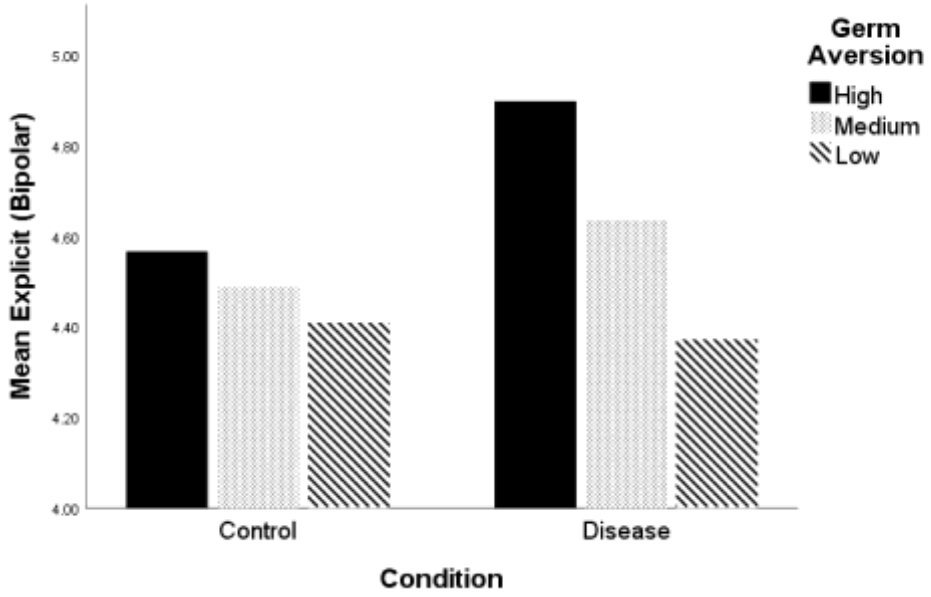

Figure S6: Bar chart of the regression of explicit (Bipolar) anti-Black/pro-White biases at three levels of GA across the two prime-types in SS2.

Table S24: Correlational matrix of the variables in study SS2

	IAT	Explicit Bipolar	Explicit Thermometer	Gender	Age	Political	Religion	Perceived Infectability	Germ Aversion	PVD Total
IAT	—									
Explicit (Bipolar)	0.219***	—								
Explicit (Thermometer)	0.249***	0.772***	—							
Gender	0.094	0.127*	0.117*	—						
Age	0.084	0.089	0.058	-0.159**	—					
Political	0.061	0.262***	0.126*	0.224***	0.006	—				
Religiosity	0.026	0.033	-0.030	0.044	0.120*	0.321***	—			
Perceived Infectability	0.028	0.083	0.153**	-0.115*	-0.064	-0.133*	-0.004	—		
Germ Aversion	0.057	0.190***	0.219***	-0.105*	0.093	0.107*	0.128*	0.359***	—	
PVD Total	0.050	0.163**	0.224***	-0.134*	0.014	-0.021	0.072	0.838***	0.810***	—

* p < .05, ** p < .01, *** p < .001

Discussion

Study SS2 was the first study carried out among all the studies on this project. Consequently, it was the first study to show that those who have strong germ aversion are more likely to express increased explicit anti-black/pro-white biases when primed with infectious diseases. The marginally significant interaction effect for the explicit bipolar measure could be due to the reduced response variation possible (1-7 response option) compared to the explicit-feeling thermometer measure (difference between the white and black 1-10 response option scores). Increased prejudice was not shown at the implicit level, as measured with the IAT. We initially interpreted this non-significant effect at the implicit level as being due to the disease primes showing only white individuals with infectious diseases. Therefore, we expected stronger effects to be apparent at both the implicit and explicit level if we added in black individuals with infectious diseases to the disease priming condition. An increase in implicit and explicit anti-black/pro-white biases among white individuals is precisely what we found in SS1 using the racially balanced primes. However, in contrast to SS1, the main report (Study 2) essentially replicated this current study (SS2). The major demographic difference between SS1 and SS2 is that SS2 had less participants taking part from countries outside the US (34% vs. 41%). Further research should test if similar or different effects to SS2 and Study 2 occur using samples outside the US. Regardless, there is converging evidence indicating that white US individuals who are particularly motivated to avoid germs will explicitly express increased anti-black/pro-white biases when primed with diseases. It is expected that individuals with a higher probability of encountering infectious diseases in their daily life, and not merely on a computer screen, will show exacerbated racial biases, especially among those with strong germ aversion.

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