

## Research article

# Disgust sensitivity predicts political ideology and policy attitudes in the Netherlands<sup>†</sup>

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### Abstract

*Individual differences in disgust sensitivity have been linked to social attitudes and ideology, but the generalizability of this effect and the nature of the political issues implicated remain unclear. In two studies using large Dutch samples, we find that disgust sensitivity predicts political attitudes for issues in several domains related to physical/spiritual purity and pathogen risk. Sensitivity to disgust was significantly associated with attitudes for a general ‘physical and spiritual purity’ factor, as well as specific issue factors regarding sex and sexual minorities, immigration, and foreign outgroups. Additionally, disgust sensitivity was associated with greater likelihood of voting for the socially conservative “Freedom Party” (Partij Voor de Vrijheid). These results suggest that the tendency to experience disgust influences a specific subset of social and political attitudes across cultures. Copyright © 2014 John Wiley & Sons, Ltd.*

The emotion of disgust likely evolved to discourage us from ingesting noxious or dangerous substances (Rozin, Haidt, & McCauley, 2008) and from coming into contact with dangerous pathogens (Oaten, Stevenson, & Case, 2009). However, it also seems to play an important role in our political, social, and moral beliefs (Bloom, 2004; Nussbaum, 2001). People who are more readily disgusted tend to score higher on broad measures of right-wing political ideology such as right-wing authoritarianism (Altemeyer, 1981) and social dominance orientation (Sidanius & Pratto, 2001) (Hodson & Costello, 2007; Terrizzi, Shook, & Ventis, 2010). Disgust sensitivity (DS) is also predictive of negative attitudes toward groups seen as threatening traditional social values—most consistently, gays and lesbians (Inbar, Pizarro, & Bloom, 2009; Inbar, Pizarro, Knobe, & Bloom, 2009; Olatunji, Haidt, McKay, & David, 2008; Terrizzi et al., 2010), but also immigrants and foreigners (Hodson & Costello, 2007).

In line with this pattern of attitudes, people who are easily disgusted are more likely to describe themselves as politically conservative and especially as socially conservative. Higher chronic sensitivity to disgust has been shown to correlate with more conservative self-reported political ideology (i.e., self-placement on a left–right continuum) in multiple samples from multiple labs (Inbar, Pizarro, & Bloom, 2009; Inbar, Pizarro, Iyer, & Haidt, 2012; Terrizzi et al., 2010; but see Tybur, Merriman, Hooper, McDonald, & Navarrete, 2010, for a failure to replicate). Meta-analytically combining the data from the relevant studies shows the relationship between DS

and ideology to be moderately sized but highly statistically reliable (Terrizzi, Shook, & McDaniel, 2013).

However, much less is known about how DS relates to attitudes on specific political issues or policies. Inbar, Pizarro, and Bloom (2009) asked participants about their views on 10 political issues related to economic, social, and foreign policy, and found that DS was consistently associated with more conservative views only on gay marriage and abortion.<sup>1</sup> Smith, Oxley, Hibbing, Alford, and Hibbing (2011) asked participants if they agreed or disagreed with statements about 16 political issues and found that greater self-reported DS predicted agreement with the more conservative positions on gay marriage, premarital sex, and abortion (whereas physiological reactivity to disgusting photographs predicted more conservative attitudes only for gay marriage and premarital sex). Although these studies paint a remarkably consistent picture, they also have significant limitations. Participants were asked about a relatively limited number of issues, and both studies used sample sizes that afforded limited power to detect smaller effects (Inbar et al.  $N=84$ ; Smith et al.  $N=46$ ; note that even with  $N=100$ , one’s power to detect a correlation of .2 is .52, well below the conventional minimum of .80). Finally, both used American samples (Inbar et al. sampled university undergraduates and Smith et al. older adults). In fact, of all the studies showing a link between DS and political ideology, all but one sampled only North Americans (the exception is Inbar, Pizarro, Iyer et al., 2012). Especially when

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<sup>†</sup>Key message: In the Netherlands, political attitudes in specific domains are related to an individual’s sensitivity to disgust.

<sup>1</sup>Disgust sensitivity was also associated with approval of lowering income tax rates, but the authors stated that this relationship failed to replicate in subsequent studies.

investigating how disgust relates to specific political issues, this obviously raises the possibility that any relationships found might be unique to the American political system, which differs substantially even from that of many other Western democracies (Lijphart, 1994).

The two studies reported here aimed to address some of these limitations. First, we asked participants about more political issues (39 in Study 1; 38 in Study 2) so that we could assess whether DS consistently predicts attitudes in some domains but not others. In order to make our estimates of these relationships more precise (and especially to be able to make credible claims about null or small relationships between disgust and attitudes in some domains), we recruited larger samples than have been previously employed ( $N=237$  in Study 1;  $N=304$  in Study 2; with sample sizes and an alpha level of .05, the resulting power to detect a correlation of .2 is above .92) and actively recruited participants from a range of ages and locations, rather than recruiting only university students. Finally, we ran both studies in the Netherlands, which allowed us to test whether the relationships observed in previous US-only research would generalize to a different culture with different political and social concerns.

The Netherlands and the USA are similar in many ways, especially by the standards of cross-cultural research comparing, say, East Asian and Western cultures. Both the Netherlands and the USA are advanced Western democracies with (to varying degrees) free-market economies. Citizens of both would be considered individualistic on the individualistic–collectivistic dimension often employed in cross-cultural psychology (Hofstede, Hofstede, & Minkov, 1997; Oyserman, Coon, & Kemmelmeier, 2002) and value self-expression to a similar degree (Inglehart & Welzel, 2010). Despite these similarities, however, there are significant political and social differences between the two countries. Two major parties dominate the USA's political landscape, whereas the Dutch electoral system comprises a diverse roster of parties. Dutch parliamentary seats are allotted in proportion to the number of votes a party captured during the election, and a majority coalition must be formed among the parties for the government to function. Legislative progress is marked by extensive discussion and compromise (Hendriks & Toonen, 2001).

There are also substantial differences in social norms and attitudes between the two countries. Americans are more religious than the Dutch and less likely to believe that homosexuality, prostitution, abortion, or euthanasia are justifiable (World Values Survey, 2005). Attitudes on abortion and gay marriage specifically were the most strongly related to DS in Inbar et al.'s (2009) American sample, but Dutch social norms around the same topics are more permissive than in the USA. Same-sex marriage has been legal in the Netherlands since 2001, and abortion has been framed as a "medical affair," with support for a government ban fading over time (Dutch Parliamentary Election Study, 1971–1989; Outshoorn, 2000). In contrast to the USA, large-scale immigration to the Netherlands is a relatively recent phenomenon, and concerns about integration, job displacement, and stress on social services are widespread (Citrin & Sides, 2008; Coenders, Lubbers,

Scheepers, & Verkuyten, 2008; "Dutch Immigration: Overflow," 2013; Mayda, 2006).

In designing the political attitude items used in the current studies, we had two equally important goals. The first was to maximize ecological validity by asking about a broad swath of currently relevant political questions. To this end, in Study 1, we asked respondents about a wide range of topics including sexuality, immigration, religion, foreign policy, European integration, social traditionalism, and the environment. These 39 items were adapted from voter-information websites created to inform the public about how their political views aligned with the platforms of the major political parties (e.g., [www.stemwijzer.nl](http://www.stemwijzer.nl)).

Our second goal was to test theoretical predictions about the specificity of the relationship between disgust and political attitudes. Disgust is linked to the maintenance of physical and spiritual purity, and is often evoked by behaviors seen as degrading, defiling, or "unnatural" (Rozin et al., 2008; Schweder, Much, Mahapatra, & Park, 1997). Based on this research, we expected that DS would most strongly predict attitudes for political and social issues touching on purity, such as sexuality, drug use (which can be seen as "contaminating" one's body with foreign substances), and euthanasia (which can be seen as interfering with the "natural" course of life and death). We therefore chose items in Study 1 with an eye toward broadly representing a variety of possible purity-related attitudes.

In Study 2, we took a somewhat different but complementary approach. In choosing disgust-relevant items for this study, we primarily drew on a theoretical framework known as the "behavioral immune system" (BIS; Schaller & Duncan, 2007; Schaller & Park, 2011). BIS theory proposes that over the course of human evolution, people developed a set of heuristics to detect the presence of parasites and pathogens in others, as well as a set of behaviors that minimized the risk of infection by avoiding individuals, groups, or behaviors that posed contagion threats. Because the risks of failing to detect a contagious individual (serious illness and possibly premature death) greatly outweigh the cost of wrongly identifying a harmless individual as contagious (the foregone benefits of a positive interaction), the BIS tends to be hypervigilant (Schaller & Duncan, 2007; Schaller & Park, 2011). Like an overly sensitive fire alarm, it "goes off" and triggers avoidance behaviors for stimuli that merely bear a resemblance to infectious agents. The emotion of disgust, with its associated "action tendencies" of withdrawal and avoidance (Haidt, 2003; Mackie, Devos, & Smith, 2000), is believed to play a crucial role in the BIS by motivating avoidance of contaminating individuals, groups, or behaviors.

To be clear, the BIS account of disgust and social attitudes is complementary to, not inconsistent with, the argument that disgust is evoked by violations of physical and spiritual purity. Disgust is likely involved both in the avoidance of literal pathogen threats and in the enforcement of socially defined norms of spiritual purity—in fact, the latter are likely based to some degree on the former. In many cases, there is a great deal of overlap between the two approaches. For example, the BIS account also predicts a strong relationship between DS and attitudes toward sex and sexuality. Sexual contact

## STUDY 1

(specifically, exchanging bodily fluids with a sex partner) incurs a substantial risk of pathogen exposure (Oaten et al., 2009). Sexual promiscuity or unusual (i.e., non-normative) sexual practices are indeed more likely to evoke disgust and rejection from the more disgust-sensitive (Inbar, Pizarro, & Bloom, 2009; Smith et al., 2011).

However, the BIS account also makes a number of novel predictions (see Schaller & Park, 2011). The most important for our purposes is that those with greater chronic BIS activation (e.g., the disgust-sensitive) are predicted to be more xenophobic (i.e., more hostile toward foreigners and immigrants). Over the course of human evolution, strangers (members of other groups or tribes) would have been especially likely to harbor novel (and therefore particularly dangerous) infectious agents. Encountering outsiders should activate the BIS, motivating hostility, rejection, and the accompanying emotion of disgust. In modern Westerners, DS has been found to correlate with more negative attitudes toward immigrants and foreigners (Hodson & Costello, 2007; but see Smith et al., 2011), and experimentally priming disease threats increases negativity toward unfamiliar immigrant groups (Faulkner, Schaller, Park, & Duncan, 2004). We therefore expected that DS might predict views on immigrants and immigration, and for that reason, we included a range of questions on immigration policy. Because Middle Eastern and North African Muslims are currently the most visible and controversial immigrant groups in the Netherlands, we also included questions on attitudes toward Muslims and Islam.

To assess differences in chronic DS, we used the Disgust Scale—Revised (DS-R; Haidt, McCauley, & Rozin, 1994, modified by Olatunji et al., 2007), which comprises three subscales: core, animal reminder, and contamination disgust. Core disgust items include “You see maggots on a piece of meat in an outdoor garbage pail,” while animal reminder items include “You see a man with his intestines exposed after an accident.” The five-item contamination disgust subscale taps the tendency to feel disgust at interpersonal contagion threats—for example, “You take a sip of soda, and then realize that you drank from the glass that an acquaintance of yours had been drinking from”—and maps most closely to the behavioral immune system’s conceptualization of social pathogen threats are indeed. Previous research has also shown that of the three subscales, contamination disgust is more predictive of political ideology and behavior than are the other two subscales, or the DS-R as a whole (Inbar, Pizarro, Iyer et al., 2012). In the current research, we therefore performed parallel analyses using the entire DS-R and the contamination subscale. In general, we expected that the contamination subscale would show the strongest relationships with political attitudes.

We subjected participants’ responses to the political issue questions to principal components analysis (PCA). This allowed us to investigate whether political attitudes clustered into the theoretically predicted issue domains (i.e., purity in Study 1; sex and immigration in Study 2) and whether self-reported DS predicted factor scores for these domains.

We report how we determined our sample sizes, all data exclusions, and all measures in both studies.

## Method

### Participants

Based on the effect sizes reported in prior research, we decided to collect as many responses as possible with a target minimum of 300. Three hundred and forty Dutch participants were recruited via social media posts or direct contact by a research assistant, and directed to an online survey in exchange for a chance to win one of two 50-euro prizes.

All participants were eligible to vote in the Netherlands. One hundred and four participants were excluded from the final sample based on a priori criteria: 86 participants did not complete the survey; 13 gave inappropriate answers to the two ‘check’ questions embedded in the DS-R; and 4 were excluded because they or their parents were not Dutch, and may have held a different set of social and political norms than Study 1 was designed to investigate. Of the remaining 237 participants, 109 were men and 128 were women, ranging in age from 18 to 84 years ( $M = 37.66$ ,  $SD = 18.20$ ; one participant did not report age). Sample size in further analyses vary because of isolated missing responses.

### Procedure

Participants first saw a welcome page describing the questionnaire and were asked to give their age, gender, nationality, and their parents’ nationality. Participants then completed the 27-item DS-R, which asks participants to evaluate potentially disgusting statements by indicating agreement with phrases like “If I see someone vomit, it makes me sick to my stomach” and to rate how disgusting they find statements like “Your friend’s pet cat dies, and you have to pick up the dead body with your bare hands.” Next, participants were asked the extent to which they agreed with 39 political statements using 5-point scales, ranging from “Totally disagree” (1) to “Totally agree” (5). Political statements were based on questions used in the “Stemwijzer” 2010 edition, published by the Dutch Institute for Public and Politics. Statements included “People who make more money should pay more taxes” and “Building new mosques in the Netherlands should remain possible” (for the full list of items, see Table 1).

Finally, participants were asked which party they voted for in the previous national election (2010) and the chance that they would ever vote for each of the 10 major parties in a future election on a 5-point scale ranging from a “Very small” likelihood to a “Very large” likelihood.

At the end of the questionnaire, participants were thanked and could anonymously submit their contact information for a chance to win the prize drawing.

## Results

### Disgust Sensitivity and Demographic Differences

Disgust sensitivity scores are the sum of the 25 DS-R items. The subscales for “core,” “contamination,” and “animal reminder”

Table 1. Factor structure of political items in Study 1

	Question text	Pattern matrix		
		Conservative Interests	Physical/Spiritual Purity	Progressive Interests
1	It should be impossible to build new mosques in the Netherlands.	.74		
2	It should be possible to give people like Robert M. the death penalty.	.67		
3	Immigrants that have committed a crime should be sent back to their land of origin.	.64		
4	Greece should be removed from the Eurozone.	.60		
5	People who commit violent crimes should be punished more severely.	-.60		
6	Women who work for the government shouldn't be allowed to wear a headscarf.	.57		
7	The government should prevent pedophiles or rapists from having children.	.57		
8	Police officers shouldn't give any indication of their beliefs, such as by wearing a headscarf.	.51		
9	People who earn more shouldn't have to pay more taxes.	.49		
10	The current mortgage interest should be maintained.	.49		
11	The government should spend less on foreign aid.	.44		.38
12	All of the Islamic schools in the Netherlands should close.	.40		
13	The government should spend less in order to lower taxes.	.34		
14	Euthanasia should be possible in the case of the patient's hopeless and unbearable suffering.		.71	
15	Elderly people who feel that their life is complete may, with the help of a professional, make an end to their lives.		.66	
16	Prostitution should be legal.		.58	
17	A civil servant may not refuse to perform marriages for gay couples.		.57	
18	It's good that gays and lesbians can marry in the Netherlands.		.54	
19	Embryo selection should be allowed for everyone.		.53	-.40
20	It should be possible to obtain an abortion after 24 weeks.		.52	-.33
21	The soft drugs industry should be completely legalized.		.52	
22	Religious schools may not fire openly gay teachers.		.46	.43
23	Abortion is a reasonable alternative for contraception.		.42	
24	The government should intervene in the out-of-control bonus culture.			.60
25	It isn't right that squatting in empty buildings is illegal.			.54
26	A ban against factory farms must be instituted.			.53
27	Squatting is a good solution to the shortage of affordable living space.			.50
28	The government should lower student financial subsidies.			.43
29	The privatization and marketing of healthcare isn't good for society.			.38
30	The government must not allow businesses to further tax the environment, even if it improves the Netherlands' competitive position.			.37
31	It's good that the government subsidizes green energy.			.35
32	The government shouldn't lower the minimum wage to improve the Netherlands' competitive position.			.30

Note: Questions with loadings < .3:

Art and culture shouldn't be subsidized by the government.

It's important that the Netherlands can defend itself, and therefore, the budget cuts in defense are wrong.

Everyone should be an organ donor unless they object.

The Netherlands should intervene to stop the war in Syria.

The legal drinking age for alcohol should be raised to 18.

The government should guarantee a good healthcare system to everyone.

The number of civil servants should be lowered.

disgust are subsets of the full battery. DS was normally distributed (Shapiro-Wilk  $W = .995$ ,  $p = .557$ ), Mean = 68.40 (12.03), Range 39–112. Scores differed by gender<sup>2</sup> and were correlated with age.<sup>3</sup>

<sup>2</sup>Replicating previous research, women in this sample reported greater sensitivity to disgust than men ( $M_{\text{Women}} = 71.63$ ,  $SD = 11.87$  and  $M_{\text{Men}} = 64.60$ ,  $SD = 11.12$ ),  $t(232.86) = 4.71$ ,  $p < .001$ .

<sup>3</sup>One participant did not report age; disgust sensitivity was significantly correlated to age for the remaining 236 participants,  $r = -.28$ ,  $t(234) = -4.50$ ,  $p < .001$ . Older participants reported less sensitivity to disgust.

### Voting Intentions and History

Neither the full DS-R nor the contamination subscale significantly predicted participants' rated likelihood of voting for any political party in the future (all  $ps > .07$ ). For past voting patterns, parties receiving fewer than 10 votes (PVV [conservative/center], CU [conservative/right], SGP [conservative/right], and PvdD [progressive/left]) were eliminated from analysis. Using the remaining six parties, analysis of variance (ANOVA) revealed significant differences in DS

Table 2. Correlation matrix for Study 1 factors and measures of disgust sensitivity (DS)

	Disgust Sensitivity	Contamination Disgust	Conservative Interests	Physical/Spiritual Purity	Progressive Interests
<i>Conservative Interests</i>	.24***	.15*	—		
<i>Physical/Spiritual Purity</i>	.15*	.17*	-.03	—	
<i>Progressive Interests</i>	-.09	-.02	.21**	.08	—

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

based on previous vote,  $F(5, 212) = 2.42$ ,  $p = .037$ , as well as for the contamination subscale,  $F(5, 212) = 3.05$ ,  $p = .011$ . While we would predict more conservative parties to show higher DS and contamination scores, the most conservative parties were not represented in the test because of the inadequate sample. A Tukey HSD test revealed no significant differences in the post hoc comparisons (all  $ps > .09$ ); the omnibus effect appears driven by the difference between GL (a progressive/left party;  $M = 72.21$ ,  $SD = 11.19$ ) and CDA (conservative/right;  $M = 63.64$ ,  $SD = 8.25$ ). Descriptives for the other parties are VVD (conservative/right;  $M = 70.62$ ,  $SD = 12.50$ ), D66 (progressive/center;  $M = 68.32$ ,  $SD = 11.66$ ), and SP (progressive/left;  $M = 65.91$ ,  $SD = 15.42$ ).

#### Principal Components Analysis

To determine whether the political questions could be grouped by content, we performed a PCA using a direct oblimin rotation on the 39 items. The items were reverse-scored as necessary, such that higher scores indicated more conservative responses. The result of a Kaiser–Meyer–Olkin test was .75, indicating adequate sampling for a PCA, and Bartlett’s test for sphericity was significant,  $\chi^2 = 2404.96$ ,  $p < .001$ , indicating a strong relationship between variables. Examination of the scree plot from this initial analysis suggested a three-factor solution, which we have characterized as follows: *Conservative Interests*, *Physical and Spiritual Purity*, and *Progressive Interests*. This three-factor solution explained 29% of the variance. See Table 1 for pattern matrix listing each question and factor loading; note that seven questions did not demonstrate factor loadings greater than .30.

As shown in Table 2, *Conservative Interests* and *Progressive Interests* were correlated,  $r(234) = .21$ ,  $p = .002$ , consistent with the interpretation that these factors collected items from opposite poles of the political spectrum. The correlation was positive because of reverse scoring items, such that a higher score indicated a more conservative opinion on all questions. Other combinations of factors were not correlated,  $rs < .08$ ,  $ps > .22$ .

#### Disgust Sensitivity and Factors

*Examination of demographics.* Differences in factor scores based on gender and age were assessed. *Physical and Spiritual Purity* and *Progressive Interests* differed by gender,  $ps < .03$ ; males showed higher factor scores than females, indicating agreement with more conservative points of view. *Conservative Interests* and *Progressive Interests* were negatively correlated with age,  $rs(233) < -.21$ ,  $ps \leq .001$  (Table 3).

Because of the significance of demographic differences on both DS and Factor scores, further analyses were run first using DS as the independent variable, then including gender and age as additional predictor variables.

*Disgust sensitivity predicts factor scores.* Because the factor scores as dependent variables were correlated, and differential effects of DS on the factor scores were of interest, the relationship between DS and the factor scores was assessed with multivariate analysis of variance (MANOVA) using Pillai’s trace. Analyses performed without the additional demographic predictor variables are computationally equivalent to multivariate regression. Alpha was set at .05, and  $p$  values were adjusted using the false discovery rate (FDR) procedure to correct for multiple testing.<sup>4</sup> The multivariate effect of DS on factor scores was significant,  $V = .11$ ,  $F(3, 232) = 9.32$ ,  $p < .001$ , indicating differential effects of DS on the different factors. Separate univariate ANOVAs revealed the significant relationship extended to *Conservative Interests*,  $F(1, 234) = 14.72$ , adjusted  $p < .001$ , and *Physical and Spiritual Purity*,  $F(1, 234) = 5.10$ , adjusted  $p = .037$ , but not *Progressive Interests*,  $F(1, 234) = 1.96$ , adjusted  $p = .16$ . The contamination subscale was also a significant predictor for *Conservative Interests* and *Physical and Spiritual Purity* in a separate MANOVA (multivariate  $p = .004$ , univariate adjusted  $ps = .036$  and  $.031$ , respectively). Including age and gender as additional predictor variables resulted in the same pattern of significance.

#### Discussion

Dutch participants’ disgust sensitivity was significantly related to their political beliefs, as represented by the *Conservative Interests* and *Physical and Spiritual Purity* factors. The link between dispositional sensitivity to disgust and political attitudes, which heretofore has primarily been observed in American samples, extended to this Dutch population and locally relevant political issues.

Our use of PCA to explore attitudes toward political issue was informative and guides our impression of political attitudes, but the resulting factors are idiosyncratic. What can the relationships between DS and the political issue factors derived here tell us about the nature of the link between disgust and social attitudes? *Physical and Spiritual Purity* items concerned sex, drugs, or violations of the “natural order” (i.e., embryo selection and euthanasia), consistent with an account of disgust as a reaction to behaviors seen as degrading, defiling, or “unnatural” (Rozin et al., 2008). Interpretation of the *Conservative Interests* factor is less straightforward. The 13 questions loading onto this factor included issues about punishment for crimes and taxation, and five items related to Islam and immigration in the Netherlands. This emphasis on immigration and Islam fits the behavioral immune system

<sup>4</sup>The adjustment is calculated by ranking  $p$  values from smallest to largest, and dividing each observed  $p$  value by its percentile rank, in contrast to the Bonferroni method of dividing by the number of tests conducted. This constrains the overall proportion of false positives, making it a more powerful and less conservative adjustment than Bonferroni (Benjamini & Hochberg, 1995).

Table 3. The relationship between disgust sensitivity and political issue factors in Study 1 (multivariate and univariate tests)

Measure	Full DS-R			Contamination Subscale		
<i>Multivariate tests</i>	$F(3, 232)$ 9.32	$p$ <.001		$F(3, 232)$ 4.50	$p$ .004	
<i>Univariate tests</i>	$F(1, 234)$	$p$	$\eta^2$	$F(1, 234)$	$p$	$\eta^2$
<i>Conservative Interests</i>	14.72	<.001	.06	5.18	.036	.02
<i>Physical/Spiritual Purity</i>	5.10	.037	.02	6.71	.031	.01
<i>Progressive Interests</i>	1.96	.163	<.01	0.07	.787	<.01

Note: DS-R, Disgust Scale—Revised.  $p$  values reflect FDR adjustment.

account linking DS and conservative political attitudes, rather than more metaphorical concerns about spiritual purity. We follow up on this possibility in Study 2.

Unlike previous research conducted in the USA, DS did not reliably predict voting patterns. We suspect that this is due to differences between American and Dutch politics. In the USA, conservative–progressive and right–left are nearly synonymous dimensions, and only two major parties fall along one bipolar axis. In contrast, “conservative–progressive” and “right–left” are orthogonal dimensions in the Dutch system, and major parties can be mapped onto a two-dimensional space created by these two axes (Krouwel, 2012). For example, the SP (Socialist Party) is both progressive and left-leaning in social and economic issues, and so lies in the upper-left quadrant of this “political space.” Although the PVV is well known for promoting a conservative agenda in terms of immigration and cultural issues, it takes a moderate stance on economic issues and so lies in the lower middle of the political space. To account for the orthogonality of social and economic political dimensions in Dutch politics, in Study 2, we separated self-ratings of conservative versus progressive and left-leaning versus right-leaning political attitude.

In Study 2, we also sought a clearer picture of the relationship between DS and specific political topics. Rather than selecting issues on the basis of breadth, as we did in Study 1, in Study 2, we chose issues from seven pre-defined topic areas: Economics & Government, Foreign Policy, Gay Rights, Immigration, Islam in the Netherlands, Sex, and Sexism. Drawing on the results of Study 1 and the behavioral immune system account, we expected DS to predict attitudes for the immigration-related topics Islam in the Netherlands and Immigration, and for the Gay Rights and Sex topics, which reference sexual minorities or sexual activity. We included the Economics & Government, Foreign Policy, and Sexism topics because these are other areas where left–right and conservative–progressive political attitudes differ, but where neither the purity nor the BIS account would predict a relationship with DS.

## STUDY 2

### Method

#### Participants

As in Study 1, we aimed to collect as many responses as possible with a target minimum of 300. Research assistants recruited

506 Dutch participants via social media posts or direct contact. One hundred and seventy-five did not complete the study, and 27 failed to respond appropriately to the check questions embedded in the DS-R, leaving 304 participants. Of these, 127 were men and 177 were women, ranging in age from 17 to 83 years ( $M = 29.71$ ,  $SD = 12.00$ ).

#### Procedure

The procedure for Study 2 followed the same pattern as Study 1, with the addition of several demographic items, the conservative–progressive and right–left scales, and a different set of political issue items.

The conservative–progressive measure was assessed by asking participants “On the scale from progressive to conservative, do you consider yourself:” followed by a bipolar scale ranging from 0 (“Progressive”) to 100 (“Conservative”). This item was accompanied by text explaining “Progressive means working toward change in a political sense, and conservative means preserving the status quo in a political sense.” The right–left scale was similarly constructed, asking participants “On the scale from left to right in the political context, do you consider yourself:” followed by a bipolar scale ranging from 0 (“Left”) to 100 (“Right”).

### Results

#### Disgust Sensitivity and Demographics

The DS-R scores were normally distributed (Shapiro–Wilk  $W = .997$ ,  $p = .856$ ),  $M = 67.89$ ,  $SD = 14.29$ , range 28–111. DS differed by gender<sup>5</sup> and education,<sup>6</sup> and was correlated with age.<sup>7</sup>

#### Voting Intentions and History

Disgust sensitivity predicted previous voting in an omnibus test,  $F(11, 290) = 1.92$ ,  $p = .037$ , but comparisons in a Tukey HSD test were not significant, all  $ps > .07$ . Results from the omnibus test appear driven by the difference between PVV

<sup>5</sup>Women reported higher disgust sensitivity than men ( $M_{\text{Women}} = 73.20$ ,  $SD = 13.04$  and  $M_{\text{Men}} = 60.49$ ,  $SD = 12.59$ ),  $t(277.08) = -8.55$ ,  $p < .001$ .

<sup>6</sup>Significant differences in disgust sensitivity did exist between different levels of education,  $F(7, 296) = 3.41$ ,  $p < .002$ . Post hoc Tukey HSD tests revealed graduates with a Bachelor’s degree reported significantly greater disgust sensitivity than graduates with a vocational degree ( $M = 74.06$ ,  $SD = 12.15$ , and  $M = 64.49$ ,  $SD = 12.58$ , respectively), or graduates with a Master’s degree ( $M = 66.41$ ,  $SD = 13.14$ ).

<sup>7</sup>Disgust sensitivity was significantly correlated to age,  $r = -.17$ ,  $t(302) = -3.02$ ,  $p = .003$ . As in Study 1, older participants reported less sensitivity to disgust.

(a conservative/center party;  $M=73.18$ ,  $SD=14.13$ ) and PvdD (a progressive/left party;  $M=63.00$ ,  $SD=11.22$ ). Other results were PvdA (progressive/center;  $M=70.29$ ,  $SD=16.15$ ), SP (progressive/left;  $M=68.58$ ,  $SD=10.27$ ), GL (progressive/left;  $M=66.91$ ,  $SD=11.08$ ), VVD (conservative/right;  $M=65.93$ ,  $SD=14.97$ ), and D66 (progressive/center;  $M=64.43$ ,  $SD=12.94$ ).

Using the contamination subscale as a predictor showed that PVV voters (a conservative party) were more disgust-sensitive than D66, GroenLinks, and PvdA voters (left and center parties),  $F(11, 290)=2.79$ ,  $p<.002$ , post hoc adjusted  $ps<.02$ . The contamination subscale also predicted individuals' rated likelihood of voting for the PVV in the next election,  $\beta=.09$ ,  $t(302)=3.72$ ,  $p<.001$ , but was not a significant predictor for any other party.

### Political Attitudes

Regressions of the conservative–progressive and left–right measures on DS revealed that DS alone did not predict Left–Right score,  $\beta=.13$ ,  $t(302)=1.38$ ,  $p=.168$ , nor was it a significant predictor when gender, age, and education were included as additional predictor variables,  $p>.07$ . The contamination subscale, however, did show a significant relationship to Left–Right score,  $\beta=.94$ ,  $t(302)=2.05$ ,  $p=.041$ , and remained significant with gender, age, and education,  $p=.045$ .

Regressing Conservative–Progressive score on DS was significant,  $\beta=.21$ ,  $t(302)=2.58$ ,  $p<.001$ , and remained significant when the additional predictors were added,  $\beta=.27$ ,  $t(293)=3.05$ ,  $p<.003$ . The contamination subscale also demonstrated a significant relationship to the Conservative–Progressive score,  $\beta=.17$ ,  $t(302)=2.97$ ,  $p=.003$ , which remained significant with additional demographic predictor variables.

### Principal Components Analysis

To determine whether political item questions could be grouped by content type, we performed a PCA using a direct oblimin rotation on the 38 items. The result of a Kaiser–Meyer–Olkin test was .87, indicating good sampling for a PCA, and Bartlett's test for sphericity was significant,  $\chi^2=4424.44$ ,  $p<.001$ , indicating a strong relationship between variables. Initial analysis revealed nine factors with eigenvalues above 1, but the scree plot was not well defined. Because the questionnaire had been designed with seven question categories, we examined a 7-factor solution, which demonstrated an adequate fit for the data. Table 4 shows the pattern matrix resulting from this analysis, which accounted for 54% of variance. Factors largely matched the seven question categories included in the questionnaire but have been renamed to reflect some differences from the categories as conceived:

- Factor 1: *Immigration and Islam*
- Factor 2: *Sex and Sexual Preference*
- Factor 3: *Nativism/Isolationism*
- Factor 4: *Sexism and Stereotypes*
- Factor 5: *Finances and Business*
- Factor 6: *Sex in Society*
- Factor 7: *Foreign Intervention*

See Table 5 for correlations between the factors.

Differences in the factor score based on gender, age, and education were assessed. Factors 2, 3, 5, and 6 differed by gender,  $ps<.05$ . Factors 1, 2, 3, 5, and 6 were correlated with age,  $|r|>.12$ ,  $p<.05$ . Factors 1, 3, 4, and 5 differed by education,  $ps<.01$ . As in Study 1, because demographic differences on both DS and Factor scores were significant, further analyses were run first with only DS, then including gender, age, and education as additional predictor variables. All patterns of significance were the same unless otherwise noted.

The relationship between DS and the factor scores was again assessed using MANOVA, at an alpha of .05. Univariate follow-up tests used FDR-adjusted  $p$  values to constrain the overall alpha despite multiple tests (Table 6). The effect of DS on factor scores was significant using Pillai's trace,  $V=.14$ ,  $F(7, 296)=7.05$ ,  $p<.001$ . Separate univariate ANOVAs on the factor scores revealed significant relationships between DS and Factor 1, *Immigration and Islam*,  $F(1, 302)=7.07$ , adjusted  $p=.019$ ; Factor 5, *Finances and Business*,  $F(1, 302)=8.07$ ,  $p=.018$ ; and Factor 6, *Sex in Society*,  $F(1, 302)=23.76$ ,  $p<.001$ .<sup>8</sup>

Separate MANOVAs were performed using the contamination subscale and measure of conservative–progressive political orientation as predictors. The Contamination subscale differed somewhat from the full disgust scale, additionally predicting the *Sex and Sexual Preference* and *Nativism/Isolationism* factors, and showing no relationship to the *Finances and Business* factor. The Conservative–Progressive score is predictive of six out of seven factors, as would be expected between a general measure of political attitude and more specific examples. The pattern of significance is shown in Table 6.

### Discussion

Building from the results of Study 1, a novel set of political issue questions was combined into domain-specific factors. DS predicted a general measure of conservative versus progressive attitude, as well as specific attitudes for issues, including immigration and sexual behavior. The factors derived here are a result of PCA, rather than directly observable variables. This approach allowed us to distinguish between potential domains of political attitude using this set of questions, but more work is necessary to resolve unexpected groupings, and may limit the potential to directly compare results with other studies. The resulting PCA explained more variance than the less targeted items in Study 1, likely the result of using items from distinct domains defined *a priori*, and demonstrated a more suitable representation of political attitudes in the Netherlands. Although overall DS scores did not predict overall voting trends, the contamination subscale was related to greater likelihood of voting for one political party: the PVV. The PVV platform is economically centrist, but socially conservative, including strong anti-immigration policies.

As in previous research, DS predicted a specific subset of political issues rather than conservative attitudes broadly. DS—particularly the contamination subscale—significantly predicted attitudes about homosexuality, immigration and

<sup>8</sup>When the analysis was repeated with additional predictors, the relationship between disgust sensitivity and *Nativism/Isolationism* reached significance,  $F(1, 258)=5.17$ , adjusted  $p=.041$ . The pattern of significance for contamination was the same when additional predictors were added.

Table 4. Factor structure of political items in Study 2

Question text	1 Imm.	2 Sex	3 Nat.	4 Sexism	5 Finance	6 Society	7 For. Int.
<b>Factor 1: Immigration and Islam</b>							
1	.82						
2	.82						
3	.72						
4	.72						
5	.68						
6	.67						
7	.66						
8	.66						
9	.64						
10	-.51						
<b>Factor 2: Sex and Sexual Preference</b>							
11		.68					
12		.68					
13		-.66					
14		-.58					
15		-.56					.31
16		.49					
17		.49					
18		.44					.42
<b>Factor 3: Nativism/Isolationism</b>							
19			.68				
20			.60				
21			.59				
22			.53				
23			.45				
24	.34		.38				
25	-.35		-.37				
26			.34				
<b>Factor 4: Sexism</b>							
27				.83			
28				.82			
29				.60			
30				.56			
31				.55			
<b>Factor 5: Finances and Business</b>							
32					.80		



33	It should be easier for employers to fire employees.				
34	It's fair that people with a higher income pay relatively more taxes than people with a lower income.			-.60	.30
	Factor 6: Sex in Society			.40	.34
35	Prostitution ought to stay legal.				.68
36	It's acceptable to have a sexual relation with someone other than your partner if you're married.		-.34		.60
	Factor 7: Foreign Intervention				
37	The Netherlands should take part in stopping the war in Syria.				.78
38	The Netherlands shouldn't take part in foreign military actions.			.32	-.60

identifiable immigrant groups, and sexual behaviors, but not attitudes regarding gender equality and foreign intervention.

While the *Finance* factor was predicted by the full DS-R score, the contamination subscale did not show a relationship. Previous researchers noted a significant relationship between DS and approval of income tax cuts but believed it to be spurious (Inbar, Pizarro, & Bloom, 2009). The current results cast doubt on the plausibility of this interpretation; we will return to this issue in the general discussion.

### GENERAL DISCUSSION

In two studies with large samples of native Dutch participants, differences in dispositional sensitivity to disgust predicted attitudes on specific political issues and, in Study 2, voting patterns. Results were generally consistent with a view of disgust as a response to violations of physical and spiritual purity, and with specific predictions derived from the behavioral immune system account of the relationship between disgust and political attitudes (Inbar & Pizarro, 2014). In Study 1, DS predicted attitudes for the factors *Physical and Spiritual Purity* and *Conservative Interests*; the latter (13-item) factor included five items relating to immigration and Islam. In Study 2, we examined the relationship between disgust and attitudes toward immigration and Islam more systematically, and found that although items had been included as two distinct areas, attitudes for both immigration and Islam loaded on a single factor that was significantly associated with DS. Replicating Study 1, as well as past research, DS also predicted attitudes on sex-related issues. Additionally, sensitivity to contamination disgust predicted attitudes toward gays and lesbians, and greater nativism and isolationism, including skepticism regarding the European Union (EU).

These results are correlational, so they cannot support causal claims on their own. In the context of related work where feelings of disgust have been experimentally manipulated to influence attitudes and judgments (Inbar, Pizarro, & Bloom, 2012; Terrizzi et al., 2010), it seems less plausible that political attitudes shape tendency to feel disgust than the reverse. In contrast to transient feelings of disgust, DS as a trait measure is stable over time (Rozin, Haidt, McCauley, Dunlop, & Ashmore, 1999), but it can vary: Physiological influences like pregnancy and sexual arousal can influence reported sensitivity to disgust (Borg & de Jong, 2012; Fessler, Eng, & Navarrete, 2005). Constructs like social dominance orientation, right-wing authoritarianism, and—most relevant to disgust—physiological reactivity (Hodson & Costello, 2007; Oxley et al., 2008) influence political attitudes, so other variables driving both DS and political opinion, or additional mediating factors, could contribute to these results.

The results of the current studies of Dutch participants are largely consistent with earlier research on disgust and political attitudes in Americans, in terms of issue domains as well as direction of attitude. As in the USA, DS in the current studies was consistently associated with more conservative positions on issues related to sexuality. Likewise, the relationship between DS and skepticism of immigrants and Islam is consistent with previous research showing a relationship between DS

Table 5. Correlation matrix for Study 2 factors and measures of disgust sensitivity (DS)

	DS	Contam.	1	2	3	4	5	6	7
1. Immigration and Islam	.15 **	.19***	—						
2. Sex and Sexual Preference	-.09	-.24***	-.07	—					
3. Nativism/Isolationism	.12*	.17**	.41***	.03	—				
4. Sexism and Stereotypes	-.08	-.03	.31***	-.22***	.16**	—			
5. Finance and Business	.16**	.07	-.09	.03	.03	-.07	—		
6. Sex in Society	-.27***	-.13*	-.13*	.19**	-.10	-.04	.04	—	
7. Foreign Intervention	.01	-.03	-.18**	.01	-.14	.02	-.04	.02	—

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Table 6. Relationship between disgust sensitivity and political issue factors in Study 2 (multivariate and univariate tests)

Measure	DS			Contamination			Conservative–Progressive		
	$F(7, 296)$	$p$		$F(7, 296)$	$p$		$F(7, 296)$	$p$	
Multivariate tests	7.05	<.001		6.58	<.001		11.68	<.001	
Univariate tests	$F(1, 302)$	$p$	$\eta^2$	$F(1, 302)$	$p$	$\eta^2$	$F(1, 302)$	$p$	$\eta^2$
Immigration and Islam	7.07	.019	.02	11.78	.002	.03	24.69	<.001	.07
Sex and Sexual Preference	2.34	.177	<.01	18.77	<.001	.06	21.03	<.001	.06
Nativism/Isolationism	4.06	.079 <sup>a</sup>	.01	9.42	.005	.03	20.60	<.001	.06
Sexism and Stereotypes	1.72	.222	<.01	.21	.650	<.01	10.35	.002	.03
Finance and Business	8.07	.018	.02	1.50	.310	<.01	11.53	.001	.03
Sex in Society	23.76	<.001	.07	5.30	.039	.01	18.90	<.001	.06
Foreign Intervention	.01	.910	<.01	.31	.650	<.01	1.28	.257	<.01

Note: DS, disgust sensitivity.  $p$  values reflect FDR adjustment; alpha = .05.

<sup>a</sup>Reached significance when age, gender, and education were added as additional predictors.

and negative attitudes toward immigrants and foreigners (Hodson & Costello, 2007). This consistency suggests that the relationship between DS and politics may be reasonably stable despite differences in political systems and cultural norms. It follows that—as the behavioral immune system account proposes—these relationships may be the result of the same underlying mechanism, namely an aversion to behaviors and groups that historically posed contamination threats. These results are consistent with a general “purity” account of disgust, which was developed in a context of investigating moral foundations (Rozin, Lowery, Imada, & Haidt, 1999). However, the pattern of attitudes we observed in Study 2—specifically toward immigration and Muslims—is more closely aligned with the mechanism suggested by the behavioral immune system and its behavioral and attitudinal consequences.

Of course, many of the cultural differences between the USA and the Netherlands are a matter of degree, not kind. Immigration is a particularly interesting example, as it has only become a volatile political issue in the Netherlands in recent decades. In contrast, the purported mechanisms behind the behavioral immune system would have developed over evolutionary time. Whereas previous studies on American participants found the strongest correlations between DS and attitude toward gays and lesbians and only intermittently toward foreigners/outgroups, the relationship to immigration and general sexual behavior was much stronger in the Dutch sample, with items about sexual orientation only significant for contamination disgust in Study 2. The conditions under which DS is related to political attitude, and the cultural contexts for these relationships, are a rich area for further investigation.

Another point supporting the behavioral immune system account of the current findings is the implausibility of most of the political issue items directly eliciting disgust. Unlike

the physically disgusting scenarios describing putatively morally repugnant acts (e.g., having sex with a chicken and then eating it for dinner) that are often used as examples of disgust’s influence on moral and social attitudes, none of the items used here directly describe disgusting acts. Sex-related items (e.g., “In principle, there is nothing wrong with a one-night stand”) might evoke disgust indirectly by leading participants to imagine actions they consider disgusting, but even this is unlikely for the items assessing attitudes toward Islam, immigration, and the EU. A framework that limits disgust’s role in social and political attitudes to a response elicited by violations of purity (whether physical or spiritual) would have trouble accounting for the relationship between disgust and attitudes on topics that are not viscerally disgusting, even indirectly. In contrast, the behavioral immune system account can easily accommodate these findings, by characterizing foreign outgroups as a contagion threat.

Further support for the behavioral immune system account comes from the fact that the contamination disgust subscale—which most directly taps concerns about interpersonal contagion—predicted political attitudes as well as, and sometimes better than, the whole DS-R (which includes the contamination subscale). For example, in Study 2, the contamination subscale was significantly associated with both sex factors (*Sex and Sexual Preference* and *Sex in Society*), whereas the full DS-R was significantly associated only with the second. This is consistent with previous research in which the contamination subscale was found to be most predictive of political ideology (Inbar, Pizarro, Iyer, et al., 2012).

There are, however, some patterns in the current results that either are inconsistent with previous work or are not easily explained by either the purity or behavioral immune system accounts. First, contrary to previous research in American

samples (e.g., Inbar, Pizarro, Iyer, et al., 2012), DS was only inconsistently predictive of voting history and intentions. We believe that the differences between American and Dutch political systems are likely responsible for this inconsistency. The USA generally uses a two-party system, and as the two parties have polarized over the last 40 years, social conservatives are unlikely to identify as Democrats and quite likely to identify as Republicans (Fiorina & Abrams, 2008). In the Netherlands, on the other hand, social conservatives have a menu of parties to consider, including the CDA, CU, PVV, SGP, and, to some extent, VVD. This, obviously, makes it more difficult to predict how socially conservative individuals will vote. Additionally, the effect sizes associated with the effect of DS on attitudes were in the small to medium range; many other influences are involved in voting behavior. Nonetheless, in Study 2, greater DS was associated with a greater likelihood of voting for the PVV, both retrospectively (i.e., past voting) and prospectively (i.e., voting intentions). The PVV's platform emphasizes Dutch cultural traditions, restrictions on immigration, skepticism toward Islamic immigrants, and resistance to EU integration (i.e., isolationism) (van Heerden, de Lange, van der Brug, & Fennema, 2014) and as such is likely to hold more appeal for the disgust-sensitive.

We also found an unpredicted relationship between DS and free-market economic views: The DS-R (although, it should be noted, not the contamination subscale) was significantly associated with the *Finance and Business* factor in Study 2. This result is consistent with the correlation Inbar, Pizarro, and Bloom (2009) observed between DS and a preference for income tax cuts—a correlation that the authors regarded as likely to be spurious. In light of the current results, this interpretation seems less plausible, but it is also not clear that any existing account of disgust and politics would predict this relationship. It may be that it is an artifact of a specific feature of the US and Dutch political systems, or a third variable related to both DS and attitude to financial policy, but we are uncertain of what this would be. Ultimately, the answer to this puzzle will require more data and, perhaps, theoretical revision.

Efforts to clarify the relationship between DS and political attitudes in different populations could benefit individuals, as well as stakeholders in politics and community development. The ability to address the way individuals judge and make decisions about specific issues like who to vote for, how to handle the changing demographics of neighborhoods, and behaviors related to drug use or sexually transmitted disease, has broad, practical implications. Aside from contributing to understanding the divisions between various political factions, and their targeted political campaign messages, this insight into political attitudes would allow more refined design and deployment of public health messaging, education, and community outreach.

## CONCLUSION

Disgust sensitivity, which can be described as an emotional/cognitive orientation to pathogen threats, is related to social and political beliefs that emphasize socially conservative, insular values. This effect extends to general political orientations,

attitudes in specific issue domains, and appears related to some voting patterns. This is likely the result of disgust's overlapping roles in our social and moral beliefs: disgust supports cultural norms regarding spiritual and physical purity as well as motivating avoidance of contaminating individuals, groups, or behaviors.

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