

Disgust Sensitivity Relates to Moral Foundations Independent of Political Ideology

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Moral judgments seem related to the emotion disgust. Evolutionary considerations might illuminate the psychological processes underlying this relation. Several studies have noted that individuals who are more disgust sensitive condemn moral violations more strongly. However, this association could result from both disgust sensitivity and moral judgment being correlated with political ideology. To clarify the relationship between disgust sensitivity and moral judgment, we analyzed data from multiple published and unpublished datasets that included the Three-Domain Disgust Scale, the Moral Foundations Questionnaire, and a measure of ideology (total $N = 2,478$). Results showed that associations between disgust sensitivity and moral judgment remained when controlling for ideology. Each of the 3 types of disgust sensitivity uniquely predicted at least 1 of the 5 moral foundations. Moral disgust predicted scores for all moral foundations (largest effect for fairness/reciprocity). Sexual disgust predicted scores for all moral foundations except fairness/reciprocity (largest effect for purity/sanctity). Pathogen disgust had small predictive effects for ingroup/loyalty, authority/respect, and purity/sanctity. All effects were positive (i.e., higher levels of disgust sensitivity were associated with greater moral foundation endorsement). These findings suggest specific relations between disgust sensitivity and moral judgment that are not explained by ideology, shedding further light on the functions of disgust and morality.

Keywords: disgust, Three-Domain Disgust Scale, moral judgment, Moral Foundations Questionnaire, political ideology, conservatism

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Sentimentalist theories of moral psychology hold that moral judgments are influenced by emotions (Haidt, 2001). The emotion disgust

seems particularly relevant for moral judgments (e.g., Rozin, Haidt, & McCauley, 2008; Tybur, Lieberman, Kurzban, & DeScioli, 2013). For instance, many morally condemned behaviors involve food, treatment of bodily wastes, and sex—stimuli that can elicit disgust independent of moral condemnation. Some studies have reported that experimentally manipulating state disgust (e.g., via an odor) increases moral condemnation (e.g., Schnall, Haidt, Clore, & Jordan, 2008). Although a recent meta-analysis suggests that effects of state disgust on moral judgment may be weaker than previously assumed (Landy & Goodwin, 2015), another line of research indicates that individuals who are more prone to experiencing disgust also condemn moral violations more strongly (Chapman & Anderson, 2013). Further, because disgust

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sensitivity and moral judgment are multidimensional, exactly how dispositional variation in disgust sensitivity relates to moral condemnation remains unclear.

How Do Moral Judgments Relate to Disgust?

Recent evolutionary psychological perspectives argue that moral judgments are the output of specific adaptations, which may be illuminated by the specific effects of disgust on moral judgment (Haidt & Graham, 2007; DeScioli & Kurzban, 2013). Recent research shows that disgust varies across pathogen, sexual, and moral domains (Tybur, Lieberman, & Griskevicius, 2009) and that moral judgment varies across five foundations (Graham et al., 2011). One perspective suggests that one moral foundation—purity—evolved from pathogen-avoidance mechanisms and that the key relationship between disgust sensitivity and moral judgment should concern pathogen disgust and moral judgments related to purity (Haidt, 2012); some data are consistent with this perspective (Horberg, Oveis, Keltner, & Cohen, 2009). Other perspectives imply a less specific relationship between disgust and morality (Chapman & Anderson, 2013; Tybur et al., 2013); some data are consistent with this alternative perspective, with higher (pathogen) disgust sensitivity being related to moral judgments of harm and fairness violations (Chapman & Anderson, 2014) and with incidental disgust (from gustatory or olfactory inductions) amplifying moral condemnation outside of the purity domain (Landy & Goodwin, 2015).

In addition, moral disgust might reflect a different process. Rather than an effect of emotions on moral judgment, moral disgust might reflect the use of emotional behaviors for navigating social interactions by communicating and coordinating moral condemnation (Tybur et al., 2013). From this perspective, individual differences in moral disgust sensitivity reflect motivations to avoid actions that might impose costs on oneself (e.g., being exploited) and tendencies to use disgust as a means of communicating one's condemnation of such actions.

In sum, the relationship between disgust sensitivity and moral condemnation could vary across domains of both constructs, and the literature reports conflicting findings regarding which do-

maines of disgust sensitivity relate to which moral foundations. Here, we seek to clarify how disgust sensitivity relates to moral judgment. Further, we test whether and how disgust sensitivity relates to moral judgment independent of a third variable that purportedly relates to disgust and moral judgment: political ideology.

Both Moral Judgments and Disgust Sensitivity Correlate With Political Ideology

In some—but not all—societies the ideologies of many people can be described in terms of a dimension ranging from left-wing liberalism to right-wing conservatism (e.g., Jost, Federico, & Napier, 2009). Liberals and conservatives vary on both moral foundation endorsement (Graham, Haidt, & Nosek, 2009) and disgust sensitivity (Inbar, Pizarro, & Bloom, 2009; Tybur, Merriman, Hooper, McDonald, & Navarrete, 2010). Covariation between ideology and moral foundations could be argued to reflect conservatives' higher investment in avoiding outgroups (e.g., Fincher & Thornhill, 2012) and consolidating ingroup cohesion (Haidt, 2012). Covariation between ideology and pathogen disgust sensitivity could be argued to reflect a similar behavioral strategy—that by avoiding outgroups and consolidating ingroup cohesion one lowers the likelihood of pathogenic infection (Tybur et al., 2010). Furthermore, covariation between ideology and sexual disgust sensitivity could be argued to reflect a sexual strategy. That is, ideology could reflect people's endorsement of rules that benefit their own reproductive strategies (Tybur, Inbar, Güler, & Molho, 2015; Weeden & Kurzban, 2014).

Hence, any correlations between disgust sensitivity and moral foundations could be a by-product of a shared relationship with ideology. If disgust sensitivity and moral judgment are correlated because of their shared relationship with conservatism, then controlling for conservatism should reduce any associations between disgust sensitivity and moral judgment, which has implications for evolutionary models that draw direct links between disgust and morality. Thus, the current study tested whether and how disgust sensitivity relates to moral foundation endorsement, independent of ideology.

Method

We aggregated data from studies that included the Three-Domain Disgust Scale (TDDS; Tybur et al., 2009), the Moral Foundations Questionnaire (MFQ; Graham et al., 2011), and a measure of ideology. The TDDS measures three types of disgust sensitivity—moral, sexual, and pathogen—which reflect tendencies to be disgusted by moral violations, sexual activities, and infectious substances, respectively. The MFQ measures five types of moral concerns: harm/care, fairness/reciprocity, ingroup/loyalty, authority/respect, and purity/sanctity. Across samples, different versions of the MFQ were used. For all samples, scores for the MFQ subscales were the average item scores. Across the samples, ideology was measured with variables of different ranges, so scores for this variable were standardized for each sample before aggregation. As sex differences have been observed for both moral foundations (Graham et al., 2011) and disgust sensitivity (Tybur, Bryan, Lieberman, Caldwell Hooper, & Merriman, 2011), we controlled for participant sex in all analyses.

We compiled three new datasets and five already published datasets:

- One sample was from an unpublished study by Van Leeuwen and Park (2013). The sample consisted of 273 students (158 females, 115 males; M age = 20.5 years, SD = 3.97) from a U.K. university who completed multiple questionnaires as part of experimental sessions that also included unrelated tasks. The majority (n = 224) were British; the others were from China (n = 12) and a variety of other countries. Participants completed the TDDS, MFQ-30, and indicated their political orientation on a 7-point scale ranging from 1 (*very liberal*) to 7 (*very conservative*).
- Two samples were from an unpublished Master thesis (Dukes, 2011). One sample consisted of 47 individuals residing in the United States (32 females, 15 males; M age = 35.9 years, SD = 11.97); another sample consisted of 83 individuals residing in India (31 females, 52 males; M age = 29.4, SD = 8.46). Both samples were recruited via Amazon Mechanical Turk. Participants completed the TDDS, MFQ-20, and, as a mea-

sure of ideology, the 16-item SDO scale (Pratto, Sidanius, Stallworth, & Malle, 1994). The SDO items were rated on a 7-point scale ranging from 1 (*very negative*) to 7 (*very positive*) and showed high reliability in both samples (United States, α = .93; India, α = .90). In both samples the study materials were in English.

- Two samples were from Kurzban, Dukes, and Weeden (2010). One sample consisted of students at a U.S. university (n = 521); another consisted of U.S. residents recruited via Amazon Mechanical Turk (n = 479). Participants completed the TDDS and the MFQ-43 (scores were transformed to range from 0 to 5), and they indicated their political orientation on a 7-point scale ranging from 1 (*very liberal*) to 7 (*very conservative*).
- Three samples were from Quintelier, Ishii, Weeden, Kurzban, and Braeckman (2013), which included students from Belgium (n = 493), the Netherlands (n = 285), and Japan (n = 297). Participants completed the TDDS, the MFQ-30, and ideology measures that differed across countries. In the Japanese sample, ideology was measured with a 7-point scale ranging from 1 (*strongly support left wing*) to 7 (*strongly support right wing*). In the Belgian and Dutch samples, ideology was measured with a 4-point scale reflecting political party preference. The scale was coded so that lower values indicate progressivism and higher values indicate conservatism. In the Belgian and Dutch samples the materials were in Dutch; in the Japanese sample the materials were in Japanese.

Results

Reliabilities for the disgust sensitivity scales were high in all samples (α s ranging from .74 to .93, see Supplemental Materials S1). Reliabilities for the moral foundations subscales differed across samples, ranging from low (α = .42) to high (α = .88; median α = .67; see Supplemental Materials S1).

Consistent with previous research (e.g., Graham et al., 2009) conservatism correlated negatively with the harm/care and fairness/reciprocity foundations and positively with the ingroup/loyalty, authority/respect, and purity/sanctity foundations (see Table 1). Consistent with Tybur et al. (2010), conservatism showed a

Table 1
Correlations Between All Included Variables

Variable	1	2	3	4	5	6	7	8	9
1. Moral disgust	—								
2. Sexual disgust	.40*	—							
3. Pathogen disgust	.32*	.45*	—						
4. Harm	.29*	.23*	.20*	—					
5. Fairness	.20*	.05	.12*	.54*	—				
6. Ingroup	.10*	.14*	.19*	.25*	.39*	—			
7. Authority	.17*	.19*	.24*	.25*	.34*	.65*	—		
8. Purity	.29*	.44*	.31*	.37*	.29*	.52*	.60*	—	
9. Conservatism	.04	.13*	.02	-.10*	-.12*	.15*	.21*	.19*	—
10. Female	.11*	.42*	.19*	.20*	.08*	-.04	-.00	.10*	-.04

Note. Cases with missing data were excluded pairwise. *N*s ranged from 2,278 to 2,389.

* $p < .01$.

small positive correlation with sexual disgust sensitivity but showed almost no correlation with moral and pathogen disgust sensitivity.

Participants were nested within samples, and failing to account for this nesting could yield spurious correlations (Kievit, Frankenhuys, Waldorp, & Borsboom, 2013). For example, four samples may on average have low disgust sensitivity and low moral judgment, and four samples may on average have high disgust sensitivity and high moral judgment. To account for the nested data structure, we analyzed the data using maximum-likelihood hierarchical linear regression. Moral foundation scores were regressed on sex, conservatism, moral disgust sensitivity, sexual disgust sensitivity, and pathogen disgust sensitivity (all Level 1), and cases were nested within samples (Level 2). Moral, sexual, and pathogen disgust sensitivity were centered within samples. Intercepts were allowed to vary across samples, as were slopes for conservatism (allowing slopes for sex and the disgust sensitivity variables to vary across samples yielded models that either did not converge or demonstrated no significant variability in slopes). We also computed models that did not include conservatism as a predictor. We computed standardized coefficients as $\beta = (\text{Unstandardized Coefficient} \times SD_{\text{predictor}}) / SD_{\text{outcome}}$ (Hox, 2010).

On the whole, the three domains of disgust sensitivity were positively related to the five moral foundations (see Table 2). Controlling for conservatism had little effect on the relationship between disgust sensitivity and moral foundations. The largest change was

for the effect of sexual disgust sensitivity on authority/respect, where β was reduced from 0.15 to 0.10.

Results indicated that the TDDS moral domain was uniquely related to all five MFQ domains, with the strongest relationships with harm/care and fairness/reciprocity (β s = 0.19 and 0.23) and smaller relationships with ingroup/loyalty, authority/respect, and purity/sanctity (β s ranged from 0.08 to 0.11). The TDDS sexual domain was related to four of the MFQ domains, with the strongest relationship with purity/sanctity ($\beta = 0.32$), smaller relationships with harm/care, ingroup/loyalty, and authority/respect (β s ranged from 0.06 to 0.11), and no relationship with fairness/reciprocity ($\beta = 0.01$). Finally, the TDDS pathogen domain was uniquely related to three of the MFQ domains, with weak relationships with ingroup/loyalty, authority/respect, and purity/sanctity (β s ranged from 0.07 to 0.13), and no relationship with harm/care and fairness/reciprocity (β s = 0.03 and 0.04).

To verify whether this analysis—which aggregated across different measures of conservatism administered in different political contexts—had not yielded results that diverged from those in the samples when analyzed separately, we regressed each of the moral foundations on the three disgust sensitivities, conservatism, and sex for each of the samples separately. These regression analyses showed that the effects of conservatism differed across samples (see Supplemental Materials S2). Nevertheless, for each kind of disgust sensitivity, the strongest predictive effects were usually ob-

Table 2
Standardized Regression Coefficients (With 95% Confidence Intervals) for Predicting Moral Foundation Scores From TDDS Moral, Sexual, and Pathogen Factors, Participant Sex, and Political Conservatism

Moral foundation	Moral disgust β (95% CI)		Sexual disgust β (95% CI)		Pathogen disgust β (95% CI)	
	Politics excluded	Politics included	Politics excluded	Politics included	Politics excluded	Politics included
Harm	.21*** (.17, .25)	.19*** (.15, .24)	.05 (-.00, .09)	.06* (.01, .11)	.04 (-.00, .08)	.03 (-.01, .07)
Fairness	.25*** (.21, .29)	.23*** (.19, .27)	-.01 (-.05, .04)	.01 (-.03, .06)	.04* (.00, .08)	.04 (-.00, .08)
Ingroup	.08*** (.04, .12)	.08*** (.04, .12)	.14*** (.09, .18)	.11*** (.06, .16)	.09*** (.05, .14)	.09*** (.05, .13)
Authority	.11*** (.07, .15)	.10*** (.06, .14)	.15*** (.10, .20)	.10*** (.06, .15)	.13*** (.08, .17)	.13*** (.09, .18)
Purity	.11*** (.08, .15)	.11*** (.07, .15)	.36*** (.31, .40)	.32*** (.28, .36)	.06*** (.03, .10)	.07*** (.03, .11)

Note. For each Three-Domain Disgust Scale (TDDS) domain, the left column shows the coefficients when not controlling for political conservatism. Participants (Level 1) were nested within samples (Level 2). Cases with missing data were excluded listwise. For models that did not include conservatism, $N_s = 2,273, 2,285, 2,270, 2,274,$ and $2,279,$ respectively. For models that included conservatism, $N_s = 2,187, 2,197, 2,186, 2,188,$ and $2,191,$ respectively. Standardized coefficients for the fixed effect of conservatism were $-.16 (-.31, -.01), -.22 (-.44, -.01), .10 (-.11, .31), .16 (.03, .30),$ and $.11 (-.05, .28),$ respectively.

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

served in multiple samples (see Supplemental Materials S3).

Discussion

Results showed that moral judgments for each foundation were uniquely related to at least one domain of disgust sensitivity, even when controlling for ideology and sex. All effects were positive (i.e., higher levels of disgust sensitivity were associated with greater moral foundation endorsement). Many of the effects were small, perhaps due in part to the inadequate reliabilities of the moral foundations scores. As the regression coefficients indicate unique effects, these effects cannot be attributed to (a) general acquiescence on either of the questionnaires, or (b) the disgust sensitivity scores reflecting a general tendency to evaluate social events negatively. That disgust sensitivity and moral judgment remained associated when controlling for ideology suggests that—at least across these samples—ideology did not confound correlations between disgust sensitivity and moral judgment.

Across the samples, ideology was assessed with different measures, which might have yielded differences in measurement accuracy (e.g., liberal vs. conservative in the U.S. sam-

ples might have captured ideology better than did left-wing vs. right-wing in the Japanese sample). Therefore, the analyses might have controlled for ideology better in some samples than in others. In addition, the contents of ideology are different across cultures. However, even for the samples in which ideology was presumably measured appropriately (e.g., the U.S. and U.K. samples), we observed multiple positive associations between disgust sensitivity and the moral foundations (see Supplemental Material S3). Nevertheless, further research may explore whether associations between disgust sensitivity and the moral foundations are robust to controlling for culturally appropriate multidimensional measures of ideology. Further research might also verify that the same pattern of associations is observed when using another measure of moral judgments. Such research might show whether the small effect sizes observed here are genuine or are an artifact of the MFQ.

A related issue is whether the associations between disgust sensitivity and the moral foundations are similar across countries. The current findings suggest that the effects observed for moral disgust sensitivity and sexual disgust sensitivity are not limited to U.S. and U.K. populations (as these predictors showed similar ef-

fects in the Belgian and Dutch samples). However, the results suggest that the effects observed for pathogen disgust sensitivity might be limited to U.S. and U.K. populations. Further research could explore whether the strongest effect observed for pathogen disgust sensitivity (its association with authority/respect) is observed across cultures.

The finding that multiple types of disgust sensitivity predicted multiple moral foundations is consistent with disgust being elicited by moral condemnation and with disgust amplifying and/or producing moral condemnation (Landy & Goodwin, 2015; Rozin et al., 2008; Tybur et al., 2013). Consistent with the notion that condemnation is sometimes expressed with disgust, individuals more prone to expressing disgust vis-à-vis moral violations were also more likely to moralize across all foundations. The current findings thus support the notion that disgust sometimes is an output of moral judgments. Furthermore, consistent with the notion that people sometimes condemn disgusting actions, individuals more easily disgusted by situations involving pathogens or sex were also more likely to moralize ingroup/loyalty, authority/respect, and purity/sanctity. Thus, although our results do not inform about the specific issue of whether disgust produces *or* merely increases moral condemnation, the current findings do support the broader notion that sexual and pathogen disgust sometimes serve as input to moral decisions.

That sexual disgust predicted purity/sanctity is unsurprising as some items assessing the latter explicitly mention disgust or sexual acts. However, that sexual disgust predicted purity/sanctity more strongly than did pathogen disgust suggests an inconsistency between theory and research on the moral foundations. The observed pattern suggests that either the purity/sanctity foundation is more based on concerns about sexual reproduction than on concerns about infectious disease (cf. Haidt & Graham, 2007; Tybur et al., 2015), or the subscale assessing endorsement of the purity/sanctity foundation does not accurately capture the intended construct.

In summary, we observed unique associations between individual differences in disgust sensitivity and moral judgment. Further research may examine whether these associations are confounded by a currently unknown vari-

able. It is possible that these predictive effects of trait disgust are genuine and do not translate to corresponding experimental effects of state disgust (cf. Landy & Goodwin, 2015). For functional traits requiring prolonged learning or development, momentary experimental manipulations cannot always be expected to exert analogous effects on the outcomes.

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