Disgust and Anger Relate to Different Aggressive Responses to Moral Violations

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Abstract

In response to the same moral violation, some people report experiencing anger, and others report feeling disgust. Do differences in emotional responses to moral violations reflect idiosyncratic differences in the communication of outrage, or do they reflect differences in motivational states? Whereas equivalence accounts suggest that anger and disgust are interchangeable expressions of condemnation, sociofunctional accounts suggest that they have distinct antecedents and consequences. We tested these accounts by investigating whether anger and disgust vary depending on the costs imposed by moral violations and whether they differentially correspond with aggressive tendencies. Results across four studies favor a sociofunctional account: When the target of a moral violation shifts from the self to another person, anger decreases, but disgust increases. Whereas anger is associated with high-cost, direct aggression, disgust is associated with less costly indirect aggression. Finally, whether the target of a moral violation is the self or another person influences direct aggression partially via anger and influences indirect aggression partially via disgust.

In the era of Internet outrage, moral violations have become increasingly visible. Indeed, online expressions of moral condemnation have become so widespread that *Slate* declared 2014 "the year of outrage." Stories such as that describing Cecil the Lion's 2015 death at the hands of dentist-hunter Walter Palmer are invariably followed by a sea of negative, morally condemning comments. At the surface, such comments might appear to be expressing a single sentiment: outrage. A closer look can reveal subtle differences, though; some comments refer to being angry, whereas others refer to being disgusted. Can the emotions underlying outrage provide insight into people's responses to moral violations? And, specifically, does the distinction between anger and disgust—the moral emotions that most strongly underlie outrage (Gutierrez & Giner-Sorolla, 2007; Hutcherson & Gross, 2011; Royzman, Atanasov, Landy, Parks, & Gepty, 2014; Rozin, Lowery, Imada, & Haidt, 1999)—capture meaningful differences in how people respond to moral violations? Or are differences in the emotions underlying condemnation

illusions of language—idiosyncratic preferences for communicating outrage?

Some approaches to this question suggest that there are meaningful differences between disgust and anger in response to moral violations, and that the emotion underlying outrage depends on the content of a moral violation. For example, according to the CAD model, moral violations of community, autonomy, and divinity ethics elicit the emotions contempt, anger, and disgust, respectively (Rozin et al., 1999; Russell, Piazza, & Giner-Sorolla, 2013). Similarly, moral-foundations theory (Graham, Haidt, & Nosek, 2009) posits that moral violations involving purity or sanctity uniquely elicit disgust, whereas other moral violations (e.g., those involving harm-care or

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fairness-reciprocity) do not. However, accumulating evidence has challenged the idea of clean mappings of moral emotions on the content of moral violations (Cameron, Lindquist, & Gray, 2015). In contrast with the CAD model's predictions, recent work suggests that pathogen-free violations of divinity ethics elicit stronger anger than disgust (Royzman et al., 2014), and that violations of autonomy ethics (e.g., "a person steals a purse from a blind person") and community ethics (e.g., "a 16-year-old refuses to give up his/her seat on the bus to a crippled old lady") elicit stronger feelings of moral disgust than anger and contempt (Hutcherson & Gross, 2011).

Although much research has focused on testing correspondences between moral content and distinct emotions, the reasons underlying variability in responses to moral violations with *similar* content have received less attention. Findings that participants report high levels of both anger and disgust toward moral violators—and that verbal self-reports of anger and disgust are highly correlated (rs as high as .82; Gutierrez & Giner-Sorolla, 2007)—have been interpreted as suggesting that the terms *anger* and *disgust* are "semantic equivalents," (Hutcherson & Gross, 2011, p. 720) used interchangeably to express moral outrage (Nabi, 2002; see also Marzillier & Davey, 2004; Simpson, Carter, Anthony, & Overton, 2006). However, little research has directly tested whether anger and disgust elicited by identical moral violations are equivalent in their antecedents and functional outcomes. In the studies reported here, we investigated whether anger and disgust vary as a function of the costs imposed by moral violations, and whether, in turn, they motivate distinct aggressive strategies toward transgressors.

Sociofunctional Approaches to Anger and Disgust

Sociofunctional approaches to moral emotions, which highlight the adaptive costs and benefits of emotions and their accompanying motivational states, may shed light on the differences between anger and disgust elicited by identical moral violations. Anger motivates approach or attack tendencies (Carver & Harmon-Jones, 2009; Harmon-Jones & Allen, 1998), and it can reduce the costs a person incurs because of others' moral violations by compelling perpetrators to change their behavior in ways that place more weight on the angry person's interests (Fischer & Roseman, 2007; Sell, Tooby, & Cosmides, 2009). Indeed, anger is associated with overt punishment of immoral behavior (Fischer & Roseman, 2007; Seip, Van Dijk, & Rotteveel, 2014), and expressions of anger alter negotiation counterparts' behavior by eliciting more concessions (Reed, DeScioli, & Pinker, 2014; Van Kleef, De Dreu, & Manstead, 2004).

Whereas anger toward moral violations motivates costly approach tendencies, moral disgust—at least at the

trait level—is associated with lower motivations to seek vengeance (Richman, DeWall, Pond, Lambert, & Fincham, 2014), especially via direct confrontation (Pond et al., 2012). That said, although moral disgust is viewed as motivating avoidance of moral violators (Curtis & Biran, 2001; Gutierrez & Giner-Sorolla, 2007; Hutcherson & Gross, 2011; Tybur, Lieberman, & Griskevicius, 2009), it does not necessarily motivate avoidance of physical contact in the same way that disgust toward pathogen cues does (Tybur, Lieberman, Kurzban, & DeScioli, 2013). Instead, moral disgust might neutralize the threats posed by moral violators by social distancing, or by recruiting punishment from other people. For example, Curtis and Biran (2001) argued that any avoidance associated with moral disgust functions "to punish and ostracize" (p. 29) moral offenders, and Haidt (2003) proposed that moral disgust functions to deter "culturally inappropriate behaviors, particularly those involving the body" (p. 858; see also Rozin, Haidt, & McCauley, 2008; Russell & Giner-Sorolla, 2013). Indeed, evidence suggests that moral disgust predicts nonviolent punishment behavior (e.g., rejection of unfair offers in economic games; Chapman, Kim, Susskind, & Anderson, 2009), and is a better predictor of such behavior than anger is.

In sum, both equivalence and sociofunctional approaches predict that anger and disgust are associated with punishment of moral violators. However, a sociofunctional account further predicts that anger and disgust are associated with distinct punishment strategies tailored to the costs imposed by a moral violation.

Variation in Aggressive Tactics

Aggressive strategies vary in their effectiveness at changing or stopping a transgressor's behavior, and they also vary in their costliness to the aggressor. Direct aggression, which involves face-to-face physical or verbal confrontation (e.g., hitting or insulting), is tailored to promptly and effectively stop other people's transgressions. It is not cost free, though; direct aggressors risk retaliation from the targets of their aggression and those targets' social allies (Archer & Coyne, 2005; Campbell, 1999). Indirect aggression, in contrast, involves manipulating other people's reputations or social standing, or excluding them from a group (e.g., by spreading negative information; Archer & Coyne, 2005) without direct confrontation. Thus, indirect aggression is less risky—given that it protects the aggressor's identity—but also less efficient in dealing with imminent threats, which instead warrant more direct, confrontational strategies.

If direct and indirect aggression vary as a function of the threats posed by moral violations—and the associated willingness to pay costs in aggressing—might anger and disgust in response to moral violations vary in a similar manner? Equivalence accounts, which view anger and disgust as indistinguishable expressions of moral outrage

(Nabi, 2002), suggest that they should not, but sociofunctional accounts imply that they do (Fischer & Roseman, 2007; Hutcherson & Gross, 2011; Sell et al., 2009; Tybur et al., 2013). Hence, equivalence and sociofunctional accounts make different predictions regarding (a) the relationship between the costs imposed by a moral violation and the emotion (anger vs. disgust) experienced in response to that violation and (b) the relationship between the emotion experienced and the kind of aggression (direct vs. indirect) that is likely to result.

Only one study has tested whether the emotion an individual experiences in response to a moral violation varies depending on the costs the moral violation imposes on that individual. In this study, participants' emotional responses to moral violations were measured, and the target of the violations (self vs. other) was manipulated, with the assumption that violations targeting the self are more personally costly than those targeting another person (Hutcherson & Gross, 2011). However, this study was limited by methods that confounded emotional experience with moral relevance (i.e., participants were asked the degree to which they experienced "moral disgust" and "anger"—but not "moral anger"; Russell et al., 2013). In the current studies, we aimed to more rigorously test whether anger and disgust, rather than reflecting equivalent responses to moral violations, depend on the self-relevance of those violations. If anger is associated with more costly punitive responses (i.e., direct aggression), then participants should report greater anger when moral violations target the self rather than another person. If disgust is associated with less costly punitive responses (i.e., indirect aggression), then participants should report greater disgust when moral violations target another person rather than the self. Across four studies, we investigated the relationships between the costs imposed by moral violations and the emotions and aggressive tendencies elicited by those violations.

Study 1

Method

Study 1 examined whether the magnitude of anger and disgust elicited by a moral violation depends on the target of the violation. After reading descriptions of moral violations, participants indicated the degree to which facial expressions of anger, disgust, and other emotions matched their reactions to the violations. The target of the violations (self vs. other) was varied across participants. Our key prediction was that participants who read a moral-violation scenario targeting someone other than themselves would experience more disgust than those who read a scenario targeting themselves, and that the opposite pattern would emerge for anger. We aimed to collect data from 200 participants, in order to have 80%

power to detect an interaction effect corresponding to a Cohen's d of 0.40. We did not conduct analyses until we had finished data collection, which was terminated after we reached our targeted sample size.

Participants. We recruited participants ($N = 201$; 56.2% male; mean age = 31.7 years, $SD = 10.78$) to complete an online survey on Amazon Mechanical Turk (MTurk), for a compensation of 25¢. All participants provided informed consent.

Procedure. Participants were randomly assigned to one of two conditions. In the *other* condition, participants read five scenarios in which another person was the target of a moral violation (e.g., "A person you knew stole someone else's ATM card and spent all of their money"). In the *self* condition, participants read the same five scenarios, except that the participant was described as the target (e.g., "A person you knew stole your ATM card and spent all of your money"). The scenarios were generated on the basis of a pilot study in which we asked participants to list a time when they felt morally disgusted by another person (for the text of the scenarios, see the Supplemental Material available online).

To measure emotional responses to the scenarios, we asked participants to endorse the degree to which arrays of faces expressing six basic emotions (anger, disgust, fear, sadness, happiness, and surprise) matched how they felt while reading the scenarios. Because endorsements of facial expressions do not rely on language—or on respondents' idiosyncratic definitions of emotion terms—they have been used as a methodological alternative to verbal self-reports (e.g., Gutierrez & Giner-Sorolla, 2007; Rozin et al., 1999; see also Chapman & Anderson, 2013). In this study, each array included three male and three female faces retrieved from the Radboud Faces Database (Langner et al., 2010). Following each scenario, participants saw arrays of all six emotional expressions and chose the one that best matched how they felt while reading the scenario. Then, they rated how well each array of expressions matched their feelings, using a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). Finally, participants saw only the anger and disgust arrays and selected which one best matched their response to the scenario.

Results

Most participants endorsed either the anger (66.2%) or the disgust (22.4%) array as best matching their feelings while reading the scenarios. When forced to choose whether the anger array or the disgust array better matched their feelings, 76.6% of participants chose the anger array, and 23.4% chose the disgust array. The pattern of the mean ratings was similar: Participants most
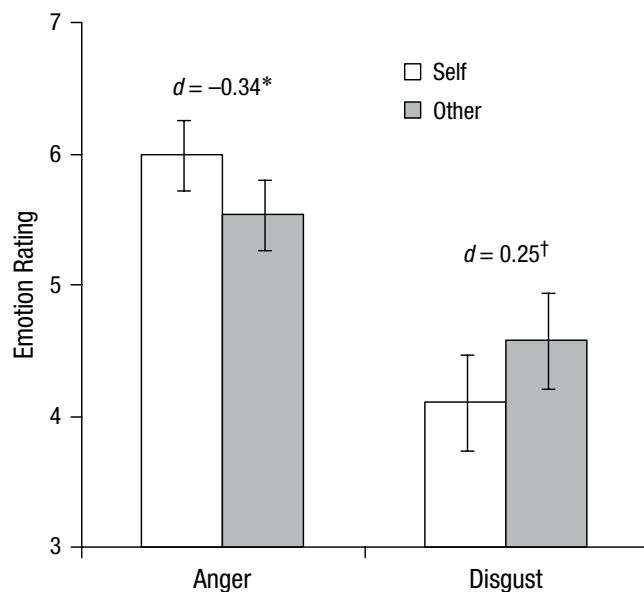
Fig. 1. Results from Study 1: mean ratings of anger and disgust in the two target conditions (self vs. other). Error bars indicate 95% confidence intervals. The dagger and asterisk indicate the significance of the differences between conditions ($^{†}p < .10$, $*p < .05$).

strongly endorsed the anger ($M = 5.77$, $SD = 1.39$) and disgust ($M = 4.35$, $SD = 1.90$) arrays as matching their feelings, and the mean ratings were lower for the sadness ($M = 3.97$, $SD = 1.68$), fear ($M = 3.49$, $SD = 1.79$), surprise ($M = 2.96$, $SD = 1.45$), and happiness ($M = 1.29$, $SD = 0.93$) arrays (for descriptive statistics and bivariate correlations, see Table S1 in the Supplemental Material). As expected, the use of facial arrays allowed for clearer distinctions between anger and disgust than have been obtained using verbal self-reports (e.g., Gutierrez & Giner-Sorolla, 2007). Indeed, there was no statistically significant relationship between endorsements of anger and disgust, $r = −.01$, 95% confidence interval (CI) = [−.15, .13], $p > .25$.

We tested our primary prediction—that varying the target in the moral-violation scenarios (other vs. self) would have opposing effects on anger and disgust—with a 2 (scenario target; between subjects) × 2 (emotion; within subjects) analysis of variance (ANOVA). Results were more consistent with a sociofunctional account than with an equivalence account, as the interaction of scenario target and emotion was statistically significant, $F(1, 199) = 8.28$, $p = .004$, $\eta_p^2 = .04$, 90% CI[1] = [.01, .09] (see Fig. 1).

Tests of the simple effects of target condition on ratings of anger and disgust were also consistent with a sociofunctional account. Anger was lower in the *other* condition compared with the *self* condition, $t(199) = −2.41$, $p = .017$, $d = −0.34$, 95% CI = [−0.62, −0.06], but disgust showed the opposite pattern, $t(199) = 1.78$, $p = .077$, $d = 0.25$, 95% CI = [−0.03, 0.53]. We also tested whether the same interaction

emerged when other emotions replaced disgust in the analysis (i.e., whether anger decreased when the target shifted from self to other, whereas other emotions increased). A significant interaction emerged only in the analysis of anger and surprise, $F(1, 199) = 4.86$, $p = .029$, $\eta_p^2 = .02$, 90% CI = [.001, .07]. However, there was no simple effect of target condition on surprise, $t(199) = 0.58$, $p > .25$, $d = 0.08$, 95% CI = [−0.36, 0.19].

Study 2

Method

Study 1 provided initial evidence that varying the target of a moral violation has distinct effects on feelings of anger and disgust. However, Study 1 relied on a small set of moral-violation scenarios, which may have limited its ecological validity (but see Brauer & Chekroun, 2005). To address this limitation, in Study 2 we analyzed data from an existing experience-sampling study in which participants reported their emotional responses—including anger and disgust—toward moral violations they had witnessed or been the targets of in their day-to-day lives (Hofmann, Wisneski, Brandt, & Skitka, 2014). Using repeated assessments of real-life moral violations, we tested whether experiencing moral violations directed toward oneself and witnessing moral violations directed toward other people had opposing effects on disgust and anger. (See Hofmann et al., 2014, for full information on the sample, procedure, and measures in the original study.)

Participants. Participants ($N = 1,252$; 51.8% female; mean age = 31.9 years, $SD = 9.96$) were recruited via various Web sites, social media, and newspaper ads in the United States and Canada. All participants provided informed consent.

Procedure. Participants first completed an intake survey, which assessed demographics and personality. On each of the next 3 days, they received five signals to complete an assessment on their smartphones. After each signal, they indicated whether they had recently committed, been the target of, witnessed, or learned about a moral or immoral event. They then wrote a description of and answered contextual questions about this event. Next, they indicated the extent to which they experienced each of nine moral emotions, including anger and disgust, in response to the described event ($0 = not\ at\ all$, $4 = very\ much$).

Results

For the present study, we focused on reported immoral (rather than moral) events ($N = 521$) that participants had

either been the targets of ($n = 174$, 33.4%) or witnessed ($n = 347$, 66.6%) in their everyday lives. Additional analyses including immoral acts that participants learned about via personal communication, online media, or other news outlets are detailed in the Supplemental Material. Participants' predominant emotional response to real-life moral violations was disgust ($M = 2.20$, $SD = 1.43$), which was followed by anger ($M = 2.05$, $SD = 1.36$) and contempt ($M = 1.62$, $SD = 1.34$). As has been found in past research that used verbal self-reports (e.g., Gutierrez & Giner-Sorolla, 2007)—and in contrast with our findings in Study 1, which instead used facial arrays—ratings of anger and disgust were highly correlated, $r = .64$, 95% CI = [.59, .69], $p < .001$ (for descriptive statistics and bivariate correlations, see Table S2 in the Supplemental Material).

To test whether the target of the moral violation (self vs. other) affected the relative degree to which participants felt anger and disgust, we subtracted disgust scores from anger scores. To account for the nested nature of the data, we conducted multilevel modeling analyses (restricted maximum likelihood estimation, using the MIXED command in SPSS 21.0), in which we allowed both the intercepts and the slopes to vary randomly across participants. In line with the interaction found in Study 1, results indicated that the difference scores varied depending on whether the violations targeted the self or someone else, $F(1, 290.99) = 14.24$, $p < .001$, $d = -0.36$, 95% CI = [−0.55, −0.18]. The pattern was consistent with a sociofunctional perspective, as participants reported more anger than disgust when they were the target of an immoral act ($M = 0.14$, 95% CI = [−0.04, 0.32]), whereas they reported more disgust than anger when someone else was the target ($M = -0.29$, 95% CI = [−0.42, −0.15]).

Additional analyses showed that emotional responses were stronger overall when violations targeted the self, and this effect was more pronounced for anger, $F(1, 292.47) = 38.11$, $p < .001$, $d = -0.57$, 95% CI = [−0.76, −0.38], than for disgust, $F(1, 274.75) = 5.90$, $p = .016$, $d = -0.23$, 95% CI = [−0.41, −0.04]. Next, following existing research examining verbal endorsements of anger and disgust (which tend to be highly correlated; e.g., Gutierrez & Giner-Sorolla, 2007), we tested the effects of moral-violation target (self vs. other) on ratings of each emotion while controlling for the other (i.e., how target influenced anger ratings when we controlled for disgust and vice versa). Anger was higher in response to offenses that targeted the self compared with those that targeted someone else, $F(1, 487.55) = 34.95$, $p < .001$, $d = -0.43$, 95% CI = [−0.62, −0.25]. As in Study 1, the effect of the target's identity (self vs. other) on disgust was in the opposite direction, though it did not differ significantly from zero, $F(1, 294.37) = 2.10$, $p = .148$, $d = 0.11$, 95% CI = [−0.07, 0.29] (see Fig. 2).
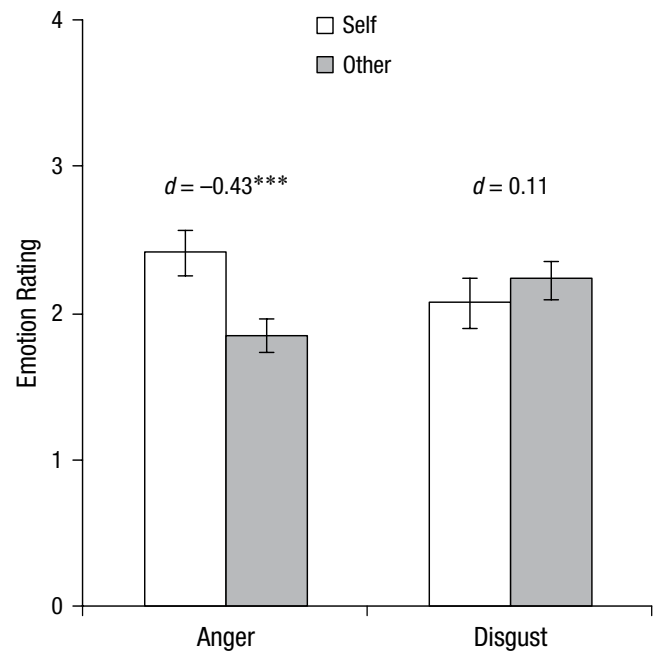

Fig. 2. Results from Study 2: mean ratings of anger (controlling for disgust) and disgust (controlling for anger) when the target was the self and when the target was another person. Error bars indicate 95% confidence intervals. Asterisks indicate a significant difference between moral violations targeting the self and those targeting another person (***$p < .001$).

Finally, we tested whether similar results would emerge if we replaced disgust with contempt in our analysis of difference scores. There was no statistically significant effect of the target of moral violations on the difference between anger and contempt, $F(1, 305.14) = 2.49$, $p = .116$, $d = -0.15$, 95% CI = [−0.33, 0.03]; indeed, this effect size was outside the estimated 95% CI for the effect of moral-violation target on the difference between anger and disgust.

Study 3

Method

Studies 1 and 2 offered preliminary support for a sociofunctional, rather than equivalence, account of the magnitude of anger and disgust experienced in response to both hypothetical scenarios of moral violations and real-life immoral acts. That said, these studies did not test a critical prediction of a sociofunctional account—that anger and disgust differentially relate to distinct aggressive sentiments. In Study 3, we aimed to fill this gap. After reading a moral-violation scenario, participants indicated their emotional response and their endorsement of different aggressive behaviors (direct vs. indirect) toward the perpetrator. To increase the generalizability of our findings, we sampled scenarios broadly (20 scenarios in

total). We aimed for each scenario to be read by 40 participants, and therefore targeted a sample size of 800 participants.

Participants. We recruited participants to complete an online survey using Amazon MTurk, for a compensation of 40¢. We also uploaded our survey on two Web sites (Social Psychology Network, http://www.socialpsychology .org/; Psychological Research on the Net, http://psych .hanover.edu/research/exponnet.html), where participants completed it voluntarily. We terminated data collection after reaching our targeted sample size, without having conducted analyses beforehand. All participants (*N* = 819; 51.6% male; mean age = 33.4 years, *SD* = 12.33) provided informed consent.

Procedure. We began by generating a pool of 36 moral violations, adapted from prior research (Graham et al., 2009; Hutcherson & Gross, 2011). On the basis of a pilot test, we excluded scenarios with ceiling or floor effects on rated moral wrongness, retaining 20 scenarios. Each involved the participant witnessing a man commit a moral violation against another person (for the text of the scenarios, see the Supplemental Material). Each participant was randomly assigned to read 1 of the 20 scenarios; we then assessed participants' emotional responses exactly as in Study 1 (i.e., using endorsements of facial arrays of emotional expression). Further, we asked respondents to rate each scenario according to how morally wrong they thought the behavior was (0 = *not at all morally wrong*, 100 = *extremely morally wrong*).

To measure participants' aggressive sentiments, we asked them to rate 10 statements concerning how they would act toward the perpetrator in the scenario, using 7-point Likert scales (1 = *strongly disagree*, 7 = *strongly agree*). The 10 statements (see the Supplemental Material) included 5 direct-aggression items and 5 indirect-aggression items adapted from prior research (Björkqvist, Lagerspetz, & Österman, 1992; Griskevicius et al., 2009; Hutcherson & Gross, 2011). We computed composite scores for direct (α = .88) and indirect (α = .74) aggression. We also administered the Brief Aggression Questionnaire (BAQ; Webster et al., 2014; α = .82) and the Three-Domain Disgust Scale (TDDS; Tybur et al., 2009; pathogen disgust: α = .84; sexual disgust: α = .88; moral disgust: α = .92) to assess and control for trait aggression and trait disgust, respectively. Finally, we asked participants to answer demographic questions regarding their age, gender, income, education level, ethnicity, and political orientation.

Results

As in Study 1, most participants endorsed either the anger (48.4%) or the disgust (21.1%) array as best matching their feelings when reading the scenario. When forced to choose whether the anger array or the disgust array

better matched their feelings, 67.0% of participants chose the anger array, and 33.0% chose the disgust array. The pattern of mean ratings was similar to that in Study 1: Scenarios elicited higher levels of anger (*M* = 5.33, *SD* = 1.65) and disgust (*M* = 4.54, *SD* = 1.85) than of surprise (*M* = 4.28, *SD* = 1.79), fear (*M* = 3.72, *SD* = 1.79), sadness (*M* = 3.67, *SD* = 1.79), and happiness (*M* = 1.48, *SD* = 1.24). Notably, the scenarios in Study 3 involved only moral violations targeting another person, and the mean ratings of anger and disgust in response to these violations were similar to those in the *other* condition of Study 1. Ratings of anger and disgust were moderately positively correlated, *r* = .25, 95% CI = [.18, .31], *p* < .001. (For descriptive statistics and bivariate correlations for these and other variables, see Tables S3.1–S3.3 in the Supplemental Material.)

To test for the effects of emotion on aggression, we conducted multilevel modeling analyses (REML; using MIXED in SPSS 21.0; for the specific equations, see the Supplemental Material). All measures were treated as Level 1 observations. Because each participant read 1 of 20 moral-violation scenarios, we treated responses as nested within scenarios (Level 2). For all analyses, we allowed both the intercepts and the slopes to vary across scenarios. We regressed endorsement of direct aggression on anger and disgust, while controlling for endorsement of indirect aggression, and we regressed endorsement of indirect aggression on anger and disgust, while controlling for endorsement of direct aggression. Given that prior research has consistently shown sex differences in direct aggression (Archer, 2004), we also controlled for participants' sex. Finally, we reran analyses controlling for trait aggression (using the BAQ) and trait disgust (using the three TDDS subscales).

Results were, again, more in line with a sociofunctional perspective than an equivalence perspective: Anger related positively to higher-cost, physically or verbally aggressive sentiments (direct aggression), *t*(102.65) = 2.26, *p* = .026, *b* = 0.07, 95% CI = [0.01, 0.14], whereas disgust did not, *t*(802.32) = 0.25, *p* > .25, *b* = 0.01, 95% CI = [−0.04, 0.05]. Further, disgust related positively to sentiments in favor of lower-cost social exclusion and reputational attacks (indirect aggression), *t*(165.08) = 4.96, *p* < .001, *b* = 0.12, 95% CI = [0.07, 0.17], but anger did not, *t*(818.95) = 1.49, *p* = .135, *b* = 0.04, 95% CI [−0.01, 0.09]. Results for both direct aggression and indirect aggression were virtually unchanged when we controlled for trait aggression and trait disgust; controlling for the behavior's moral wrongness also did not change results (see Additional Analyses in the Supplemental Material).

Study 4

Method

Study 4 tested whether varying the costs imposed by moral violations (by varying the target, as in Study 1)

would shift both the emotional response (anger vs. disgust) and aggressive sentiments (direct vs. indirect aggression), and, if so, whether feelings of anger and disgust would differentially mediate the effect of target condition on aggressive tendencies. Participants read a moral-violation scenario in which the target was either themselves or another person, and then they reported their emotional responses and endorsements of direct and indirect aggression toward the perpetrator. We aimed to collect data from 340 participants to have 80% power to detect a small to medium effect (i.e., the size of the effect found in Study 1). As in Studies 1 and 3, data collection was terminated after we reached our targeted sample size, and no analyses were conducted before data collection was complete.

Participants. We recruited participants (N = 347; 51.9% male; mean age = 34.3 years, SD = 11.91) to complete an online survey using Amazon MTurk, for a compensation of 60¢. All participants gave informed consent.

Procedure. Participants were randomly assigned to one of two conditions (*other* vs. *self*). In both conditions, participants read a scenario in which they were at a party and witnessed a man intentionally flicking his cigarette on a pile of jackets, badly damaging the jacket on the top of the pile (adapted from Griskevicius et al., 2009; for the text of the scenario, see the Supplemental Material). In the *other* condition, the jacket on the top of the pile was described as belonging to another person; the reader's jacket was described as undamaged and in the middle of the pile. In the *self* condition, the jacket on the top of the pile was described as belonging to the participant. We assessed emotional responses to this violation as in Studies 1 and 3, and we used the same measure of moral wrongness as in Study 3.

To measure direct aggression, we used the same five items used in Study 3. To measure indirect aggression, we used the three indirect-aggression items that exhibited the highest item-total correlations in Study 3 and two additional items adapted from previous research (Griskevicius et al., 2009; see the Supplemental Material). We computed composite scores for direct (α = .87) and indirect (α = .86) aggression. Further, we used the BAQ (α = .85) and TDDS (pathogen disgust: α = .85; sexual disgust: α = .87; moral disgust: α = .94) to assess trait aggression and trait disgust, respectively. Finally, we asked participants to provide basic demographic information.

Results

As in our previous studies, most participants endorsed either the anger (57.9%) or the disgust (25.1%) array as best matching their feeling when reading the scenario.

When participants were forced to choose whether the anger array or the disgust array better matched their feelings, 71.5% chose the anger array, and 28.5% chose the disgust array. The pattern of mean ratings was also similar to what we found previously, with participants reporting greater anger (M = 5.87, SD = 1.35) and disgust (M = 4.73, SD = 1.85) than surprise (M = 4.15, SD = 1.74), fear (M = 3.93, SD = 1.79), sadness (M = 3.31, SD = 1.77), and happiness (M = 1.33, SD = 0.97). The correlation between anger and disgust ratings was small in magnitude, r = .10, 95% CI = [−.01, .20], p = .064. Further, the *self* and *other* scenarios did not differ in their moral wrongness as rated by participants, $t(345)$ = 1.41, d = 0.15, 95% CI = [−0.06, 0.36], p = .160 (for descriptive statistics and bivariate correlations, see Tables S4.1 and S4.2 in the Supplemental Material).

Scenario target and emotion ratings. As in Study 1, we conducted a 2 (scenario target; between subjects) × 2 (emotion; within subjects) ANOVA to test for the predicted interaction. And, as in Study 1, results were consistent with our prediction, $F(1, 345)$ = 12.54, p < .001, η_p^2 = .03, 90% CI = [.01, .07] (see Fig. 3).

Tests of the simple effects of target condition on anger and disgust ratings again revealed that, whereas anger was lower in the *other* compared with the *self* condition, $t(345)$ = −1.79, p = .075, d = −0.19, 95% CI = [−0.40, 0.02], disgust was higher in the *other* compared with the *self*
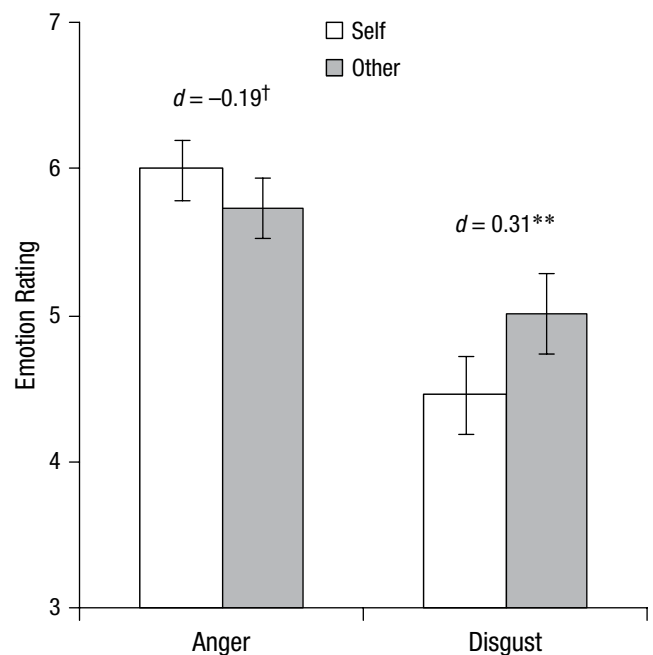

Fig. 3. Results from Study 4: mean ratings of anger and disgust in the two target conditions (self vs. other). Error bars indicate 95% confidence intervals. The dagger and asterisks indicate the significance of the differences between conditions (†p < .10, **p < .01).

condition, $t(345) = 2.83$, $p = .005$, $d = 0.31$, 95% CI = [0.09, 0.52]. We tested whether the same interaction would emerge when other emotions replaced disgust in our analysis; no significant interactions emerged (all ps > .10).

Scenario target and aggression. To test whether the target of the scenario also had opposing effects on aggressive tendencies, we conducted a 2 (scenario target; between subjects) × 2 (type of aggression; within subjects) ANOVA. As in Study 3, we controlled for participants' sex. There was a statistically significant interaction between scenario target and type of aggression, which indicated that target condition had different effects on endorsement of direct and indirect aggression, $F(1, 344) = 9.60$, $p = .002$, $\eta_p^2 = .03$, 90% CI = [.01, .06]. Tests of the simple effects of target condition on aggression indicated that, although endorsement of direct aggression was higher in the *self* compared with the *other* condition, $t(344) = -4.55$, $p < .001$, $d = -0.48$, 95% CI = [−0.70, −0.27], indirect aggression did not vary between the target conditions, $t(344) = -0.91$, $p > .25$, $d = -0.10$, 95% CI = [−0.31, 0.11].

As in Study 3, we next examined the simple effects of target condition on endorsements of each type of aggression while controlling for the other type, and still controlling for participants' sex. Again, results indicated that endorsement of direct aggression was higher for violations that targeted the self rather than another person, $t(343) = -4.57$, $p < .001$, $d = -0.43$, 95% CI = [−0.65, −0.22], whereas target condition did not have a significant effect on endorsement of indirect aggression, though the pattern of the means was in the opposing direction, $t(343) = 1.03$, $p > .25$, $d = 0.10$, 95% CI = [−0.11, 0.31] (see Fig. 4).

Scenario target, emotion, and aggression. Next, we examined whether the effects of target condition on tendencies toward direct and indirect aggression were mediated by anger and disgust. Using PROCESS for SPSS (Hayes, 2013), we first tested a model in which anger and disgust both mediated the relationship between scenario target and endorsement of direct aggression, while controlling for endorsement of indirect aggression. We then tested a model in which anger and disgust both mediated the relationship between scenario target and endorsement of indirect aggression, while controlling for endorsement of direct aggression. Finally, we reran both analyses while controlling for trait aggression (using the BAQ) and disgust sensitivity (using the three TDDS subscales; see Fig. 5). As in Study 3, we controlled for participants' sex in all analyses.

As we found in Study 3, anger was positively related to endorsement of direct aggression, $b = 0.11$, 95% CI =
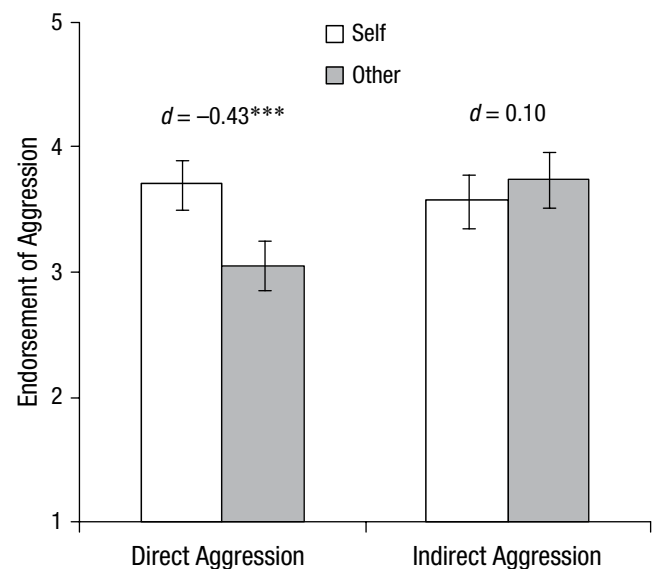

Fig. 4. Results from Study 4: mean endorsements of direct aggression (controlling for indirect aggression) and indirect aggression (controlling for direct aggression) in the two target conditions (self vs. other), controlling for participants' sex. Error bars indicate 95% confidence intervals. Asterisks indicate a significant difference between conditions (***$p < .001$).

[0.01, 0.22], $p = .035$, whereas disgust was not, $b = -0.01$, 95% CI = [−0.09, 0.07], $p > .25$. Further, we observed a marginally significant indirect effect of target condition on endorsement of direct aggression via anger, $b = -0.03$, 95% CI = [−0.10, 0.003], but not via disgust, $b = -0.01$, 95% CI = [−0.06, 0.05]. When we controlled for trait aggression and trait disgust, the indirect effect of target condition on endorsement of direct aggression via anger was statistically significant, $b = -0.03$, 95% CI = [−0.09, −0.001]. Also as in Study 3, disgust was positively related to endorsement of indirect aggression, $b = 0.11$, 95% CI = [0.03, 0.19], $p = .011$, whereas anger was not, $b = -0.02$, 95% CI = [−0.13, 0.10], $p > .25$. Further, there was an indirect effect of target condition on endorsement of indirect aggression via disgust, $b = 0.06$, 95% CI = [0.01, 0.16], but not via anger, $b = 0.01$, 95% CI = [−0.02, 0.05]. The indirect effect of target condition on endorsement of indirect aggression via disgust remained when we controlled for trait aggression and trait disgust, $b = 0.07$, 95% CI = [0.01, 0.17].

General Discussion

Are anger and disgust in response to moral violations interchangeable expressions of moral outrage, or do they reflect distinct motivational states? Although this question has inspired considerable debate in the literature (e.g., Cameron et al., 2015; Fischer & Roseman, 2007; Hutcherson & Gross, 2011; Nabi, 2002), little research has directly
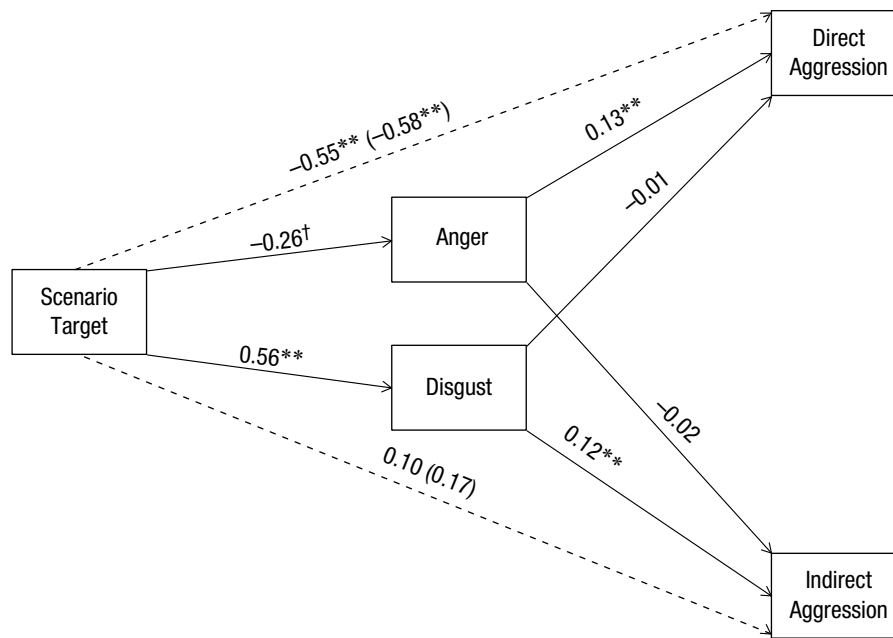
Fig. 5. Results from Study 4: unstandardized regression coefficients for the effects of target condition on endorsement of direct and indirect aggression, as mediated by ratings of anger and disgust. The models controlled for participants' sex, trait aggression, and trait disgust. Covariances between anger and disgust ratings and between endorsement of direct and indirect aggression were also controlled for. Values above the dashed arrows refer to residual and total (in parentheses) direct effects of target condition on endorsements of aggression. Values above the solid arrows refer to the effects of target condition on the mediators (anger and disgust) and the effects of the mediators on endorsements of direct and indirect aggression. The dagger and asterisks indicate marginally significant and significant paths ($^†p < .10$, $^{**}p < .01$).

pitted predictions generated from an equivalence account against those generated from a sociofunctional account. Results from these four studies favor a sociofunctional account, which predicts that anger and disgust have distinct antecedents and consequences, over equivalence accounts, which suggest that these two emotions reflect a common state of outrage.

Our results suggest that the emotion elicited by moral violations shifts toward anger when the costs of the violations increase, such as when the self is directly involved: Whereas anger increases when a moral violation targets the self rather than someone else, disgust decreases. Further, the emotion elicited relates to preferences for aggressive tactics. Anger (but not disgust) predicts preferences for direct aggression, such as hitting, insulting, or yelling at the moral violator, whereas disgust (but not anger) predicts preferences for indirect aggression, such as socially excluding or spreading negative information about the moral violator (Curtis & Biran, 2001), potentially as a means for coordinating punishment with other people (Tybur et al., 2013). Especially in the case of moral offenses that are not personally relevant and in the case of morally ambiguous acts, disgust may serve to signal condemnation and facilitate taking of sides, while reducing the risk of escalating conflict (DeScioli, 2016).

Aggressive strategies also seem to vary in a context-sensitive manner (Archer & Coyne, 2005); participants report stronger preferences for direct aggression toward perpetrators of personally relevant transgressions than toward perpetrators of non-personally relevant transgressions, whereas participants report preferences for indirect aggression more evenly across moral offenses targeting the self and others. Thus, it appears that individuals avoid endorsing high-cost, direct aggression when they are not personally targeted by a violation, but they endorse both direct and indirect aggression in response to self-threatening offenses. Finally, the target of a moral offense influences endorsement of direct aggression partially via anger (but not disgust), whereas it influences endorsement of indirect aggression partially via disgust (but not anger).

Recent debates in the moral-psychology literature have contrasted "modular" perspectives positing specific correspondences between the content of moral violations and the emotions they elicit (e.g., the CAD model—Rozin et al., 1999; moral-foundations theory—Graham et al., 2009) with a domain-general perspective, which rejects "a whole number of discrete and domain-specific mental mechanisms [as] underlying morality and emotion" (Cameron et al., 2015, p. 371). Our results are inconsistent with a

one-to-one link between moral-violation content and emotion, but they are compatible with a modular view of emotions, at least as defined by evolutionary psychologists (e.g., Sell et al., 2009; Tybur et al., 2013), for whom "modular" means "functionally specialized." That is, our results are consistent with the idea that different moral emotions are specialized for addressing different threats posed by conspecifics.

Of course, further work is needed to elucidate the functions of anger and disgust in moral contexts. In addition to motivating different aggression tactics, disgust and anger might serve communicative functions, signaling information to a moral violator or third parties (Kupfer & Giner-Sorolla, 2016; McCullough & Reed, 2016). Anger displays, for example, might communicate that the signaler is the kind of person who would respond aggressively to others who do not place sufficient weight on his or her welfare (Reed et al., 2014; Sell et al., 2009). If anger functions to deter future transgressions—from the same perpetrator or others—we would expect expressions of anger to be especially strong in response to personally relevant offenses that happen in front of other people. And if disgust functions to signal condemnation and recruit punishment (Tybur et al., 2013), expressions of disgust should be most effective when a moral violation targets someone other than the signaler in the presence of multiple observers. Further work on these issues can both inform vibrant theoretical debates and clarify the role of moral emotions in the era of outrage.

Action Editor

Eddie Harmon-Jones served as action editor for this article.

Author Contributions

C. Molho, J. M. Tybur, and E. Güler designed and collected the data for Studies 1, 3, and 4. W. Hofmann provided access to the data for Study 2 and valuable guidance in data analysis. C. Molho and J. M. Tybur were responsible for analyzing the data. All the authors participated in drafting and revising the manuscript and approved the final version of the manuscript for submission.

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Open Practices

All data and materials for Studies 1, 3, and 4 have been made publicly available via the Open Science Framework and can be accessed at https://osf.io/p97fk/. All data and materials for Study 2 have been made publicly available at the Dataverse repository and can be accessed at https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/26910. The complete Open Practices Disclosure for this article can be found at http://journals.sagepub.com/doi/suppl/10.1177/0956797617692000. This article has received badges for Open Data and Open Materials. More information about the Open Practices badges can be found at http://www.psychologicalscience.org/publications/badges.

Note

1. Following Wuensch's (2009) recommendations, we report 90% CIs for squared effect-size estimates.

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