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Disgust at Tainted Souls: Testing the Character Hypothesis of Disgust Through Descriptions of Dark Personality Traits

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ABSTRACT

Disgust is commonly reported in response to socio-moral violations, but whether and how it differs from anger in these contexts is often debated. Preliminary evidence that disgust tracks the bad character of actors has left unanswered the question of which observable actions, other than visibly harming other people, lead to such character judgements. We tested the character hypothesis of disgust using a novel idea: that the perception of dark personality traits could be an important cue to bad character without direct harm. Our three pre-registered experiments (*N*s = 191, 180, 157) tested participants' emotional responses to observable behavioural signals of sadism, narcissism and Machiavellianism respectively. Harmful consequences were also manipulated in two of the experiments. Results further supported the character hypothesis of disgust, shedding light on the difference between the two often intertwined moral emotions and the multi-faceted concept of bad moral character.

1 | Introduction

Ordinary moral vices, such as unfairness, racism, betrayal and hypocrisy, can evoke expressions of disgust. Although disgust and anger often co-occur in moral situations, disgust has been shown to predominate in purity violations involving norms about the use of the body, such as food or sexual taboos (Giner-Sorolla et al. 2018). In the socio-moral domain where bodily norm violation is not involved, however, disgust still often appears. One explanation for this phenomenon is the character hypothesis of moral disgust (Giner-Sorolla and Chapman 2017), which proposed that disgust is closely associated with judgement of bad moral character, more so than anger, whereas anger is more closely associated with judgement of harmful outcomes of actions. In this article, we consolidate the limited evidence for this hypothesis, breaking reliance on 'mind-reading' scenarios and for the first time systematically examining which natural cues in the social environment would elicit moral emotions. Across three experiments, we manipulated behavioural cues to dark personality traits to create bad-character impressions, then measured disgust and anger responses.

1.1 | Disgust and Anger in Socio-Moral Contexts

Often separated in schemes of 'basic' emotion, disgust and anger nonetheless both characterize disapproval of other people's immoral behaviours. Early theory and research on moral disgust and anger linked them to violations of different moral codes. The CAD model (Rozin et al. 1999) and the moral foundations theory (MFT) (Graham et al. 2013) used different names to propose similar ideas: Disgust predominates over anger in violations involving 'purity' or 'divinity' norms, most clearly when bodily norms such as sexual taboos are involved. Anger, though, prevails when consequences cause individual harm or violation of 'autonomy' rights (for a review of research in support, see Giner-Sorolla et al. 2018). Contempt, another other-condemning emotion, was

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originally posited to be linked to violations of the 'community' code in the CAD model, which received less attention as well as evidence (Fischer and Roseman 2007; Hutcherson and Gross 2011).

For wrongs where bodily norm violation is not involved, however, it has been unclear which appraisals distinguish these emotions. Within this category, early theorists speculated that deception or abusiveness might elicit disgust (Haidt et al. 1997; Miller 1997; Nussbaum 2004). At the same time, some findings of disgust in response to socio-moral violations might be explained by a tendency to co-endorse anger and disgust verbally, or to confuse the two words semantically (Gutierrez et al. 2012; Hutcherson and Gross 2011; Marzillier and Davey 2004; Nabi 2002; Simpson et al. 2006). Anger is often found to be more prevalent than disgust in harm situations not involving bodily norms (Kayyal et al. 2015; Kollareth et al. 2022; Piazza and Landy 2020; Royzman et al. 2014). However, going beyond language, studies measuring facial muscle movement have shown specific disgust towards unfairness violations not involving the body, as indicated by facial physiology (Cannon et al. 2011; Chapman et al. 2009).

One way to explain the differences maintains that anger is related primarily to offences against the self or extended-self, while disgust is stronger in offences in which self-relevance is low. This distinction has been shown in several studies (Hutcherson and Gross 2011; Liu and Giner-Sorolla 2024; Molho et al. 2017). Still, anger is often felt towards non-self-relevant offences, even though it may be less intense and partly driven by empathic concerns for the suffering (Batson 2011). In third-party cases, it remains unclear which moral appraisals can distinguish the two emotions.

What is clearer, though, is the two emotions' different motivational functions. Research has consistently shown that disgust is more closely associated with indirect aggression, such as social exclusion and gossip; whereas anger is more closely associated with direct aggression, such as physical or verbal confrontation (Fan et al. 2024; Lopez et al. 2021; Molho et al. 2017; Tybur et al. 2020). In these studies, self-relevance was often manipulated to shift respondents' emotional and motivational states. As similar as anger and disgust can be, these divergent motivational tendencies are a strong reason to care about the difference between the two emotions, because they predict quite different action outcomes. So, in seeking appraisals other than self-relevance that distinguish anger and disgust among third-party observational scenarios, it will remain important to test the different role of these two emotions in predicting downstream motivational consequences.

1.2 | The Character Hypothesis of Disgust

A character hypothesis has been proposed to explain socio-moral disgust (Giner-Sorolla and Chapman 2017). Building on the similarity between the object of physical disgust (cues to contagious matter that needs to be avoided or cleansed) and the nature of a person who acts badly in an irredeemable way, this theory proposes to explain anger and disgust as distinct responses that in practice often overlap. That is, when violations show the bad character of a person, disgust works to focus evaluation on the fundamental unfitness of the person for society, even if they do not immediately harm other people. While the theory mainly focuses on appraisals associated with socio-moral disgust, it assumes overlapping phenomenological and motivational features (e.g., facial expression and avoidance) between socio-moral disgust and pathogen-related disgust, leaving open the answers to whether the two types of disgust should be considered as distinct and whether the former is an exaptation of the latter (see Rozin et al. 2009; Tybur et al. 2013, but also Rottman et al. 2018).

The character hypothesis also can explain the prevalence of disgust at bodily-moral violations, even when pathogenic threat is absent (e.g., when a person is described as merely imagining a disgusting transgression (Sabo and Giner-Sorolla 2017). Such violations are strong cues to character, as shown by findings that physically 'impure' violations influence character judgements more negatively, compared to merely harmful acts (see Chakroff et al. 2017; Chakroff and Young 2015; Sabo and Giner-Sorolla 2017).

However, evidence for this hypothesis so far has not given us any insight into which observable behavioural cues can elevate socio-moral disgust over anger. Hutcherson and Gross (2011) first hinted at disgust's stronger association with bad-character judgement, in comparison to anger. When asked, 90% of participants preferred to be the target of anger versus moral disgust, and 60% of them agreed that disgust says more about a target's moral sense or character than anger—but not specifically how. Giner-Sorolla and Chapman (2017) also presented evidence for the character hypothesis of disgust outside the purity domain. Adapting scenarios from Cushman (2008), they manipulated the protagonist's desire to cause harm and the harmful consequences of their behaviour. Desire to harm predicted only disgust when controlling for anger, whereas harmful consequences were more closely associated with anger when controlling for disgust. Furthermore, the effect of desire on disgust was mediated by bad-character judgement. However, the best-controlled study designs in this series described the target's desire to harm in a 'mind-reading' scenario to induce bad-character judgement (Studies 2 and 3, Giner-Sorolla and Chapman 2017), which is not realistically how people form character impressions.[1] These studies, then, left open the question of what could be observed as a cue to bad character, especially when separating disgust reactions from anger reactions based on harm.

To be sure, observable cues to bad character often involve seeing a person harming others, which would promote anger as well as disgust under the character hypothesis. But we were particularly interested in non-harmful behaviours that nonetheless convey cues to bad character. For example, individuals with bad character may not actually cause harm; they may simply care little about causing harm or even take joy in seeing people harmed by others. Whether these indirect but ecologically valid indicators of bad character could reliably induce moral disgust, more so than anger, remains to be seen. The current research, then, innovates over previous efforts, by manipulating some of the much-studied dark personality traits as cues to bad moral character.

Moral character is often considered to be a general evaluation of the moral dimension of an individual's personality (Goodwin et al. 2014; Kamtekar 2004; Kupperman 1995). Evaluating morally relevant traits helps people judge whether another person is fit

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or unfit for inclusion in cooperation (Helzer and Critcher 2019). Here, we were only interested in the outcome of general character evaluation, specifically judgement of bad character. We define it as a negative dispositional evaluation of a person, as revealed by attributing to them such traits as 'untrustworthy', 'immoral' or 'unfair'.

1.3 | Linking Bad Character to Dark Personality Traits

Paulhus and Williams (2002) coined the term 'dark triad' for three problematic personality traits: Machiavellianism, narcissism and psychopathy. Individuals with high Machiavellianism see others as means rather than ends (Christie and Geis 1970; Wilson et al. 1996). Narcissism combines excessive self-importance with vulnerability (e.g., Emmons 1987; Raskin and Terry 1988; Wink 1991). Psychopathy involves callous affect, erratic lifestyle and criminality (e.g., Hare 1985; Mahmut et al. 2011). A fourth construct, everyday sadism, was added to form a dark tetrad; sadists derive pleasure from other people's suffering (Baumeister and Campbell 1999; Buckels et al. 2013).

Although moral character can be studied from a personality approach (Cohen and Morse 2014; Fleeson et al. 2014), research on third-person character judgement has largely remained separate from the study of personality traits existing in people (that is, from a first-person perspective). Empirical research has shown that people with dark traits lack positive traits of character, such as honesty and caring (Bader et al. 2021; Jones and Paulhus 2017), and manifest bad character through antisocial behaviours (Baughman et al. 2014; Muris et al. 2017; O'Boyle et al. 2012). Connecting dark traits to bad character, third-person perspective studies have also found that people who show everyday-sadistic reactions to others' misfortune are judged as having bad character even if they did not cause harm (Ames and Johar 2009; Gromet et al. 2016). Apart from these findings, there are theoretical works and reviews analysing, for example, Machiavellianism as an absence of the positive traits of honesty and humility (Cohen and Morse 2014), or narcissism as a failure of moral character (Fatic 2023). To be sure, criticism has been raised about the insufficient distinctiveness among dark traits, particularly conceptual overlap between psychopathy and the others (Muris et al. 2017; Vize et al. 2018). With this in mind, we judged that the most distinct three—sadism, narcissism and Machiavellianism—could be valuable cues to bad character.

2 | The Current Research

Three pre-registered experiments tested the character hypothesis of disgust by describing behaviours representing everyday sadism (Experiment 1), narcissism (Experiment 2) and Machiavellianism (Experiment 3). While the main aim of these studies was to extend the scope of the character hypothesis using a variety of observable behaviours, we took the opportunity to make another minor improvement in this research. Giner-Sorolla and Chapman's (2017) scenarios often involved body-envelope violation (e.g., piercing one's hand or cutting off a piece of one's ear). These scenarios might have aroused concerns for pathogenic infection or existential concerns about bodily frailty, both of which have been named as alternative explanations for the connection between morality and disgust in experimental studies (cf. Giner-Sorolla et al. 2018). The vignettes we developed, however, avoided the creatural element in harm, offering a purer test of disgust–character links.

Experiment 1 tested whether a wrongdoer expressing malicious pleasure (i.e., everyday sadism) would evoke more disgust than anger, and whether this effect would be mediated by bad-character judgement. While this first experiment only manipulated cues to character in the form of sadistic expressions, Experiments 2–3 manipulated cues to character orthogonally to harmful consequences caused, while also using different dark triad expressions (narcissism and Machiavellianism). This harm manipulation was expected to elicit anger, explicitly in contrast to bad character as an elicitor of disgust. Exploratorily, Experiment 2 also measured contempt, as it frequently appeared in participants' free reports of emotions in a pre-test of vignette manipulation. We report all measures, manipulations and data exclusions here. All materials, raw data and analysis code are available at: https://osf.io/j2ft9/.

3 | Experiment 1

Participants read four scenarios in which targets' reaction to condemnation of their wrongdoings was varied. The four conditions involved (a) the target showing malicious pleasure on seeing or imagining others' suffering or loss, representing everyday sadism; (b) the target's denial of harmful consequences, offensive but less indicative of bad character than malicious pleasure; (c) the target expressing regret, which would show decent character and appease condemnation; and (d) no reaction from the target, a control condition. Four hypotheses were pre-registered at: https://osf.io/fqt7h/.

Hypothesis 1. *Disgust would be strongest in the malicious-pleasure condition, after controlling for anger, whereas anger would be strongest in the denial condition, after controlling for disgust. Showing regret would trigger less anger and disgust than other conditions.*

Hypothesis 2. *The effects of the reaction manipulation on disgust would be mediated by bad-character judgement. For this and all mediation hypotheses, the causal direction of paths from the predictor is ensured by random assignment to experimental condition; and the causal direction of paths from character to emotion is based on the theoretical assumption that character is the appraisal being manipulated by the presentation of dark trait-relevant behaviour.*

As rare or unusual behaviours can lead to stronger trait-based attributions (Gray and Keeney 2015), a secondary hypothesis addressed this potential confounding effect.

Hypothesis 3. *The effect of reaction type on judgement of bad character would not be explained away by judgements of the 'weirdness' of the act.*

Finally, we wanted to see if, in these situations, disgust and anger would preferentially predict different action tendencies.

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Hypothesis 4. *Disgust would be more closely associated with indirect action tendencies, whereas anger would be more closely associated with direct action tendencies.*

3.1 | Method

3.1.1 | Design

The experiment used a 4 (scenario) × 4 (target reaction: malicious pleasure vs. denial vs. regret vs. control) Greco-Latin square design, ensuring that each scenario and each reaction type appeared only once per participant, in one of four different configurations ('rows') that between them covered all possible combinations.

3.1.2 | Participants

We pre-registered a sample size of 176 for the central hypothesis (ANOVA repeated measures, within-between interaction with 4 groups × 2 measures). This size was based on analysis with G*power 3.1, and would have 80% power to detect a medium effect, $f(V) = 0.25$ or $\eta^2_p = 0.06$, using the 'as in Cohen (1988)' option. We recruited 207 British participants on the crowdsourcing platform Prolific Academic to allow for 10% data exclusion. Sixteen participants were excluded following our pre-registration for failing one or more fact-check questions, leaving a sample of 191 (76 male, 115 female, $M_{age} = 35.17$, SD = 11.88), which could detect a minimum effect size of $f(V) = 0.24$.

3.1.3 | Procedure and Materials

Participants were randomly assigned to one row of the Greco-Latin square, and they read four scenarios and answered questions after each one. Each scenario described a moral offence, such as swearing in public or making a false insurance claim, followed by a conversation in which a stranger, not directly harmed by the offence, condemns what the offender did. Depending on the condition, the offending agent reacts to the condemnation differently. For example, the malicious-pleasure condition described that the offender laughs heartily and says they like to see others' loss or suffering.

3.1.4 | Measures

Attention and manipulation check: For each scenario, two questions about key facts screened inattentive participants. At the end of the questionnaire, two more manipulation-check questions asked participants to what extent they thought the scenario revealed the agent's bad character on a seven-point scale (r = 0.71).

Emotions: For disgust and anger expressions, three pictures each were shown from the Montreal Set of Facial Displays of Emotion (Beaupré et al. 2000). Participants were asked to choose which set of faces better described their feelings (anger, disgust or neither), and in two separate scaled questions, how angry and disgusted they felt, referring to the faces. This facial-endorsement measure has been useful in distinguishing the two emotions compared to purely verbal measures (Giner-Sorolla et al. 2018).

Adapted from Salerno and Peter-Hagene (2013), a further grid measure showed a scale with the x-axis verbally labelled 'disgust' and the y-axis labelled 'anger'. Participants had to choose one cell in the two-dimensional grid, discouraging them from considering the emotions as parallel responses. Both the facial-endorsement measure and the grid measure used seven-point scales, from not at all angry/disgusted to very angry/disgusted.

There were high correlations between the face and grid scales for anger (r = 0.91) and for disgust (r = 0.88). The correlations between anger and disgust using either of the two measures were lower, *rs* ranging from 0.64 to 0.70. As pre-registered, the face and grid measures were averaged for each emotion, with the final emotions correlated at $r = 0.71$.

Bad-character judgement: Following previous research (Sabo and Giner-Sorolla 2017, Study 5; Tannenbaum et al. 2011), 11 items measured judgement of moral character (e.g., 'empathetic', 'trustworthy', 'has good moral standards') scaled from 1, not at all to 7, completely. The measure had high reliability once positively worded items were reverse-coded (α = 0.91), so all items were averaged, with higher numbers indicating worse character.

Action judgement: Judgement of wrongness of the action was measured by asking how wrong, immoral and blameworthy the agent's actions were on a seven-point scale ($\alpha = 0.95$). Judgement of weirdness of the actions was measured by asking how common (reverse-coded), strange and weird the target's reaction was (α = 0.44). The commonness item was dropped to improve reliability of the measure, leaving strangeness and weirdness correlating at $r = 0.83$.

Action tendencies: Adapted from Molho et al. (2017), three items measured direct action tendency, such as how much participants would like to publicly condemn and to argue with the agent (α = 0.87), and other three measured indirect action tendency, such as how much would they like to avoid and to exclude the agent from their social group ($\alpha = 0.93$), anchored by 1, not at all and 7, very much.

3.2 | Analytic Procedure

The dataset was converted to a long format in which each row represents participants' responses to one scenario (764 rows, N = 191). Thirty-six rows were removed because participants failed one or more fact-check questions, keeping these participants' responses to other scenarios. Most analyses used linear mixed models (LMMs) or generalized LMMs (GLMMs) with the R package lme4 (Bates et al. 2015). Scenario was entered as a fixed factor in the models, together with target reaction, to account for stimulus variation. But because the effect of scenario was not of main interest, we used deviation coding for scenario so that the grand mean of the dependent variable was set as the reference level. The intercepts were allowed to vary across participants as random effects.[2]

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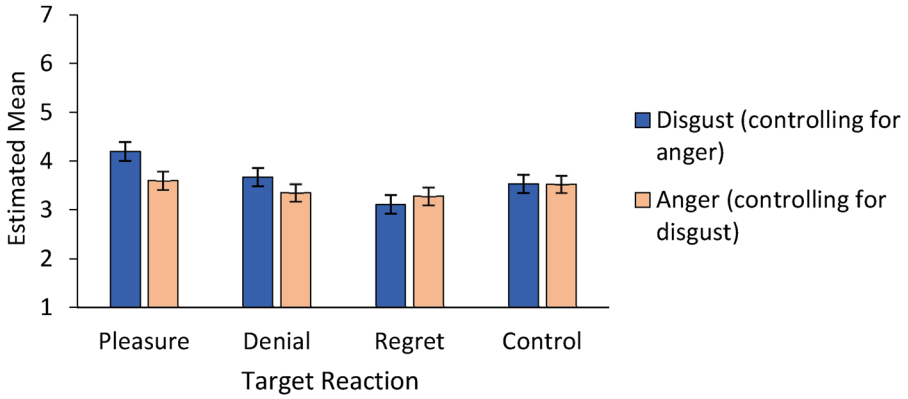


FIGURE 1 | Disgust/anger as a function of target reaction, Experiment 1. *Note:* Model equations: Disgust ~ Reaction × Scenario + Anger + (1|Participant); Anger ~ Reaction × Scenario + Disgust + (1|Participant). Error bars show 95% confidence intervals.

3.3 | Results

3.3.1 | Manipulation Check

An LMM tested the crossed effects of scenario and target reaction on the mean of the manipulation-check character items (see all descriptive statistics and bivariate correlations in the Supporting Information). In coefficient estimates, malicious pleasure (reference level) showed worse character than each of the other reaction types (vs. denial: $b = -1.32$, 95% CI [−1.60, −1.04], $\beta = -0.78$, $t(540.57) = -9.30$, $p < 0.001$; regret: $b = -1.93$, 95% CI [−2.21, −1.65], $\beta = -1.15$, $t(534.92) = -13.74$, $p < 0.001$; control: $b = -1.67$, 95% CI [−1.94, −1.39], $\beta = -0.99$, $t(537.82) = -11.80$, $p < 0.001$).

3.3.2 | Emotions

Scaled ratings of emotion: For our central tests of whether the manipulations affected disgust and anger differently, two LMMs each took one of the emotions as the dependent variable and the other emotion as a covariate.[3]

Predicting disgust, pairwise comparisons with Tukey adjustment of p values showed that disgust was stronger in the malicious-pleasure condition ($M_{estimate} = 4.20$, 95% CI [4.00, 4.39]) than in the others (denial: $M_{estimate} = 3.67$, 95% CI [3.48, 3.86], $t(554) = 4.22$, $p < 0.001$; $d = 0.42$;[4] control: $M_{estimate} = 3.53$, 95% CI [3.35, 3.72], $t(547) = 5.41$, $p < 0.001$, $d = 0.53$; regret: $M_{estimate} = 3.11$, 95% CI [2.92, 3.30], $t(584) = 8.41$, $p < 0.001$, $d = 0.85$; see Figure 1). Disgust in the regret condition was also lower than both the denial condition, $t(544) = -4.61$, $p < 0.001$, $d = -0.43$; and the control condition, $t(547) = -3.46$, $p = 0.003$, $d = -0.33$.

Predicting anger, pairwise comparisons showed no significant differences among conditions (pleasure: $M_{estimate} = 3.60$, 95% CI [3.41, 3.79]; denial: $M_{estimate} = 3.35$, 95% CI [3.17, 3.53]; regret: $M_{estimate} = 3.28$, 95% CI [3.09, 3.46], control: $M_{estimate} = 3.53$, 95% CI [3.35, 3.70]; see Figure 1). Anger in the denial condition was not higher than in the others (vs. pleasure: $t(556) = -2.11$, $p = 0.152$, $d = -0.20$; regret: $t(552) = 0.60$, $p = 0.931$, $d = 0.06$; control: $t(533) = -1.57$, $p = 0.396$, $d = -0.15$). Regret also did not significantly reduce anger compared to malicious pleasure, $t(600) = 2.51$, $p = 0.059$, $d = 0.26$, or control, $t(548) = 2.16$, $p = 0.137$, $d = 0.20$.

Choice of emotion: For the choice measure, more than 80% of participants' responses were either anger or disgust, except for the regret reaction condition, in which 44% of the responses were 'neither' (see Figure 2). The analysis focused on the binary choice of anger or disgust, excluding 'neither' responses. A GLMM tested the crossed effects of target reaction and scenario on recoded emotion choice (anger = 0, disgust = 1).[5] The malicious-pleasure condition (reference level) showed higher disgust versus anger than in the control condition, $b = -0.52$, 95% CI [−1.01, −0.04], $z = 2.11$, $p = 0.035$, odds ratio (OR) = 0.59; and the regret condition, $b = -0.62$, 95% CI [−1.19, −0.04], $z = 2.11$, $p = 0.035$, OR = 0.54. The emotion choice in denial, however, was not different from malicious pleasure, $b = -0.05$, 95% CI [0.59, 1.55], $z = 0.19$, $p = 0.847$, OR = 0.95.

3.3.3 | Bad-Character Judgement

An LMM was performed using target reaction, scenario and judgement of weirdness to predict bad-character judgement. Judgement of wrongness was also controlled for, as preregistered, to have a stringent test of Hypothesis 3. The coefficient estimates of the model showed that when accounting for judgements of weirdness and wrongness, character judgement was still more negative in the malicious-pleasure condition than in others (denial: $b = 0.63$, 95% CI [−0.51, 0.75], $\beta = 0.60$, $t(569.42) = 10.21$, $p < 0.001$, $d = 1.01$; regret: $b = 1.30$, 95% CI [1.18, 1.42], $\beta = 1.25$, $t(587.97) = -20.58$, $p < 0.001$, $d = 2.08$; and control: $b = 0.73$, 95% CI [0.61, 0.86], $\beta = 0.70$, $t(573.50) = 11.81$, $p < 0.001$, $d = 1.18$).

3.3.4 | Mediation of the Sadism–Disgust Link by Bad-Character Judgement

A mediation analysis of the sadism–disgust link through bad-character judgement was performed, using the R package lavaan (Rosseel 2012). The mediation contrasted the malicious-pleasure condition with the control condition to test Hypothesis 2, and anger was added as a covariate.[6] To account for the clustering of observations under each participant, the cluster-robust standard errors (SEs) method was used to adjust the SEs for the coefficients (McNeish et al. 2017). The indirect path in this mediation was significant ($a*b = 0.62$, 95% CI [0.40, 0.85]), and the direct

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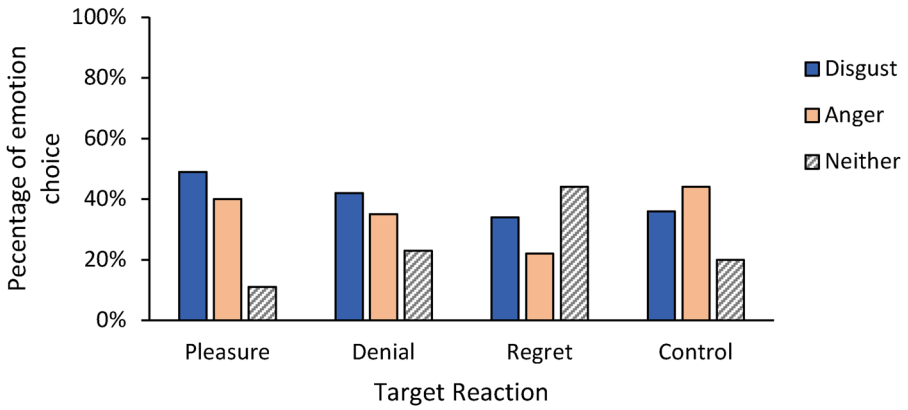


FIGURE 2 | Emotion choice in experiment conditions, Experiment 1.

path was not significant (c' = 0.17, p = 0.271), suggesting that bad-character judgement fully mediated the link between target reaction and disgust (total: $c = 0.79$, $p < 0.001$).

3.3.5 | Action Tendencies

To test Hypothesis 4, LMMs were performed using the two emotions to predict direct and indirect action tendencies separately. Both anger and disgust positively predicted the two action tendencies, but anger was a significantly stronger predictor of direct action tendencies, $b = 0.48$, 95% CI [0.41, 0.55], $\beta = 0.47$, $t(715.49) = 13.40$, $p < 0.001$, compared to disgust, $b = 0.30$, 95% CI [0.23, 0.36], $\beta = 0.31$, $t(697.94) = 8.97$, $p < 0.001$; Wald $\chi^2 = 8.22$, $p = 0.004$. By contrast, disgust is more closely associated with indirect action tendencies, $b = 0.45$, 95% CI [0.37, 0.53], $\beta = 0.42$, $t(697.86) = 11.07$, $p < 0.001$, compared to anger, $b = 0.33$, 95% CI [0.25, 0.42], $\beta = 0.29$, $t(715.53) = 7.52$, $p < 0.001$, although the Wald chi-square test showed no significant difference between the coefficients, $\chi^2 = 2.34$, $p = 0.126$.[7]

3.4 | Discussion

For the scaled emotion measures, the malicious-pleasure reaction evoked stronger disgust compared to each other condition when controlling for anger, while the regret reaction had significantly lower ratings of disgust compared to the other three conditions, supporting the predictions about disgust in Hypothesis 1. Also, ratings of anger did not differ among the four reaction conditions when controlling for disgust, despite the prediction that anger would be strongest in the denial condition or significantly lower in the regret condition versus other conditions. This non-result for anger might be because anger is more sensitive to harm than to character (Giner-Sorolla and Chapman 2017), and the experimental conditions all presented similar levels of social harm. For the emotion-choice measure, disgust was chosen more frequently in the malicious-pleasure condition compared to the control or regret conditions, but not the denial condition.

Further planned analyses supported our predictions that weirdness judgement could not completely explain our manipulation's effects on character, and that character judgement was a strong mediator of the relationship between manipulation and disgust. The hypothesis about action tendencies were also largely supported; anger versus disgust was found to be more closely associated with direct action tendencies. Disgust versus anger was more closely associated with indirect action tendencies, although this difference was not statistically significant. To be able to test hypotheses about harm and anger as well as character and disgust, Experiments 2 and 3 added direct harm as a factor manipulated separately from bad character.

4 | Experiment 2

Experiment 2 extended the character hypothesis of disgust to another dark personality trait, narcissism. Narcissism is a complex construct, often defined as arising from internal insecurities that may not be directly visible (Emmons 1987; Krizan and Herlache 2018; Raskin and Terry 1988). However, grandiosity, involving vanity, exhibitionism and overconfidence, is notable among its external features. This experiment thus used grandiose behaviour as a cue for bad moral character.

This experiment manipulated harmful consequences (high harm vs. low harm) orthogonally to non-intrinsically-harmful narcissistic behaviours (high narcissism vs. low narcissism). That said, both narcissism and harm have the potential to signal bad character. We expected that nonharmful narcissistic behaviour would lead to bad-character judgement both with and without intentional harm. If the actor caused harm, bad-character inference would presumably increase even more. However, although causing harm would also plausibly influence character judgement and increase disgust, we still anticipated that harm should influence anger more strongly than disgust, in line with previous findings on these two moral emotions.

Moreover, this experiment explored the emotion of contempt, because in our pre-test of the vignette manipulation, participants frequently reported this emotion alongside anger and disgust. Including contempt could improve the applicability of emotions measures for participants. Similar to disgust but milder in felt intensities, contempt arises from appraisals of negative dispositions, leading to rejection and social exclusion (Fischer and Giner-Sorolla 2016; Fischer and Roseman 2007). Therefore, we expected contempt to associate with bad-character judgement and indirect aggression. However, as both narcissism and harm could lead to bad-character judgements, we expected contempt to mainly track bad-character judgements that are not related

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to harm (e.g., grandiose behaviour that does not cause harm), because of its milder intensities. When bad-character judgements are derived from intentional harm, we expected disgust to be more applicable than contempt. In other words, we expected harm to have a stronger effect on disgust than on contempt.

The following hypotheses were tested (pre-registration at: https://osf.io/t49qz/).

Hypothesis 1. *Both narcissism and harm would increase the three emotions, but the effect of harm would be stronger on anger (because of the negative outcome) and disgust (because of bad-character judgements related to harm) than on contempt, and the effect of narcissism would be stronger on disgust and contempt (because of bad-character judgements not related to harm) than on anger.*

Hypothesis 2. *Both narcissism and harm would increase bad-character judgement, although the effect of harm would be stronger.*

Similar to Experiment 1, we also hypothesized the mediation effect of character judgement in the narcissism–disgust link (Hypothesis 3)[8] as well as different action tendencies of anger and disgust (Hypothesis 4). Contempt was expected to mirror the action tendencies of disgust.

4.1 | Method

4.1.1 | Design

The experiment used a 2 (harm: high vs. low, between-subjects) × 2 (narcissism: high vs. low, between-subjects) × 2 (scenario, within-subjects) × 3 (repeated measure, emotions) mixed design. Each participant evaluated two different scenarios having the same combination of between-subjects factors.

4.1.2 | Participants

Using G*power 3.1 as before, the central hypothesis test (ANOVA repeated measures, between factors with 4 groups × 3 measures) would have 80% power to detect a medium effect, $f(V) = 0.25$ (determined by $\eta^2_p = 0.06$), with a sample size of 176. We recruited 194 participants whose first language was English on Prolific. Fourteen were excluded for failing one or more fact-check questions, resulting in a sample of 180 (127 female, 50 male and 3 other; $M_{age} = 38.19$, SD = 14.34), which could detect a minimum effect size of $f(V) = 0.28$.

4.1.3 | Procedure and Materials

Participants were randomly assigned to one of four experimental conditions, in which narcissism and harm were orthogonally manipulated. They read the condition's two scenarios in a random order and answered questions after each one. For example, one scenario described a man who gifted a 3D-printed sculpture to a woman he is dating. In the high-narcissism conditions, the sculpture depicted himself wearing swim trunks. In the high-harm conditions, the sculpture depicted the woman, but with a much slimmer body, which would be interpreted as unsubtle pressure to lose weight. The high-narcissism-and-high-harm condition combined these two elements (sculptures depicting the women and himself). In the low-narcissism-and-low-harm condition, the sculpture depicted the woman in her own proportions.

4.1.4 | Measures

Attention and manipulation check: A multiple-choice question asked participants what the agent did in the scenario. Then, five items measured judgement of narcissism (e.g., egocentric, self-obsessed), on a seven-point scale from very unlikely to very likely ($\alpha = 0.92$). Four items, such as how harmful and how bad the consequences of their actions were, measured judgement of harm from 1, not at all to 7, very ($\alpha = 0.88$).

Emotions: Anger, disgust and contempt were measured using both endorsement of facial expressions and emotion terms. For face pictures we used a set including contempt, the Amsterdam Dynamic Facial Expression Set (ADFES) (van der Schalk et al. 2011). Participants were asked to rate their emotion, referring to sets of faces (two male and two female) expressing anger, disgust, or contempt from ADFES on a seven-point scale. Each emotion was also measured by three synonyms using the same scale (angry, irritated and outraged, $\alpha = 0.93$; disgusted, repulsed and sickened, $\alpha = 0.94$; contemptuous, disdainful and scornful, $\alpha = 0.90$). Filler terms such as surprised and sad were included.

Correlations between different measures of anger/disgust/contempt (*r*s = 0.87/0.86/0.69, respectively) were not all higher than correlations among the three emotions using any one measure (*r*s ranging from 0.47 to 0.88). By our pre-registered criterion, this indistinctness of verbal measures led us to use only the facial-endorsement measures for further analyses, which had relatively lower correlations among the three emotions than the verbal measures did (facial-endorsement measure: $r_{anger–contempt} = 0.49$, $r_{disgust–contempt} = 0.47$, $r_{anger–disgust} = 0.80$).

Bad-character judgement: Bad-character judgement was measured by seven items on a seven-point scale ($\alpha = 0.89$), similar to Experiment 1 but removing items such as 'cruel', 'perverse' and 'deviant', which we thought might not be applicable in these scenarios.

Action tendencies: Two items measured direct action tendency (i.e., how much participants would like to punish/publicly condemn the agent, Spearman–Brown $\rho = 0.88$), and the other two measured indirect action tendency (i.e., how much they would like to avoid/gossip about the agent, $\rho = 0.66$), using a seven-point scale. The items were slightly modified from Experiment 1 to ensure applicability for the scenario.

4.2 | Results

4.2.1 | Manipulation Check

Three-way mixed ANOVAs tested the effects of narcissism, harm and scenario factors on judgements of narcissism and harm, respectively. The harm factor had the strongest effect on judge-

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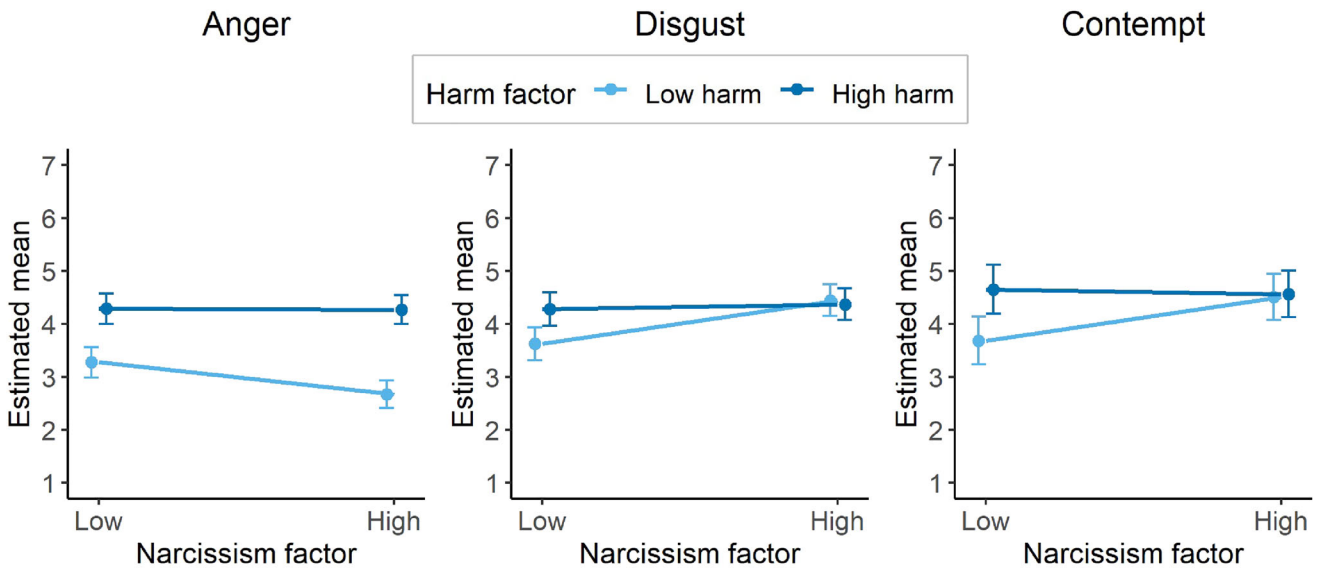


FIGURE 3 | Emotions as a function of factors of narcissism and harm, Experiment 2. *Note:* The estimated means were plotted from the LMMs specified in Table 1 note. Error bars show 95% confidence intervals.

ment of harm, $F(1, 176) = 403.62$, $p < 0.001$, $\eta^2_p = 0.70$; followed by scenario, $F(1, 176) = 11.81$, $p < 0.001$, $\eta^2_p = 0.06$. Narcissism did not affect judgement of harm, $F(1, 176) = 0.00$, $p = 0.973$, $\eta^2_p = 0.00$. Among all interactions, only the interaction between harm and scenario was significant, $F(1, 176) = 11.57$, $p < 0.001$, $\eta^2_p = 0.06$.

The narcissism factor also had the strongest effect on judgement of narcissism, $F(1, 176) = 126.95$, $p < 0.001$, $\eta^2_p = 0.42$, followed by scenario, $F(1, 176) = 52.26$, $p < 0.001$, $\eta^2_p = 0.23$; and harm, $F(1, 176) = 21.65$, $p < 0.001$, $\eta^2_p = 0.11$. Among all interactions, only the interaction between narcissism and harm was significant, $F(1, 176) = 22.80$, $p < 0.001$, $\eta^2_p = 0.12$. Simple effect tests showed that in the low-narcissism conditions, judgement of narcissism was significantly higher when harm was high (vs. low), $F(1, 84) = 32.64$, $p < 0.001$, $\eta^2_p = 0.28$. But this effect was not found in the high-narcissism conditions, $F(1, 92) = 0.01$, $p = 0.918$, $\eta^2_p = 0.00$. Despite this, the effect of harm on judgement of narcissism was noticeably smaller than the intended effect of our grandiosity-based manipulation.

4.2.2 | Emotions

To test Hypothesis 1, LMMs were performed to analyse effects of manipulated narcissism, harm and scenario on each of the three emotions.[9] For each LMM we added the two other emotions as covariates.[10] The coefficient estimates showed that anger was higher in the high-harm versus low-harm conditions, but was lower in the high-narcissism versus low-narcissism conditions (see Table 1). By contrast, disgust was higher both in the high-narcissism conditions and high-harm conditions, reflecting independent inputs into character judgement from the two factors. Contempt showed similar patterns to disgust.

All three models had a significant interaction between narcissism and harm (see Figure 3). Simple effect tests showed that in the low-harm conditions, the high-narcissism (vs. low-narcissism) condition elicited stronger disgust, $t(179) = 4.11$, $p < 0.001$, $d = 0.56$; and stronger contempt, $t(184) = 2.75$, $p = 0.007$, $d = 0.38$; but less strong anger, $t(181) = -3.19$, $p = 0.002$, $d = -0.45$. In the high-harm conditions, none of the three emotions were affected by narcissism.

4.2.3 | Bad-Character Judgement

To test Hypothesis 2, a three-way mixed ANOVA analysed the effects of harm and narcissism factors and scenario on bad-character judgement. Harm had the strongest effect on bad-character judgement, $F(1, 176) = 93.54$, $p < 0.001$, $\eta^2_p = 0.35$; followed by scenario $F(1, 176) = 19.46$, $p < 0.001$, $\eta^2_p = 0.10$ and narcissism, $F(1, 176) = 7.94$, $p = 0.005$, $\eta^2_p = 0.04$. No two-way or three-way interactions were significant.

4.2.4 | Mediation of the Narcissism–Disgust Link by Bad-Character Judgement

For the mediation analysis, using a similar method to Experiment 1, narcissism was treated as the predictor, bad-character judgement as the mediator, disgust as the outcome and anger as a covariate. Bad-character judgement partially mediated the link between narcissism and disgust, controlling for anger (total: $c = 0.51$, $p < 0.001$; indirect path: $a*b = 0.13$, 95% CI [0.04, 0.25]); the direct path between narcissism condition and disgust remained significant ($c' = 0.38$, $p = 0.009$).

4.2.5 | Action Tendencies

LMMs were performed using the three emotions to predict direct and indirect action tendencies separately. For direct action tendencies, anger was a stronger predictor, $b = 0.43$, 95% CI [0.32, 0.54], $\beta = 0.47$, $t(355.81) = 7.80$, $p < 0.001$, compared to disgust, $b = 0.20$, 95% CI [0.10, 0.31], $\beta = 0.22$, $t(349.37) = 3.73$, $p < 0.001$ and

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TABLE 1 | Emotions as a function of factors of narcissism and harm, Experiment 2.

Fixed effects	Model predicting anger	Model predicting disgust	Model predicting contempt
	Coefficient estimate, 95% CI [LL, UL], standardized beta (β), p		
Narcissism	−0.60, [−0.97, −0.23], $\beta = -0.27$, $p = 0.002$	0.83, [0.43, 1.22], $\beta = 0.37$, $p < 0.001$	0.83, [0.24, 1.41], $\beta = 0.41$, $p = 0.006$
Harm	1.01, [0.57, 1.45], $\beta = 0.45$, $p < 0.001$	0.66, [0.18, 1.13], $\beta = 0.30$, $p = 0.007$	0.97, [0.28, 1.66], $\beta = 0.47$, $p = 0.006$
Narcissism × harm	0.59, [0.06, 1.11], $\beta = 0.26$, $p = 0.028$	−0.73, [−1.30, −0.17], $\beta = -0.33$, $p = 0.010$	−0.92, [−1.75, −0.08], $\beta = -0.45$, $p = 0.032$

Note: Model equation—Emotion ~ Narcissism × Harm × Scenario + Covariate emotion1 + Covariate emotion2 + (1|Participant). Dummy coding was used for the factors of narcissism and harm. Only estimates of primary interest were presented. Although contempt and disgust showed similar patterns, the model predicting contempt had notably lower explanatory power (marginal $R^2 = 0.28$) than the models predicting anger (marginal $R^2 = 0.73$) or disgust (marginal $R^2 = 0.71$).

Abbreviations: CI, confidence interval; LL, lower limit; UL, upper limit.

contempt, $b = 0.11$, 95% CI [0.02, 0.191], $\beta = 0.10$, $t(354.43) = 2.55$, $p = 0.011$. Wald chi-square tests showed significant differences between the coefficients (anger–disgust: $\chi^2 = 4.91$, $p = 0.027$; anger–contempt: $\chi^2 = 18.14$, $p < 0.001$). For indirect action tendencies, disgust was the strongest predictor, $b = 0.42$, 95% CI [0.31, 0.53], $\beta = 0.49$, $t(332.60) = 7.35$, $p < 0.001$, followed by contempt, $b = 0.12$, 95% CI [0.03, 0.21], $\beta = 0.13$, $t(354.01) = 2.70$, $p = 0.007$, and anger was not a significant predictor, $b = 0.06$, 95% CI [−0.05, 0.18], $\beta = 0.08$, $t(351.38) = 1.11$, $p = 0.27$. The coefficient for disgust was significantly higher than that for anger ($\chi^2 = 11.04$, $p < 0.001$) and contempt ($\chi^2 = 15.59$, $p < 0.001$).

4.3 | Discussion

By varying moral agents' narcissistic behaviour and harm caused, Experiment 2 showed that the emotions of anger, disgust and contempt responded differently to these factors. In line with Hypothesis 1, harm increased all three emotions, whereas narcissism increased disgust and contempt but lowered anger when controlling for the other emotions. The interaction effect between narcissism and harm predicting anger showed a different pattern from interactions predicting disgust and contempt. Only when harm was low, high narcissism (vs. low narcissism) evoked stronger disgust and contempt but less strong anger.

Although disgust and contempt showed similar patterns of response in their separate models, the model that tested the emotion type × harm interaction (see Supporting Information) showed a stronger effect of harm on disgust than contempt, as predicted in Hypothesis 1. Although both are associated with bad-character judgement, disgust seems to be more responsive to bad-character judgements inferred from actual harm or harmful intentions, whereas contempt may mainly track bad-character judgements not related to harm (e.g., grandiose behaviour). This was reflected in the emotion ratings—in the high-narcissism-and-low-harm condition contempt was rated the highest among the three. The different effect of harm on disgust versus contempt may also explain their noticeably lower correlation compared with the correlation between disgust and anger.

Results also supported Hypothesis 2 and Hypothesis 3. Both narcissism and harm had positive effects on bad-character judgement, but the effect of harm was stronger than the effect of narcissism (Hypothesis 2). As expected, the intentional harm described in the scenarios could be attributed to the agents' bad character and did increase both anger and disgust. This may explain why the effect of narcissism on disgust was more evident when levels of harm were low, and why anger–disgust correlations were high even using facial endorsement measures. Nonetheless, the effect of narcissism on disgust (controlling for anger) was partially mediated by judgement of bad moral character across high-harm and low-harm conditions (Hypothesis 3). Supporting Hypothesis 4, anger was more closely associated with direct action tendencies than disgust and contempt, whereas disgust and contempt were found to be more closely associated with indirect action tendencies than anger, although the association for contempt relative to disgust is noticeably weaker.

The experiment had limitations. Firstly, the manipulation of harm also increased participants' judgement of narcissism, indi-

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cating a confounding effect. Being insensitive about causing harm to others, as described in the scenarios, could have suggested the agent's egocentrism, which is part of narcissism. In any event, this effect of the narcissism manipulation on harm was much smaller in magnitude than its effect on judgement of narcissism. However, because the manipulation of harm also influenced character, the two manipulations were not as orthogonal as we might have wished—despite showing distinct effects on our two focal emotions.

Another limitation was that even though the highly correlated verbal measures of emotion were dropped in favour of the facial-endorsement measures, those measures still showed a very high anger–disgust correlation, leaving only 36% of variance ($1 - 0.80^2$) free to vary. This might attenuate the effect size of the findings, but also indicated a limitation in design: None of our conditions involved purely accidental harm with no suggestion of bad character, which would have allowed anger and disgust to stand more independently of each other. Experiment 3 remedied this limitation.

5 | Experiment 3

Experiment 3 manipulated Machiavellianism: a 'dark' personality trait characterized by strategic manipulation of others to achieve personal gains (Christie and Geis 1970; Paulhus and Williams 2002; Wilson et al. 1996). Machiavellian individuals are 'ultimately self-interested'; they 'simply do what they think will work for selfish gain' (Jones 2016, 88). We therefore operationalized Machiavellianism as using and manipulating others for gain. We returned to the two focal emotions and excluded contempt, as it was shown mainly tracking bad-character judgement not related to harm and would thus be less applicable to Machiavellian behaviours that often lead to harm.

Unlike Experiment 2, in which harm caused by the agents was implied to be intentional, Experiment 3 made clear that harm was unintentional in the low-Machiavellianism conditions, a change that should reduce bad-character inferences. We expected that both Machiavellianism and harm could increase disgust and anger. However, Machiavellianism would have a stronger effect than harm on disgust, controlling for anger (Hypothesis 1), whereas harm would have a stronger effect on anger, controlling for disgust (Hypothesis 2). Following Experiments 1 and 2, we also hypothesized the mediation effect of character judgement in the Machiavellianism–disgust link (Hypothesis 3) and the two emotions' different action tendencies (Hypothesis 4). All hypotheses were pre-registered at: https://osf.io/d94jf/?view_only=1cab3db3ca364d00bfc9f6facd0b6238.

5.1 | Methods

5.1.1 | Design

The experiment manipulated Machiavellianism (low vs. high) and harm (low vs. high) in four different scenarios. The four experimental conditions (Machiavellianism × harm) and four scenarios were arranged in a Greco-Latin square, like Experiment 1.

5.1.2 | Participants

Simulation-based power estimation was conducted with the R package simr (Green and MacLeod 2016). Using the fixed-effect parameters from the LMMs for disgust and anger in Experiment 2, and adding random-effect parameters from a comparable, unpublished study we ran on the two emotions (for detail, see https://osf.io/mjydt/), the estimation suggested a sample size of 180 to detect parallel effects with over 95% power at $\alpha = 0.05$. To allow for 15% data exclusion, 210 participants were recruited from Prolific. Participants who failed any attention or fact check were excluded, leaving 157 (71 male, 86 female, M_{age} = 30.57, SD = 11.57), for which power remained satisfactory (90%).

5.1.3 | Materials and Procedure

Participants were randomly assigned to one row of the Greco-Latin square. They read all four scenarios and answered questions after each one. For each scenario, the agent's Machiavellianism and harm were varied by condition. For example, one scenario described a friend working at a law firm who suggested a lawsuit settlement idea to his boss. The manipulation of Machiavellianism varied whether the boss tried to take the credit, and the manipulation of harm varied whether the friend was negatively impacted.

5.1.4 | Measures

Attention and manipulation check: As attention checks, two questions asked about key facts of the scenario, and a seven-point scaled item in the middle of the questionnaire instructed participants not to select any point. As manipulation checks, six items measured judgement of Machiavellianism, such as how likely the agent is manipulative and exploitative ($\alpha = 0.96$); and three items measured judgement of harm, such as how bad the consequences the agent caused were and how much harm the agent caused ($\alpha = 0.96$), on a seven-point scale.

Emotions: Anger and disgust were measured as in Experiment 1, taking the angry and disgusted faces from the ADFES used in Experiment 2. The facial-endorsement and grid measures of anger had high correlation ($r = 0.93$), as did the two measures of disgust ($r = 0.93$). The correlations between any anger measure and any disgust measure were relatively lower (*rs* ranging from 0.71 to 0.77). As pre-registered, the two measures were averaged for each emotion, with the mean scores of anger and disgust correlating at $r = 0.76$.

Bad-character judgement: Six items measured judgements of agents' bad character, similar to Experiment 2 but removing the items of 'twisted' and 'a bad person in general' and adding one item, 'callous' ($\alpha = 0.94$).

Action tendencies: Adapted from Molho et al. (2017), three items measured direct action tendency (e.g., how much participants would like to argue with/confront the agent, $r = 0.71$), and other three measured indirect action tendency (e.g., to avoid/share negative information about the agent, $\alpha = 0.89$).

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5.2 | Results

5.2.1 | Manipulation Check

Two LMMs were carried out, entering factors of Machiavellianism and harm as fixed effects to predict judgements of Machiavellianism and harm separately. As pre-registered, scenario was treated as a random factor rather than a fixed factor in Experiment 3's GLMM and LMM analyses, allowing intercepts to vary across both scenarios and participants as random effects.[11] We adopted this improvement upon Experiments 1 and 2's analyses to increase the generalizability of conclusions from our selection of scenarios (Judd et al. 2012).

Coefficient estimates showed that judgement of Machiavellianism was higher in the high- (vs. low-) Machiavellianism conditions, $b = 3.39$, 95% CI [3.15, 3.63], $\beta = 1.74$, $t(465.05) = 27.97$, $p < 0.001$. It was also higher in the high-harm (vs. low) conditions, but to a lesser extent, $b = 1.22$, 95% CI [0.98, 1.46], $\beta = 0.62$, $t(465.03) = 10.06$, $p < 0.001$. There was an interaction between harm and Machiavellianism, $b = -0.84$, 95% CI [−1.17, −0.50], $\beta = -0.43$, $t(465.00) = 4.89$, $p < 0.001$, so simple effects were analysed. Harm increased judgement of Machiavellianism more in low-Machiavellianism conditions, $t(465) = 10.06$, $p < 0.001$, $d = 0.39$, compared to high-Machiavellianism conditions, $t(465) = 3.15$, $p = 0.009$, $d = 0.12$.

Similarly, judgement of harm was significantly higher in the high- (vs. low-) harm conditions, $b = 3.42$, 95% CI [3.17, 3.66], $\beta = 1.58$, $t(465.03) = 27.24$, $p < 0.001$. It was also higher in the high- (vs. low-) Machiavellianism conditions, but to a less extent, $b = 1.00$, 95% CI [0.75, 1.24], $\beta = 0.46$, $t(465.05) = 7.93$, $p < 0.001$. No significant interaction between harm and Machiavellianism was found, $b = -0.05$, 95% CI [−0.39, 0.30], $\beta = -0.02$, $t(465.00) = -0.26$, $p = 0.794$. Thus, the manipulations were generally successful. Although cross-influence effects were statistically significant, their magnitudes were much smaller than the intended effects of the manipulations.[12]

5.2.2 | Emotions

Scaled ratings of emotion: Two LMMs were performed, using Machiavellianism and harm to predict anger and disgust, respectively, and adding the other emotion as a covariate. When controlling for disgust, both harm and Machiavellianism had significant effects on anger, with harm stronger (see Table 2). When controlling for anger, Machiavellianism significantly increased disgust, but harm did not. The interaction between Machiavellianism and harm was not significant in either model (see Figure 4).

Choice of emotion: Categorically, 74% of participants' responses were either anger or disgust, excluding the low-Machiavellianism-and-low-harm condition, in which 96% of participants chose neither (see Figure 5). Analysing the binary emotion choice, we could thus only meaningfully test the simple effect of Machiavellianism in the high-harm conditions and the simple effect of harm in the high-Machiavellianism conditions. Two GLMMs were performed using Machiavellianism or harm

TABLE 2 | Emotions as a function of factors of Machiavellianism and harm, Experiment 3.

	Model predicting anger	Model predicting disgust
Fixed effects	**Coefficient estimate, 95% CI [LL, UL], standardized beta (β), p**	
Machiavellianism	0.94, [0.63, 1.25], $\beta = 0.46$, $p < 0.001$	1.48, [1.16, 1.81], $\beta = 0.67$, $p < 0.001$
Harm	1.17, [0.91, 1.44], $\beta = 0.58$, $p < 0.001$	0.16, [−0.14, 0.47], $\beta = 0.07$, $p = 0.295$
Machiavellianism × harm	−0.33, [−0.69, 0.03], $\beta = -0.16$, $p = 0.072$	0.01, [−0.38, 0.39], $\beta = 0.01$, $p = 0.901$

Note: Model equation—Emotion ~ Machiavellianism × Harm + Covariate emotion + (1|Scenario) + (1|Participant). Dummy coding was used for factors of Machiavellianism and harm.
Abbreviations: CI, confidence interval; LL, lower limit; UL, upper limit.

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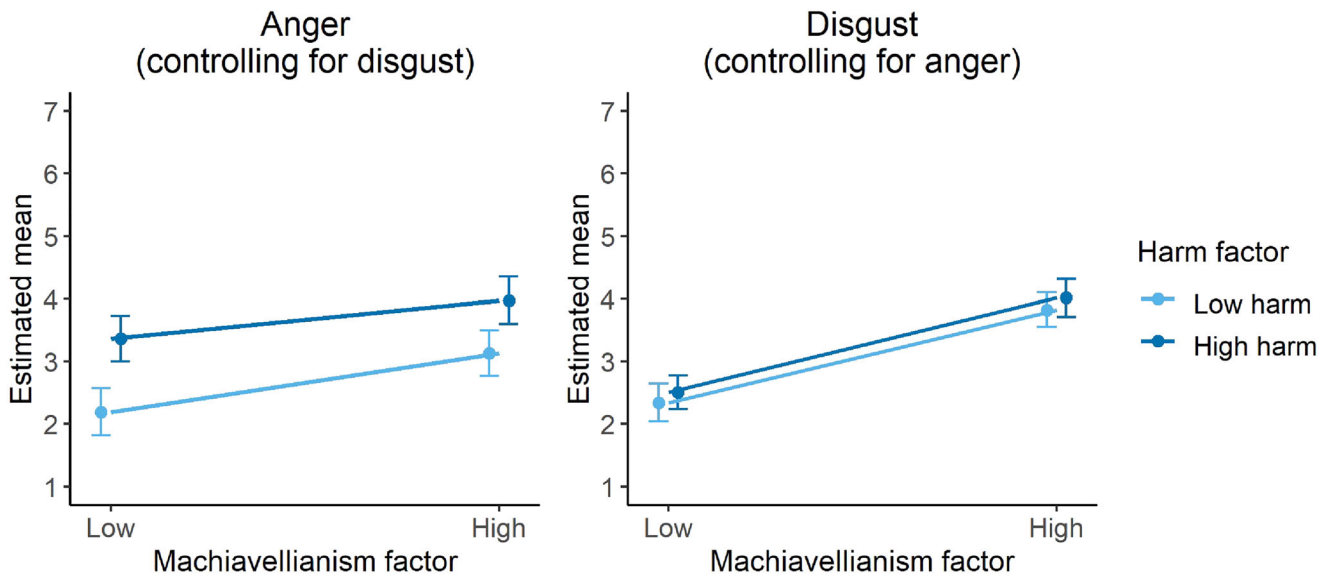


FIGURE 4 | Emotion choice by factors of Machiavellianism and harm, Experiment 3. *Note:* *Mach is short for Machiavellianism.

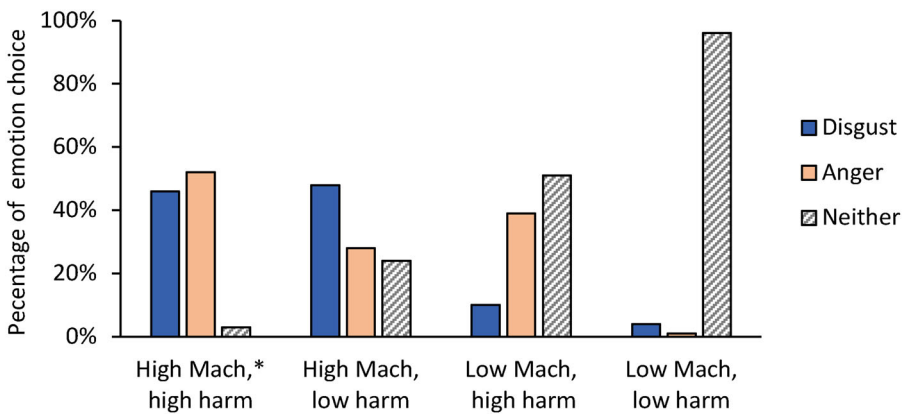


FIGURE 5 | Emotion as a function of Machiavellianism and harm, Experiment 3. *Note:* The estimated means were plotted from the two LMMs as specified in Table 2 note. Error bars show 95% confidence intervals.

to predict the recoded emotion choice (anger = 0, disgust = 1). When harm was high, disgust was more frequently chosen in the high- (vs. low-) Machiavellianism condition, $b = 1.00$, 95% CI [0.34, 1.66], $z = 2.99$, $p = 0.003$, OR = 2.72; whereas when Machiavellianism was high, anger was more frequently chosen in the high- (vs. low-) harm condition, $b = -0.67$, 95% CI [−1.16, −0.18], $z = -2.69$, $p = 0.007$, OR = 0.51.

5.2.3 | Mediation of the Machiavellianism–Disgust Link by Bad-Character Judgement

We first ran an LMM to establish the effect of Machiavellianism on bad-character judgement. To parallel the analyses in Experiments 1 and 2, harm was also included as a predictor. Results showed that the high- (vs. low-) Machiavellianism conditions increased bad-character judgement, $b = 3.11$, 95% CI [2.90, 3.33], $\beta = 1.73$, $p < 0.001$; and the high- (vs. low-) harm conditions also increased bad-character judgement but to a lesser extent, $b = 1.36$, 95% CI [1.15, 1.58], $\beta = 0.76$, $p < 0.001$.

Given the significant effect of Machiavellianism on bad-character judgement, multilevel mediation analysis was carried out. Manipulation of Machiavellianism and all measured variables were treated as Level 1 observations and participants as Level 2 units. The Monte Carlo method was used to obtain the confidence interval for the indirect path (Selig and Preacher 2008). Bad-character judgement was found to be a partial mediator between Machiavellianism and disgust (total: $c = 1.89$, $p < 0.001$), controlling for anger; when bad-character judgement was accounted for (indirect: $a*b = 1.06$, 95% CI [0.75, 1.38]), the direct path between Machiavellianism and disgust remained significant ($c' = 0.83$, $p < 0.001$).

5.2.4 | Action Tendencies

The LMM analyses showed that for direct action tendencies, anger was a stronger predictor, $b = 0.46$, 95% CI [0.40, 0.53], $\beta = 0.53$, $t(569.57) = 14.01$, $p < 0.001$, compared to disgust, $b = 0.24$, 95% CI [0.18, 0.30], $\beta = 0.29$, $t(562.61) = 7.90$, $p < 0.001$; Wald χ^2

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= 20.52, $p < 0.001$. For indirect action tendencies, however, the coefficient estimate for disgust, $b = 0.43$, 95% CI [0.36, 0.49], $\beta = 0.43$, $t(5540.13) = 12.51$, $p < 0.001$, was comparable to that for anger, $b = 0.44$, 95% CI [0.36, 0.51], $\beta = 0.41$, $t(560.88) = 11.75$, $p < 0.001$; Wald $\chi^2 = 0.001$, $p = 0.925$.[13]

5.3 | Discussion

Experiment 3 showed, across scaled and forced-choice emotion measures, that Machiavellianism increased disgust (controlling for anger) more strongly than harm did, whereas harm versus Machiavellianism increased anger (controlling for disgust) more strongly. Moreover, the effect of Machiavellianism on disgust was partially mediated by bad-character judgement, controlling for anger. The hypothesis about action tendencies was partly supported. Anger versus disgust was found to be more closely associated with direct action tendencies, but the two emotions did not differ in their associations with indirect action tendencies. It is unclear whether the result is due to the different study design, materials or analytical approach compared to previous research (e.g., Molho et al. 2017; Tybur et al. 2020, as mentioned in endnotes 7 and 13).

Although the manipulations of Machiavellianism and harm were generally validated by the manipulation checks, it is worth noting that the high- (vs. low-) Machiavellianism conditions increased judgement of harm, if less strongly. This was probably because participants inferred that using others for selfish gain might have caused emotional harm, even though none was described in the scenarios. The high- (vs. low-) harm conditions also increased judgement of Machiavellianism somewhat, even in the low-Machiavellianism conditions, where the harm was described as accidental. It seems that harm caused by an agent, even unintentionally, may still increase the likelihood of people attributing fault to negative character. This may involve a similar process as the 'side-effect effect'—people are more willing to say that a bad consequence as a side effect is brought about intentionally, compared with a good side effect (Cova et al. 2016; Knobe 2003).

6 | General Discussion

Linking dark personality traits to bad moral character, the current experiments manipulated behavioural signals of sadism (Experiment 1), narcissism (Experiment 2) and Machiavellianism (Experiment 3). They tested the character hypothesis that disgust is associated with judgement of bad moral character, more so than anger. Harmful consequences were also manipulated in Experiments 2 and 3 to test whether anger is more closely associated with harm than bad character. The results consistently showed that disgust responded more sensitively to agents' dark personality traits than to harm, whereas anger responded more sensitively to harm than to their dark personality traits. Moreover, the link between dark personality traits and disgust was mediated by bad-character judgement across three experiments. The motivational function account of anger and disgust was also largely supported. Across three experiments, anger was consistently more closely associated with direct action tendencies than disgust, whereas disgust was more closely associated with indirect action tendencies than anger, although this difference was weaker and less consistent. In addition to providing ecologically valid evidence for the character hypothesis, the present research also sheds light on the distinct function of socio-moral disgust and opens discussions for moral character perception.

6.1 | Theoretical Implications

6.1.1 | Theoretical Accounts of Socio-Moral Disgust

The character hypothesis and these findings supporting it reinforce how several theoretical accounts of socio-moral disgust are compatible with each other. Among these functional accounts, some focus on the use of disgust as a tag or metaphor for persons as negative social objects (Rottman et al. 2018), stemming from the observation that disgust is an object-focused emotion (Ortony et al. 1988); others emphasize the function of moral disgust in preparing specific and relevant social actions such as ostracism and expulsion (Chapman and Anderson 2013; Molho et al. 2017; Tybur et al. 2013). However, these latter theories also stress to varying degrees the role of communication and coordination which expressions of disgust play in getting others to go along with the harsh judgement (see also Kupfer and Giner-Sorolla 2017). After all, being shunned by one person is a minor slight, but being shunned by everyone is social death (Williams 2007).

We contend that our findings are compatible with all these interlinking perspectives and clarify what kind of input informs moral disgust versus anger. Again, even though in our studies these measures were strongly correlated, they also consistently showed differences in degree of response. The shared variance, perhaps, represents the natural linkage between a person who is capable of harm and a person who has done harm. As shown in Experiment 2, these emotions' focus on harm distinguishes them from contempt, explaining contempt's lower relevance in moral emotion literature. Yet when these two elements are separated, as in our vignettes, moral disgust followed cues from three different dark triad traits that each in their own way indicate bad character. This input, identifying a 'bad person', not only elevated disgust over anger, but also correspondingly activated tendencies to avoid the target person and to inform others about them. These results should be seen in tandem with previous findings that specific judgements of moral character and moral motivation are also reverse-engineered from disgust expressions (Kupfer and Giner-Sorolla 2017; Liu and Giner-Sorolla 2024), another fundamental part of a social function that not only appraises situations but communicates those appraisals (Giner-Sorolla 2013).

6.1.2 | Moral Character Perception

In line with the person-centred approach to morality (e.g., Uhlmann et al. 2015), the current experiments demonstrated the necessity of considering judgements of the moral agents and judgements of harm as separate processes. Previous research has shown that many different behavioural cues can lead to bad-character judgement (for a review, see Landy and Uhlmann 2017). In these three experiments, although dark personality traits were indicated through distinct behaviours, they all resulted in judgement of bad character. It might be of interest whether the

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findings could be replicated with other manifestations of bad character, such as hypocrisy (Laurent et al. 2014). Meanwhile, the volume and heterogeneity of these diagnostic behaviours raise the question whether there are any core elements in naturalistic conceptions of bad character.

Classic psychological research on moral character studied what qualities define good moral character, for which traits like honesty, fairness, trustworthiness and kindness are commonly listed (e.g., Walker and Pitts 1998; Wojciszke et al. 1998). If the opposite of these moral traits defines bad moral character, we might ask whether some of these traits are more central than others, and whether people perceive bad character as multidimensional or on a single dimension of bad versus good (Jackson et al. 2023). Although the focus of the current research is not on bad-character perception, we believe that moral psychology could gain insights from dark personality research, which has extensively discussed similar questions, such as what the core of dark personality traits is (e.g., Jones and Figueredo 2013; Moshagen et al. 2018) and how they are structured (Bader et al. 2021).

6.2 | Boundaries of the Character Hypothesis of Disgust

As the present experiments have shown, socio-moral disgust is most likely to prevail over anger in situations where there is no evidence of direct harm but clear signals for one's bad character. There were also other implied conditions in the experiments. Most notably, participants were described as third parties rather than the victim or directly involved in the situations. This aligns with previous research which found that as the relevance of the victim in a moral violation to oneself decreases, anger decreases, while disgust increases (e.g., Hutcherson and Gross 2011; Molho et al. 2017). In the contexts of third-party condemnation, disgust may be a tactical choice due to its stronger association with lower-cost, indirect (vs. direct) aggression relative to anger (Molho et al. 2017; Tybur et al. 2020).

Certainly, not all bad moral character triggers disgust. Vanity may be more contemptible than disgusting if it intends no harm. 'Evil' characters such as serial killers, whose character flaws threaten direct harm to others, may be fearsome or intriguing rather than disgusting. Less drastically, immoral people who act unpredictably or bizarrely, such as assaulting others without a clear motive or hitting someone with a frozen fish (Walker et al. 2021), may make people feel more frightened and perplexed than disgusted. Note that in Experiment 1, the effects of sadism on disgust persisted even after weirdness perception was controlled for. Bad-character judgement may elicit disgust mainly when antisocial motives are clear. Under uncertainty, fear rather than disgust might prevail (see Ellsworth and Smith 1988; Roseman et al. 1990).

6.3 | Limitations and Future Directions

Our emotion measures relied on self-report using verbal terms and facial-expression endorsement. Although these measures have been used successfully to distinguish between anger and disgust (see Giner-Sorolla et al. 2018 for a review), they also showed high correlations between the emotions. While this may be expected for the verbal measures, prior research using the similar facial-expression measures has reported noticeably lower correlations between anger and disgust, mostly ranging from −0.01 to 0.25 (Fan et al. 2024; Molho et al. 2017; Tybur et al. 2020). This discrepancy was very likely due to our presentation of the measures: We presented a verbal label alongside the array of faces. Labelling the facial expressions could reduce ambiguity in what emotion they represent, considering that disgusted faces are sometimes recognized as anger (Langner et al. 2010; Pochedly et al. 2012). But it might have also led to inflated correlations between anger and disgust due to conflated language usage. Nevertheless, even though correlations within the multi-item emotion measures we used were higher, our anger–disgust choice measures (in Experiments 1 and 3) showed strong patterns.

Although our measures of disgust relied on multiple indicators across labelled faces and synonyms, there are also findings that suggest that measures of disgust focused on the experience of nausea—such as the term 'grossed out' or the 'sick face'—tap a construct differing from the kind of 'disgust' usually reported toward non-bodily moral violations (e.g., Herz and Hinds 2013; Kollareth et al. 2022; Kollareth and Russell 2019). Our methods guard against the most extreme interpretation of this limitation: that people responding to the word 'disgust' misused it as a synonym for the anger experience (e.g., Nabi 2002; Piazza et al. 2018; see also Royzman and Kurzban 2011). All our studies measured and controlled for anger. The 'disgust' that remains in our studies may, however, be a form of avoidant social emotion distinct from both anger and core pathogen disgust. Indeed, evidence across non-English languages points to a recurrent theme of separate terms for nauseated feelings and exclusionary social feelings (Giner-Sorolla 2026).

While it is valuable to pursue the defining boundaries of an emotion category in scientific terms, it is important to keep in mind that folk emotion concepts anchored on straightforward, common terms such as 'disgust' are also part of the subject matter of psychology (Scarantino 2012). From this perspective, studying the conceptual knowledge behind emotion concepts could inform us how emotions are constructed (Barrett 2006, 2013; Clore and Ortony 2013; Russell 2015; see also Cameron et al. 2015). For this purpose, self-report is the most accessible method for measuring subjective emotion experiences. Nonetheless, there may be more complex affective dimensions, such as dominance and certainty, that might also help differentiate the experiences of socio-moral disgust and anger (Cowen and Keltner 2017; Scherer et al. 2013; Smith and Ellsworth 1985).

Thirdly, all the experiments used one-off moral scenarios about stranger offenders. However, our moral encounters often concern familiar others too. We form and update impressions through their behaviours in varying contexts, and these repeated impressions may be more complex than good–bad moral snapshots (Jackson et al. 2023).

Lastly, all the samples in the experiments were from Western English-speaking populations. It will be interesting to see whether the findings can be applied to other cultures with polysemous words joining emotional responses to bodily and moral concerns in their languages, similar to the English 'disgust'

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(Haidt et al. 1997). From a sociofunctional perspective, we may expect to observe the association between moral disgust and bad-character judgement in those cultures too. But there may be substantial variability in how people make judgements about others' moral character among different cultures (e.g., Vauclair et al. 2014).

In conclusion, by using nonharmful sadistic, narcissistic and Machiavellian behavioural cues, our three experiments have provided more solid evidence for the character hypothesis of disgust, given indications of which cues are relied upon in judging bad moral character, and shed light on the moral appraisals and downstream motivations associated with disgust and anger.

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Disclosure

For the purpose of open access, the authors have applied a Creative Commons Attribution (CC BY) licence to any author accepted manuscript version arising from this submission.

Ethics Statement

All studies were approved by the Psychology Research Ethics Committee at the University of Kent (approval nos. 202015994841976595, 202116111344186921 and 202216601254137877).

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Study materials, codebooks, data and analysis code are available at: https://osf.io/j2ft9/. All experiments were pre-registered (Experiment 1: https://osf.io/fqt7h/; Experiment 2: https://osf.io/t49qz/; and Experiment 3: https://osf.io/d94jf/?view_only=1cab3db3ca364d00bfc9f6facd0b6238).

Endnotes

[1] Their Study 1 described two different behaviours used in previous research to manipulate harm and character judgements. But the behaviours (a man hitting an unfaithful woman, versus that woman's cat) had many other differences besides evidencing bad character; for example, people might have (however wrongly) judged the unfaithful woman as deserving rebuke.

[2] Experiments 2 and 3 used similar setup for the LMMs and GLMMs, unless specified otherwise.

[3] We also tested the hypothesis using LMMs in which emotion type (disgust vs. anger) was added as a within-subjects categorical variable and the emotion ratings were the dependent variable. These analyses across three experiments yield very similar results as the LMM we report here (see detail in Supporting Information).

[4] The effect sizes (d) were calculated using the formula introduced by Westfall et al. (2014).

[5] This analysis of the emotion-choice measure was not pre-registered.

[6] We first ran the pre-registered multilevel mediation analysis, but the model did not converge, so single-level mediation was used instead. Additionally, since the denial condition had shown the next-highest level of bad-character judgement, we exploratorily performed a more stringent mediation analysis contrasting the pleasure with denial condition, which also suggested a full mediation (see Supporting Information).

[7] It is worth noting that Molho et al. (2017) controlled for the other type of action tendencies in their similar analyses. We did not take this approach, considering the two types of action tendencies as relatively independent from each other. Nonetheless, when controlling for direct action tendencies, the coefficient for disgust was significantly larger than anger, Wald $\chi^2 = 6.98$, $p = 0.008$ (disgust: $b = 0.32$, 95% CI [0.24, 0.40], $\beta = 0.30$, $p < 0.001$), anger: $b = 0.12$, 95% CI [0.03, 0.21], $\beta = 0.11$, $p < 0.001$).

[8] The pre-registration inaccurately specified that this mediation would be tested only in the high-harm conditions, which would greatly lower statistical power (see report of the pre-registered analysis in Supporting Information); we judged that this hypothesis would be more accurately tested across both high- and low-harm conditions.

[9] For consistency across three experiments, we opted for LMM instead of the pre-registered general linear model (GLM) analyses. The results of GLM analyses were reported in the Supporting Information. Additionally, due to the cross-influence effect of the manipulation of harm, we also reported LMM analyses using manipulation checks to substitute for experimental factors in Supporting Information.

[10] Similar to Experiment 1, we also conducted an LMM analysis using emotion type (anger vs. disgust vs. contempt) as a categorical predictor and emotion intensity as the outcome variable, to more directly test the hypothesized interaction between emotion type and narcissism/harm (Hypothesis 1). Supporting Hypothesis 1, the results showed a stronger effect of narcissism for disgust and contempt (vs. anger) and a stronger effect of harm for anger and disgust (vs. contempt) (see Supporting Information).

[11] Analyses treating scenario as a fixed effect produced almost identical results to the random scenario analyses (see report in Supporting Information).

[12] We reported the analyses of emotions using manipulation checks in Supporting Information, due to the cross-influence effect.

[13] When controlling for direct action tendencies, our results showed similar results to Molho et al.'s (2017): Disgust was a stronger predictor of indirect action tendencies ($b = 0.31$, 95% CI [0.25, 0.38], $\beta = 0.32$, $p < 0.001$), compared to anger ($b = 0.22$, 95% CI [0.14, 0.29], $\beta = 0.20$, $p < 0.001$); Wald $\chi^2 = 4.30$, $p = 0.038$.

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