THE SOCIAL DISGUST: REPORTED DISGUST MEDIATES PERCEIVED OBSERVATION AND BLAME

Tianxing Zhang

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Advisor: Keelah Williams

Abstract

The audience effect suggests that, when an observation cue is present, people behave more prosocially to build reputation. For example, people tend to be more generous and eco-friendly when they imagine shopping in public. Past studies have not investigated how disgust, a social emotion, could be influenced by perceived observation. Since people use disgust to express moral concerns and manage reputation, disgust could also be prone to the influence of perceived observation. Additionally, prior studies have found that both perceived observation and disgust positively predict higher levels of blame. Thus, I hypothesized that disgust is a mediator between perceived observation and blame, such that the presence of an observation cue would predict more disgust, which would then predict more blame. In Study 1, participants ($N = 71$) read a moral-sexual disgust vignette under either observation or no observation, then reported disgust and blame. Results found preliminary evidence that observation may elicit more disgust. In Study 2, participants ($N = 403$) read vignettes involving either moral-sexual or pathogen disgust, then completed the same procedures as Study 1 under either an observation cue or a control cue. Results suggested that the presence of an observation cue predicted marginally significantly higher disgust and significantly higher blame. Results also found that reported disgust fully mediated the relationship between observation and blame. These results expand our understanding of disgust and its social implications.

Keywords: Disgust, audience effect, blame

The Social Disgust: Reported Disgust Mediates Perceived Observation and Blame

Imagine a world where you truly did not care about how others saw you. You wore socks under sandals, asked for directions but went the opposite way, and freely embraced all of your quirkiest habits without hesitation. Does this world sound liberating and appealing? Unfortunately, this world is less than likely to become a reality. Due to the social nature of humans, we often adjust our behaviors when others are present. No matter how much an individual strives for independence from their surroundings, the presence of an audience casts a subtle yet powerful influence on people's thoughts and actions. This phenomenon is known as the audience effect.

The audience effect happens when an individual changes their behavior due to an observer or the belief that there is an observer (Hamilton & Lind, 2016). A wide range of animals, including cockroaches, rats, monkeys, and humans, change their behavior when audiences are present (Zajonc, 1965). In particular, studies have found that the presence of conspecifics increases arousal, which generally leads to better performance in easy tasks and worse performance in difficult tasks (Geen, 1985; Strauss, 2002).

In humans, more complicated accounts of the audience effect have been raised. Bond (1982), for instance, presented the self-presentation theory of the audience effect, suggesting that people are more aware of their image and self-esteem when they are performing tasks in public, leading to worse performance of difficult tasks. Later, Tennie et al. (2010) further highlighted the social aspect of the audience effect by presenting the reputation management theory. This theory focuses on how people try to maintain their reputation in public, which often leads to behavioral modifications–ranging from sharing food to leaving positive online reviews on one's own product–based on social expectations (Tennie et al., 2010). Meanwhile, Fridlund et al. (1992)

suggested that people make more pronounced and frequent facial expressions under observation to communicate emotions. The various accounts of the audience effect discussed above, be it self-presentation, reputation management, or communication, all draw on one key concept: social signaling.

Among behaviors that can be interpreted as social signals, the expression of disgust is particularly intriguing. Since previous research has not investigated how disgust is influenced by observation, the present study aims to fill gaps in previous studies by exploring how being observed might influence the way people signal disgust, as well as how observation and disgust interact when determining blame.

Observation Influences Behavior and Judgment

Prosocial Tendencies

Among the behaviors that can be influenced by the presence of others, prosocial decisions are especially prone to the audience effect. Prosocial tendencies, usually demonstrated through some form of altruistic behavior, can serve to build and maintain a costly prosocial reputation. A costly prosocial reputation signals to others that one is both willing to and capable of helping others at their own expense. This suggests one's cooperativeness, generosity, and possession of disposable resources. This kind of reputation can be extremely beneficial, as studies have found that people with a cooperative or helpful reputation are viewed as more trustworthy and more desirable as friends and romantic partners (Barclay, 2004; Cottrell, 2007; Iredale, 2008). To take advantage of these benefits, humans exhibit a unique connection between prosocial behaviors and reputation maintenance, such that many people act prosocially or altruistically even toward complete strangers (Izuma, 2012). Since the goal of these costly behaviors is to gain a prosocial reputation, people tend to only act altruistically in public, when

they believe others are watching, and not in private (Griskevicius et al., 2010). For example, in one series of studies, when participants imagined being in public and were motivated to gain status, they had a greater desire to purchase expensive and eco-friendly products. However, when the participants imagined shopping online by themselves at home, they were more likely to purchase cheaper and non-eco-friendly products (Griskevicius et al., 2010). While not involving actual audiences, Griskevicius et al.'s (2010) findings provide ample support for the audience effect. By asking participants to imagine shopping in public, the participants were primed to feel that they were being observed, which led them to behave more prosocially by purchasing expensive but eco-friendly products.

Purchase habits are not the only kind of behavior that is influenced by the feeling of being watched. Generosity, a quality that is commonly associated with virtue and prosocial tendencies, is also prone to the audience effect. Numerous studies have found that participants behave more generously by sharing more often in resource-allocation games when they believe that they are being watched (Cañigueral & Hamilton, 2019; Haley & Fessler, 2005; Rigdon et al., 2009). Intriguingly, an actual audience does not necessarily need to be present for the audience effect to take place. For example, Cañigueral and Hamilton (2019) observed the audience effect by showing participants pre-recorded video clips of confederates and convinced the participants that the videos were live feeds of actual confederates. Participants who believed that they were talking to and being watched by the confederate not only behaved more generously in resource-allocation games, but also explicitly disclosed higher levels of prosocial tendencies (Cañigueral & Hamilton, 2019). Furthermore, studies have found that even extremely subtle observation cues, such as a stylized eye-icon or three dots arranged as an inverted pyramid (such that the two dots on top resemble eyes and the one dot at the bottom resembles a mouth), are associated with

more generosity (Rigdon et al., 2009; Haley & Fessler, 2005). These findings suggest that the audience effect could happen not only when people are actually observed by others, but also when people believe–either consciously or subconsciously–that they are being observed. More specifically, stimuli that resemble eyes or a face tend to automatically activate mental representations of others watching them (Emery, 2000; Haxby et al., 2000). Based on these findings, it is likely that simply activating the mental representation of being observed is enough to make people change their behavior and act more prosocially than they otherwise would.

When we think about prosocial behaviors that help build reputation, concepts such as generosity, friendliness, or other kinds of virtues may come to mind. However, a prosocial behavior that is less obvious than the concepts listed above is the process of determining blame.

Blame and Punishment

Perhaps it is counterintuitive to consider blaming or even punishing others as prosocial behavior, as they often involve negative consequences that could harm social relationships. However, in situations where blame or punishment is justifiable, blaming or punishing others could be considered prosocial. For example, in a cooperative group, punishing an uncooperative free-rider could be considered prosocial since all other group members would benefit if the free-rider becomes more cooperative due to the punishment (Yamagishi, 1986).

When blame and punishment are considered prosocial, they also bring reputational benefits. Barclay (2006) supported this point by designing a public goods game where participants could choose to donate certain amounts of their own money for the sake of the group. Unbeknownst to the participants, they played against pre-programmed computer players who were either free-riders (donating only small amounts of money but increasing donations after being punished), punishers (punishing free-riders), or neutral group members. After playing

the game, participants were asked to report their impression of the computer players. The results showed that the participants rated punishers as significantly more trustworthy, group-focused, and worthy of respect than the other computer players. Furthermore, Barclay (2006) also found that, when the punishers unjustly punished group members who were not free-riders, the punishers did not gain a positive reputation. These results suggest that, under circumstances when blame and punishment are justified by the greater good, blame and punishment can be viewed as prosocial behavior and would help the punisher gain a positive reputation. Since blame and punishment can signal prosocial tendencies, it makes sense to expect them both to be prone to the audience effect.

In the case of blame, Bourrat et al. (2011) have found that exposing participants to surveillance cues increased their tendency to report greater disapproval of moral transgressions. In their study, participants were assigned to read vignettes of moral violations on a piece of paper with either an image of a pair of eyes (observation cue) or some flowers (control) printed on the page. Results suggest that when the participants saw the pair of eyes, they reported significantly lower levels of moral acceptability for the violations. Bourrat et al.'s (2011) findings suggest that people assign more blame to moral violations when they are exposed to observation cues. Intriguingly, Bourrat et al. (2011) presented two potential explanations for this phenomenon: First, it could be the case that surveillance cues actually led to people perceiving moral violations as more blameworthy. Second, it could also be the case that the image of eyes activates "public self-awareness," causing participants to express more blame in an attempt to become more socially desirable, as opposed to actually perceiving more blame. These two potential explanations are both compatible with the reputation-maintaining function of blame and are not mutually exclusive.

Similar to blame, people's willingness to impose punishment can also be influenced by the presence of an audience. Moralistic punishment refers to behaviors that aim to inflict costs on another individual who has committed moral violations (Kurzban et al., 2007). In addition to the reputation-maintenance accounts of punishment discussed above, another potential account of moralistic punishment suggests that moralistic punishment signals one's ability to cooperate since it demonstrates one's endorsement of local moral norms (Fessler et al., 2003). If these accounts are correct, it would be expected that the presence of an audience would lead to an increase in moralistic punishment. Indeed, according to Kurzban et al. (2007), the presence of an audience leads to an increase in moralistic punishment. In their studies, the researchers found that participants spent more resources on punishing others in various resource distribution games when they knew that their decision would be known by the experimenters or other participants.

In sum, due to the reputational benefits of social signaling, people tend to commit more prosocial behaviors when they believe that they are being watched. And since blame and punishment can be prosocial in certain circumstances, people tend to blame and punish more when an audience is present. Although previous studies found evidence that supports the direct effect between observation and blame, no research so far has investigated the effect of observation on another prosocial signal: disgust.

Disgust

Three Domains of Disgust

Disgust is a universal emotion found across cultures (Ekman, 1992). Commonly associated with feelings of repulsion towards potentially contagious sources such as vomit and filth, disgust is well recognized for its pathogen avoidance function. Nevertheless, pathogen avoidance is only one facet of disgust. Recently, Tybur et al. (2009) proposed the three-domain

model of disgust, with each domain serving distinct evolutionary functions: (1) pathogen disgust, which motivates people to avoid potentially illness-causing contagions; (2) sexual disgust, which helps people avoid sexual situations that could hinder reproductive success; and (3) moral disgust, which is sensitive to people who violate social norms or break taboos (Gutierrez & Giner-Sorolla, 2007).

Through factor analysis, Tybur et al. (2009) found that people react with disgust to a wide variety of concepts, and those concepts can be distinctively categorized into pathogens, sexuality, and morality. Additionally, the researchers found that the individual differences in the reported intensity of disgust clustered into these three domains, which further supports the three-domain categorization of disgust. Olatunji et al. (2012) also investigated the validity of the three-domain model of disgust. Through conducting confirmatory factor analyses, the researchers found that this model demonstrated adequate internal consistencies and that the three domains of disgust could indeed be separated and measured independently from each other. Furthermore, Olatunji et al. (2012) found a unique correlation between sexual disgust and moral disgust, such that sexual disgust is consistently associated with activities in the sanctity foundation of Moral Foundation Theory (MFT). According to the MFT, people intuitively judge morality based on five dimensions: Two *individualizing* foundations operate on an individual level, namely care vs. harm and fairness vs. cheating; whereas three *binding* foundations operate on a group level, namely loyalty vs. betrayal, authority vs. subversion, and sanctity vs. degradation (Graham et al., 2013). The sanctity foundation, specifically, addresses people's concerns about sexually deviant tendencies, such as promiscuity. This connection between sexual and moral disgust is intuitive, as items in the sexual disgust category often inherently carry moral connotations. For instance, items such as "watching a pornographic video" and "a stranger of the opposite sex intentionally

rubbing your thigh in an elevator" are associated with eliciting sexual disgust. However, these items could also carry negative moral implications. Pathogenic disgust, on the other hand, does not share this unique connection with sexual or moral disgust, and thus is relatively distinct from sexual and moral disgust.

Since moral violations can elicit disgust, it may not come as a surprise that researchers have found correlations between disgust and blame. In fact, numerous studies have found evidence suggesting that feeling disgusted is associated with increased severity when assigning blame.

Disgust Predicts Blame

Disgust plays a role in the way people make moral judgments (Eskine et al., 2011; Wagemans et al. 2018). Previous research found that experimentally inducing disgust increases the severity of moral judgments (Donner, 2022; Schnall et al., 2008; Quinn et al., 2021). In particular, studies have found that experimentally inducing feelings of disgust increases the severity of moral condemnation towards moral violations, such as keeping a lost wallet or lying on a resume (Schnall et al., 2008). Furthermore, Quinn et al. (2021) found that experimentally induced disgust via images of vomit or insects led participants to perceive more blame in gay victims of hate crimes. The results of these studies support that feeling disgust increases people's tendency to blame and condemn transgressors of morality or taboos.

One potential explanation of disgust's influence on blame is that feeling disgust makes people more prone to negatively interpreting information. Past studies have found that when people are experiencing negative emotions, such as sadness and anxiety, they are more likely to interpret incoming ambiguous information as sad or threatening, respectively (Eysenck et al., 1987; Halberstadt et al., 1995). Since disgust is a negative emotion, feeling disgusted may also

lead to negative biases when allocating attention and interpreting information (Mathews & MacLeod, 1994). Indeed, Davey et al. (2006) found that after experimentally inducing feelings of disgust, participants were more likely to interpret ambiguous messages as threatening than participants who were induced to feel happy or neutral. These results show that feeling disgusted tends to elicit negative interpretation bias, which could influence people's interpretation of moral or taboo violations–making them view transgressions as more severe than they otherwise would.

While disgust plays an important role in deciding blame, different kinds of disgust may influence blame to different degrees. Donner et al. (2022) found that while overall disgust sensitivity is related to all moral domains in the MFT, it is most strongly associated with the sanctity domain. In other words, while people can be disgusted by all kinds of moral violations, people are the most prone to feeling disgust towards violations in the sanctity foundation, which mainly concerns deviant sexualities (Graham et al., 2013). Additionally, Donner et al. (2022) found that while both pathogen disgust and sexual disgust were significantly associated with moral judgment, sexual disgust was the stronger predictor of moral judgments. These results combined potentially suggest that sexual disgust is more likely to influence people's judgment of blame than pathogenic disgust.

To further support that sexual disgust better predicts blame than pathogenic disgust, Donner et al. (2023) conducted surveys to investigate disgust sensitivity and the greater moralization of sanctity moral values. According to Donner et al. (2023), there are two accounts for disgust sensitivity and the greater moralization of sanctity moral values: the pathogen avoidance account and the promiscuity avoidance account. Whereas the pathogen avoidance account (pathogen disgust) maintains that people hold sanctity moral values mainly to avoid sexually transmitted diseases, the promiscuity avoidance account (sexual disgust) focuses on the

risk of losing reproductive benefits gained from long-term relationships if sanctity moral values are not upheld. More specifically, the promiscuity avoidance account suggests that people would try to restrict the sexual activities of their partner to secure the reproductive benefits of a long-term partner, and they tend to avoid sexual activities with promiscuous individuals since promiscuous individuals threaten sexual restrictiveness. Participants in their study filled out disgust sensitivity questionnaires and moral foundation questionnaires. Controlling for the shared variance of pathogen and sexual disgust, only sexual disgust was positively and strongly associated with the *binding* moral foundations, which include the sanctity foundation. Donner et al.'s (2023) results provided evidence for the promiscuity avoidance account, which further supports that it is sexual disgust, rather than pathogenic disgust, that contributes to the relationship between disgust and higher severity of blame.

To summarize, disgust has been shown to predict blame, but different types of disgust predict blame to different degrees. Current findings suggest that sexual disgust, perhaps due to its connections with moral disgust and negative moral implications, predicts blame to a higher extent than pathogenic disgust.

Disgust as a Social Signal

In addition to helping people avoid pathogens and restrict promiscuity, disgust also carries an essential social function. Fischer and Manstead (2008) suggest that emotions in general play one of two roles in social interactions: affiliation or social distancing. Most positive emotions like love and admiration and some negative emotions such as guilt and regret serve to affiliate, or to tighten social bonds. On the other hand, most negative emotions, including disgust, serve to increase social distance and social standing. In other words, negative emotions such as disgust or anger aid individuals in distinguishing themselves from a group or even in

competing for social status, which indicates that disgust indeed serves one or more social functions.

In addition to social distancing, previous studies have found that disgust is often utilized to express moral concerns. Hutcherson and Gross (2011) suggest that disgust is an emotion used to respond to individuals who do not pose an immediate threat but should be avoided nonetheless, such as transgressors of moral codes. In their study, the researchers found that out of negative emotions such as moral disgust, anger, contempt, sadness, and fear, people least prefer to be the recipient of others' moral disgust. This suggests that moral disgust may be perceived as the most socially damaging emotion because it is the most indicative of someone's moral character. Similarly, Kupfer and Giner-Sorolla (2016) also found evidence for the relationship between disgust and moral violations when distinguishing between anger and disgust. Anger and disgust are both emotions commonly associated with expressing moral condemnation. To distinguish between these two closely related emotions, Kupfer and Giner-Sorolla (2016) proposed that people express disgust to communicate moral concerns and anger to express threatened self-interest. In their studies, participants read vignettes of either angry or disgusted agents. Results showed that participants inferred more selfish concern from angry agents and more moral and principle concern from disgusted agents. They also found in their studies that participants were more likely to pick disgust as the most appropriate emotion to express when communicating moral concern, and anger as the most appropriate emotion to express when communicating self concern. To further support that disgust is a social signal used to communicate moral concerns, Kupfer and Giner-Sorolla (2016) demonstrated that even when the participants' self-interest is harmed, they are still more likely to express disgust if they are trying to communicate moral concern than if they are trying to communicate self-interest concern. In

sum, the results of previous studies suggest a bidirectional relationship between disgust and moral concerns, such that people interpret more moral concerns from perceived disgust, and people also tend to express more disgust when they feel the need to communicate moral motives. These findings provide robust support that disgust plays an important role in social interactions beyond social distancing, namely when people want to express moral concerns.

Furthermore, disgust may also function socially by contributing towards maintaining people's reputations. Experiments have shown that people are reluctant to come into physical contact with morally disgusting objects, such as a Nazi uniform (Rozin et al., 1999). Some suggest that people avoid morally disgusting objects since they perceive such objects as physically contagious (Horberg et al., 2009). However, Kupfer and Giner-Sorolla (2021) proposed an alternative social explanation for this phenomenon, suggesting that people tend to avoid morally disgusting objects to avoid being perceived as immoral, thus managing their reputation. Their studies found that when participants were given the choice to either wear a Nazi armband over or under a coat, most participants preferred to wear the armband under a coat even though the armband would contact their skin. Additionally, when the participants were asked why they would prefer to wear the armband under the coat, reputation maintenance was the most chosen option. This suggests that people are not trying to avoid the perceived physical contagiousness of the armband, but rather to avoid the social repercussions of wearing it. Kupfer and Giner-Sorolla (2021) also asked participants to report their level of discomfort and moral contamination, both measures of moral disgust, if they wore a t-shirt with anti-Semitic slogans publicly versus privately. The participants reported higher levels of discomfort and moral contamination when they imagined wearing the t-shirt publicly. These results provide further evidence that moral disgust has a social role in reputation management.

Given robust support for disgust's role as a social signal, it is likely that disgust would be influenced by the audience effect, meaning the presence of an observer or observation cue may influence the feeling or expression of disgust. More specifically, since disgust serves to express moral concern and help maintain reputation, it may be interpreted as a prosocial signal. Thus, when individuals perceive observation, they may be motivated to express higher levels of disgust than if they perceive no observation.

Present Research

To date, previous studies have established that perceived observation predicts changes in people's social behaviors, namely people's judgments regarding blame and punishment. Previous research has also found that that feeling of disgust, and especially sexual disgust, predicts more severe moral judgments and blame. However, previous studies have not yet investigated how disgust, which serves a social function, may also be influenced by perceived observation. To fill the gap in existing research, the present studies investigate how being observed influences the way people signal disgust. Additionally, given that disgust predicts blame, this study also investigates how observation and disgust interact with determining blame. More specifically, I examine whether disgust serves as a mediator for the direct effect of observation predicting blame.

Study 1 examined if perceived observation increases levels of disgust and blame. In Study 1, participants were asked to read a morally and sexually disgusting vignette, then they completed the disgust and blame measures. Participants were assigned to either the observed condition, where they were monitored by an experimenter, or the unobserved condition, where they were not monitored when completing the tasks. I hypothesized that:

(1) Participants would report higher levels of disgust in the observed condition compared to the unobserved condition.

(2) Participants would report higher levels of blame in the observed condition compared to the unobserved condition.

(3) Disgust would be a mediator that explains the relationship between the independent variable of perceived observation and the dependent variable of blame; such that perceived observation predicts higher levels of disgust, which then predicts higher levels of blame.

Study 2 examined if different kinds of disgust would be differently affected by perceived observation. In Study 2, participants were asked to read vignettes that either involved pathogen disgust or moral-sexual disgust, then participants completed disgust and blame measures. Participants were either assigned to receive an observation cue or a neutral cue when completing the tasks. I hypothesized that:

(1) There would be a main effect of the observation conditions on reported disgust, such that on average, participants in the observed conditions would report higher levels of disgust than participants in the unobserved conditions.

(2) There would be a main effect of the observation conditions on reported blame, such that on average, participants in the observed conditions would report higher levels of disgust than participants in the unobserved conditions.

(3) Overall, disgust would be a mediator that explains the relationship between the independent variable of perceived observation and the dependent variable of blame; such that perceived observation predicts higher levels of disgust, which then predicts higher levels of blame.

(4) While pathogen disgust and moral-sexual disgust would both predict higher levels of blame, moral-sexual disgust would be the strongest predictor of blame.

Study 1 Method

Participants

The sample for this study included a total of 71 Hamilton College students (12 men, 58 women, 1 non-binary). The participants ranged in age from 18 to 23 (M = 19.52, SD = 1.25). The majority of the participants were White (61.97%), while others identified as Asian (30.99%), Black (5.63%), Hispanic (11.27%), or other (2.82%). Participants were recruited through the SONA platform and a campus-wide email. All participants were compensated by either entering a raffle for one of four $10 Fojo Beans gift cards or one SONA credit.

Materials

Moral-Sexual Disgust Vignette

Each participant read a short vignette that induced a mixture of moral and sexual disgust. The vignette is as follows:

> An ugly person is on an elevator, and they are having sexual fantasies about an attractive stranger standing next to them.

Disgust Items

Five items measured the amount of disgust the participants were willing to report. These items included “I feel contaminated”, “I feel uncomfortable”, “I feel revolted”, and “the person in the vignette is disgusting.” Participants responded to these items using a 7-point Likert scale (1 = *Strongly Disagree*; 7 = *Strongly Agree*), where higher scores indicate higher levels of disgust reported by the participants. One item, “I feel pleasant”, was reverse coded, with higher scores indicating lower levels of disgust reported. Reliability was good (Cronbach’s $\alpha = .82$), so a mean reported disgust score was calculated across five items.

Disgust Word Association Task

The disgust word association task used in the present study is a modified version of the cleansing-related word completion task used by Zhong and Lilijenquist (2006). Participants were asked to complete a word association task, where they filled in missing letters in word fragments to create meaningful words. Of the eight word fragments, five (W _ S H, G R _ S S, D _ R T, N _ _ T Y, S _ A P) could be completed as either disgust-related words (wash, gross, dirt, nasty, soap) or as unrelated words (wish, grass, dart, nutty, slap). A higher likelihood of interpreting word fragments as disgust-related words indicated more disgust felt by participants.

Cleaning Wipe Question

Participants were asked to answer the question: If you were given a choice between a pack of cleaning wipes or a dollar as a gift right now, which would you choose? Participants responded to these items using a 7-point Likert scale (1 = *Definitely the dollar*; 7 = *Definitely the cleaning wipes*). A higher likelihood of choosing the cleaning wipes indicated a higher desire for self-cleansing, which was associated with feelings of disgust and moral threat (Zhong & Liljenquist, 2006).

Blame Items

This measure was composed of a 5-item blame scale. Items included “the person in the vignette is blameworthy”, “the person in the vignette did something wrong”, “the person in the vignette deserves to be punished”, and “the person in the vignette is at fault”. Participants responded to these items using a 7-point Likert scale (1 = *Strongly Disagree*; 7 = *Strongly Agree*), where higher scores indicate higher levels of blame attribution. There was one reverse-coded item, with higher scores indicating lower levels of blame attribution, being “the person’s

behavior should be encouraged." Reliability was good (Cronbach's $\alpha = .86$), so a mean blame score was calculated across five items.

Demographics

The demographic section asked the participants to provide their age, sex or gender identity, and racial or ethnic identity. The participants also indicated whether they completed this study for SONA credit or a raffle chance. If the participants selected the raffle chance, they were directed to a separate survey and asked to leave their email addresses so that they could be notified regarding the results of the raffle.

Design and Procedure

Participants were randomly assigned to one of two conditions: the observed condition or the unobserved condition. Upon entering the room, the participants first read and signed an informed consent form. Then, depending on the condition they were assigned, the participants either sat facing the experimenter where they were observed or entered an isolated cubicle room where they were not observed. Subsequently, the participants read the moral-sexual disgust vignette on a computer. Then, the participants completed the disgust items, the disgust word association task, and the cleaning wipe question. The order of these three tasks was randomized for each participant to counter the order effect. Afterward, participants completed the blame items. Lastly, the participants reported their demographics, were probed for suspicion, and then debriefed. If participants selected a raffle ticket as compensation, they would be directed to a separate survey to report their email addresses.

Study 1 Results

The first hypothesis predicted that participants in the observed condition would report higher levels of disgust than participants in the unobserved condition. An independent sample *t*

test was conducted to compare mean reported disgust scores between the observed and unobserved conditions. No significant difference was found, $t(68) = 1.00$, $p = .323$.

Independent sample *t* tests were also conducted to compare the amount of disgust felt by participants, measured by the word association tasks and the cleaning wipe question. No significant differences were found between the observation conditions in the word association tasks, $t(68) = 1.63$, $p = .109$, and the cleaning wipe questions, $t(68) = 0.84$, $p = .403$.

The second hypothesis predicted that participants in the observed condition would report higher levels of blame than participants in the unobserved condition. An independent sample *t* test was conducted to compare mean blame scores between the observed and unobserved conditions. No significant difference was found, $t(68) = 1.45$, $p = .153$.

The third hypothesis predicted that reported disgust serves as a mediator between observation and blame. While no such mediation was present, reported disgust significantly predicted more blame in a regression model, $F(1,68) = 76.31$, $p < .001$.

Study 1 Discussion

Study 1 found that reported disgust positively predicted blame, which replicates previous findings (Donner, 2022; Schnall et al., 2008; Quinn et al., 2021). While the results of Study 1 did not find significant effects of observation on reported disgust and blame, the mean disgust score in the observed condition ($M = 4.20$, $SD = 1.33$) trended towards being higher than the mean disgust score in the unobserved condition ($M = 3.92$, $SD = 1.01$). Additionally, the mean blame score in the observed condition ($M = 3.57$, $SD = 1.35$) trended towards being higher than the mean disgust score in the unobserved condition ($M = 3.17$, $SD = 0.97$). It is possible that the effects of observation were weakly present, and the sample size was not large enough for the effect to be statistically significant.

To test if a larger sample size would indeed lead to finding significant effects of observation, Study 2 expanded on Study 1 by increasing the total number of participants. In addition, Study 2 explored if the effects of observation would be different between pathogenic and moral-sexual disgust.

Study 2 Method

Participants

The sample for this study included a total of 403 participants recruited from CloudResearch (215 men, 179 women, 7 non-binary, 2 preferred not to say). The participants ranged in age from 18 to 82 (M = 42.15, SD = 13.57). The majority of the participants were White (81.14%), while others identified as Asian (9.93%), Black (5.96%), Hispanic (4.96%), Native American (0.99%), or other (0.74%). All participants were compensated with 0.50 USD.

Materials

Moral-Sexual Disgust Vignette

Participants assigned to the moral-sexual disgust conditions read a short vignette that induces moral and sexual disgust. This vignette was the same as was used in Study 1.

Pathogen Disgust Vignette

Participants assigned to the pathogen disgust conditions read a short vignette that induces pathogen disgust. The vignette is as follows:

> After Person uses the public restroom, the sink was clogged with matted hair and congealed soap scum.

Observation Cue

Participants assigned to the observed condition were presented with an image of a pair of cartoon eyes while they were reading the disgust vignettes, completing the disgust items, the disgust word association task, the cleaning wipe question, and the blame items. Alternatively,

participants assigned to the unobserved condition were presented with an image of a cartoon flower while they were completing the same procedures. (See Appendix A.)

Disgust Items, Word Association Task, Cleaning Wipe Question, and Blame Items

Study 2 used the same disgust and blame measures as Study 1. Reliability was good for the disgust items (Cronbach's $\alpha = .86$), so a mean disgust score was calculated across five items. Reliability was also good for the blame items (Cronbach's $\alpha = .85$), so a mean blame score was calculated across five items.

Demographics

The demographic section asked the participants to provide their age, sex or gender identity, and racial or ethnic identity.

Design and Procedure

Participants were randomly assigned to one of four conditions: 2 (Observed vs. Unobserved) x 2 (Pathogen Disgust vs. Moral-Sexual Disgust). The study was completed online, via a Qualtrics survey. The participants first read and signed an informed consent form. Then, the participants read either the moral-sexual disgust vignette or the pathogen disgust vignette, depending on their assigned condition. Subsequently, the participants completed the disgust items, the disgust word association task, and the cleaning wipe question. The order of these three tasks was randomized for each participant to counter order effects. Afterward, participants completed the blame items. While reading the vignette and completing the measurements for disgust and blame, the participants assigned to the observed condition saw the image of a pair of cartoon eyes, whereas participants assigned to the unobserved condition saw the image of a cartoon flower. Lastly, the participants reported their demographics, were probed for what they thought the study was about, and were then debriefed.

Study 2 Results

The first hypothesis predicted that participants in the observed condition would report higher levels of disgust than participants in the unobserved condition. A factorial ANOVA was conducted to compare the main effects and interaction of the observation conditions (observed vs. unobserved) and the disgust conditions (pathogenic vs. moral-sexual) on the amount of disgust reported by participants, measured by the disgust items. The main effect of the observation conditions was marginally significant, $F(1, 398) = 3.72$, $p = .054$, indicating that participants in the observed condition ($M = 4.56$, $SD = 1.44$) reported marginally significantly higher disgust than participants in the unobserved condition ($M = 4.30$, $SD = 1.44$). The main effect of the disgust conditions was significant, $F(1, 398) = 68.45$, $p < .001$, indicating that participants in the pathogenic disgust condition ($M = 4.98$, $SD = 1.22$) reported significantly higher disgust than participants in the moral-sexual disgust conditions ($M = 3.88$, $SD = 1.45$). The interaction was not significant $F(1, 398) = 0.32$, $p = .574$. These findings support the first hypothesis (see Figure 1 in Appendix B).

Factorial ANOVAs were also conducted to compare the main effects and interaction of the observation conditions and the disgust conditions on the amount of disgust felt by the participants, measured by the word association tasks and the cleaning wipe question. No significant main effect of the observation condition was found in the word association task, $F(1, 399) = 0.09$, $p = .771$, nor the cleaning wipe question, $F(1, 399) = 1.89$, $p = .170$. The main effect of the disgust conditions was significant in both the word association task, $F(1, 399) = 25.58$, $p < .001$, and the cleaning wipe question $F(1, 399) = 6.09$, $p = .014$. This indicates that in both measures, participants in the pathogenic disgust conditions ($M = 2.84$, $SD = 1.62$; $M = 3.57$, $SD = 2.59$) felt more disgust than participants in the moral-sexual disgust conditions ($M = 2.07$, $SD =$

1.41; $M = 2.95$, $SD = 2.47$). No significant interaction was found in either the word association task, $F(1, 399) = 0.05$, $p = .818$, or the cleaning wipe question, $F(1, 399) < 0.01$, $p = .971$.

The second hypothesis predicted that participants in the observed condition would report higher levels of blame than participants in the unobserved condition. A factorial ANOVA was conducted to compare the main effects and interaction of the observation conditions and the disgust conditions on blame items. The main effect of observation was significant, $F(1, 398) = 3.96$, $p = .047$, indicating that participants in the observed condition ($M = 3.80$, $SD = 1.50$) reported significantly higher blame than participants in the unobserved condition ($M = 3.52$, $SD = 1.34$). The main effect of the disgust condition was also significant, $F(1, 398) = 28.04$, $p < .001$, indicating that participants in the pathogenic disgust condition ($M = 4.02$, $SD = 1.47$) reported significantly higher blame than participants in the moral-sexual disgust conditions ($M = 3.30$, $SD = 1.29$). The interaction was not significant $F(1, 398) = 0.19$, $p = .662$. These findings support the second hypothesis (see Figure 2 in Appendix B).

The third hypothesis predicted that expressed disgust was a mediator between perceived observation and blame. From a simple mediation analysis conducted using model 4 of PROCESS (v4.0) macro for SPSS (Hayes, 2013), perceived observation was indirectly related to blame through its effect on expressed disgust. As illustrated in Figure 3 in Appendix B, the perceived presence of an observer marginally significantly predicted higher levels of reported disgust ($a = .25$, $p = .081$), and higher levels of reported disgust significantly predicted higher levels of blame ($b = .50$, $p < .001$). In the model, 5000 bootstrapped samples were drawn from the data. The total indirect effect was marginally significant ($ab = .13$), with the 90% CI above zero [0.01, 0.25]. While the total effect of perceived observation on blame was significant ($c = .28$, $p = .046$), there was no evidence that perceived observation was related to blame independent of its effect on

reported disgust. In other words, after controlling for reported disgust, the direct effect of perceived observation on blame was not significant (c' = .16, p = .120).

Study 2 Discussion

The results of Study 2 suggest that the presence of observation cues increased the amount of disgust reported by participants. When the participants saw an image of cartoon eyes as they read the vignettes and completed the disgust items, the participants reported significantly higher mean disgust scores than when participants saw an image of a cartoon flower. While the presence of observation cues increased the level of reported disgust, no evidence suggested that the observation cue increased the amount of disgust the participants actually felt. Additionally, participants both reported and felt significantly more disgust in the pathogenic disgust condition than in the moral-sexual disgust condition.

Replicating previous findings, the results of Study 2 found that the observation cue increased the level of blame reported by participants (Bourrat et al., 2011; Kurzban et al., 2007). Also replicating previous findings, Study 2 found evidence that reported disgust and blame are positively correlated, such that higher levels of reported disgust predict more blame (Donner, 2022; Schnall et al., 2008; Quinn et al., 2021). Similar to the disgust measures, participants reported significantly higher levels of blame in the pathogenic disgust conditions than in the moral-sexual disgust conditions.

No evidence of mediation was found when analyzing the disgust conditions separately. However, when collapsing the two disgust conditions together, Study 2 found evidence that reported disgust is a marginally significant mediator between perceived observation and blame, such that perceived observation positively predicts reported disgust, which positively predicts blame. Perceived observation no longer significantly predicted blame when controlling for the

indirect effect of reported disgust. It is possible that the mediating effect of reported disgust is faintly present in each disgust condition separately, and the effect only becomes significant when collapsing the two conditions and doubling the sample size.

General Discussion

The present studies investigated the effect of perceived observation on participants' willingness to express disgust and blame. In Study 1, participants read a moral-sexual disgust vignette, then reported their disgust and blame either alone in a room or under the experimenter's observation. Results of Study 1 showed that reported disgust and blame trended towards being higher in the observed condition than in the unobserved condition. These results were not significant, and the most likely explanation is the relatively small sample size. Expanding on these results, Study 2 conducted the same procedures in an online survey while vastly increasing the sample size and distinguishing between pathogen disgust and moral-sexual disgust. Confirming the hypotheses, the results of Study 2 found that participants in the observed conditions reported marginally significantly higher levels of disgust and significantly higher levels of blame than participants in the unobserved conditions. Additionally, Study 2 found reported disgust to be a marginally significant mediator, where perceived observation positively predicted reported disgust, which then positively predicted blame. Together, these results suggest that disgust, or at least the explicitly expressed disgust, serves a social function.

Disgust plays an important and diverse role in social interactions. Depending on the scenario, people can signal disapproval, blame, or manage their reputation by expressing disgust. Numerous studies have found that the perceived presence of an audience leads to the increased ascription of blame and punishment (Bourrat et al., 2011; Kurzban et al., 2007). Though the

present studies take a similar approach, the results complement and build on the existing findings in several ways.

First, while blame and disgust are closely related, we cannot assume without evidence that they would react to the presence of an observer in the same fashion as they nevertheless serve different purposes in social interactions. On the one hand, people use blame to express their disapproval of social or moral transgressions (Bourrat et al., 2011; Schnall et al., 2008). When people blame others, it tends to imply their compliance with the local social norm, as well as their desire to impose punishment on the transgressor to deter future transgressions (Fessler et al., 2003). On the other hand, disgust is a mechanism originally evolved to help avoid pathogenic threats. When the use of disgust is extended beyond pathogens and into social interactions, people use disgust to express the desire for social distancing and moral concerns (Fischer & Manstead, 2008; Hutcherson & Gross, 2011). Since previous studies did not specifically investigate the effect of perceived observation on disgust, the present study expands our understanding of disgust by providing evidence that, in addition to blame, the expression of disgust is also susceptible to the influence of the audience effect.

Second, the mediating effect of disgust between observation and blame found in Study 2 is especially interesting. While some past research investigated the relationship between observation and blame, others investigated the relationship between disgust and blame. However, no research explored the potential role of disgust as a mediator. Since Study 2 found that the direct path between perceived observation and blame was no longer significant after controlling for the effect of reported disgust, the present studies provide a new perspective on how perceived observation, disgust, and blame interact with each other.

Third, the results of Study 2 found an intriguing distinction between disgust reported by participants and disgust actually felt by participants. According to the results, the presence of an observation cue increased the amount of reported disgust, measured by disgust items that use explicitly disgust-related words such as “contaminated” or “revolted”. However, the presence of an observation cue did not significantly influence the results of the word association task and the cleaning wipe question, which were both designed to measure disgust through the desire for self-cleansing. This may suggest that while the presence of an observation cue motivates people to explicitly and outwardly express that they felt disgusted by the vignette, they did not actually feel more disgust or desire to clean themselves. This interpretation further confirms the social signaling function of disgust: As mentioned previously, expressing disgust can help people maintain their reputation by distancing themselves from socially undesirable behaviors. In order to receive these social and reputational benefits, people only need to express disgust and not actually feel disgusted.

Moving forward, the results of the present studies can be applied to real-world situations and have important implications. One example of this involves the jury decision making process. Since disgust tends to predict more assignment of blame, jurors would be more likely to make harsher decisions when disgusted. Numerous prior studies have found evidence supporting this idea. For instance, Salerno (2017) found that jurors were more likely to convict when presented with disgust-eliciting red-colored gruesome images compared to black-and-white gruesome images. Similarly, Salerno et al. (2013) found that disgust significantly predicted moral outrage, as well as the jurors’ confidence in the defendant’s guilt in mock-trial paradigms. In short, jurors may become harsher when making decisions if they feel disgusted (Inbar & Pizarro, 2009). Applying the results of the present studies, since jurors make decisions while other jurors are

present, they would most likely feel the presence of numerous observers when casting their judgment. And since the present results suggest that the presence of observers would increase the amount of reported disgust, it is possible that jurors would unknowingly influence each other into making harsher decisions.

Outside of courtrooms, disgust also contributes to prejudice and stigmatization against many groups in society in a more general sense. Inbar et al. (2009) found that people with higher disgust sensitivity tended to demonstrate higher implicit anti-gay sentiment even when they explicitly stated that they do not discriminate against homosexuality, while Inbar et al. (2012) also found that people reported more criticism against homosexuality when a noxious smell was present in an experimental setting. In addition, prior studies also suggest that obese people tend to elicit more disgust, negative attitudes, and desire for social-distancing (Vartanian et al., 2015). In a similar vein, Skinner and Hudac (2017) found that experimentally induced disgust is associated with the dehumanization of interracial couples. These instances of disgust may be amplified if observers are present.

Limitations

A limitation of the present studies arises when examining the main effects of disgust type. Study 2 found that participants reported both higher levels of disgust and higher levels of blame when they read the pathogen disgust vignette as compared to the moral-sexual disgust vignette. There are two possible explanations for this. First, it is possible that people have the general tendency to view pathogenetically disgusting behaviors as more disgusting and blameworthy than morally and sexually disgusting behaviors. Given that the original purpose of disgust is to help people avoid pathogens and contamination, this explanation is plausible. However, this explanation does not account for why people also find pathogenetically disgusting

behaviors more blameworthy. Second, it is possible that the participants found the specific behavior described in the pathogen disgust vignette (clogging the sink with hair and soap) more disgusting and blameworthy than the specific behavior described in the moral-sexual disgust vignette (an unattractive person having sexual fantasies). This explanation could better account for the main effect of disgust type in blame. Batson et al. (2007) found that unfair behaviors that threaten self-interest often elicit anger, whereas unfair treatment towards others elicited little anger in the absence of empathy concerns. In the Study 2 vignettes, encountering a disgustingly clogged sink hurts people's self-interest whereas the sexual fantasies were not targeted at the participants. And since anger contributes to assigning blame, this could explain why people reported more blame in the pathogen disgust conditions. Unfortunately, there is no way to confirm either potential explanation through the data currently available. Future research could utilize self-interest measures to test if self-interest threat has a moderating effect on the results.

Another limitation of the present studies is that the majority of the participants are White. Several previous studies indicated that different races may differ in their disgust sensitivity and tendency to avoid contamination. More specifically, African Americans tend to report significantly higher contamination cognition and disgust sensitivity than European Americans (Williams et al., 2012; George et al., 2018). As a result of this difference, generalization of the results of the present studies should be done with caution. More research should be done regarding the racial or ethnic differences in disgust sensitivity before such generalizations.

Future Directions

A direction worth pursuing in the future is whether the effect of observation on disgust and blame would be different between ingroup members and outgroup members. Both disgust and blame play a role in reputation management, and since maintaining reputation is often costly,

it would be more efficient to only maintain reputation in front of ingroup members. For instance, Engelman et al. (2013) found that children share more resources with others when others are ingroup members who are able to reciprocate. This study could potentially show that the effect of observation on disgust and blame would be more apparent when the observer is an ingroup member of the participants. Future studies could test this by swapping the observation cue in Study 2, a pair of simplistic cartoon eyes, with cues that clearly imply the race or gender of the observer.

Another potential future direction is to investigate how the authority of the observer would influence the audience effect. In Study 1, the experimenter was physically present in the observed conditions to serve as the observation cue. However, the experimenter could be viewed as an authority. Studies have found that people's perception of authority could influence their moral judgment (Mulder et al., 2008). Future studies could test the effect of authority on the audience effect through utilizing confederates to decrease the perceived authority.

Conclusion

The present studies used observation cues to influence the participants' reported disgust and blame and showed that participants reported significantly higher disgust and blame when exposed to observation cues. Furthermore, the present studies showed that disgust is a mediator between perceived observation and increased blame, such that the presence of observation cues elicited more disgust which then led to more blame. These findings suggest that, due to the social function of disgust, disgust can be manipulated through the presence of an audience. This provides additional understanding and a new perspective on how we understand and utilize disgust in experimental settings.

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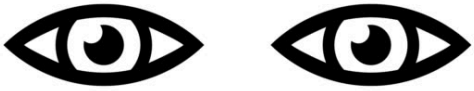
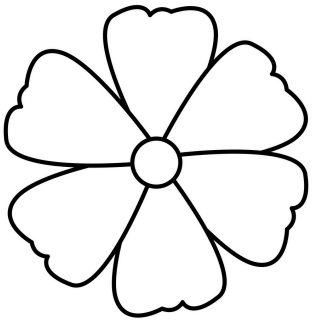
Appendix A: Study 2 Stimuli

Observation Cue



Neutral Cue



Appendix B: Figures

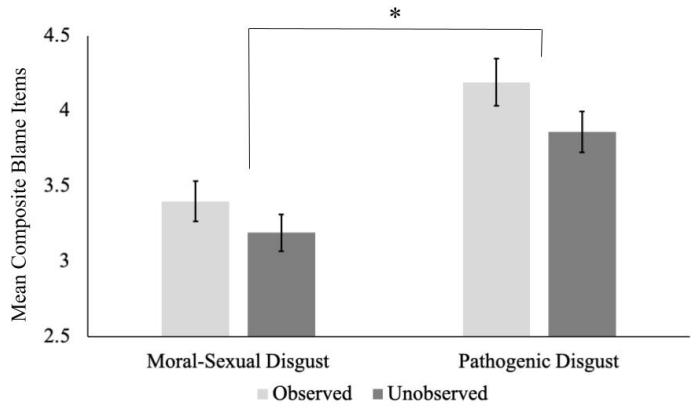
Figure 1

Reported Disgust by Observation x Type of Disgust Interaction in Study 2

Note. * indicates marginally significant main effects of the observation conditions ($p = .054$) and the significant main effect of disgust conditions ($p < .001$).

Figure 2

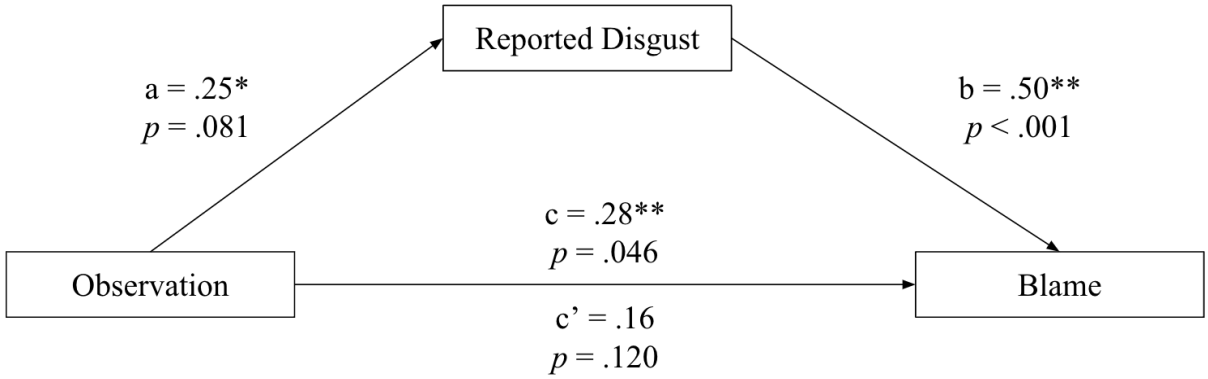
Blame by Observation x Type of Disgust Interaction in Study 2



Note. * indicates significant main effects of the observation conditions ($p = .047$) and the disgust conditions ($p < .001$).

Figure 3

Standardized Regression Coefficients for the Relationship between Perceived Observation and Blame as Mediated by Reported Disgust in Study 2



Note. * significant at $p = .010$, ** significant at $p = .050$