Published in final edited form as:

Cogn Emot. 2009 January 1; 23(2): 399–414. doi:10.1080/02699930801961731.

I am going to gag: Disgust cognitions in spider and blood-injury-injection fears

Bethany A. Teachman and Jena Saporito

University of Virginia

Abstract

There is mounting evidence that disgust plays an important role in certain anxiety disorders, yet little is known about disgust's cognitive component. The current study introduces a measure of cognitions associated with disgust and contamination to assess the role of disgust-specific primary and secondary appraisals in phobic responding. A multi-modal assessment of blood-injury-injection (BII) and spider phobia was conducted using BII ($N=29$) and spider ($N=30$) fearful groups, and a non-fearful control group ($N=30$). The Disgust Cognitions scale showed good reliability and validity, and distinguished among the groups. For example, relative to the other groups, the spider fear group reported higher disgust cognitions following presentation of a live spider, whereas the BII Fear group reported higher disgust cognitions following a surgery video. Moreover, the scale was associated with multiple phobic indicators (behavioral avoidance, subjective distress, symptom endorsement), suggesting cognitions may be critical to understanding how disgust contributes to anxiety disorders.

Keywords

disgust; cognition; contamination; spider fear; blood-injury-injection; phobia

Over the past decade, there has been a surge of interest in the role of disgust in anxiety problems. Considerable evidence indicates that disgust is likely central to certain specific phobias, particularly spider and blood-injury-injection (BII) phobia (see Special Issue by Olatunji & McKay, 2006, and Woody & Teachman, 2000), and to obsessive-compulsive disorder (OCD; e.g., Tolin, Worhunsky, & Maltby, 2004). This recent work has built on research characterizing the subjective feelings, and physiological and behavioral responses associated with disgust (e.g., Rozin, Haidt, & McCauley, 1993). Yet, despite these advances, little is known about the cognitive responses connected with disgust when it becomes implicated in clinical problems. This is somewhat surprising, especially given that cognitive theories have held a dominant position in anxiety psychopathology and treatment (see Wells, 1997). The goal of the current study is to develop a measure of cognitions associated with disgust and contamination concerns that can be used to evaluate pathological disgust, particularly in phobic responding.

On the one hand, cognitive models of anxiety disorders emphasize that irrational appraisals related to danger, along with selective processing of threatening information, maintain and perhaps cause pathological fear (see Mathews & MacLeod, 2005). If disgust is implicated in anxiety problems, then it seems likely that there will also be irrational disgust appraisals. Moreover, one of the domains where fear and disgust overlap is in the threat of

contamination (see Woody & Teachman, 2000), which Rachman (2004) argues is driven by maladaptive cognitions.

On the other hand, a challenge to the idea of biased disgust cognitions follows from an intriguing study by Mikulincer and Florian (1997) in which participants were asked to recall a prior disgust-arousing situation and then report their appraisals about the situation. The authors measured primary appraisals tied to threat and challenge and secondary appraisals reflecting responsibility, control, and coping. They then compared endorsement of these appraisals following participants' recall for different types of emotional memories (e.g., disgust versus guilt). They found that among undergraduate students, appraisals following the disgust memory tended to be endorsed less than these same appraisals following the other emotional memories. Mikulincer and Florian (1997) interpreted these results as evidence that disgust is "a simple negative emotion, which does not require any particular secondary appraisal component" (p. 277).

While provocative, we are reticent to accept that disgust involves minimal appraisals. This may be true of healthy disgust responses, though we are skeptical given the work by Rozin and others on the normative, yet irrational, beliefs tied to the spread of contagion (termed the "laws of sympathetic magic"; Rozin & Nemeroff, 1990). Also, we suspect that disgust appraisals will become more apparent when disgust is implicated in psychopathology. Further, Mikulincer and Florian (1997) used a brief, generic measure of appraisals that was intended to apply to any emotion-arousing situation.

This leaves open the possibility that cognitions that are *specific* to disgust will be evident when disgust is aroused. This study evaluates disgust-specific appraisals and investigates whether these appraisals are elevated in specific phobias that feature disgust reactions (we focus on BII & spider fear, given the substantial evidence that disgust is involved in these phobias). A multi-modal assessment of BII and spider phobic responding was conducted using both BII and spider fearful groups (who served as controls for one another), as well as a non-fearful group. The assessment involved a series of disgust- and fear-relevant provocations. In this way, it was possible to evaluate whether our new measure of disgust cognitions would be related to phobic responding (e.g., avoidance), higher for tasks that elicited disgust versus only fear, and elevated among individuals with specific phobic symptoms. Establishing the reliability and validity of a measure of cognitions associated with disgust is likely critical to understanding how disgust and contamination may contribute to anxiety and other disorders.

Methods

Participants

Participants were students ($N=30$ Low Fear, 37% female; $N=30$ Spider Fear, 80% female; $N=29$ BII Fear, 72% female) enrolled in psychology courses who were pre-selected based on responses to the Fear Survey Schedule-III (FSS-III; Wolpe & Lang, 1964) and the Anxiety subscale of the Injection Phobia Scale (IPS; Öst, Hellstrom, & Kaver, 1992). The fear groups were selected to serve as controls for one another, so participants who were high in spider fear had to score low on the measure of BII fears, and vice versa. Participants who rated their spider fear as 1 or 2 (Low Fear and BII Fear groups), or as a 4 or 5 (Spider Fear group), on a 1–5 point Likert scale (spider item modified from the FSS-III) were invited to participate. This approach follows comparable recruitment procedures for analogue spider phobic samples from Teachman, Gregg, and Woody (2001). For the Anxiety subscale of the IPS, participants who scored below 11.1 (Low Fear and Spider Fear groups) or above 43.8 (BII Fear group) were invited to participate, so that the BII Fear group was at or above the phobic mean established in Öst et al. (1992) and the groups low in BII fear were at least 3

SD below the phobic mean. In addition, to be classified as low in BII fears, participants had to indicate that they had never fainted or felt dizzy during medical procedures, and had not avoided, delayed, or put off medical procedures because of BII fears. Mean age was 18.9 years ($SD=1.20$), and race and/or ethnicity was reported as 75% Caucasian, 11% African American, 1% Hispanic, 4% Asian, and 10% indicated 'other' or chose not to report. Not surprisingly, given the gender difference in prevalence of specific phobias (Fredrikson, Annas, Fischer, & Wik, 1996), the high fear groups had significantly more women than did the Low Fear group ($\chi^2=13.73$, $p<.001$). Importantly, however, the Spider Fear and BII Fear groups (that were designed to serve as controls for one another) did not differ on gender ($\chi^2=.47$, $p>.10$).

Materials¹

Phobic Symptoms—Symptoms of spider phobia were assessed using the Fear of Spiders Questionnaire (FSQ; Szymanski & O'Donohue, 1995), a widely-used 18-item scale that assesses participants' avoidance and fear of harm from spiders. BII symptoms were measured using the Mutilation Questionnaire (MQ; Klorman, Hastings, Weerts, Melamed, & Lang, 1974), a 30-item true-false measure of fear associated with situations where bodily injury is possible.

Disgust Sensitivity—The Disgust Scale (DS; Haidt, McCauley, & Rozin, 1994) is a 32-item measure of general disgust sensitivity, which provides both a total score and eight specific disgust domain scores (food, animals, body products, sex, body envelope violations, death, hygiene, magical thinking).

Disgust/Fear Provocations—The provocations included both fear- and disgust-related behavioral avoidance tests that provide an opportunity to assess avoidance (by measuring the last step completed on the tasks) and subjective distress (by obtaining verbal reports of peak fear and disgust experienced during the tasks on 0–100 scales, where 0 indicates no distress). Four provocations were included that were designed to activate disgust cognitions differently as a function of fear group: 1) *approaching a live spider*, which was expected to elicit both fear and disgust, especially for the Spider Fear group, 2) *watching a video of heart surgery*, which was expected to elicit both fear and disgust, especially for the BII Fear group, 3) *being asked to eat a cookie that looked like cat poop*, a general disgust sensitivity task not tied to a particular phobia that was expected to elicit disgust, but minimal fear, and 4) *giving an impromptu speech*, which was a control task expected to elicit fear, but minimal disgust. For each provocation, participants were told they could stop the task at any point, and that we did not expect everyone to complete the task. This instruction was included to reduce demand effects and avoid potentially coercing participants.

Spider (modified from Teachman & Addison, in press): A completely harmless but large spider was placed in a cage at one end of a room. Participants were asked to enter the room and approach the spider as closely as possible, ultimately touching the spider. Scoring was based on the number of steps completed, which ranged from 0 (not entering the room) to 8 (touching the spider).

Surgery video (modified from Rozin, Haidt, McCauley, Dunlop, & Ashmore, 1999): Participants were invited to watch an increasingly graphic video of a heart surgery for up to two minutes. Steps completed were scored based on the amount of time spent watching the video and ranged from 0 to 4 (corresponding to each of the four 30 second increments).

¹Only those measures relevant to the current hypotheses are reported here.

Poop cookie (modified from Rozin et al., 1999): An edible cookie designed to look like a piece of animal poop was placed in a litter box filled with cereal, which resembled cat litter. Participants were told that it was not real poop, and were invited to interact with the cookie (scored on a 0 to 4 scale), by first touching the cookie and ultimately taking a bite.

Speech (modified from Gordon & Teachman, in press). Participants were asked to stand in front of a mirror and do an impromptu speech about their initial impressions of college with the experimenter watching for up to four minutes. To increase anxiety, participants were instructed to stare at themselves in the mirror for the duration of the speech and the experimenter always maintained a blank facial expression. Steps completed were scored based on the amount of time spent giving the speech (ranging from 0 to 4 in one minute increments).

Disgust Cognitions—The Disgust Cognitions scale was designed to tap a range of appraisals implicated in the disgust response and threat of contamination. Building upon cognitive theories of OCD (e.g., Rachman, 1997; Salkovskis, 1996), both primary and secondary appraisals were assessed. Primary appraisals reflect initial reactions to the stimulus and secondary appraisals reflect the significance of that reaction to the individual. As noted in Teachman (2006), primary appraisals of disgust should reflect thoughts about the contaminating properties of a disgusting object or likelihood of a disgust reaction, and secondary appraisals should reflect beliefs about the perceived consequences if that thought is deemed true (e.g., beliefs about the dire consequences of becoming disgusted; see also Rachman, 2004).

To assess primary appraisals, 12 items (rated on a 1–7 Likert scale) were created to reflect negative thoughts about the feeling of disgust (e.g., ‘I feel like I might vomit’), thoughts about becoming contaminated (e.g., ‘It is going to contaminate me’), as well as cognitions related to “looming vulnerability” (see Tolin, Worhunsky, & Maltby, 2004). Looming vulnerability in this context refers to the belief that contamination will spread or escalate in threat value (e.g., ‘This will rub off on me’).

To assess secondary appraisals, the belief domains thought to contribute to OCD (OCCWG, 1997) and the laws of sympathetic magic in normal disgust (Rozin & Nemeroff, 1990) were used as starting points to generate disgust-relevant items. The rationale was that, akin to intrusive thoughts in OCD, the interpretation of a disgust reaction as personally meaningful or threatening would lead to problematic disgust cognitions. Thus, seven items (also rated on a 1–7 Likert scale) were created that asked participants about how they would feel if the original disgust cognitions (the 12 primary appraisals) were true. Therefore, while the first 12 items primarily reflected a tendency to overestimate threat, the secondary appraisal items tapped into beliefs about one’s tolerance for emotional discomfort (e.g., ‘If this happened, I couldn’t cope’), the need to control reactions (e.g., ‘If I get highly disgusted, I could lose control of myself’), and overestimations of threat.

Finally, because this was the first use of the scale, open-ended questions inviting participants to report other thoughts that occurred to them during the provocation were also included, but these were not scored. No items were reverse scored, so scoring simply required adding the scores for the 19 items, resulting in a score ranging from 19 to 133. See Appendix for copy of the scale.

Procedure

Participants were informed that we were interested in emotional reactions and thoughts to unusual situations. Disgust and specific phobias were not explicitly mentioned and

participants were not informed as to why they were specifically recruited in order to minimize the likelihood of demand effects. In addition, the experimenter was blind to participants' fear status. Following informed consent, definitions of fear and disgust were provided and baseline verbal ratings (on a 0–100 scale) for each emotion were obtained. Whether the questionnaires (FSQ, MQ, and DS) or provocations (spider, surgery video, poop cookie, and speech) were completed first was counterbalanced, and order within the set of questionnaires and provocations was random. Participants were asked immediately after each provocation ended to verbally report their peak fear and disgust levels during the task on the 0–100 scale. They then completed the measure of disgust cognitions, and were instructed to complete the scale based on that specific task. Finally, to minimize the likelihood that residual disgust from one task would contaminate responding on a subsequent task, participants were given an opportunity to wash their hands between provocations.

Results

Descriptive Statistics, and Validity of Fear Groups and Disgust/Fear Provocations

Before evaluating the role of disgust cognitions, it was first necessary to establish that the fear groups were valid (i.e., show expected phobic responses to specific feared stimuli), and that the provocations elicited the predicted fear and/or disgust reactions. As expected, there were no group differences in baseline self-reported fear ($F_{(2, 85)}=.90, p>.10, \eta_p^2=.02$) or disgust ($F_{(2, 85)}=1.56, p>.10, \eta_p^2=.04$) on the 0–100 verbal analogue scales, and the fear groups differed on the spider and BII phobic symptom measures. Specifically, there was a significant group effect on the FSQ ($F_{(2, 86)}=45.72, p<.001, \eta_p^2=.52$) Follow-up Scheffe tests indicated that the Spider Fear group was higher than both the BII Fear group ($p<.001$) and the Low Fear group ($p<.001$), who did not differ from one another ($p>.10$). Analogously, on the MQ, follow-up Scheffe tests on the group effect ($F_{(2, 86)}=35.86, p<.001, \eta_p^2=.46$) indicated that the BII Fear group scored higher than both the Spider Fear group ($p<.001$) and the Low Fear group ($p<.001$), who did not differ from one another ($p>.10$). Moreover, there was a significant group difference in general disgust sensitivity (on the DS; $F_{(2, 86)}=14.58, p<.001, \eta_p^2=.25$), whereby the Low Fear group was lower than both fearful groups (both $p<.001$), who did not differ from one another ($p>.10$). Taken together, these results indicate that participants showed the expected differences on trait measures of spider and BII phobic symptom measures.

To examine phobic responses to the provocations (avoidance and subjective distress), repeated measures multivariate analysis of variance (MANOVA) tests for the four provocations (spider, surgery video, poop cookie, speech) were conducted. As expected, the fear group (between-subjects) x provocation (within-subjects) interaction was significant for last step completed ($F_{(6, 164)}=8.02, p<.001, \eta_p^2=.23$), and for both peak fear ($F_{(6, 166)}=6.87, p<.001, \eta_p^2=.20$) and peak disgust ($F_{(6, 166)}=6.73, p<.001, \eta_p^2=.20$). Follow-up univariate tests for the last step completed (i.e., avoidance), peak fear, and peak disgust all indicated group differences on the spider and surgery video tasks, and no significant group differences on the poop cookie or speech tasks². Moreover, as anticipated, peak disgust was lowest for the speech task, and was significantly lower on this task than on any of the other provocations (all $p<.001$). Finally, peak fear was lowest on the cookie task, and was significantly lower on this task than on the speech or spider tasks (both $p<.001$), though it did not reach significance for the difference with the surgery video ($p=.13$). Table 1 reports the means and standard deviations for the questionnaires, and fear and disgust responses by

²Post hoc Scheffe tests were mostly as expected based on fear group classification, so are not included here due to space constraints. The only exception concerned the last step completed for the surgery video, which showed few group differences because 89% of the full sample watched the entire video.

fear group and provocation. Overall, results strongly supported the validity of both the fear group classifications and fear/disgust provocations, indicating that it was reasonable to then examine how disgust cognitions differed across fear groups and provocations.

Disgust Cognitions

Reliability—Inter-item consistency for the 19-item scale was assessed for each occasion (once per provocation) that the scale was administered. Reliability (indicated by Cronbach's alpha) was excellent in each case: spider=.93, surgery video=.90, poop cookie=.91, speech=.91. In addition, reliability for the primary and secondary appraisals alone were also good (range for: primary=.87–.91, secondary=.79–.87).

Construct Validity—As expected, a repeated measures ANOVA indicated a significant difference in disgust cognitions across the four provocations ($F_{(3, 85)}=9.87, p<.001, \eta_p^2=.26$). Further, the follow-up within-subjects simple contrast comparing disgust cognitions for the spider, surgery video, and poop cookie relative to the speech indicated that, in each case, the disgust cognitions scale was higher when administered following a disgust-relevant task than following the speech control task (all comparisons $p \leq .002$). The same pattern was also observed when examining the primary ($F_{(3, 85)}=10.67, p<.001, \eta_p^2=.27$) and secondary ($F_{(3, 82)}=2.95, p=.04, \eta_p^2=.10$) appraisals alone, though the follow-up simple contrasts did not all reach significance for the secondary appraisals.

Known-groups Validity—A repeated measures MANOVA with fear group (between-subjects) and disgust cognitions across the four different provocations (within-subjects) showed a significant group by provocation interaction ($F_{(3, 83)}=10.19, p<.001, \eta_p^2=.27$). Follow-up univariate tests indicated significant group differences on the three disgust-relevant tasks (spider: $F_{(2, 85)}=9.02, p<.001, \eta_p^2=.18$, surgery video: $F_{(2, 85)}=11.02, p<.001, \eta_p^2=.21$, poop cookie: $F_{(2, 85)}=3.70, p=.03, \eta_p^2=.08$), but not on the speech control task ($F_{(2, 85)}=2.15, p>.10, \eta_p^2=.05$). Further, post hoc Scheffe tests for the significant group effects were mostly as expected. For the spider provocation, disgust cognitions were higher for the Spider Fear group than for both the BII Fear group ($p=.03$) and the Low Fear group ($p<.001$), who did not differ from one another ($p>.10$). Similarly, for the surgery video, disgust cognitions were higher for the BII Fear group than for both the Spider Fear group ($p=.001$) and the Low Fear group ($p<.001$), who did not differ from one another ($p>.10$). In addition, the pattern for the phobic-relevant provocations was the same when examining either the primary or secondary appraisals alone (significant group differences for the spider and surgery video, all $p \leq .001$), suggesting both play a role in distinguishing phobic responding. Finally, for the poop cookie provocation, the BII Fear group was higher than the Low Fear group on total disgust cognitions ($p=.04$) and primary appraisals ($p=.02$; other comparisons were nonsignificant). Overall, results indicated that the fear groups differed in their reported disgust cognitions in the expected directions (see Table 1), demonstrating known-groups validity.

Convergent and Discriminant Validity—To establish the convergent validity of the disgust cognitions, correlations were examined between a specific administration of the scale and other features of disgust and phobic responses involved in that specific phobia (e.g., disgust cognitions following the spider provocation were expected to correlate with self-reported disgust, avoidance, etc. during the spider provocation). In parallel, to demonstrate discriminant validity, correlations between scores on the cognitions scale and disgust and phobic responses to an alternate phobia were examined (e.g., disgust cognitions following the spider provocation should be less strongly correlated with self-reported disgust during the surgery video provocation). By using the spider- and BII-relevant tasks and fear groups as controls for one another, it was possible to evaluate the specificity of a given

administration of the disgust cognitions scale. As noted in Table 2, the pattern clearly supported both the convergent and discriminant validity of the measure. Disgust cognitions (total score, or primary or secondary appraisals) following the spider provocation were significantly related to the spider fear and disgust measures, but not to the equivalent BII measures, and vice versa for disgust cognitions following the surgery video provocation (with only a couple minor exceptions).

Interestingly, simultaneous regressions examining the unique predictive validity of the primary and secondary appraisals in predicting avoidance found that, while the overall model was significant for both avoidance of the spider (Model $F=13.46$, $p<.001$) and the surgery video (Model $F=5.55$, $p=.005$), the primary appraisals were the stronger predictor in both cases (Spider: primary appraisals $Beta=-.31$, $p=.01$; secondary appraisals $Beta=-.23$, $p=.06$; Surgery video: appraisals $Beta=-2.12$, $p=.04$; secondary appraisals $Beta=-.60$, $p>.10$). For the equivalent simultaneous regressions predicting questionnaire measures of symptoms (the FSQ and MQ), both primary and secondary appraisals remained significant predictors (FSQ: Model $F=30.38$, $p<.001$; primary appraisals $Beta=.27$, $p=.02$; secondary appraisals $Beta=.44$, $p<.001$; MQ: Model $F=44.82$, $p<.001$; primary appraisals $Beta=.55$, $p<.001$; secondary appraisals $Beta=.22$, $p=.03$).

Discussion

A novel measure of cognitions associated with disgust and contamination was introduced to assess the role of disgust-specific appraisals in phobic responding. Across multiple administrations, the measure showed good reliability based on inter-item consistency. Further, construct validity was demonstrated based on findings of higher disgust cognitions following disgust-relevant provocations, versus a control task that elicited primarily fear alone. Known-groups validity was also established based on findings that the Spider Fear group reported higher disgust cognitions (relative to the other groups) following presentation of a live spider, whereas the BII Fear group reported higher disgust cognitions following video presentation of a heart surgery. Finally, disgust cognitions for a given target (e.g., spider) were related to multiple components of that phobic response, but not to indicators of the alternate phobic response (BII phobia in this case). These findings also held when examining the primary or secondary appraisals subscales independently.

These results suggest that disgust-specific cognitions, including both primary and secondary appraisals, can be identified, and that these thoughts are predictive of phobic responding (both across tasks and individuals). Importantly, disgust cognitions relate to questionnaire measures of phobic symptoms and subjective distress during encounters with phobic stimuli, and even predict behavioral avoidance, a critical indicator of clinical phobias. The primary and secondary appraisals tend to show similar magnitude of relationships to the various phobic responses; however, when evaluated simultaneously, it appears that the primary appraisals are the stronger predictor of avoidance, but both uniquely predict questionnaire measures of symptoms.

Taken together, these findings challenge prior claims that disgust is a simple emotion with few appraisals (see Mikulincer & Florian, 1997). When disgust is provoked in populations that experience disgust in the context of emotion dysregulation, a range of thoughts about becoming disgusted and about the nature and seriousness of contamination are apparent. While the current study focused on BII and spider phobia, we suspect that similar patterns would emerge in OCD and other pathological states where disgust is implicated.

Moreover, our findings of primary and secondary disgust appraisals fit well with recent research demonstrating that there are individual differences in the tendency to become

disgusted (propensity), and negative reactions to the experience of disgust (sensitivity). van Overveld, de Jong, Peters, Cavanagh, and Davey (2006) developed the Disgust Propensity and Sensitivity Scale to capture trait differences in disgust, and our measure provides a somewhat parallel assessment of state cognitive disgust reactions. Our primary disgust appraisals seem likely to predict who will have a strong propensity to become disgusted in a given situation, whereas the secondary negative reactions to these appraisals may predict who will ultimately be sensitive to emotion regulation difficulties (see Gratz & Roemer, 2004). At this stage, these ideas remain speculative, especially given that our regression analyses suggested that both primary and secondary appraisals independently predict phobic symptoms.

It is also important to recognize limitations of the current study. The scale includes few items focused on moral disgust. Also, the study used an undiagnosed, college-aged, primarily Caucasian sample, leaving important questions about cultural differences in disgust cognitions unanswered. It will also be critical to do further tests of the reliability of the measure, including test-retest, to establish its potential treatment sensitivity. Finally, administration to a larger sample will be helpful to permit factor analysis on the scale, which will be important to establish whether the primary and secondary disgust appraisals reflect separate factors. Notwithstanding, the current results provide a promising glimpse into the thoughts associated with disgust in anxiety disorders, and may help explain why a feeling of “ick” can have such serious consequences.

Acknowledgments

The authors are thankful to Nichole Heiman and Suzanne Unger and the research assistance provided by members of the Teachman PACT lab at the University of Virginia. This research was supported by an NIMH R03 PA-03-039 grant to Bethany Teachman.

References

- Fredrikson M, Annas P, Fischer H, Wik G. Gender and age differences in the prevalence of specific fears and phobias. *Behaviour Research and Therapy*. 1996; 34:33–39. [PubMed: 8561762]
- Gordon TL, Teachman BA. Ethnic group differences in affective, behavioral, and cognitive markers of anxiety. *Journal of Cross-Cultural Psychology*. (in press).
- Gratz KL, Roemer L. Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*. 2004; 26:41–54.
- Haidt J, McCauley C, Rozin P. Individual differences in sensitivity to disgust: A scale sampling seven domains of disgust elicitors. *Personality and Individual Differences*. 1994; 16:701–713.
- Klorman R, Hastings J, Weerts T, Melamed B, Lang P. Psychometric description of some specific-fear questionnaires. *Behavior Therapy*. 1974; 5:401–409.
- Mathews A, MacLeod C. Cognitive vulnerability to emotional disorders. *Annual Review of Clinical Psychology*. 2005; 1:167–195.
- Mikulincer M, Florian V. A cognitive-relational approach to emotions--the appraisal and coping components of sadness, shame, guilt, jealousy, and disgust. *Imagination, Cognition and Personality*. 1997; 16:263–279.
- Obsessive Compulsive Cognition Working Group. Cognitive assessment of obsessive-compulsive disorder. *Behaviour Research and Therapy*. 1997; 35:667–681. [PubMed: 9193129]
- Olatunji B, McKay D. Introduction to the special series: Disgust sensitivity in anxiety disorders. *Journal of Behavior Therapy and Experimental Psychiatry*. 2006; 37:1–3.
- Öst L, Hellstrom K, Kaver A. One versus five sessions of exposure in the treatment of injection phobia. *Behavior Therapy*. 1992; 23:263–282.
- Rachman SJ. A cognitive theory of obsessions. *Behaviour Research and Therapy*. 1997; 35:793–802. [PubMed: 9299799]

- Rachman S. Fear of contamination. *Behaviour Research and Therapy*. 2004; 42:1227–1255. [PubMed: 15381436]
- Rozin, P.; Haidt, J.; McCauley, CR. Disgust. In: Lewis, M.; Haviland, JM., editors. *Handbook of Emotions*. New York: Guilford Press; 1993. p. 575-594.
- Rozin P, Haidt J, McCauley C, Dunlop L, Ashmore M. Individual Differences in Disgust Sensitivity: Comparisons and Evaluations of Paper-and-Pencil versus Behavioral Measures. *Journal of Research in Personality*. 1999; 33:330–351.
- Rozin, P.; Nemeroff, C. The laws of sympathetic magic: A psychological analysis of similarity and contagion. In: Stigler, JW.; Shweder, RA.; Herdt, G., editors. *Cultural psychology: Essays on comparative human development*. Cambridge, England: Cambridge University Press; 1990. p. 205-232.
- Salkovskis, PM. Cognitive-behavioral approaches to the understanding of obsessional problems. In: Rapee, RM., editor. *Current controversies in the anxiety disorders*. New York, New York: Guilford Press; 1996. p. 103-133.
- Szymanski J, O'Donohue W. Fear of Spiders Questionnaire. *Journal of Behavior Therapy and Experimental Psychology*. 1995; 26:31–34.
- Teachman BA. Pathological disgust: In the thoughts, not the eye, of the beholder. *Anxiety, Stress, and Coping*. 2006; 19:335–351.
- Teachman, BA.; Addison, LM. Cognitive Therapy and Research. Training interpretation biases away from threat in spider fear. (in press)
- Teachman BA, Gregg AP, Woody SR. Implicit associations for fear-relevant stimuli among individuals with snake and spider fears. *Journal of Abnormal Psychology*. 2001; 110:226–235. [PubMed: 11358017]
- Tolin DF, Worhunsky P, Maltby N. Sympathetic magic in contamination-related OCD. *Journal of Behavior Therapy and Experimental Psychiatry*. 2004; 35:193–205. [PubMed: 15210379]
- van Overveld WJM, de Jong PJ, Peters ML, Cavanagh K, Davey GCL. Disgust propensity and disgust sensitivity: Separate constructs that are differentially related to specific fears. *Personality and Individual Differences*. 2006; 41:1241–1252.
- Wells, A. *Cognitive therapy of anxiety disorders: A practice manual and conceptual guide*. Chichester, Sussex: Wiley; 1997.
- Wolpe J, Lang PJ. A fear survey schedule for use in behavior therapy. *Behaviour Research and Therapy*. 1964; 2:27–30. [PubMed: 14170305]
- Woody SR, Teachman BA. Intersection of disgust and fear: Normative and pathological views. *Clinical Psychology: Science and Practice*. 2000; 7:291–311.

Appendix. Disgust Cognitions Scale

Please complete the following statements with any thoughts that went through your mind when you _____ (name disgust provocation).

1. I think it could...

2. If I go near it...

Please describe how strongly you can relate to each of the following statements as you recall your thoughts **while you were** _____ (name disgust provocation):

Please circle the number that best reflects how you feel based on the following scale:

	1	2	3	4	5	6			7			
	Cannot relate to statement at all				Neutral	Strongly relate to statement						
3.	I am going to gag.					1	2	3	4	5	6	7
4.	I am going to get infected.					1	2	3	4	5	6	7
5.	I feel like I might vomit.					1	2	3	4	5	6	7
6.	I will become disgusting.					1	2	3	4	5	6	7
7.	I will feel dirty until I clean up.					1	2	3	4	5	6	7
8.	I will never feel clean again.					1	2	3	4	5	6	7
9.	I will smell bad for the rest of the day.					1	2	3	4	5	6	7
10.	It is going to contaminate me.					1	2	3	4	5	6	7
11.	It is going to make me physically ill.					1	2	3	4	5	6	7
12.	It will stay on me.					1	2	3	4	5	6	7
13.	This feeling is going to last forever.					1	2	3	4	5	6	7
14.	This will rub off on me.					1	2	3	4	5	6	7

Based on the statements above that you were able to relate to most strongly, please indicate how much you agree with the following statements:

Please circle the number that best reflects how you feel based on the following scale:

	1	2	3	4	5	6	7					
Strongly disagree	Neutral					Strongly agree						
15.	If this happened, I couldn't cope.					1	2	3	4	5	6	7
16.	This is very likely to happen.					1	2	3	4	5	6	7
17.	This would be a really horrible thing to happen.					1	2	3	4	5	6	7
18.	It's important for me to control my disgust reaction.					1	2	3	4	5	6	7
19.	If I get highly disgusted, I could lose control of myself.					1	2	3	4	5	6	7
20.	I can't tolerate feeling disgusted or grossed out.					1	2	3	4	5	6	7
21.	Disgust will never go away.					1	2	3	4	5	6	7
22.	Other thoughts: _____											
23.	Other thoughts: _____											

Table 1

Descriptive Statistics

Measure	Spider Fear		BII Fear		Low Fear	
	M	SD	M	SD	M	SD
Fear of Spiders Questionnaire (FSQ)	70.13	27.31	35.14	17.98	24.33	7.43
Mutilation Questionnaire (MQ)	7.37	5.35	16.48	5.67	5.90	4.48
Disgust Scale (DS)	27.77	8.17	28.27	6.15	19.40	6.86
<u>Spider Provocation</u>						
– Peak disgust (0–100)	43.45	36.96	27.28	28.65	9.13	17.38
– Peak fear (0–100)	66.83	29.09	38.24	26.57	26.50	23.63
– Last step completed (0–8)	5.07	2.10	7.38	1.12	7.87	.35
– Total Disgust Cognitions (19–133)	45.14	20.05	33.41	17.68	26.97	8.41
– Disgust Cognitions: Primary Appraisals only (12–84)	24.07	12.36	18.50	10.12	13.83	3.71
– Disgust Cognitions: Secondary Appraisals only (7–49)	21.20	10.68	15.18	8.43	13.13	6.22
<u>Surgery Video Provocation</u>						
– Peak disgust (0–100)	22.66	27.54	45.24	27.78	22.97	24.13
– Peak fear (0–100)	9.17	18.74	28.72	25.28	9.70	16.87
– Last step completed (0–4)	3.83	.66	3.38	1.29	3.93	.37
– Total Disgust Cognitions (19–133)	30.83	12.57	44.24	17.08	29.23	10.04
– Disgust Cognitions: Primary Appraisals only (12–84)	15.40	5.51	21.62	10.11	14.77	4.21
– Disgust Cognitions: Secondary Appraisals only (7–49)	15.43	8.50	23.18	8.55	14.47	6.92
<u>Poop Cookie Provocation</u>						
– Peak disgust (0–100)	34.21	24.37	37.57	25.49	26.03	22.10
– Peak fear (0–100)	12.66	16.45	17.89	23.11	8.30	11.50
– Last step completed (0–4)	3.07	1.39	3.22	1.12	3.60	.89
– Total Disgust Cognitions (19–133)	39.67	17.08	41.93	20.12	30.97	9.60
– Disgust Cognitions: Primary Appraisals only (12–84)	22.40	11.41	24.21	13.95	16.33	4.93
– Disgust Cognitions: Secondary Appraisals only (7–49)	17.27	7.40	17.72	8.45	14.63	5.83
<u>Speech Provocation</u>						
– Peak disgust (0–100)	4.59	9.05	7.69	17.77	4.47	8.73
– Peak fear (0–100)	21.48	23.33	27.93	28.30	18.93	21.32
– Last step completed (0–4)	2.03	1.52	2.45	1.33	1.83	1.53

Measure	Spider Fear		BII Fear		Low Fear	
	M	SD	M	SD	M	SD
– Total Disgust Cognitions (19–133)	28.59	12.66	33.79	18.63	26.67	7.26
– Disgust Cognitions: Primary Appraisals only (12–84)	14.48	7.07	17.10	9.54	12.73	1.55
– Disgust Cognitions: Secondary Appraisals only (7–49)	14.36	8.09	17.41	10.18	13.93	6.43

Correlations between Disgust Cognitions and Traditional Phobic and Disgust Responses

Table 2

	Spider: Total Disgust Cognitions	Spider: Primary Appraisals Only	Spider: Secondary Appraisals Only	Surgery Video: Total Disgust Cognitions	Surgery Video: Primary Appraisals Only	Surgery Video: Secondary Appraisals Only
Fear of Spiders Questionnaire (FSQ)	.63**	.55**	.61**	.05	.04	.05
Mutilation Questionnaire (MQ)	.20	.19	.18	.68**	.69**	.58**
Disgust Scale (DS) – Animal subscale	.40**	.30**	.44**	.20	.15	.22*
Disgust Scale (DS) – Body envelope violations subscale	.06	.02	.12	.25*	.24*	.25*
Spider Provocation – Peak disgust	.45**	.45**	.40**	.19	.12	.25*
Spider Provocation – Peak fear	.47**	.41**	.46**	.02	-.03	.08
Spider Provocation – Last step completed	-.49**	-.46**	-.43**	.05	.12	-.01
Surgery Video Provocation – Peak disgust	.24*	.25*	.17	.66**	.61**	.57**
Surgery Video Provocation – Peak fear	.17	.16	.14	.63**	.57**	.57**
Surgery Video Provocation – Last step completed	.08	.10	.06	-.33**	-.34**	-.26*

Note.

*
= $p < .05$,

**
= $p < .001$.