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Disgust as a Unique Affective Predictor of Mental Contamination Following Sexual Trauma

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Abstract

Mental contamination has been described as an internal experience of dirtiness that can arise and persist in the absence of contact with observable physical contaminants. Recent research has examined mental contamination specifically related to unwanted physical contact and sexual trauma. This study evaluated the degree to which disgust propensity and both self-focused and perpetrator-focused peritraumatic disgust were associated with mental contamination in a sample of women who experienced sexual trauma ($n = 72$). Results showed that peritraumatic self-focused disgust, but not peritraumatic perpetrator-focused disgust or fear, was significantly associated with mental contamination. Additionally, disgust propensity contributed significantly to the incremental validity of the model. These findings support the nascent literature showing that disgust plays a significant role in mental contamination, particularly following sexual trauma. Future research directions, and clinical/theoretical implications of these results are discussed.

Keywords

disgust; mental contamination; sexual trauma; posttraumatic stress disorder

Contamination, defined as “an intense and persisting feeling of having been polluted, dirtied, or infected, or endangered as a result of contact, direct or indirect, with an item/place/person

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perceived to be soiled, impure, dirty, infectious or harmful” (Rachman, 2006, p. 9), is a widely studied phenomenon linked to a number of affective (e.g., fear, anxiety, disgust) and cognitive (e.g., inflated beliefs about responsibility, beliefs regarding the spread of contaminants) vulnerabilities (Cisler, Olatunji, & Lohr, 2009; Rachman, 1997; Tolin, Worhunsky, & Maltby, 2004). Like most psychological constructs, contamination concerns exist upon a continuum ranging in frequency and severity, with distinct forms of psychopathology, most commonly contamination-based obsessive-compulsive disorder (OCD), falling upon the extreme end of the spectrum (Olatunji, Williams, Haslam, Abramowitz, & Tolin, 2008). Research in this area has traditionally focused on understanding mechanisms underlying the development and maintenance of contact contamination, or contamination-related concerns that follow direct physical contact with a potential pollutant. This form of contamination is thought to result from a discrete source (i.e., polluting object), be contained to an identifiable site of contamination (e.g., hands, face), spread easily and widely to other people and objects through touch, and respond to cleansing or washing behavior (Rachman, 2004).

Recently, researchers have increasingly turned their attention to understanding a specific form of contamination referred to as mental contamination (or mental pollution), defined as “a sense of internal un-cleanness which can and usually does arise and persist regardless of the presence or absence of external, observable dirt” (Rachman, 1994). Mental contamination is theorized to emerge predominantly in response to mental events (e.g., thoughts, memories, images), or experiences involving negative human interactions such as violations of morality (e.g., sexual victimization or other violation), betrayal, or humiliation (Ishikawa, Kobori, & Shimizu, in press; Rachman, 2006, 2010; Rachman, Radomsky, Elliott, & Zysk, 2012). In contrast with contact contamination, sensations associated with mental contamination are typically described as diffuse, difficult to locate, with some individuals reporting feeling dirty “inside their bodies” or “under their skin” (Coughtrey Shafran, Lee et al., 2012). Mental contamination does not require initial physical contact with a stimulus and often endures despite repeated washing or cleansing rituals (Coughtrey, Shafran, Lee et al., 2012; Fairbrother & Rachman, 2004).

Mental contamination may have important implications for understanding certain types of psychopathology, including both OCD and posttraumatic stress disorder (PTSD). For example, one study suggests that mental contamination concerns are experienced by nearly half of individuals with clinical diagnoses of OCD (Coughtrey, Shafran, Knibbs, & Rachman, 2012). Moreover, mental contamination concerns have been consistently shown to correlate with severity of PTSD symptoms following sexual trauma (Badour, Feldner, Babson, Blumenthal, & Dutton, 2013; Badour, Feldner, Blumenthal, & Bujarski, 2013; Fairbrother & Rachman, 2004; Ishikawa et al., in press; Olatunji, Elwood, Williams, & Lohr, 2008). As the vast majority of individuals with a history of sexual trauma report experiencing at least transient mental contamination at some point following their assault (Fairbrother & Rachman, 2004), much of the research on mental contamination has been conducted among these samples. Related laboratory paradigms have been developed to serve as analogues for investigation of relevant processes involved in traumatic sexual victimization (Elliott & Radomsky, 2009; Herba & Rachman, 2007; Radomsky & Elliott, 2009, 2012).

The nascent body of research aimed at identifying mechanisms underlying the development and maintenance of mental contamination has focused primarily on the role of cognitive appraisals and vulnerabilities. For example, studies involving imagery of a past instance of sexual victimization as well as analogue studies involving imagery of a nonconsensual kiss at a party (i.e., *dirty kiss paradigm*) suggest cognitive appraisals such as beliefs about the degree of violation associated with an event, perceived responsibility for the event, and perceptions of the perpetrator (e.g., morality/immorality of character, physical cleanliness) may be involved in the development of mental contamination concerns (Elliott & Radomsky, 2009; Ishikawa et al., in press; Radomsky & Elliott, 2009, 2012). Preliminary evidence further suggests that posttraumatic cognitions, including those related to self-blame, negative beliefs about the self, and negative beliefs about the world, mediate the association between mental contamination and posttraumatic stress symptoms following traumatic sexual victimization (Olatunji et al., 2008). Finally, general cognitive vulnerabilities linked to increased concerns with contact contamination such as inflated beliefs regarding responsibility and thought-action fusion (i.e., thinking about an unacceptable action is equivalent to carrying out the action or increases the likelihood that it will happen; Shafran, Thordarson, & Rachman, 1996) have also demonstrated associations with mental contamination concerns (Cogle, Lee, Horowitz, Wolitzky-Taylor, & Telch, 2008).

As compared to cognitive factors, the role of specific emotions in the development and maintenance of mental contamination has received significantly less attention. This is notable, given that several emotions are theorized to be important within this domain (Fairbrother & Rachman, 2004; Rachman, 2004). Although several studies have examined how a range of negative emotions correlate with feelings of dirtiness and urges to wash elicited by the dirty kiss paradigm (Elliott & Radomsky, 2009, 2013; Radomsky & Elliott, 2009), these studies have combined a number of negative emotions into single aggregate variables purported to index internal (i.e., shame, guilt, humiliation, fear, sadness, self-perception as cheap or sleazy) or external negative emotions (anxiety, distress, anger, disgust toward perpetrator's physical appearance or behavior). There are at least two critical limitations to this approach. First, one could argue that perception of the self as being cheap or sleazy involves cognitive appraisals, rather than affective constructs. Second, collapsing this broad range of negative emotions into aggregate variables may result in loss of important information about specific emotional responses underlying mental contamination concerns. Other studies, including those reporting individual emotional responses (Rachman et al., 2012), have not examined correlations between affective variables and indices of mental contamination (Elliott & Radomsky, 2012; Ishikawa et al., in press).

Drawing upon theory and preliminary empirical research on mental contamination (Fairbrother & Rachman, 2004; Rachman, 2004), as well as our more robust understanding of affective mechanisms underlying contact contamination (for a review see Cisler et al., 2009), we might expect disgust to be one emotion particularly relevant in this domain. Disgust is a basic emotion characterized by a rejection/revulsion response thought to have initially developed as a protective mechanism aimed at preventing oral ingestion of potential contaminants in order to minimize contraction of illness or disease (e.g., Rozin, Haidt, &

McCauley, 2000). It is thought that disgust has since evolved to distance organisms from a variety of other potentially harmful stimuli. For example, Tybur, Lieberman, and Griskevicius (2009) proposed three distinct domains of disgust, including pathogen disgust (e.g., disgust responses to contaminants that increase chance of illness or disease), sexual disgust (e.g., aversion to unconventional or potentially harmful sexual acts that increase illness probability and/or fail to produce progeny), and moral disgust (e.g., aversion toward perceived moral violations). It is easy to imagine that experiences involving sexual victimization may be capable of evoking any (or all) of these domains of disgust, and that such peritraumatic disgust responses may be involved in the development of mental and/or contact contamination concerns following the trauma (e.g., Badour, Bown, Adams, Bunaciu, & Feldner, 2012; Badour, Feldner, Blumenthal et al., 2013).

Preliminary evidence has linked disgust and disgust-related constructs to mental contamination. For example, significant correlations have been observed between disgust propensity (i.e., trait-like ease with which disgust is elicited by a variety of stimuli; van Overveld, de Jong, Peters, Cavanagh, & Davey, 2006) and feelings of dirtiness/urges to wash in response to the dirty kiss paradigm (Elliott & Radomsky, 2009) as well as with questionnaire-based measures of mental contamination (Radomsky, Rachman, Shafraan, Coughtrey, & Barber, 2014). Mental contamination has also been shown to mediate the association between disgust sensitivity (i.e., trait-like tendency to perceive feeling disgusted as negative; van Overveld et al., 2006) and sexual trauma-related posttraumatic stress symptoms (Badour, Feldner, Blumenthal, et al., 2013). However, other studies have not observed correlations between disgust propensity and trait measures of mental contamination (Cougle et al., 2008). Taken together, these studies suggest that disgust is an affective factor that likely plays a role in both mental contamination and symptomatic responding often linked to mental contamination.

Despite the emerging empirical evidence linking disgust-related constructs to mental contamination, little evidence documents the specific role of disgust itself. In the only study we are aware of in this domain, Badour, Feldner, Babson, and colleagues (2013) demonstrated that increases in state feelings of dirtiness correlated with concurrent increases in state disgust, but not increases in state anxiety, in response to idiographic imagery of a past sexual trauma. While these correlational results do not speak directly to the etiological role of disgust in mental contamination, it is possible that feeling disgusted during a traumatic event (i.e., peritraumatic disgust) may increase risk for developing mental contamination concerns following a sexual trauma. It has been suggested that self-focused disgust, in this case internalization of the disgust response associated with a trauma, may be particularly relevant to mental contamination (Badour, Feldner, Blumenthal et al., 2013; Olatunji et al., 2008). Indeed, perceiving disgust present during an assault as indicative of the self as being dirty or contaminated may lead to increased mental contamination. This process may subsequently potentiate related symptoms of psychopathology as observed elsewhere (Badour, Bown et al., 2012; Badour, Feldner, Blumenthal et al., 2013). Although the relation between self-focused disgust and mental contamination has not yet been tested empirically, intensity of self-focused disgust reported during either traumatic sexual or physical assault has been linked to contact contamination-related obsessions and compulsions (Badour, Bown et al., 2012). Notably, neither intensity of peritraumatic fear

nor perpetrator-focused disgust was linked to contamination-related obsessions or compulsions, suggesting that self-focused disgust may be a specific mechanism through which mental contamination emerges following sexual trauma.

The current study sought to extend this research by exploring the role of disgust in mental contamination in two novel ways. First, by examining the unique association of peritraumatic self-focused disgust as compared to perpetrator-focused disgust and peritraumatic fear in understanding variability in mental contamination among a sample of community-recruited female victims of sexual trauma. A second model considered in this study further examined whether the general affective vulnerability factors of disgust propensity and trait anxiety (as opposed to trauma-specific emotional responses) accounted for unique variability in mental contamination.

Given established relations among posttraumatic cognitions, contact contamination, posttraumatic stress symptoms, and mental contamination as well as between depression and self-focused disgust (Overton, Markland, Taggart, Bagshaw, & Simpson, 2008), the models used in this study controlled for these theoretically- and empirically-relevant variables in order to advance a specific understanding of disgust in explaining variability in mental contamination. It was hypothesized that this study would 1) replicate findings linking both disgust and posttraumatic cognitions to mental contamination among sexual trauma victims, and 2) demonstrate that both peritraumatic self-focused disgust and disgust propensity significantly relate to mental contamination after accounting for relevant cognitive, affective, and symptom-relevant covariates.

Method

Participants

Seventy-two adult women ($M_{\text{age}} = 31.15$, $SD = 13.17$) with a history of at least one instance of sexual victimization were recruited from the community (see Procedure) as part of a larger investigation focused on affective processes involved in responses to sexual trauma (e.g., Badour, Feldner, Blumenthal, et al., 2013). Participants were excluded from the study based on 1) evidence of limited mental competency and the inability to give informed, voluntary, written consent to participate; 2) current suicidal intent 3) report that memory of the index sexual trauma having occurred was present only as a result of spontaneous or assisted recovery of memory (this criterion pertained to the larger study); and 4) the experience of any traumatic event during the month prior to participation in the study. All participants from the larger study who completed all relevant measures were included in the current investigation.

Participants reported the following racial backgrounds: 79.2% Caucasian/non-Hispanic, 9.7% African American, 4.2% Asian, 4.2% “bi- or multi-racial”, and 2.8% “Other.” Seven percent of participants identified as ethnically Hispanic. High school or high school equivalent was the highest level of education completed for 11.1% of the sample, 45.8% completed some college, 20.8% graduated from a 2-year or 4-year college, 12.5% completed some graduate or professional school, and 9.7% completed graduate or professional school.

A history of the following non-consensual sexual acts were reported by participants: vaginal intercourse (58.3%), anal intercourse (15.3%), another person displayed his/her sexual organs (66.7%), own sexual organs displayed to another person (45.8%), touched/fondled another person's sexual organs (62.5%), own sexual organs touched/fondled (87.5%), performed oral sex (51.4%), received oral sex (37.5%), and other (13.9%). The average age at which the index (i.e., most distressing) sexual assault occurred was 14.00 years ($SD = 9.20$; range: 1–47), and 70.8% of index assaults occurred before the age of 18. Participants described their assailants as: relatives (38.9%), intimate partners/spouses (15.2%), friends (9.7%), acquaintances (11.1%), other known persons (12.5%), and strangers (12.5%). While detailed information regarding trauma characteristics was obtained only in relation to participants' index sexual trauma, the majority of participants (84.7%) reported a lifetime history of more than one instance of sexual victimization. Of the total sample, 18.1% met criteria for a current diagnosis of PTSD.

Measures

Peritraumatic disgust and fear—Participants were asked to provide a rating on a 0 – 100 scale regarding the degree to which they experienced peritraumatic fear, self-focused disgust and perpetrator-focused disgust during the trauma (Badour, Bown et al., 2012). Single item ratings of peritraumatic emotion intensity have been used extensively in previous research, and correlations between single-item ratings of peritraumatic fear or disgust and measures of disgust propensity/sensitivity and anxiety sensitivity offer evidence of convergent validity (Engelhard et al., 2011). This approach has also demonstrated discriminant validity in predicting emotional reactions to experimental procedures (Badour, Feldner et al., 2012). Moreover, small to moderate correlations have been observed between peritraumatic emotion measures and corresponding trait measures of emotion vulnerability in prior studies (Badour, Bown et al., 2012; Badour, Feldner et al., 2012; Engelhard et al., 2011).

Trait disgust and anxiety—The Disgust Propensity subscale of the Disgust Propensity and Sensitivity Scale-Revised (DPSS-R; van Overveld et al., 2006) was used to index disgust propensity. This subscale includes 8 items, which are rated on a 5-point Likert-type scale ranging from 0 (*never*) to 5 (*always*). The DPSS-R has evidenced adequate psychometric properties including acceptable levels of internal consistency for the Disgust Propensity subscale and both convergent and divergent validity with other relevant constructs (van Overveld et al., 2006).

Trait anxiety, or the frequency/ease with which anxiety is generally experienced, was assessed using the State-Trait Anxiety Inventory-Trait version, Form Y (STAI-T; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The STAI-T is a 20-item scale with items rated on a 4-point Likert-type scale ranging from 1 (*not at all*) to 4 (*very much so*). The STAI-T has demonstrated adequate psychometric properties in previous studies including acceptable test-retest reliability, internal consistency, and concurrent validity (Spielberger et al., 1983).

Mental and contact contamination—Mental contamination was assessed via the Vancouver Obsessional Compulsive Inventory-Mental Contamination Scale (VOCI-MC; Rachman, 2005). The VOCI-MC is a 20-item scale that assesses the degree to which respondents experience mental contamination (e.g., “I often feel dirty under my skin”). Items are rated on a 5-point Likert-type scale ranging from 0 (*not at all*) to 4 (*very much*). This subscale has demonstrated adequate psychometric properties including high internal consistency and convergent, divergent, and discriminative validity (Radomsky et al., 2014).

Contact contamination was indexed via the Contamination subscale of the VOCI (VOCI-CTN; Thordarson et al., 2004). The VOCI-CTN is a 12-item subscale that assesses concern regarding contact with specific physical contaminants (e.g., “touching the bottom of my shoes makes me very anxious”) or concern with germs or disease (e.g., “I am excessively concerned about germs and disease”). Items are rated on a Likert-type scale ranging from 0 (*not at all*) to 4 (*very much*). This subscale evidences good internal consistency, test-retest reliability, and convergent and discriminant validity (Thordarson et al., 2004). Contact contamination was included as a potential covariate based on previous research establishing robust correlations between contact contamination and mental contamination (e.g., Elliott & Radomsky, 2009).

Posttraumatic cognitive appraisals—Posttraumatic cognitive appraisals were assessed with the Posttraumatic Cognitions Inventory (PTCI; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). The PTCI is a 36-item questionnaire designed to assess individuals' beliefs associated with a past traumatic event with items assessed on a 7-point Likert-type scale ranging from 1 (*totally disagree*) to 7 (*totally agree*). Negative cognitions assessed include beliefs about the self (e.g., “I am a weak person”), the world (e.g., “people can't be trusted”), and self-blame (e.g., “the event happened because of the way I acted”). The PTCI has demonstrated good psychometric properties including high internal consistency, test-retest reliability, and concurrent and discriminant validity (Foa et al., 1999).

Posttraumatic stress symptoms—Posttraumatic stress symptoms and PTSD diagnostic status were assessed using the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995), a well-established semi-structured interview that measures past-month frequency and intensity of 17 posttraumatic stress symptoms, and provides a dichotomous index of current PTSD diagnosis. A continuous index of posttraumatic stress symptom severity was employed in the current study with diagnostic status included for descriptive purposes. The CAPS evidences excellent psychometric properties and is considered a gold standard of PTSD assessment (Weathers, Keane, & Davidson, 2001). A predoctoral researcher trained in the administration of the CAPS delivered all interviews. An independent predoctoral researcher also trained in administration of the CAPS conducted reliability checks of 10% of interviews, resulting in 100% diagnostic agreement and 97.8% agreement on the frequency and intensity for each symptom included in the continuous index of posttraumatic stress symptom severity.

Obsessive-compulsive symptoms—Severity of contamination-based OCD symptoms was assessed using the Obsessive-Compulsive Inventory-Revised (OCI-R; Foa et al., 2002). The OCI-R is an 18-item self-report measure that provides an index of the severity of 6

domains of OC symptoms, including washing (i.e., contamination concerns), checking/doubting, obsessing, neutralizing, ordering, and hoarding. Summing each of the subscale scores generates a total symptom severity score. Items are rated on a 5-point Likert-type scale ranging from 0 (*not at all*) to 4 (*extremely*). This measure has evidenced strong psychometric properties (Foa et al., 2002) including good internal consistency (alphas = .81 to .93 across samples) and adequate test-retest reliability (.57 to .91 across samples). Given overlapping content between the washing subscale of the OCI-R and the VOCI-CTN, the washing subscale was removed from the total score for the OCI-R for the purpose of indexing OCD symptoms in the present study.

Depressive symptoms—The Beck Depression Inventory-Second Edition (BDI-II; Beck, Steer, & Brown, 1996) was used to measure depressive symptom levels. The BDI-II is a 21-item self-report measure that assesses the severity of depressive symptoms over the past two weeks. Respondents indicate on a four-point Likert-type scale (0 to 3) signifying the severity of depressive symptoms. The BDI-II is used extensively in research and evidences excellent psychometric properties (Beck et al., 1996).

Procedure

The University Institutional Review Board approved all study procedures prior to participant contact. Participants were recruited via electronic and paper flyers as well as media advertisements placed throughout the community. Interested individuals were given instructions to contact the laboratory where a preliminary screening for eligibility was conducted via telephone. Persons deemed potentially eligible upon initial phone screening were invited to the laboratory.

All eligible individuals provided written informed consent prior to study participation. In order to decrease participant burden during the laboratory visit, participants were given the option to complete the VOCI-CTN, VOCI-MC, STAI-T, BDI-II, OCI-R and DPSS-R as well as additional questionnaires not relevant to the current study online prior to their scheduled laboratory visit. During the laboratory session all participants were administered the CAPS interview and ratings of peritraumatic disgust and fear were obtained. Participants then completed the PTCI as well as other questionnaires and laboratory procedures not relevant to the current investigation. Participants were then debriefed regarding study procedures, information regarding local mental health services was provided, and participants were thanked and compensated \$40 for their time.

Results

Table 1 displays indices of internal consistency for measures included in the current study as well as zero-order correlations among continuous predictor, criterion, and demographic variables. Given an unacceptably low Cronbach's alpha coefficient ($\alpha = .24$), for the STAI-T, this measure was excluded from further analyses. Mental contamination was significantly correlated with both indices of disgust (disgust propensity, peritraumatic self-focused disgust) and posttraumatic cognitive appraisals. Mental contamination was also significantly correlated with contact contamination, PTSD symptoms, OCD symptoms, and depression. Intensity of peritraumatic fear and perpetrator-focused disgust were not significantly

correlated with mental contamination; however these factors were positively associated with contact contamination.

Two separate hierarchical regression analyses were performed to test the incremental validity of 1) peritraumatic self-focused disgust, perpetrator-focused disgust, and peritraumatic fear and 2) disgust propensity in predicting mental contamination after accounting for variance associated with covariates. Given significant zero-order correlations, posttraumatic cognitive appraisals, contact contamination, PTSD symptoms, OCD symptoms, and depression symptoms were entered simultaneously as covariates into step 1 of each model. Peritraumatic self-focused disgust, perpetrator-focused disgust and fear were then simultaneously entered into step 2 of the first model and disgust propensity was entered into step 2 of the second model. This approach allowed for inferences regarding the association between mental contamination and peritraumatic disgust above-and-beyond both covariates and peritraumatic fear, and inferences between mental contamination and general disgust vulnerability above-and-beyond the influence of covariates.

In the first model (see Table 2), covariates entered at step 1 accounted for 47% of the total variance in mental contamination ($p < .001$). Posttraumatic stress symptoms were significantly correlated with mental contamination, while OCD symptoms, depression, contact contamination, and posttraumatic cognitive appraisals were not. The inclusion of peritraumatic fear, perpetrator-focused disgust, and self-focused disgust in step 2 of this model accounted for an additional 8% of variance above and beyond covariates entered into step 1. As expected, peritraumatic self-focused disgust was significantly related to mental contamination, while peritraumatic fear and perpetrator-focused disgust were not. The inclusion of disgust propensity in step 2 of the second model accounted for an additional 6% of variance ($p < .01$) above and beyond the covariates entered into step 1 (see Table 3). Consistent with hypotheses, a significant relation emerged for disgust propensity in predicting mental contamination.¹

Discussion

The current study examined the unique association between disgust and mental contamination, a phenomenon involving internal sensations of dirtiness and urges to wash that can emerge and persist in the absence of contact with physical contaminants. This was examined among a sample of women with a history of sexual trauma, as sexual victimization has been identified in previous research as an experience particularly likely to result in mental contamination (Fairbrother & Rachman, 2004; Badour, Feldner, Babson et al., 2013). Consistent with hypotheses, peritraumatic self-focused disgust and disgust propensity positively correlated with mental contamination above and beyond the influence of peritraumatic fear, posttraumatic cognitions, contact contamination, and symptoms of psychopathology (i.e., symptoms of PTSD, OCD, and depression). Of note, the association

¹An alternative hierarchical regression model was tested that included covariates in step one (PTSD symptoms, OCD symptoms, depression symptoms, contact contamination, posttraumatic cognitions), trait factors (disgust propensity) in step two, and peritraumatic factors (fear, self-focused disgust, perpetrator-focused disgust) in step three. The pattern of significant relationships did not change. Specifically, peritraumatic self-focused disgust remained a significant and unique predictor of mental contamination even when accounting for disgust propensity.

between peritraumatic disgust and mental contamination was specific to self-focused, as opposed to perpetrator-focused disgust, suggesting that perceiving the self as disgusting as a result of experiencing a sexual assault may be more predictive of subsequent concerns with mental contamination (involving *internal* dirtiness) as compared to feelings of disgust experienced toward a perpetrator of an assault. In contrast, both peritraumatic fear and perpetrator-focused disgust were found to correlate positively with contact contamination concerns, which are typically thought to involve concerns with *external* dirtiness.

This finding is consistent with the emerging hypothesis that individuals' internalization of a disgust response during a sexual trauma (i.e., self-focused disgust) may specifically lead to the subsequent experience of mental contamination (Badour, Feldner, Blumenthal, et al., 2013; Olatunji et al., 2008) and highlights an important distinction in prediction of contamination concerns that warrants additional research. This study contributes to a growing literature linking disgust to mental contamination, and offers support for the importance of this relation even after accounting for other relevant affective, cognitive, and symptom-relevant factors. These findings offer a number of important clinical implications with regards to treatment of mental contamination symptoms among individuals who have experienced sexual traumas. Currently, the most widely used empirically supported interventions are cognitive and behavioral therapies (CBT; Cahill, Rothbaum, Resick, & Follette, 2009; Foa & Jaycox, 1999; Institute of Medicine, 2007) such as prolonged exposure therapy (Foa & Chambless, 1978; Foa et al., 2005) and cognitive processing therapy (Resick & Schnicke, 1992; Resick, Nishith, Weaver, Astin, & Feuer, 2002) for PTSD. However, the literature suggests that disgust-related contamination symptoms may not be maximally responsive to key components of CBT, such as the fear-based extinction procedures used in exposure (McKay, 2006; Olatunji, Forsyth, et al., 2007; Olatunji, Wolitzky-Taylor, Willems, Lohr, & Armstrong, 2009) and cognitive modification processes (Jones & Menzies, 1998; Sookman, Abramowitz, Calamari, Wilhelm, & McKay, 2005) following trauma exposure. In fact, several case studies have been reported in which sexual trauma-related mental contamination symptoms were unresponsive to exposure therapy (Gershuny, Baer, Radomsky, Wilson, & Jenike, 2003). Thus, if disgust is indeed a crucial factor in the development of sexual trauma-related mental contamination as these results suggest, then it will be prudent for future research to examine alternative strategies for treating disgust-based trauma symptoms, which we have recently begun to explore (Ojserkis et al., in press).

In order to develop and implement such interventions, further research is needed to clarify the respective (or interactive) roles of disgust propensity and peritraumatic self-focused disgust, in the development of sexual trauma-related mental contamination. An increased specificity to our understanding of disgust in sexual trauma-related mental contamination would further guide the development of interventions targeting this clinical condition. It will also be important for future research to identify target groups for whom specialized treatments aimed at reducing disgust and mental contamination symptoms may be particularly helpful. For instance, it is unclear whether number of sexual traumas experienced or whether victimization occurring during adulthood as compared to during critical or sensitive periods in development might impact the link between disgust and

mental contamination. It will further be important to examine whether patterns of mental contamination differ among individuals experiencing penetrative versus non-penetrative forms of sexual trauma (Ishikawa et al., in press). Unfortunately the small sample size and methodological approach used in the present study did not offer sufficient power to appropriately address these questions. Moreover, the relationship of trauma perpetrators to victims (e.g., relatives, friends, and other known persons versus strangers), and characteristics of the perpetrator may be important to consider. For example, in experimental studies researchers have found perpetrator characteristics including perceived physical cleanliness/uncleanliness (Elliott & Radomsky, 2012), and morality/immorality (Elliott & Radomsky, 2009; Radomsky & Elliott, 2009) to impact the degree of reported mental contamination following an imagined sexual violation. Although the current findings converge with those of other samples of sexual assault victims to suggest that self-focused disgust, as opposed to perpetrator-focused disgust, appears to be most germane to subsequent contamination-related concerns (Badour, Bown et al., 2012), this study included perpetrators who were primarily known to victims. It is possible that perceptions of perpetrators and thus perpetrator-focused disgust may be more relevant to mental contamination in instances of stranger-perpetrated assaults.

Given the growing literature documenting the importance of disgust to understanding sex and sexual behavior, research on the role of disgust in avoidance of sexual stimuli and in sexual pain disorders (i.e., vaginismus, dyspareunia) may also be particularly relevant to consider in this domain (Borg, de Jong, & Schultz, 2010; de Jong, Overveld, Schultz, Peters, & Buwalda, 2009). In addition, it will be important to determine whether associations between disgust, and particularly self-focused disgust, and mental contamination will generalize to individuals without a history of sexual trauma. While our inclusion of a general measure of mental contamination, as opposed to a trauma-specific measure, may increase the generalizability of these findings, a different pattern may emerge in predicting mental contamination among individuals without a history of sexual trauma.

There are several limitations of this study that warrant consideration. One such limitation is the reliance on self-report questionnaires of disgust propensity and contamination. Previous literature has highlighted the shortcomings among questionnaires in defining and assessing trait disgust (Rozin et al., 2000), with some work even suggesting the need for trauma-specific assessments of this emotional propensity (Ojserkis et al., in press). Yet, while imperfect, the measures utilized in the current study represent the best available options for measuring disgust-related traits given the absence of established behavioral or other approaches that validly assess these constructs. Moreover, while we carefully considered overlapping content across measures and removed items assessing contamination obsessions and compulsions from our index of OCD symptoms, it is possible that the results presented herein may have been conflated to some degree by shared item content. For example, the disgust propensity scale of the DPSS-R includes one item assessing the degree to which respondents are disgusted by items that could cause illness or infection, an item that is likely to tap into the construct of contact contamination. While, we believe the primary measures of interest in this study (those assessing mental contamination, peritraumatic disgust, and disgust propensity) represent conceptually distinct constructs, additional psychometric research is warranted. In addition, the finding of unacceptable internal consistency for the

measure of trait anxiety precluded inclusion of this factor as a predictor of mental contamination in the present study. As such, these findings were unable to demonstrate unique associations between disgust propensity and mental contamination above-and-beyond the contributions of anxiety vulnerability. This will be important to consider in future research.

Assessments of peritraumatic fear and disgust in the current study may have also been limited by the retrospective nature of their report, especially since the average time since the index trauma occurred was 17 years. This long time lag in retrospective reports is likely subject to reporting biases. For example, the repeated retelling of the trauma narrative, such as experienced in therapy, may either sensitize or introduce extinction learning into an individual's recollection of peritraumatic emotional intensity. Traumatic memories may also simply be subject to forgetting or alterations during the process of reconsolidation after a prolonged period of time. Future investigations, including prospective studies, should endeavor to decrease the time between trauma exposure and the assessment of peritraumatic emotional responding (e.g., emergency room assessments) in order to increase confidence in the validity and reliability of responses. Moreover, while widely employed, the use of single-item ratings increases the possibility of problems with method-related covariation. For example, correlations between single-item ratings and established measures of disgust or other affective constructs may be high because the single item taps into one, but not all features, of a broader complex construct.

Finally, while the present study adopted an approach similar to prior studies in examining disgust as a correlate and hypothesized candidate predictor involved in the development of mental contamination (e.g., Badour, Feldner, Blumenthal et al., 2013; Radomsky et al., 2014), other studies have incorporated indices of negative emotions such as disgust, anxiety, and shame into measures of mental contamination (Elliott & Radomsky, 2009, 2012; Ishikawa et al., in press). These methodological and conceptual differences highlight the need for further research aimed at increasing the clarity in defining the construct of mental contamination. For example, it is possible that disgust (and in particular self-focused disgust), as well as other negative emotions, may represent core features of mental contamination, rather than separate but related constructs.

These limitations notwithstanding, the current study contributes to a small, but growing, literature examining the affective and cognitive factors underlying the development and maintenance of mental contamination among individuals with a history of sexual trauma. The present findings further demonstrate the importance of disgust within the context of mental contamination, suggesting that trait disgust vulnerabilities as well the experience of disgust during a sexual trauma may be important in understanding the development of this phenomenon.

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Highlights

A growing empirical literature links mental contamination to sexual assault.

Evidence supports a link between disgust vulnerability and mental contamination.

A link also emerged between peritraumatic self-focused disgust and mental contamination.

Current limitations, future directions, and clinical implications are discussed.

Table 1

Zero-Order Relations among Continuous Predictor and Criterion Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. VOICI-MCS	.96	.62***	.51***	.59***	.42***	.50***	.57***	.38**	.08	.15	.48***	-.22	.01
2. CAPS	--	.90	.46***	.82***	.36**	.67***	.39**	.25*	.19	.16	.02*	-.07	.06
3. OCI-R	--	--	.87	.48***	.53***	.28*	.40***	.39**	.12	.17	.20	.01	-.04
4. BDI-II	--	--	--	.91	.36**	.71***	.48***	.31**	.05	.15	.29*	-.03	.16
5. VOICI-CTN	--	--	--	--	.88	.40***	.44***	.28*	.40***	.39**	.12	.02	-.16
6. PTCT	--	--	--	--	--	.96	.50***	.25*	.13	.19	.50***	-.16	.17
7. DPSS-R-DP	--	--	--	--	--	--	.85	.33***	.03	-.001	.38***	-.25*	-.08
8. STAI-T	--	--	--	--	--	--	--	.24	-.01	.14	.25*	.07	-.19
9. Fear	--	--	--	--	--	--	--	--	--	.23	.87	-.11	.10
10. Perpetrator-Focused Disgust	--	--	--	--	--	--	--	--	--	--	.29*	.06	.05
11. Self-Focused Disgust	--	--	--	--	--	--	--	--	--	--	--	-.25*	.04
12. Age	--	--	--	--	--	--	--	--	--	--	--	--	.19
13. Age of Index Assault	--	--	--	--	--	--	--	--	--	--	--	--	--
Mean	16.64	32.81	13.19	36.99	5.49	9.24	20.03	45.81	66.70	72.36	45.90	31.15	14.00
SD	16.95	19.56	10.25	11.73	6.76	3.70	5.62	4.77	35.67	37.23	40.87	13.17	9.20

Note: Values on the diagonal represent Cronbach's alpha coefficients for the current sample; BDI-II = Beck Depression Index-II, CAPS = Clinician Administered PTSD Scale, DPSS-R-DP = Disgust Propensity and Sensitivity Scale, Revised – Disgust Propensity, OCI-R = Obsessive Compulsive Inventory-Revised, PTCT-Tot = Posttraumatic Cognitions Inventory – Total, VOICI-CTN = Vancouver Obsessional Compulsive Inventory-Contamination, VOICI-MCS = Vancouver Obsessional Compulsive Inventory-Mental Contamination Scale

*
 $p < .05$,

**
 $p < .01$,

 $p < .001$.

Table 2

Peritraumatic Fear, Self-Focused Disgust, and Other-Focused Disgust as Predictors of Mental Contamination

	R²	<i>t</i>	β	<i>sr</i>²
	(each predictor)			
<i>Step 1</i>	0.47***			
CAPS		2.24	0.33	0.04*
OCI-R		1.46	0.30	0.02
BDI-II		0.43	0.11	0.00
VOCI-CTN		1.48	0.50	0.02
PTCI		0.60	0.39	0.00
<i>Step 2</i>	0.08*			
Fear		0.78	0.01	0.00
Perpetrator-Focused Disgust		-0.64	-0.06	0.00
Self-Focused Disgust		3.23	0.34	0.08**

Note: β = standardized beta weight; *sr*² = squared semi-partial correlation

*
p < .05;

**
p < .01;

p < .001.

Table 3

Disgust Propensity as a Predictor of Mental Contamination

	R^2	t	β	sr^2
	(each predictor)			
<i>Step 1</i>	0.47***			
CAPS		2.24	0.33	0.04*
OCI-R		1.46	0.30	0.02
BDI-II		0.43	0.11	0.00
VOCI-CTN		1.48	0.50	0.02
PTCI		0.60	0.39	0.00
<i>Step 2</i>	0.06**			
DPSS-R-DP		2.79	0.91	0.06*

Note: β = standardized beta weight; sr^2 = squared semi-partial correlation

*
 $p < .05$;

**
 $p < .01$;

 $p < .001$.