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The effects of cognitive reappraisal on conditioned disgust in contamination-based OCD: An analogue study

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ABSTRACT

Experimental research has shown that conditioned disgust is resistant to extinction, which may account for the slower habituation to disgust relative to fear in contamination-based obsessive-compulsive disorder (OCD). However, few studies have examined the efficacy of interventions that may attenuate conditioned disgust responses. Studies of cognitive reappraisal have demonstrated that reinterpreting a stimulus can alter emotional responding. This technique is based on cognitive theories which suggest that anxiety disorders arise from biased cognitions; therefore, changing a person's thoughts will elicit durable changes in emotional responses. Given the demonstrated effectiveness of cognitive reappraisal, the present study examined whether cognitive reappraisal would attenuate conditioned disgust responses. We conditioned participants high in contamination fear (n = 55) using images of neutral food items (conditioned stimuli; CS) paired with videos of individuals vomiting (unconditioned stimuli; US) while we obtained subjective disgust reports. After conditioning, half of the participants were randomly assigned to cognitive reappraisal training aimed at decreasing their emotional response to the US and CS, while the other half received no such training. The findings showed that cognitive reappraisal participants demonstrated a reduction in learned disgust across sessions and further benefited from extinction. These findings suggest that cognitive reappraisal may be an effective strategy for attenuating learned disgust.

1. Introduction

Contamination concerns are a common theme associated with obsessive- compulsive disorder (OCD; Rasmussen & Tsuang, 1986; Summerfeldt, Antony, Downie, Richter, & Swinson, 1997), and studies have shown that up to 50% of people with OCD present with such concerns (Rachman & Hodgson, 1980; Rasmussen & Eisen, 1992). Ritualistic neutralizing behaviors (i.e., washing) associated with contamination concerns in OCD serve a negatively reinforcing function, as distress elicited by the obsessions is temporarily alleviated (Rachman, 1994, 2004). Although such neutralizing behaviors in OCD have traditionally been attributed to fear/anxiety, there is growing recognition that functionally impairing contamination concerns may also be driven by disgust. More specifically, disgust may function as a "danger signal" for those with OCD that indicates that the likelihood of contagion is high (Mitte, 2008; Verwoerd, Jong, Wessel, Wiljo, & van Hout, 2013). Evidence from multiple levels of analysis has now linked disgust to contamination-based OCD. For example, self-report questionnaires of disgust proneness correlate with self-report measures of symptoms of contamination-based OCD (Mancini, Gragnani, & D'Olimpio, 2001; Olatunji, 2010; Olatunji, Sawchuk, Lohr, & de Jong, 2004; Olatunji, Williams, Lohr, & Sawchuk, 2005). Disgust responses also predict avoidance of stimuli high in contagion potency among those with symptoms of contamination-related OCD (e.g., bedpans; Deacon & Olatunji, 2007; Olatunji, Lohr, Sawchuk, & Tolin, 2007; Tsao, & McKay, 2004). Lastly, neuroimaging research has shown that the neural substrates involved in disgust proneness may be relevant to the development of OCD, particularly the contamination/washing symptom dimension (Husted, Shapira, & Goodman, 2006; Shapira et al., 2003).

A role for disgust in contamination-based OCD may be understood from a conditioning framework (Armstrong & Olatunji, 2017). For example, disgust associations may form more easily (heightened disgust learning) among those with OCD compared to those without OCD, and frequent perceptions of contamination often endure despite the passage of time or ordinary hygiene procedures (impaired disgust extinction). It would be adaptive if novel or initially neutral stimuli rapidly evoke disgust when they are consistently associated with stimuli that could be contagious (Curtis, de Barra, & Aunger, 2011). This conditioning pathway would be robust, evolutionarily adaptive, and more relevant for contact contamination (which arises from tangible contact with unpleasant, disgusting, or dangerous substances, such as decaying

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matter, bodily fluids and products, and germs) relative to mental contamination (where a feeling of internal dirtiness is caused by a psychological or physical violation that is not an external contaminant such as blood or dirt, but human interaction). Although fear is typically thought to be acquired through Pavlovian conditioning, disgust is believed to be acquired by evaluative conditioning (Schienle, Stark, & Vaitl, 2001). Pavlovian conditioning can be conceptualized as expectancy learning, whereby the CS becomes a reliable predictor of the US. Thus, Pavlovian conditioning is dependent on statistical contingency, such that learning will occur to the extent that the organism is able to predict the US occurrence. Evaluative conditioning, however, is based upon appraisal of stimuli along dimensions of like/dislike, good/bad, or pleasant/unpleasant (De Houwer, Thomas, & Baeyens, 2001). Thus, evaluative conditioning occurs through referential learning where the CS serves as a reference to the US but does not necessarily generate anticipation that the US will occur.

Experimental research to date has revealed robust disgust conditioning effects. For example, Olatunji, Forsyth, and Cherian (2007) examined individual differences in one conditioned stimuli (CS; a neutral word) that was never paired with a disgusting pictorial US (CS−) and one CS (another neutral word) that was always paired with a disgusting US (CS+). The results showed that during acquisition, the CS+ elicited stronger subjective disgust than the CS-. Using similar differential conditioning procedures, three subsequent studies successfully replicated the basic finding that contingent pairing of a neutral face (Engelhard, Leer, Lange, & Olatunji, 2014; Mason & Richardson, 2010) or a neutral word (Olatunji, Tomarken, & Punochar, 2013) with a disgusting picture resulted in heightened subjective disgust ratings of the CS+. Research has also shown that the disgust conditioned response is resistant to extinction (Mason & Richardson, 2010; Olatunji, Forsyth et al., 2007; Olatunji, Lohr et al., 2007). The resistance to extinction of disgust in basic research mirrors findings that have been observed in clinical research. More specifically, research has shown that the decay slope for fear during exposure-based treatment is significantly greater in comparison to that of disgust (Adams, Willems, & Bridges, 2011; Olatunji, Wolitzky-Taylor, Willems, Lohr, & Armstrong, 2009).

The available evidence suggests that disgust reactions in contamination-based OCD are either resistant to treatment or slower to respond to exposure interventions compared to fear responses (Mason & Richardson, 2012; McKay, 2006). The resistance to extinction of disgust among those with OCD may be facilitated by the persistence of the perception that an object is contaminated. In one study by Tolin, Worhunsky, and Maltby (2004), OCD patients were instructed to touch a clean pencil to an object that had been identified as being contaminated. A second “clean” pencil was then touched to the now “contaminated” pencil, with this procedure continued until a series of 12 pencils had been exposed. The results indicated that OCD patients reported a “chain of contagion” in which successive degrees of removal from the original pencil did not change their perceptions regarding the original degree of contamination. This stimulus generalization may render it difficult to extinguish disgust responses to specific stimuli.

Although disgust learning and extinction may contribute to the development and maintenance of contamination-based OCD, there remains a paucity of research examining interventions that may attenuate conditioned disgust responses and facilitate disgust extinction. Recent research suggests that counterconditioning (Engelhard et al., 2014) may be a promising approach to facilitating disgust extinction. However, no study to date has examined the effects of cognitive reappraisal on conditioned disgust responses. Cognitive reappraisal is an emotion regulation strategy that involves changing the trajectory of an emotional response by reinterpreting the meaning of the emotional stimulus (Ray, McRae, Ochsner, & Gross, 2010). Cognitive reappraisal is also a component of cognitive behavioral therapy, an effective treatment for OCD (Olatunji, Davis, Powers, & Smits, 2013). Cognitive reappraisal has been described as an antecedent-focused strategy that is implemented before the complete activation of emotion response tendencies (Gross, 2001). Previous research has shown that cognitive reappraisal can be effective in attenuating conditioned fear (Shurick et al., 2012). Although it has been initially theorized that the experience of disgust may be fairly impenetrable by cognition (Oaten, Stevenson, & Case, 2009), recent research suggests that cognitive reappraisal may effectively reduce verbal distress associated with disgust. For example, Olatunji, Berg, and Zhao (2017) found that for participants exposed to a fear-relevant video, change in emotional distress did not significantly differ between those that suppressed and those that reappraised. However, significantly less emotional distress was observed for those that reappraised compared to those that suppressed when exposed to a disgust-relevant video.

Previous experimental research has also examined the differences between reappraisal and suppression when watching a disgusting film. For example, Gross (1998) found that compared with a control condition, both reappraisal and suppression were effective in reducing emotion-expressive behavior. However, reappraisal decreased disgust experience, whereas suppression increased sympathetic activation. It has been suggested that as a potential intervention for disgust (Mason & Richardson, 2012; Rachman, 2004; Rozin & Fallon, 1987), reappraisal may also take the form of ‘conceptual reorientation' where the disgusting object takes on a new representation (e.g., thinking rotten milk is actually yogurt). However, the effects of reappraisal on the learning of disgust is unclear. Accordingly, the present study examines the extent to which cognitive reappraisal may attenuate conditioned disgust responses and facilitate disgust extinction in a sample that may be at risk for contamination-based OCD. It was hypothesized that compared to those assigned to a control condition, those assigned to cognitive reappraisal would demonstrate a reduction in conditioned disgust across sessions. Those assigned to cognitive reappraisal were also hypothesized to further benefit from an extinction procedure.

2. Method

2.1. Participant selection

Participants were selected from a large pool (n = 596) of psychology students based on their scores on the Padua Inventory (PI; Burns, Keortge, Formea, & Sternberger, 1996) contamination subscale. The PI has demonstrated excellent psychometric properties in non-clinical samples (i.e., Mancini, Gragnani, Orazi, & Pietrangeli, 1999; van Oppen, 1992). The PI contamination subscale also has adequate test-retest reliability over a 6–7-month interval (r = 0.72; Burns et al., 1996). Those scoring equal to and above the OCD washer patient mean (n = 165) reported on the PI contamination subscale (mean = 13.87; Burns et al., 1996) were invited to participate via an email solicitation. The final sample consisted of 57 participants that responded to the email solicitation (35% of eligible participants) who were mostly female (75%) with a mean age of 18.87 (SD = 0.93). The mean PI scores for those that were eligible (19.22) to participate did not significantly differ from those that did participate (18.63). Similar methods for identifying analogue contamination-based OCD groups have been employed in prior studies (e.g., Olatunji, Lohr et al., 2007), and there is compelling evidence that studies of analogue OCD samples are relevant to understanding OCD in clinical populations (see Abramowitz et al., 2014; Gibbs, 1996 for a review). For example, Burns, Formea, Keortge, and Sternberger (1995) found that non treatment-seeking individuals who scored highly on self-report measures of OC symptoms often met diagnostic criteria for OCD, evidenced stability of symptoms over time, and exhibited similar associated symptom features as patients diagnosed with OCD. Such findings are consistent with a growing consensus that OCD symptoms occur on a continuum of severity and have their origin in largely normal human processes, such as associative learning and negative reinforcement (Abramowitz et al., 2014). Under this approach, OCD-related phenomena can be observed and studied among analogue samples.