

## The effect of disgust on anxiety ratings to fear-relevant, disgust-relevant and fear-irrelevant stimuli

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### Abstract

This study investigated the effect of an experimental disgust induction and experience of a homophone spelling task on subsequent anxiety to fear-relevant, disgust-relevant and fear-irrelevant stimuli in a non-clinical population. The design of the study allowed an assessment of (1) whether disgust facilitates anxiety only if the stimulus being evaluated is disgust-relevant and (2) whether experiencing the threat-interpretation bias induced by disgust facilitates anxiety generally. The results indicated that a disgust induction facilitated levels of self-reported anxiety to a range of scenarios regardless of whether they were disgust-relevant, fear-relevant or fear-irrelevant, and regardless of whether participants had experienced the disgust-induced threat-interpretation bias. This study provides evidence for a general effect of disgust on self-reported anxiety to stimuli regardless of the disgust-relevance or fear-relevance of those stimuli. The results lend support to the view that disgust has a causal effect on anxiety, and implicates disgust as a risk factor for anxious psychopathology.

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Disgust is a universal negative emotion characterized by a distinctive facial expression and specific cognitive, physiological and behavioral components. It has been viewed primarily as a food-rejection response that manifests as a fear of contamination, avoidance of disgusting objects, and is accompanied by physiological responses such as feelings of nausea (Davey, 1994; Rozin & Fallon, 1987). Over the past decade there has been a growing interest in the role of the disgust emotion in psychopathology, and particularly anxious psychopathology (e.g. Phillips, Senior, Fahy, & David, 1998; Woody & Teachman, 2000). For example, disgust has been identified as an experienced emotion in a

variety of anxious psychopathologies, including specific phobias such as animal phobias generally (Davey, 1994; Matchett & Davey, 1991) and spider phobia specifically (Mulken, de Jong, & Merckelbach, 1996), blood injury and inoculation (BII) phobia (Page, 1994; Tolin, Lohr, Sawchuk, & Lee, 1997), obsessive-compulsive disorder (OCD) (Charash & McKay, 2002; Muris et al., 2000), health anxiety (Davey & Bond, 2006), and eating concerns, where disgust is manifested in disgust of food, the body, and body products (Davey, Buckland, Tantow, & Dallos, 1998).

Despite this wealth of accumulating research on the involvement of experienced disgust in anxious psychopathology, there is at present no compelling or integrated theory of how disgust might be involved in anxious psychopathology. In each of the psychopathologies in which its involvement has been implicated, disgust is usually seen as relevant because the psychopathology

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contains features which involve some of the relevant elements of the disgust emotion, e.g. food-rejection (eating disorders), or fear of contamination (obsessive-compulsive washing), and relate quite obviously to some of the putative functions of the disgust response, such as disease-avoidance (Davey, 1994) or avoidance of body-envelope violations or death (Haidt, McCauley, & Rozin, 1994).

However, while there is substantial evidence that disgust is *experienced* in most of these ‘disgust-relevant’ psychopathologies, and high disgust sensitivity levels may represent a risk factor, there is still no convincing evidence that disgust plays a role in the development of these disorders (Davey, 2003). The most obvious way to investigate a causal relationship between disgust and psychopathology is to experimentally manipulate disgust levels and then assess the effects of this manipulation on measures of anxiety or anxious psychopathology. In an early study manipulating disgust, Webb and Davey (1993) asked a non-clinical population to rate fear to four categories of animals (predatory, disgust-relevant small mammals and reptiles, disgust-relevant invertebrates, and neutral stimuli) before and after watching a violent, disgusting or neutral video. Participants who watched the violent video showed increased fear ratings to predatory animals, whereas participants who watched the disgusting video showed increased fear to both groups of disgust-relevant animals. Initially, this appears to represent evidence for a causal role for disgust in animal fears because it suggests that disgust inductions may directly act to increase fear to fear-relevant animals. However, there are a number of limitations to this study. First, the video used to manipulate disgust showed an open-heart surgery operation, and may have been as likely to elicit anxiety as disgust. Second, Webb and Davey (1993) failed to make a mood manipulation check after the inductions, and so it cannot be verified whether the inductions facilitated the target emotions they were supposed to.

In a more controlled and thorough investigation, Marzillier and Davey (2005) looked at whether induced disgust facilitated experienced anxiety and *vice versa*. Using a range of mood induction procedures and a variety of mood measures, Marzillier and Davey demonstrated that induced anxiety produced increases in disgust, but there was no evidence for an effect of induced disgust on anxiety. These findings were independent of the type of mood induction procedure used, and the type of dependent mood measure used. These findings have important implications for the putative causal role for disgust in anxious psycho-

pathology, and suggest that if disgust does have a causal influence on anxious psychopathology then this influence is not mediated simply by experienced disgust facilitating experienced anxiety.

These studies stand as some of the few in the literature that have directly manipulated the disgust emotion and reported the effect of this manipulation on self-reported anxiety or fear. The evidence so far available suggests that experienced disgust does not simply facilitate experienced fear or anxiety. However, disgust may play an indirect role in influencing anxiety and fear. Disgust is just one of a number of negative emotions that people experience, and negative emotions can often have important effects on how information is processed and stored. For example, Davey, Bickerstaffe, and MacDonald (2006) reported the results of an experiment investigating the effect of induced disgust on interpretational bias using the homophone spelling task (see Blanchette & Richards, 2003). Four groups of participants experienced disgust, anxiety, happy or neutral mood inductions and then completed the homophone spelling task which requires the participant to interpret ambiguous words presented through headphones. Both the disgust and anxiety groups interpreted significantly more threat/neutral homophones as threat than both the happy and neutral groups; the disgust group also interpreted significantly fewer positive/neutral homophones as positive than the happy group. If experienced disgust causes a shift away from positive towards threatening interpretations of ambiguous material, then this may provide the basis for a causal mechanism involving disgust in anxious psychopathology. Because the effect appears to be a non-specific emotion-congruent one (i.e. a negative emotion causing negative interpretations of any ambiguous material), elevated disgust levels may result in a predisposition to interpret information in a threatening way across a broad range of anxiety- and threat-relevant domains.

A summary of these findings suggests that (1) disgust may not facilitate anxiety if there is no object or target stimulus or event that is being evaluated (Marzillier & Davey, 2005), (2) disgust may facilitate anxiety if there is an object being evaluated, but only if that object is disgust-relevant (Webb & Davey, 1993), and (3) disgust does generate a threat-interpretation bias and if that bias is experienced in practice (e.g. by having to evaluate ambiguous stimuli), then this may facilitate anxiety generally across a range of stimuli, and not just those that are disgust-relevant (Davey et al., 2006). The present paper reports a study designed to test some of these possibilities. In a  $2 \times 2$  design,

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