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## Disgust- and anxiety-based emotional reasoning in non-clinical fear of vomiting



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### ABSTRACT

**Background and objectives:** Emotional reasoning has been described as a dysfunctional tendency to use subjective responses to make erroneous inferences about threatening outcomes in objectively safe situations (e.g., "If I feel anxious/disgusted, there must be danger/risk of becoming ill"). Prior studies found evidence for anxiety-based emotional reasoning (ER) in several anxiety disorders as well as disgust-based ER in healthy individuals scoring above the clinical cut-off on a measure of contamination fear. The current study tested whether disgust- and anxiety-based ER might be involved in fear of vomiting, a phobic disorder in which both fear/anxiety and disgust are assumed to play an important role.

**Methods:** Non-clinical participants scoring high (>75%; n = 35) and low (<25%; n = 38) on a measure of fear of vomiting were presented with a series of scripts describing objectively safe everyday situations that systematically varied in the absence/presence of the actor's disgust/anxiety response. Following each script, participants rated their perceived danger and threat of contamination/illness.

**Results:** In line with hypotheses, specifically high vomit-fearful individuals used experienced disgust and anxiety to overestimate risk of becoming ill. Follow up analyses taking into account shared variance between both emotions revealed that more pronounced ER in the high vomit fearful group was mainly driven by the emotion of disgust.

**Limitations:** Current study asked participants to imagine experienced emotions in scenarios instead of experimentally inducing real-life emotions.

**Conclusions:** These findings are consistent with the view that disgust-based ER is involved in fear of vomiting.

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### 1. Introduction

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5, APA, 2013), patients with a specific phobia of vomiting (SPOV) show an irrational fear of vomiting together with avoidance behaviours related to vomiting-relevant situations. SPOV is also known as emetophobia. Descriptive studies on clinical features indicate that emetophobia has an early onset (between 13 and 18 years) and a chronic course with a large number of patients showing marked impairments in daily life (Lipsitz, Fyer, Paterniti, & Klein, 2001; Veale & Lambrou, 2006). Regarding prevalence rates, Becker et al. (2007) found a point prevalence rate of 0.1% for SPOV in a sample of 2064 young German women (18–24 years of age).

Using more lenient inclusion criteria for investigating elevated (non-clinical) levels of fear of vomiting in the population, a recent study using a Dutch community sample (Van Hout & Bouman, 2012) showed a point prevalence rate of 8.8% with the proportion of women being four times higher than the proportion of men (see also Veale & Lambrou, 2006). Avoidance and safety seeking behaviours vary greatly between subjects with fear of vomiting; commonly reported are checking food for expiration dates, avoiding drunk, sick and/or unhealthy people, carrying or taking stomach pills, avoidance of taking alcohol, and eating unknown food. For some women, their fear of vomiting would even let them consider postponing pregnancy because of the risk of pregnancy-related nausea and vomiting. The focus of emetophobic fears can differ across individuals; for some individuals their fear is focussed on vomiting themselves or on vomiting in the presence of others, whereas others tend to fear seeing others vomiting. Given these loci, it may not come as a surprise that surveys involving emetophobic participants have found a significant overlap in

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phenomenology with panic disorder, OCD-contamination fear, and social anxiety/agoraphobia (i.e., fear of negative social evaluation) (Boschen, 2007; Van Hout & Bouman, 2012; Veale & Lambrou, 2006).

With the aim of improving current understanding of emetophobic fears, Boschen (2007) proposed a conceptual model describing predisposing factors, an acute phase, and maintenance factors underlying pathological fears of vomiting. In his model, predisposing factors consist of general anxiety vulnerability (e.g., neuroticism, trait anxiety) and somatization vulnerability (vulnerability to express anxiety through gastrointestinal somatic symptoms such as nausea and “butterflies.”). According to Boschen (2007) both vulnerability factors may increase the risk of interpreting interoceptive cues as indication of imminent vomiting during the acute phase of the disorder (e.g., entering vomit-related but objectively safe situations). Finally, this misinterpretation of innocuous cues as signals of immediate danger will lead to typical avoidance and safety-seeking behaviours and a consequent failure to gather disconfirming evidence in the maintenance phase of the disorder.

Although this conceptual model provides a helpful framework for understanding emetophobia, by exclusively focussing on fear-based mechanism it seems to ignore that other emotions than fear may play a role as well. As vomit is among the universally accepted disgust stimuli (Rozin, Haidt, & McCauley, 2000) it seems reasonable to assume that in addition to fear/anxiety also disgust might be involved in emetophobia. In support of this, it has been shown that people with emetophobia have increased levels of both disgust propensity and disgust sensitivity (van Overveld, de Jong, Peters, van Hout, & Bouman, 2008). Disgust propensity has been described as a tendency to experience disgust in a wide variety of situations (low disgust threshold), while disgust sensitivity indicates how awful participants consider disgust experiences in general (van Overveld, de Jong, Peters, Cavanagh, & Davey, 2006). Moreover, within the group of people with emetophobia there was a strong relationship between the strength of symptoms and the level of disgust sensitivity. A more recent study that was designed to evaluate the psychometric properties of a recently developed inventory to measure emetophobic symptoms similarly showed that high scoring individuals on fear of vomiting were also likely to report high levels of disgust sensitivity (Veale, Ellison, et al., 2013; Veale, Murphy, Ellison, Kanakam, & Costa, 2013; see also Boschen, Veale, Ellison, & Reddell, 2013).

One way disgust may promote the development and persistence of emetophobic concerns is via emotional reasoning. Emotional reasoning involves using feelings as validation of dysfunctional thoughts and beliefs, for example, “If I feel anxious, there must be danger”, or “If I feel disgusted, I must be getting ill” (Arntz, Rauner, & van den Hout, 1995; Verwoerd, de Jong, Wessel, & van Hout, 2013). People with a tendency to show emotional reasoning may draw conclusions about the presence of impending danger purely on emotional response information. In the absence of objective danger, this heuristic would hamper the identification of false alarms (i.e., feelings of fear/disgust but no danger/risk of becoming ill) and contribute to the persistence of erroneous, phobic beliefs (cf. Slovic, Finucane, Peters, & MacGregor, 2002). In other words, if people erroneously interpret feelings of fear or disgust as signalling danger, and use their emotional response as input in the process of validating their lingering concerns they will enter a danger-confirming vicious circle.

In a first experiment to test emotional reasoning in anxiety disorders, participants read a series of scenarios comprising of four versions of each scenario that always started identical but ended differently in a way to systematically vary the absence/presence of

objective danger and the absence/presence of anxiety responses (Arntz et al., 1995). Following each script, participants rated the level of perceived danger. By systematically varying the absence/presence of the actor's anxiety response, this design allowed testing whether patients with anxiety disorders infer danger on the basis of anxiety responses (in addition to objective threats). In support of the hypothesis that anxiety patients would use the emotional information to infer danger, specifically anxiety patients reported higher threat ratings for the scenarios in which an anxiety response was present relative to scenarios in which the anxiety response was absent. More recent research demonstrated that this type of emotional reasoning might not be restricted to anxiety-based inferences and showed evidence for disgust-based reasoning in fear of contamination (Verwoerd et al., 2013): When contamination fearful individuals were presented with disgust response information in scenarios low in objective threat, they significantly overestimated the risk of contracting a disease.

The major aim of the current study was to investigate whether emotional reasoning might also be involved in fear of vomiting. Since both anxiety and disgust seem involved in emetophobia, we included measures of both disgust and anxiety-based emotional reasoning. Participants high and low on fear of vomiting (Bouman & van Hout, 2006; van Overveld et al., 2008) were presented with a series of objectively safe vomit-related scripts (e.g., a hospital visit) varying in the presence/absence of a disgust/anxiety response. Subsequently, participants rated the scenarios on perceived danger, risk of contamination, and risk of becoming ill. Because disgust is a defensive emotion that specifically serves disease-avoidance (e.g., Curtis, 2013), we anticipated that disgust-based reasoning would be especially pronounced with regard to the participants' estimations of the risk of becoming ill (cf. Verwoerd et al., 2013). Because anxiety serves a more general threat-avoidance function, we anticipated that adding an anxiety response would result in a more general increase in participants' danger/risk ratings.

## 2. Method

### 2.1. Participants

Participants ( $N = 144$ ; mean age = 22.62,  $SD = 7.12$ ) were recruited via mail contact and social media such as Facebook. The majority of participants were female (77%) which reflects the gender distribution of the undergraduate psychology student population at our university. Based on scores of the Emetophobia Questionnaire (EQ; Bouman & van Hout, 2015 unpublished manuscript), groups scoring high and low on fear of vomiting were selected by taking participants from the highest- (EQ > 174;  $n = 35$ ; 89% females; range: 174–328) and lowest quartile range (EQ < 133;  $n = 38$ ; 66% females; range: 98–133).

### 2.2. Materials

#### 2.2.1. Online task

The task and questionnaires were generated using Qualtrics Labs, Inc. software, version 12.018 of the Qualtrics Research Suite Copyright© 2005, which specializes in the construction of online questionnaires. This method provided the opportunity for participants to complete the study from their own PC at home at a self-selected time.

*Scenarios.* We constructed the scenarios along the lines of Verwoerd et al. (2013; see also Arntz et al., 1995). Participants were presented with a series of scripts describing everyday scenarios which were objectively safe but relevant for people with elevated scores on fear of vomiting (see below). Each scenario was followed

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