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Changes in disgust and heart rate during exposure for Obsessive Compulsive Disorder: A case series



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ABSTRACT

Background and Objectives: The emotion of disgust has been suggested as a factor contributing to a poor response to Cognitive Behaviour Therapy (CBT) in the treatment of Obsessive Compulsive Disorder (OCD). However, only limited information is available about the phenomenology of disgust in clinical OCD and the physiological mechanisms involved. This case series was designed to explore the phenomenology of OCD and the physiological activity associated with the emotion of disgust.

Methods: State disgust and heart rate was measured in eleven participants attending treatment for OCD during exposure relevant to their individual formulation.

Results: All participants with contamination and most patients with blood and injury related fears experienced a prominent increase in state disgust during exposure. These participants also had absent heart rate acceleration during exposure. Disgust response correlated with heart rate response ($r = -0.63$, $p < 0.01$) and Root Mean Square of Successive Differences (RMSSD) ($r = 0.52$, $p < 0.01$).

Limitations: The design using ecologically valid stimuli and the limited number of participants did not allow between subject comparisons or more detailed analysis of relationship between trait and state disgust and between disgust and severity of OCD.

Conclusions: Our findings show that a large proportion of our case series with OCD experience prominent disgust with signs of increased vagal tonus during their exposure. Such experiences differ from the concept of adrenergic activation used for psychoeducation in CBT and appraisals of harm and this may result in poorer therapeutic outcome.

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Cognitive Behaviour Therapy (CBT) including the Exposure and Response Prevention (ERP) represents the first line treatment recommended for Obsessive Compulsive Disorder (OCD) (NICE, 2005) but this treatment approach is still accompanied by considerable dropout rates (20%) and treatment resistance (20%) (Foa, 2010). One of the factors contributing to limited effectiveness of CBT may be the co-occurrence of emotions such as disgust (Woody & Teachman, 2000).

Disgust can be characterized by a desire to distance oneself from the object of disgust, a fear of oral incorporation of the object of disgust and a feeling of “revulsion” (Davey, 1994). Several components of trait disgust have been identified, including: (i) Core disgust, which relates to the threat of oral incorporation of food or

body waste products (“guardian of the mouth”) (ii) Animal reminder disgust, which relates to reminders of our own mortality and inherent animalistic nature (“guardian of the body”). This relates to our attitudes and practices regarding sex (e.g. incest), death and injury to the body or violations of the outer envelope, (iii) Contamination disgust, which involves contact with individuals who are unknown, tainted by disease, misfortune or immorality (Olatunji, Williams, et al., 2007; Rozin & Fallon, 1987). These 3 components can be measured with the Disgust Scale-Revised (Haidt, McCauley, & Rozin, 1994; Olatunji, Williams, et al., 2007) and other self-report measures have been developed to assess other specific components of disgust. These measures have been used extensively in studies investigating the role of disgust in various mental health conditions and it has been suggested that disgust can play a significant role in the development and maintenance of anxiety disorders such as specific phobias, blood and injury phobia or OCD (Cisler, Olatunji, & Lohr, 2009).

Significant amount of research has been focused on links

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between disgust and symptoms of OCD. Studies of nonclinical samples by several research groups indicate a strong association between trait disgust and OCD-related fears (Cisler, Reardon, Williams, & Lohr, 2007; Mancini, Gragnani, & D'Olimpio, 2001; Moretz & McKay, 2008; Olatunji, Haidt, McKay, & David, 2008; Schienle, Stark, Walter, & Vaitl, 2003) and this relationship was confirmed in a prospective study (Olatunji, 2010). Results from studies with clinical populations are less consistent with a significant relationship between disgust and contamination OCD reported by two research groups (Melli, Bulli, Carraresi, & Stopani, 2014; Melli, Chiorri, Carraresi, Stopani, & Bulli, 2015a, Olatunji, Tart, Ciesielski, McGrath, & Smits, 2011) while only small size correlations were found by others (Woody & Tolin, 2002). A more recent research identified disgust avoidance as a factor involved in contamination OCD with possible influence on therapy outcome (Melli, Chiorri, Carraresi, Stopani, & Bulli, 2015b). To explore the role in maintenance of OCD, several studies investigated changes in disgust in response to possible treatment procedures showing that disgust is more resistant to extinction (Mason & Richardson, 2010; Olatunji, Forsyth, & Chorian, 2007) and habituates more slowly than anxiety (Adams Jr, Willems, & Bridges, 2011; McKay, 2006; Olatunji, Wolitzky-Taylor, Willems, Lohr, & Armstrong, 2009). These findings demonstrate the importance of improving our understanding of disgust in order to be able to address this emotion during the treatment of OCD (Mason & Richardson, 2012). One of the approaches suggested for identifying mechanisms involved in the link between disgust and OCD is the focus on physiological correlates of disgust.

Since the early studies, disgust was reported to be associated with specific patterns of psychophysiological activity. This includes a group of measures related to the known facial expression of disgust (Ekman, 1973) such as the increased activity of corrugator (Lang, Greenwald, Bradley, & Hamm, 1993) and levator labii facial muscles (van Overveld, de Jong, & Peters, 2009; Vrana, 1993). Another measure commonly associated with disgust is increased electrodermal activity likely reflecting a general activation during a negative emotion (de Jong, van Overveld, & Peters, 2011; Lang et al., 1993; Rohrmann, Hopp, Schienle, & Hodapp, 2009; van Overveld et al., 2009) but the main differentiating measures appear to be those reflecting sympathovagal balance related to cardiovascular function. State disgust is associated with increased vagal activity or sympathetic withdrawal as demonstrated by reduced heart rate (Lang et al., 1993; Levenson, 2003; Meissner, Muth, & Herbert, 2011; Rohrmann et al., 2009), increased T wave amplitude (van Overveld et al., 2009) and increased high frequency band power of the heart rate variability (de Jong et al., 2011; Meissner et al., 2011). The importance of identifying such changes in sympathovagal balance in disorders such as OCD relates to the fact that the focus on sympathetic activation during treatment of OCD may not be relevant for patients experiencing symptoms of vagal activation and may contribute to higher dropout rates and less favourable treatment outcomes (Mason & Richardson, 2012). In contrast to the extensive literature on the psychophysiology of disgust in the nonclinical population, only inconsistent data are reported in individuals with clinical OCD. A recent clinical research did not find significant association between disgust in OCD and psychophysiological response but this study did not include measures of cardiovascular sympathovagal balance (Whitton, Henry, & Grisham, 2015). Studies examining measures, such as heart rate in patients with OCD during negative affect, report heart rate acceleration (Rabavilas & Boulougouris, 1974; Stein, Arya, Pietrini, Rapoport, & Swedo, 2006), deceleration (Hoehn-Saric, McLeod, & Hipsley, 1995; Simon, Kaufmann, Kniesche, Kischkel, & Kathmann, 2013) or no changes (Zahn, Leonard, Swedo, & Rapoport, 1996) but only a few of these studies attempted to

differentiate between emotions such as anxiety and disgust. Another possible explanation for such contradictory results is the individual variability of responses to disgust-eliciting stimuli in the context of the differing phenomenology of symptoms between participants.

Most of the preclinical or clinical studies investigating the relationship between disgust and symptoms of OCD and the physiological mechanisms involved have used procedures with specific standardized disgust elicitors presented uniformly to participants in the study. However, a person's individual responses to disgust or anxiety triggers can vary widely depending on their personal history and experiences (Ellsworth & Scherer, 2003). The use of individually identified stimuli has been employed in early as well as more recent studies investigating psychophysiological features of OCD (Rabavilas & Boulougouris, 1974; Simon et al., 2013) and the need for using ecologically valid methods was also pointed out in other areas of OCD research (Radomsky & Rachman, 1999). Such use of idiosyncratic stimuli can interfere with traditional research designs relying on group comparisons and single case series designs have been suggested as a possible tool to capitalize on such individual variability (Kazdin, 2011). This approach has frequently been used in studies evaluating new therapeutic approaches but also in exploratory studies on psychophysiology of OCD (Rabavilas & Boulougouris, 1974) and other idiosyncratic phenomena (Caramazza, 1986).

The present study utilized a multiple single case design to explore the phenomenology associated with disgust in individuals with OCD and to test the hypothesis that disgust is associated with contamination OCD symptoms. Our second aim was to determine whether an individually identified elicitor of disgust is associated with heart rate deceleration similar to those observed in a nonclinical population. Lastly, we attempted to explore the link between state disgust experienced during exposure and the severity of OCD, depressive symptoms and trait disgust.

1. Methods

1.1. Design

The study was designed as a naturalistic descriptive study using the AB design with multiple baselines. To allow an attempt at generalization of results, the design was extended using the clinical replication series approach (Hayes, Barlow, & Nelson-Gray, 1999) and data obtained from multiple single cases were correlated to explore possible links between experienced disgust and psychological and physiological measures as has been reported in larger case series (Arts, Kols, Onderwater, & Peul, 2012).

1.2. Participants

The study included 11 consecutive patients attending for treatment of OCD at the Anxiety Disorders Residential Unit at the Bethlem Royal Hospital, London who agreed to participate. There were 9 male and 2 female patients. The inclusion criteria were ongoing CBT, age over 18 years and primary diagnosis of OCD. The diagnosis according to DSM-IV (American Psychiatric Association, 2000) was established during a clinical interview including a Structured Clinical Interview for DSM-IV (Spitzer, Gibbon, & Williams, 1998) and confirmed by the consensus of the clinical team. The exclusion criteria were English language level insufficient for participating in CBT and completing required questionnaires, or lack of capacity to provide informed consent. The main obsessions and compulsions of participants were as follows:

Case I was a 47 year old woman with intrusive thoughts and images of hurting others, triggered in social contexts. She also

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