



A quantitative analysis of facial emotion recognition in obsessive–compulsive disorder



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ABSTRACT

Obsessive–Compulsive Disorder (OCD) is characterized by persistent and unwanted obsessions generally accompanied by ritualistic behaviors or compulsions. Previous research proposed specific disgust facial emotion recognition deficits in patients with OCD. This research however, remains largely inconsistent. Therefore, the results of 10 studies contrasting facial emotion recognition accuracy in patients with OCD ($n=221$) and non-psychiatric controls ($n=224$) were quantitatively reviewed and synthesized using meta-analytic techniques. Patients with OCD were less accurate than controls in recognizing emotional facial expressions. Patients were also less accurate in recognizing negative emotions as a whole; however, this was largely due to significant differences in disgust and anger recognition specifically. The results of this study suggest that patients with OCD have difficulty recognizing specific negative emotions in faces and may misclassify emotional expressions due to symptom characteristics within the disorder. The contribution of state-related emotion perception biases to these findings requires further clarification.

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1. Introduction

Obsessive–Compulsive Disorder (OCD) is characterized by persistent and unwanted obsessions generally accompanied by ritualistic

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behaviors or compulsions performed to reduce the anxiety of obsessions. The disorder affects between 2% and 3% of adults and 1% of children and adolescents (Flament et al., 1988; Karno et al., 1988). OCD can be a chronic illness when untreated and as many as 50% of adult cases developed during childhood (Rasmussen and Eisen, 1990; Karno and Golding, 1991). According to the World Health Organization, OCD is one of the top 10 causes of disability (Murray and Lopez, 1996), demonstrating its serious impact on quality of life. The symptoms experienced in OCD can be heterogeneous, ranging

from fears of contamination, repeated checking, time-consuming and distressing ordering of objects, and distressing intrusive fears pertaining to harming oneself to name but a few.

Within the past two decades, the appraisal and interpretation of “disgusting” objects and situations by persons with OCD has been intensely studied. Disgust differs from other negative emotions in that it has evolved from a basic evolutionary sense in avoiding distaste and contamination to one that includes higher order constructs such as moral reasoning and interpersonal rejection (Rozin and Fallon, 1987). Cognitive appraisals that derive from an excessive experience of disgust may increase perceptions of rejection towards objects and situational triggers and thereby increase anxiety to cues that do not normally elicit anxiety. Individuals with OCD demonstrate heightened disgust sensitivity to symptom-specific stimuli and experience a higher degree of distress associated with these stimuli compared to healthy individuals (Mataix-Cols et al., 2004, 2008). Disgust sensitivity has been hypothesized to contribute to the development and maintenance of anxiety to contamination-based stressors in the form of obsessions and compulsions (Woody and Teachman, 2000; Olatunji et al., 2010) because of its association with a broad range of OCD symptoms, including rumination and checking (Mancini et al., 2001), and doubting, checking, and slowness (Schienle et al., 2003). There is also evidence that disgust sensitivity may be malleable with exposure-based interventions, although less readily than anxiety during the therapeutic process (Smits et al., 2002; McKay, 2006; Cougle et al., 2007; Olatunji et al., 2009). Therefore, how individuals with OCD experience disgust in relation to objects and cues remains a potentially important vulnerability factor associated with the disorder.

Given the salience of stimuli related to the emotion of disgust in OCD, it would be hypothesized that they should demonstrate vigilance or selective attention toward such stimuli. Research has supported an attentional bias towards threat in many fear-based anxiety disorders (e.g., panic disorder, post-traumatic stress disorder, and social phobia), although studies attempting to replicate this effect in OCD have been mixed (Williams et al., 1997; Armstrong and Olatunji, 2012). Some researchers have suggested that attentional bias to threat may only occur in a subset of patients with OCD, namely those with contamination-based fear symptoms that clearly also involve the experience of disgust. A preliminary analog study demonstrated that individuals high in contamination-based fears demonstrate excessive visual fixation on emotional facial expressions of disgust and fear (Armstrong et al., 2010). One might hypothesize that individuals with OCD, or at least a subset of them, would demonstrate enhanced recognition of disgust facial expressions. The emotion recognition literature suggests, that there is a reduction in the correct classification of disgust facial expressions, however.

The earliest study on the topic, by Sprengelmeyer et al. (1997), reported that all patients with OCD exhibited a marked reduction in the ability to recognize disgust from facial expressions. Several subsequent studies failed to clearly detect disgust recognition difficulties (Buhlmann et al., 2004; Parker et al., 2004; Allen et al., 2006; Montagne et al., 2008; Bozidak et al., 2009; Jhung et al., 2010). Yet, more recent research has again demonstrated the presence of disgust facial emotion recognition in OCD (Corcoran et al., 2008; Amiri et al., 2012; Lochner et al., 2012; Rector et al., 2012). Given these equivocal findings, research has focused on moderator variables that may explain why disgust recognition deficits were found in some studies but not others, including the possibility that the problem exists only in those with severe symptom presentations of OCD (Parker et al., 2004). There have also been attempts to test the specificity of this finding to patients with other anxiety disorders. For example, Corcoran et al. (2008) demonstrated that patients with OCD recognized disgust facial

expressions less often than patients with panic disorder, but found that only one-third of patients demonstrated this deficit. Rector et al. (2012) compared groups of patients with OCD, generalized social phobia, and panic disorder and again found a specific reduced accuracy for disgust expression recognition in patients with OCD only. Furthermore, this study demonstrated that patients with OCD, who were treatment responders to cognitive-behavioral therapy, no longer demonstrated difficulty in recognizing disgust and supported a hypothesis that these difficulties would be state-dependent.

Disgust sensitivity may influence emotion recognition within OCD. If an individual with the disorder experiences disgust to a variety of situations when others do not, he or she will undoubtedly experience disgust more often than others and may in turn, modulate learned associations between objects that elicit disgust and reactions to them (Berle and Phillips, 2006). Therefore, to reconcile the disgust sensitivity and emotion recognition literature, it is important to consider how both of these variables interact when responding to emotional facial expressions within OCD. Individuals with OCD may become aroused when viewing facial expressions of disgust to the point that attentional control is affected. Participants with poor attentional control could therefore have difficulty shifting their attention away from disgusting stimuli, which in turn, potentiates affective arousal or prevents down-regulation of arousal (Adams and Lohr, 2012). Alternatively, vigilance and maintenance of attention on the stimulus could increase the state of anxiety experienced by the individual, causing cognitive interference and thereby impairing accurate perception (Armstrong and Olatunji, 2012). Either of these instances could affect the process of ascribing the correct emotion to a facial expression. Finally, the recognition of disgusted facial expressions is possible through the anterior insula (Fusar-Poli et al., 2009), an area that has been found to be abnormally hyperactive in OCD and correlated with symptom provocation (Husted et al., 2006; Mataix-Cols et al., 2008), suggesting underlying links to pathophysiology.

The focus of this meta-analysis seeks to quantitatively synthesize existing research on facial emotion recognition abilities in patients with OCD to determine whether statistically reliable impairments are present and the extent of their magnitude. It is hypothesized that patients with OCD, compared with healthy controls, will demonstrate reduced accuracy in recognizing emotional facial expressions, particularly facial expressions of disgust. This meta-analytic investigation will also help to determine the degree of specificity of emotional processing, i.e., are all negative emotions poorly recognized in OCD or is the effect specific to disgust stimuli? We also aim to examine the relations between potentially important moderator variables including age, gender, current mood, severity of OCD, symptom subtype of OCD (e.g., contamination-based symptoms), psychiatric co-morbidity (e.g., depression), medication use, and magnitude of effect representing impaired emotion recognition in the disorder.

2. Materials and methods

2.1. Meta-analysis

Comprehensive Meta-analysis (CMA) Version 2.2.057 (Borenstein et al., 2010) was used to conduct the meta-analysis using a random effects modeling approach. We employed standard meta-analytic techniques to our review of the literature (e.g., Hedges and Olkin, 1985; Rosenthal, 1991). Briefly, the analysis of magnitude was indexed with the effect size estimate d , the difference between two group means calibrated in pooled standard deviation units (Cohen, 1988). Individual study results and relevant moderator variables were abstracted, quantified and assembled into a database for statistical analysis. Moderator variables were then correlated with effect size differences in order to test relationships that may influence the magnitude of the effect. Depending on the nature of the moderating

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