



Facial affect recognition in body dysmorphic disorder versus obsessive-compulsive disorder: An eye-tracking study



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ABSTRACT

Background: Body dysmorphic disorder (BDD) is characterised by repetitive behaviours and/or mental acts occurring in response to preoccupations with perceived defects or flaws in physical appearance (American Psychiatric Association, 2013). This study aimed to investigate facial affect recognition in BDD using an integrated eye-tracking paradigm.

Method: Participants were 21 BDD patients, 19 obsessive-compulsive disorder (OCD) patients and 21 healthy controls (HC), who were age-, sex-, and IQ-matched. Stimuli were from the Pictures of Facial Affect (Ekman & Friesen, 1975), and outcome measures were affect recognition accuracy as well as spatial and temporal scanpath parameters.

Results: Relative to OCD and HC groups, BDD patients demonstrated significantly poorer facial affect perception and an angry recognition bias. An atypical scanning strategy encompassing significantly more blinks, fewer fixations of extended mean durations, higher mean saccade amplitudes, and less visual attention devoted to salient facial features was found.

Conclusions: Patients with BDD were substantially impaired in the scanning of faces, and unable to extract affect-related information, likely indicating deficits in basic perceptual operations.

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1. Introduction

The human face is integral as a primary means of conveying social information (Zebrowitz, 1997). In body dysmorphic disorder (BDD), not only do key elements of social perception underpin significant concerns involving physical appearance, the content of patients' preoccupations are also often centred on the face (Buhlmann, Etcoff, & Wilhelm, 2008; Phillips, Menard, Fay, & Weisberg, 2005). A study of how people with BDD process faces is therefore especially informative.

1.1. Face processing in BDD

Accordingly, BDD is characterised by repetitive behaviours and/or mental acts occurring in response to preoccupations with perceived defects or flaws in physical appearance (American

Psychiatric Association, 2013). Face processing research in BDD has garnered interest because of its direct significance to clinical features of the disorder. Yet there have been limited studies along three dominant themes: (i) aesthetic sensitivity, (ii) affect recognition, and (iii) selective attention.

In an early study, Yaryura-Tobias et al. (2002) reported that when presented with a choice to undertake digital modification based on whether each image was perceived to be distorted (no images were distorted), significantly more BDD (50%) and obsessive-compulsive disorder (OCD; 40%) patients digitally modified their own facial photographs relative to healthy controls (HC; 0%). When asked to judge the attractiveness of their own and others' faces, persons with BDD, but not OCD or HC, overestimated the good looks of others, and underrated their own physical attractiveness (Buhlmann et al., 2008). Likewise, Reese, McNally, and Wilhelm (2010) found BDD patients were not better at detecting symmetry differences in dot arrays and faces of unfamiliar others relative to OCD and HC groups. Interestingly, BDD participants rated identical facial (but not object) images as significantly more often altered relative to individuals without BDD (Buhlmann, Rupf, Gleiss, Zschenderlein, & Kathmann, 2014). Several studies have

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examined other aspects of aesthetic perception in BDD (Lambrou, Veale, & Wilson, 2011; Stangier, Adam-Schwebe, Muller, & Wolter, 2008).

Buhlmann, McNally, Etcoff, Tuschen-Caffier, and Wilhelm (2004) examined the ability of BDD patients to (i) discriminate facial features, and (ii) identify facial affect. Despite an absence of feature discrimination deficits, BDD patients demonstrated significantly impaired affect recognition, especially misidentifying emotional expressions as angry. Follow-up research uncovered an added contemptuous recognition bias in BDD, which were only significant for self-referent, as opposed to other-referent, scenarios (Buhlmann, Etcoff, & Wilhelm, 2006). It was hypothesised poor insight and ideas of reference underpinned these difficulties; perceptions of anger and rejection bolstered existing beliefs of personal 'ugliness' and social undesirability in this disorder. A small series of case studies in BDD also showed evidence of a similar angry recognition bias (Labuschagne, Castle, & Rossell, 2011).

Only two known studies to date have attempted to explore attentional biases in BDD with the aid of eye-tracking. Grochowski, Kliem, and Heinrichs (2012) asked BDD participants to gaze at photographs of themselves as well as unfamiliar others, and found that they, but not participants with social anxiety disorder (SAD) or HC, focused disproportionate visual attention on their perceived facial defect and to the corresponding area of others' faces. When participants with BDD were asked to view images of themselves and a neutral control face, they predictably had a negative mean bias relative to HC; persons with BDD displayed heightened selective visual attention toward unattractive features of their own face as well as attractive features of another's face (Greenberg, Reuman, Hartmann, Kasarskis, & Wilhelm, 2014). Collectively, these studies implicate the role of specific attentional biases in precipitating and maintaining symptoms of the disorder.

1.2. Face processing in OCD

The majority of face processing research in OCD has centred on affect recognition, specifically implicating the emotion of disgust, but with mixed findings. A number of studies have reported impaired disgust recognition (Corcoran, Woody, & Tolin, 2008; Rector, Daros, Bradbury, & Richter, 2012; Sprengelmeyer et al., 1997), whereas other work has failed to establish a clear disgust deficit in OCD (Buhlmann et al., 2004; Grisham, Henry, Williams, & Bailey, 2010; Jung et al., 2010; Parker, McNally, Nakayama, & Wilhelm, 2004; Rozin, Taylor, Ross, Bennett, & Hejmadi, 2005). Nevertheless, BDD remains the focus of the current study, with OCD acting as an appropriate clinical control group due to considerable overlaps in terms of clinical features, familial loading, symptomatology, and psychiatric comorbidity between these disorders (Simeon, Hollander, Stein, Cohen, & Aronowitz, 1995; Wilhelm, Otto, Zucker, & Pollack, 1997). This is reflected by the reclassification of BDD under the umbrella of obsessive-compulsive and related disorders (American Psychiatric Association, 2013). For a meta-analytic review of facial emotion recognition in OCD, see Daros, Zakzanis, and Rector (2014).

1.3. What is eye-tracking?

Eye-tracking refers to the monitoring of an individual's eye movements with the use of specialised equipment during scanning of visual stimuli. The theoretical framework underlying eye-tracking is beyond the scope of the current paper (see Toh, Rossell, & Castle, 2011). Instead, our purpose is to provide a brief overview of findings within comparable disorders to facilitate later discussion as well as define key eye-tracking parameters. A review of existing scanpath literature converged on generalised scanning deficits of a restricted nature in schizophrenia, with affected

patients displaying significantly fewer fixations of extended durations, shorter scanpaths and a marked avoidance of salient facial features (Bestelmeyer et al., 2006; Gordon et al., 1992; Loughland, Williams, & Gordon, 2002a, 2002b; Manor et al., 1999; Williams, Loughland, Gordon, & Davidson, 1999). Preliminary investigations into SAD conversely uncovered a hyperscanning strategy, comprising fewer fixations of shorter durations, longer scanpaths and an avoidance of salient features offset by extensive scanning of non-salient features (Horley, Williams, Gonsalvez, & Gordon, 2003, 2004). Typical scanpath variables examined were number of fixations (i.e. frequency of stationary gaze points acquired during scanning), mean fixation durations (i.e. average time length per fixation, usually denoted in ms) and mean saccade amplitudes (i.e. average summed distance travelled by the eye during scanning, typically measured in degrees of visual angle).

1.4. Aims and hypotheses

Preliminary studies have indicated significant deficits in facial affect recognition in BDD, especially implicating an angry recognition bias, which may be more pronounced during the scrutiny of one's own facial image or in self-referent scenarios. Visual scanpath research in BDD is still in its early stages. A combination of these two lines of research would therefore not only enable verification of affect recognition anomalies in BDD, but also aid in possibly identifying underlying mechanisms. Several pertinent research questions exist: (i) Can tentative emotion recognition biases detected in BDD be corroborated? (ii) If so, do these exist alongside aberrant eye-tracking strategies? (iii) What is the nature of such eye movement dysfunction? This study endeavoured to answer these questions by examining eye-tracking during a facial affect recognition task.

Three hypotheses were postulated: (i) Relative to HC, BDD participants would exhibit poorer affect recognition and a significant angry recognition bias. (ii) Relative to HC, BDD participants would utilise atypical visual scanning strategies, especially in response to negative facial affect (i.e. anger, disgust, fear and sadness). This means their scanpath variables were expected to be significantly different from those found in HC. Basing predictions on phenomenological overlaps between BDD, schizophrenia and SAD however, suggested restricted or extensive scanning was possible. (iii) In the presence of atypical scanning strategies, added scanpath deficits relating to salient facial features (i.e. eyes, nose, mouth) would be expected, likely involving decreased visual attention to one or more of these facial regions. No a priori hypotheses with respect to BDD versus OCD group contrasts were offered for two reasons: (i) the pre-existing literature surrounding OCD is inconsistent at best, and (ii) the OCD group forms the clinical control group, so we would plausibly expect their performance to fall between that of the BDD and HC groups (though we were unable to postulate specific outcomes for given variables).

2. Method

2.1. Participants

Twenty-one BDD patients and 19 OCD patients were recruited from a specialised outpatient psychiatric service and community sources. Twenty-one HC participants were recruited via a voluntary healthy participant database, based on a null personal and immediate family history of diagnosed psychiatric disorders. Axis I diagnoses were verified with the Body Dysmorphic Disorder-Diagnostic Module (BDD-DM) for BDD (Phillips, 2005) and Mini International Neuropsychiatric Interview-English Version 5.0.0 (MINI500) for OCD and other major Axis I disorders (Sheehan et al., 1998). Based on symptom severity, all BDD and OCD patients

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