

Emotion recognition deficits in body dysmorphic disorder

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Abstract

Patients with Body Dysmorphic Disorder (BDD) are characterized by excessive concerns about imagined defects in their appearance, most commonly, facial features. In this study, we investigated (1) the ability to identify facial expressions of emotion, and (2) to discriminate single facial features in BDD patients, Obsessive-Compulsive Disorder (OCD) patients, and in healthy control participants. Specifically, their ability for general facial feature discrimination was assessed using the Short Form of the Benton Facial Recognition Test (Benton AL, Hamsher KdeS, Varney NR, Spreen O. Contributions to neuropsychological assessment: a clinical manual. New York: Oxford University Press; 1983). However, findings of the BFRT indicate no differences among the groups. Moreover, participants were presented with facial photographs from the Ekman and Friesen (Ekman P, Friesen W. Unmasking the face: a guide to recognizing emotions from facial cues. Englewood Cliffs, NJ: Prentice-Hall; 1975 and Ekman P, Friesen W. Pictures of facial affect. Palo Alto: Consulting Psychologists Press, 1976) series and were asked to identify the corresponding emotion. The BDD group was less accurate than the control group, but not the OCD group, in identifying facial expressions of emotion. Relative to the control and OCD groups, the BDD group more often misidentified emotional expressions as angry. In contrast to the findings of Sprengelmeyer et al. [Proc. Royal Soc. London Series B: Biol. Sci. 264 (1997),1767], OCD patients did not show a disgust recognition deficit. Poor insight and ideas of reference, common in BDD, might partly result from an emotion recognition bias for angry expressions. Perceiving others as angry and rejecting might reinforce concerns about one's personal ugliness and social desirability.

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Patients with Body Dysmorphic Disorder (BDD) are distressed about imagined defects in their appearance, most commonly, facial flaws (American Psychiatric Association, 1994). They are very self-critical, fear negative evaluation by others, and often suffer significant morbidity, including social/occupational impairment, hospitalization, and suicide attempts (e.g., Phillips et al., 1993).

Research has shown that neuropsychological deficits and selective information processing might play an important role in the etiology or maintenance of emotional disorders (for review, see Williams et al., 1997; Lezak, 1995). For example, when drawing a complex figure from memory (Osterrieth, 1944), BDD patients

tend to recall details rather than larger organizational design features, resulting in memory deficits (Deckersbach et al., 2000). These maladaptive strategies may also be related to the etiology and maintenance of BDD. Indeed, BDD patients tend to ritualistically compare themselves to others (e.g., Phillips et al., 1993). Based on our clinical experience, we would assume that BDD patients focus on the body part of concern when unfavorably comparing themselves to others (i.e., a patient with nose concerns would focus on other people's noses and disregard the rest of the face). This focus on specific body parts rather than considering global aspects of appearance might impair overall face recognition and could interfere with interpreting facial expressions accurately.

BDD patients have other distortions as well. Compared with OCD patients and healthy controls, they

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interpret ambiguous situations (BDD-related, social, and general) as threatening, whereas OCD patients only exhibit a negative interpretive bias for ambiguous general situations (Buhlmann et al., 2002). Thus, this might lead to increased anxiety in these situations, and BDD patients might, as a result, avoid them.

Most researchers investigating selective information processing used words as stimuli, and there is scant research investigating “real life” stimuli such as faces. However, the advantage of using more ecologically valid stimuli to investigate information-processing abnormalities has been discussed (e.g., Lundh & Öst, 1996). For example, facial expressions are an important means to express negative or positive thoughts and feelings, and researchers have investigated the ability to recognize facial expressions in psychiatric patients, mainly those with schizophrenia (e.g., Addington & Addington, 1998; Mueser et al., 1996; Kerr & Neale, 1993). Kerr and Neale (1993), for example, presented schizophrenic patients and healthy controls with faces varying in emotional expressions and found that schizophrenics, in contrast to controls, exhibited a generalized deficit to recognize emotions. Studying recognition of facial expressions in socially anxious children, Simonian and colleagues found that clinically socially anxious children had significantly poorer facial expression recognition skills than had children with no psychiatric disorder (Simonian et al., 2001). Especially, socially anxious children performed poorer when presented with happy, sad, and disgusted facial expressions.

Given the strong fear of negative evaluation and the frequent presence of ideas of reference (e.g., that other people stare at them), individuals with BDD, like social phobics and delusional patients, might be particularly sensitive to facial expressions. For example, they might interpret a person’s facial expression as negative when it is actually neutral. Therefore, the ability to recognize facial expressions may play a role in the maintenance or even etiology of disorders that are characterized by a strong fear of negative evaluations, such as social phobia and BDD. Taken together, examining recognition biases for threatening facial expressions might help us understand why BDD patients fear and avoid social situations.

In the current study, we investigated (1) the general ability of overall face recognition (a) to control for neuropsychological deficits in facial feature processing, and (b) to examine whether BDD patients, relative to individuals without BDD, would be less accurate in recognizing faces considering their tendency to over-focus on single aspects in their face while ignoring broader aspects of the face, and (2) whether BDD patients are characterized by recognition biases for threatening facial expressions. To investigate whether these phenomena were typical for BDD or also char-

acterize a broader spectrum of psychiatric disorders, we also included patients with Obsessive-Compulsive Disorder (OCD) as a psychiatric control group.

1. Method

1.1. Participants

The BDD group comprised 20 outpatients (eight men) whose diagnosis was confirmed by structured clinical interviews (SCID; First et al., 1995). The BDD patients’ concerns were related to their facial skin ($n=15$), hair ($n=5$), breasts ($n=1$), eyes ($n=1$), and shape of nose ($n=1$). The OCD group comprised 20 outpatients (eight men) whose diagnosis was determined by the SCID (First et al., 1995). OCD patients had the following symptoms: contamination fears ($n=9$), aggressive obsessions ($n=5$), sexual obsessions ($n=2$), fear of making mistakes ($n=1$), obsessions about guilt ($n=1$), religious obsessions ($n=1$), rumination ($n=1$), checking ($n=15$), hand washing ($n=9$), counting compulsions ($n=2$), hoarding ($n=1$), and rereading ($n=1$). The control group comprised 20 participants (seven men), free of any current or past psychiatric disorder (DSM-IV; APA, 1994, as determined by the SCID (First et al., 1995). The groups did not differ with respect to age, $F(2, 59)=0.17$, $P=0.85$ (BDD group: $M=32.7$, $SD=11.3$; OCD group: $M=31.0$, $SD=10.5$; Controls: $M=32.9$, $SD=11.7$) and education, $F(2, 59)=0.08$, $P=0.92$, (BDD group: $M=16.4$, $SD=2.7$; OCD group: $M=16.6$, $SD=2.0$; Controls: $M=16.6$, $SD=2.1$). BDD and OCD patients were recruited at the OCD Clinic at the Massachusetts General Hospital (MGH). Controls were recruited through posted flyers in the Boston area.

1.2. Materials and methods

1.2.1. General facial recognition stimuli

To determine whether the groups would differ in their ability of overall face recognition, we administered the Short Form of the Benton Facial Recognition Test (BFRT; Benton et al., 1983). Specifically, it requires matching a target face with up to three pictures of the same person in a six-stimuli array of faces that vary in terms of angles and lighting. Thirteen faces were presented in black and white; none was expressing emotion. For the first six items, only one face matched the target face. For the last seven items, three faces matched the target face. Scores could range from 0 to 27 correct responses.

1.2.2. Emotion recognition task

The stimuli comprised 42 photographs showing emotional expressions (Ekman & Friesen, 1975, 1976). Each emotion was presented by six different models

(three women and three men), and each condition (angry, disgusted, happy, neutral, sad, scared, surprised) was presented six times. For each photograph, participants circled the corresponding expression (angry, disgusted, happy, neutral, sad, scared, surprised) on an answer sheet. The total score could range from 0 to 42, whereas for each emotion subcategory, the score could range from 0 to 6. One set of photographs including each emotional expression and the neutral expression was used as a practice trial.

1.2.3. Psychometrics

Participants completed a form that asked about demographic information such as age, gender, and education. Furthermore, they completed the following questionnaires: the Beck Depression Inventory (BDI; Beck & Steer, 1987), the Body Dysmorphic Disorder Modification of the YBOCS (BDD–YBOCS; Phillips et al., 1997), and the Fear of Negative Evaluation Scale (FNE; Watson & Friend, 1969).

The Beck Depression Inventory (BDI) is a 21-item inventory that examines the severity of depression. Specifically, each item has a series of four self-evaluative statements that indicate the severity of a particular symptom. It has a good test–retest reliability for 1–3 months (0.74; Rehm, 1988). Tests of internal consistency produce alpha coefficients of 0.76 to 0.95 (Rehm, 1988). Moreover, the BDI has a high correlation with the Hamilton Rating Scale ($r=0.82$; Hamilton, 1960).

The Body Dysmorphic Disorder Modification of the YBOCS (BDD–YBOCS; Phillips et al., 1997) is a modified version of the Yale-Brown Obsessive-Compulsive Scale (Goodman et al., 1989). It consists of 12 items that measure the severity of BDD symptoms during the past week. Intraclass correlation coefficients reveal that the interrater reliabilities both for the total score and for the individual item score are very high ($r_s=0.79$ – 1.00 ; Phillips et al., 1997).

The Fear of Negative Evaluation Scale (FNE) examines the expectation and fear of negative evaluation. The original version consists of 30 items which are rated by the participants as true or false. The short version consists of 12 items (Leary, 1983). We used the short version because the correlation between the original and the short version is very high ($r=0.96$). Both the original and the short version have also very high interitem reliabilities ($\alpha=0.92$ and 0.94). The test–retest reliability for one month is satisfactory ($r=0.78$; Leary, 1983).

1.2.4. Procedure

The study protocol was reviewed by an institutional review committee at MGH. Informed consent of the participants was obtained after the nature of the procedures had been fully explained. All participants were tested individually. Upon arrival, participants read and

signed a consent form prior to receiving a SCID interview. During the emotion recognition task, participants were presented with 42 photographs, one at a time. Each photograph was presented for 15 s. Participants were asked to circle on an answer sheet for each photograph the corresponding emotional expression. The experimenter presented the photographs in random order to the participant. Participants in the BDD group received the photographs in different random orders, and participants in the OCD and control group were yoked to the BDD participants.

After the emotion recognition task, participants completed the BFRT and completed the remaining inventories assessing BDD symptoms, social anxiety, and depression (Table 1). Finally, participants were paid \$35 dollars for their participation and were debriefed about the purpose of the research.

1.2.5. Statistical analyses

Data were analyzed using one-way analyses of variance (ANOVAs) and post hoc Bonferroni-corrected *t*-tests.

2. Results

We submitted the BFRT data to a oneway ANOVA. The groups did not differ on the BFRT, $F(2, 59)=0.14$, $P=0.87$ (BDD group: $M=23.7$, $SD=2.5$; OCD group: $M=23.5$, $SD=2.2$; Controls: $M=23.3$, $SD=2.7$). Their mean scores were in the normal range, and comparable to those of healthy adults ($M=21.7$, $SD=2.5$; Schretlen et al., 2001).

We submitted the emotion recognition data to one way ANOVAs. First, we analyzed whether the groups differed in their overall test performance across all facial expression categories; that is, how well they performed in identifying facial expressions in general. We found a significant group difference, $F(2, 59)=4.70$, $P=0.01$ (see Table 2). BDD participants, compared with controls, were significantly worse at identifying facial expressions

Table 1
Psychometric data

Variable	BDD group		OCD group		Control group	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
BDD–YBOCS	25.8a	7.5	5.5b	7.1	3.3b	2.7
BDI	17.1a	8.5	9.5b	7.8	2.0c	1.9
FNE	49.4a	7.7	43.4a	9.4	28.3b	6.8
Age	32.7a	11.3	31.0a	10.5	32.9a	11.7
Education	16.4a	2.7	16.6a	2.0	16.6a	2.1

BDD–YBOCS = Body Dysmorphic Disorder Modification of the YBOCS; BDI = Beck Depression Inventory; FNE = Fear of Negative Evaluation Scale; Age in years; Education = years of education. Means sharing letters do not differ ($P>0.05$, Bonferroni-corrected).

Table 2
Mean performance of expression recognition

Category	BDD group		OCD group		Control group	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Total score	35.4a	3.2	36.6ab	2.6	38.0b	2.2
Angry	5.6a	0.6	5.4a	0.6	5.5a	0.7
Disgusted	4.8a	1.4	5.3ab	0.9	5.7b	0.6
Happy	6.0a	0.2	6.0a	0.22	6.0a	0.0
Neutral	4.8a	1.0	5.2ab	0.7	5.7b	0.5
Sad	4.5a	1.2	4.2a	1.1	4.4a	1.4
Scared	4.6a	1.5	5.1a	1.0	5.2a	0.9
Surprised	5.2a	1.1	5.5a	0.9	5.6a	0.7
Bias for angry faces	2.7a*	1.7	1.7ab*	1.3	1.1b	1.1

Means sharing letters do not differ ($p > 0.05$, Bonferroni-corrected); angry, etc. = angry facial expressions, etc.; bias for angry faces = facial expressions misinterpreted as angry across all emotion categories.

* Marginally significant.

in general, $P = 0.01$. No differences were obtained between OCD participants and controls, $P = 0.31$, or between BDD participants and OCD participants, $P = 0.49$.

Furthermore, we analyzed whether the group differences occurred in the separate facial expression categories. Group differences occurred only on the categories of neutral, $F(2, 59) = 5.29$, $P = 0.008$, and disgust, $F(2, 59) = 4.46$, $P = 0.02$; groups did not differ on anger, fear, sadness, happiness and surprise.

With respect to neutral expressions, BDD participants identified significantly fewer neutral expressions correctly than did controls, $P = 0.006$. There was no difference between BDD and OCD participants, $P = 0.40$, and between OCD participants and controls, $P = 0.27$. With respect to disgusted expressions, BDD participants identified significantly fewer disgusted expressions correctly than did controls, $P = 0.01$. There was no significant difference between BDD and OCD participants, $P = 0.27$, and between OCD participants and controls, $P = 0.65$.

We further analyzed separately how many neutral expressions were misinterpreted as angry, disgusted, happy, sad, scared, or surprised. One-way ANOVAs and follow-up comparisons revealed no differences between the groups, $P_s > 0.05$. Next, we analyzed separately how many disgusted expressions were misinterpreted as angry, happy, neutral, sad, surprised, or scared. The groups only differed significantly in misinterpreting disgusted expressions as angry, $F(2, 59) = 4.67$, $P = 0.013$. BDD participants misinterpreted significantly more disgusted expressions as angry than did controls, $P = 0.01$. No differences were found between BDD and OCD participants, $P = 0.29$, or between OCD participants and controls, $P = 0.54$. No group differences occurred for classifying disgusted expressions as happy, neutral, sad, scared, and surprised, $P_s > 0.05$.

One-way ANOVAs indicated no further overall group differences with respect to angry, happy, sad, scared, and surprised expressions, $P_s > 0.05$.

To investigate overall recognition biases, we calculated the number of mistakes across the categories for each facial expression. For example, we calculated how many photographs the participants incorrectly classified as angry. We found a significant group difference with respect to misinterpreting expressions as angry, $F(2, 59) = 6.4$, $P = 0.003$. BDD participants misinterpreted significantly more faces as angry than did controls, $P = 0.002$ (Table 2). The difference between BDD and OCD participants fell short of significance, $P = 0.10$. To investigate the magnitude of this result, we computed effect size Cohen's d and found an effect size of $d = 0.66$. Thus, this difference may have been significant if our sample was larger. The difference between OCD participants and controls was also nonsignificant, $P = 0.52$. No group differences occurred with respect to disgusted, happy, neutral, sad, scared, and surprised expressions, $P_s > 0.05$.

To examine whether the overall recognition bias for angry expressions were not simply caused by a disgust–anger confusion, we further calculated—across all emotion categories except the category ‘disgust’—how many photographs the participants incorrectly classified as angry. We found a group difference with respect to misinterpreting non-disgusted expressions as angry, $F(2, 59) = 3.69$, $P = 0.03$. Specifically, BDD participants still misinterpreted significantly more (non-disgusted) faces as angry than did controls, $P = 0.03$. No differences between BDD and OCD participants and between OCD participants and controls were found, $P_s > 0.05$.

3. Discussion

Results of the BFRT indicate that the BDD group, OCD group and controls exhibited no neuropsychological deficits in facial feature processing. Thus, the following results were related to deficits in the recognition of emotional expressions rather than general neuropsychological deficits in face recognition. Moreover, inconsistent with our hypothesis, BDD patients were not less accurate in recognizing faces, relative to OCD patients and controls. This finding is inconsistent with the finding of Deckersbach et al. (2000) who found that BDD patients, relative to controls, focused on isolated details rather than global aspects of a complex figure.

Results of the emotion recognition task indicated that BDD patients, relative to healthy controls, performed worse at identifying emotional expressions. BDD patients were impaired in identifying disgusted expressions, compared to controls, whereas there was no difference between OCD patients and controls, nor between BDD and OCD patients. Inconsistent with Sprengelmeyer et al. (1997), who found disgust recognition deficits in an OCD sample ($n = 12$), we did not find these deficits in our slightly larger sample ($n = 20$),

relative to controls. However, our findings are consistent with recent findings of Kornreich et al. (2001) and Parker et al. (in press) who also failed to find disgust recognition deficits in OCD, relative to healthy controls. Thus, the findings of Sprengelmeyer et al. (1997) should be interpreted with caution given their small sample size.

Altogether, BDD patients have more difficulties interpreting facial expressions than do OCD patients and controls. Although BDD patients are as accurate as OCD patients and controls in identifying angry expressions, they misinterpret other facial expressions, especially disgusted ones, more often as angry than do controls. The confusion of disgust and anger is common among healthy individuals (Ekman & Friesen, 1976). However, further analyses indicated that the overall emotion recognition bias for angry expressions still existed after we excluded disgusted expressions. In other words, this bias is not simply caused by an anger–disgust confusion.

OCD patients also exhibited an emotion recognition bias for angry expressions, suggesting that—although BDD patients seem to exhibit a stronger emotion recognition bias for angry facial expressions—this bias might also be found in a broader spectrum of psychological disorders such as OCD.

What are the clinical implications of this study? Poor insight and ideas of reference, common in BDD, might be related to emotion recognition biases for angry expressions. For example, the misinterpretation of other people's facial expressions as negative might foster beliefs that others are repelled by one's ugliness and, thus, might contribute to the maintenance of BDD. However, larger scale research needs to investigate possible causal relationships between poor insight, ideas of references and emotion recognition biases for angry facial expressions. Furthermore, researchers have discussed whether BDD should be classified as a somatoform disorder or as an anxiety disorder (especially as a subtype of OCD or social phobia; Phillips et al., 1993). Thus, future studies need to directly compare emotion recognition deficits among BDD, OCD and social phobia with further investigate this issue.

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