Emotion recognition bias for contempt and anger in body dysmorphic disorder

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Abstract

Body dysmorphic disorder (BDD) patients are preoccupied with imagined defects or flaws in appearance (e.g., size or shape of nose). They are afraid of negative evaluations by others and often suffer significant morbidity including hospitalization and suicide attempts. Many patients experience ideas of reference, e.g., they often believe others take special notice of their "flaw".

Facial expressions play an important role in conveying negative or positive feelings, and sympathy or rejection. In this study, we investigated emotion recognition deficits in 18 BDD patients and 18 healthy controls. Participants were presented with two questionnaires accompanying facial photographs. One questionnaire included self-referent scenarios ("Imagine that the bank teller is looking at you. What is his facial expression like?"), whereas the other one included other-referent scenarios ("Imagine that the bank teller is looking at a friend of yours," etc.), and participants were asked to identify the corresponding emotion (e.g., anger, contempt, neutral, or surprise). Overall, BDD patients, relative to controls, had difficulty identifying emotional expressions in self-referent scenarios. They misinterpreted more expressions as contemptuous and angry in self-referent scenarios than did controls. However, they did not have significantly more difficulties identifying emotional expressions in other-referent scenarios than controls.

Thus, poor insight and ideas of reference, common in BDD, might be related to a bias for misinterpreting other people's emotional expressions as negative. Perceiving others as rejecting might reinforce concerns about one's personal perceived ugliness and social desirability.
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1. Introduction

Body Dysmorphic Disorder (BDD) patients are distressed about imagined or slight physical defects in their appearance, most commonly "flaws" in one's own face (American Psychiatric Association [APA], 1994). Associated features are frequent checking in mirrors and other reflective surfaces (e.g., store windows) and excessive grooming behaviors (e.g., hair combing, makeup application, or skin picking). Although classified as a somatoform disorder, BDD patients, like sufferers of other anxiety disorders such as social phobia, are often characterized by fear of negative evaluation by others (e.g., Buhlmann et al., 2002a; Hollander et al., 1992). BDD patients, however, are also characterized by a strong fear of appearance-related negative evaluation.

BDD patients may also experience ideas of reference related to their "flaw" (APA, 1994). That is, they are often convinced that others take special notice of the "flaw" and talk about or mock it. If insight is very poor, patients may qualify for an additional diagnosis of delusional disorder, somatic subtype. However, it is possible

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that both delusional and nondelusional forms of BDD reflect one single disorder with different degrees of insight (Phillips et al., 1994). Moreover, BDD is associated with significant morbidity, including social or occupational impairment, being housebound, hospitalization and suicide attempts (e.g., Phillips et al., 1993).

Previous research has shown that selective information processing might play an important role in the maintenance or etiology of psychological disorders (for review, see Williams et al., 1997). For example, BDD patients, in contrast to healthy controls, selectively attended to BDD-related words such as "attractive" or "ugly". This may explain why BDD patients are so preoccupied with both their beauty ideal and perceived defect (Buhlmann et al., 2002a). Furthermore, compared to OCD patients and healthy controls, BDD patients interpreted a range of ambiguous situations (BDD-related, social, and general) as threatening, whereas OCD patients only exhibited a negative interpretive bias in ambiguous general situations (Buhlmann et al., 2002b). Thus, it may be that selective processing of threat leads to increased anxiety in these situations, and BDD patients might, as a result, avoid them.

Cooper (1997) asked eating-disordered patients and healthy controls to rate ambiguous scenarios that were either self-referent (including themselves in the situation; e.g., "Two friends are giggling and whispering behind you. They're saying something uncomplimentary about you. What do you think they're saying?") or other-referent (including another person in the situation; e.g., "Two friends are giggling and whispering behind your friend...."). Half of the scenarios described negative events and the other half described positive events. Participants were given three possible interpretations, one of which was weight-related (e.g., "that you look fat and unattractive"). Cooper (1997) found that the eating-disordered group exhibited only a negative interpretive bias in self-referent scenarios. However, the reversed pattern was found in other-referent scenarios: They exhibited a positive interpretive bias if they imagined other people in that ambiguous situation.

Most researchers investigating selective information processing used words as stimuli, and there is little research investigating "real life" stimuli such as faces. However, it is advantageous to use more ecologically valid stimuli to investigate information-processing abnormalities (e.g., Lundh and Öst, 1996). Thus, recently, ecological valid stimuli such as pictures, faces or facial expressions have been applied to the field of experimental psychopathology (e.g., Constantine et al., 2001; Foa et al., 2000; Mansell et al., 1999).

Specifically, facial expressions are an important means to express negative or positive thoughts, feelings, and attitudes such as sympathy and rejection, and researchers have investigated the ability to recognize facial expressions in individuals with psychiatric disorders.

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 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 BDD.

Investigating emotion recognition in BDD, we recently found that BDD patients, overall, performed significantly poorer in recognizing other people's emotional expressions, relative to healthy controls (Buhlmann et al., 2004). Moreover, relative to controls, BDD patients exhibited a recognition bias for angry facial expressions (e.g., they misidentified neutral expressions as angry). These recognition biases for threatening facial expressions might help us understand why psychiatric patients, especially those with an excessive fear of negative evaluation by others such as BDD patients, develop or maintain these fears and consequently tend to avoid social situations.

To our knowledge, emotion recognition biases in self-referent and other-referent scenarios have never been examined in BDD. Thus, in the current study, we investigated whether BDD patients, relative to healthy controls, are characterized by recognition biases for threatening facial expressions. We further investigated whether BDD patients only exhibit this recognition bias in self-referent situations (e.g., *Imagine yourself being in this situation*) or also in other-referent situations (e.g., *Imagine a friend being in this situation*).

2. Methods

2.1. Participants

The BDD group was comprised of 18 outpatients (4 men, 14 women), all of whom were diagnosed with BDD (DSM-IV; APA, 1994). Diagnoses were confirmed by structured clinical interviews (SCID; First et al., 1995). BDD participants were preoccupied with the following body part(s): eyes ($n = 5$), hair ($n = 5$), nose ($n = 5$), teeth ($n = 4$), skin ($n = 4$), stomach ($n = 3$), arms ($n = 2$), breasts ($n = 2$), feet ($n = 2$), chest ($n = 1$), ears ($n = 1$), eyebrows ($n = 1$), lips ($n = 1$), muscle size ($n = 1$), and thighs ($n = 1$). SCID interviews revealed the following comorbid diagnoses: social phobia ($n = 6$), major depression ($n = 4$), OCD ($n = 5$), anorexia nervosa ($n = 3$), generalized anxiety disorder ($n = 3$), specific phobia ($n = 2$), bulimia nervosa ($n = 1$), dysthymia ($n = 1$), panic disorder ($n = 1$), and posttraumatic stress disorder ($n = 1$). If BDD patients had a comorbid diagnosis, BDD had to be the primary concern. The

mean age of onset was 14.19 years (SD = 2.34), ranging from 10 to 19 years. Eleven BDD patients were receiving cognitive-behavioral therapy at the time of testing, and data on treatment history of two BDD patients were missing. The control group was comprised of 18 participants (3 men, 15 women). The SCID confirmed the absence of any current or past psychiatric disorder (DSM-IV; APA, 1994). The BDD group and control group did not differ with respect to age, $t(34) = 0.21$, $p = 0.84$ (BDD group: $M = 28.39$, SD = 9.22; Controls: $M = 29.00$, SD = 8.32), and gender, $\chi^2 (1) = 0.18$, $p = 0.67$. However, the groups differed with respect to years of education, $t(34) = 2.50$, $p = 0.02$ (BDD group: $M = 15.22$, SD = 1.56; Controls: $M = 16.44$, SD = 1.21). SCID interviews were conducted by a doctoral-level clinician and a trained Master-level clinician. BDD patients were recruited at the BDD Clinic at the Massachusetts General Hospital (MGH). Control participants were recruited through posted flyers in the Boston area. All participants were native English speakers. Compensation for participating in the study was $50.

2.2. Materials and methods

2.2.1. Emotion Recognition Questionnaires

The stimulus material consisted of 24 photographs, each showing emotional expressions. The photographs were drawn from the Ekman and Friesen (1975, 1976) series. Each emotion was presented by 6 different models (3 females and 3 males), and each condition (anger, disgust, neutral, surprise) was presented 6 times. Each questionnaire (self-referent versus other-referent) consisted of 24 items. Each item described a scenario (e.g., *Imagine that this bank teller is looking in your direction*), followed by the instruction to rate the person's emotion (*What is his/her emotional expression like?*). The participant then circled the answer that best described the person's emotional expression (anger, contempt, disgust, fear, happiness, neutral, sadness, surprise). Thus, although participants were only shown photographs with emotional expressions displaying anger, disgust, surprise or neutral expressions, they were given the choice to rate them as displaying anger, contempt, disgust, fear, happiness, neutral, sadness, and surprise.

The total score for correctly identifying the emotion could range from 0 to 24 for each questionnaire (self-versus other-referent), whereas for each emotion subcategory, the score could range from 0 to 6.

Moreover, for each scenario, participants rated whether the other person's emotional expression was caused by the participant (self-attributional, score = 0) or by the situation or other reasons (other-attributional, score = 1). In other words, the higher the total score for attribution, the more often the participant had attributed the person's emotion to the situation and not to him or herself or to a friend. The total score for attribu-

tion could range from 0 to 24, separately for each questionnaire (self-versus other-referent).

2.2.2. Psychometrics

Participants completed the following questionnaires: the Beck Depression Inventory (BDI-II; Beck et al., 1996) and the Body Dysmorphic Disorder Modification of the YBOCS (BDD-YBOCS; Phillips et al., 1997).

The *Beck Depression Inventory II* (BDI-II) 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. Tests of internal consistency reveal alpha coefficients between 0.92 and 0.93. Furthermore, the BDI-II has a high correlation with the Hamilton Psychiatric Rating Scale for Depression ($r = 0.71$; Beck et al., 1996).

The *Body Dysmorphic Disorder Modification of the YBOCS* (BDD-YBOCS) 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. Moreover, the BDD-YBOCS examines the degree of insight (i.e., how convinced the patient is that the "defect" really exists) and avoidance due to the perceived defect. Intraclass correlation coefficients reveal that the inter-rater reliabilities both for the total score and for the individual item score are very high ($rs = 0.79–1.00$; Phillips et al., 1997).

2.2.3. Procedure

The study protocol was reviewed by the institutional review committee at Massachusetts General Hospital. 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 asked to complete two questionnaires (self-referent versus other-referent) in a counter-balanced order, one at a time.

Table 1
Psychometric and demographic data

Variable	BDD group (N = 18)		Control group (N = 18)	
	M	SD	M	SD
BDD-YBOCS	24.8ₐ	8.2	–	–
BDI-II	16.8ₐ	10.6	1.1_b	1.5
Age	28.9ₐ	9.2	29.0ₐ	8.3
Education	15.2ₐ	1.6	16.2_b	1.0

Notes: BDD-YBOCS = Body Dysmorphic Disorder Modification of the YBOCS; BDI-II = Beck Depression Inventory-Second Edition; Age in years; Education = years of education. Means sharing subscripts do not differ ($ps > 0.05$, Bonferroni-corrected).

After the emotion recognition task was finished, participants filled out the remaining inventories assessing BDD symptoms and depression (see Table 1). Finally, participants were debriefed about the purpose of the research.

3. Results

To examine whether BDD patients, overall, were less accurate in identifying emotional expressions, we computed a total score for the correct responses, separately for each questionnaire (self-referent versus other-referent), and conducted Bonferroni-corrected t-tests (see Table 2). As expected, BDD patients, relative to controls, were significantly less accurate in identifying emotional expressions in self-referent scenarios, $t(34) = 2.90$, $p = 0.007$, effect size Cohen's $d = 0.97$. No significant group difference was obtained with respect to other-referent scenarios, indicating that BDD patients were not significantly worse in identifying emotional expressions, relative to controls, $t(34) = 1.88$, $p = 0.07$, $d = 0.64$. However, given the medium effect size, this difference may have been significant if we had tested a larger sample size.

We further submitted the emotion recognition data, separately for each questionnaire, to Analyses of Variance (ANOVAs) with repeated measurements on Emotion Stimulus Category (anger, disgust, neutral, surprise). For self-referent scenarios, we found a significant main effect for Group, $F(1,34) = 8.03$, $p = 0.008$, and a significant Group by Emotion Stimulus Category interaction, $F(3,102) = 2.96$, $p = 0.04$. However, the

main effect for Emotion Stimulus Category fell short of significance, $F(3,102) = 2.40$, $p = 0.07$. Post hoc t-tests indicated that BDD patients were less accurate in identifying neutral expressions in self-referent scenarios than were controls, $t(20.6) = 3.42$, $p = 0.003$, $d = 1.12$. The group difference with respect to angry expressions fell short of significance, $t(34) = 1.72$, $p = 0.09$, $d = 0.62$. No further group differences were found with respect to disgust, $t(34) = 0.56$, $p = 0.58$, $d = 0.18$, and surprise, $t(34) = 0.31$, $p = 0.76$, $d = 0.10$. For other-referent scenarios, we did not find significant main effects for Group and Emotion Category, nor did we find a significant Group by Emotion Category interaction, $p\text{s} > 0.05$.

3.1. Emotion recognition error pattern in self-referent scenarios

To investigate with which emotion category BDD patients incorrectly misidentified the neutral expressions, we submitted the data of the emotion stimulus category "neutral" to a Multivariate Analysis of Variance (MANOVA) with Emotion Response Category (anger, contempt, disgust, fear, happiness, sadness, surprise) as the dependent variables. As evident from Fig. 1, we found that BDD patients, relative to controls, misinterpreted significantly more neutral expressions as contemptuous, $F(1,34) = 12.35$, $p = 0.001$, $d = 1.18$, and significantly more neutral expressions as angry, $F(1,34) = 4.71$, $p = 0.04$, $d = 0.71$. Furthermore, we obtained a trend suggesting that BDD patients misinterpreted neutral expressions somewhat more often as

Table 2
Means and standard deviations of emotion recognition data

Variable	BDD group (N = 18)		Control group (N = 18)	
	M	SD	M	SD
Self-referent scenarios				
Total	16.8_a	3.1	19.3_b	1.9
Neutral	3.8_a	1.8	5.3_b	0.6
Surprised	4.8_a	1.3	4.9_a	0.9
Disgusted	4.1_a	1.1	4.3_a	1.3
Angry	4.1_a	1.1	4.7_a*	0.8
Other-referent scenarios				
Total	18.1_a	3.1	19.9_a**	2.5
Neutral	4.2_a	1.7	5.3_a	1.2
Surprised	4.8_a	1.2	5.2_a	1.2
Disgusted	4.4_a	1.2	4.5_a	1.2
Angry	4.7_a	1.1	4.9_a	1.2

Notes: Total = total score; neutral = neutral expressions; surprised = surprised expressions; disgusted = disgusted expressions; angry = angry expressions; means sharing subscripts do not differ ($p\text{s} > 0.05$, Bonferroni-corrected).
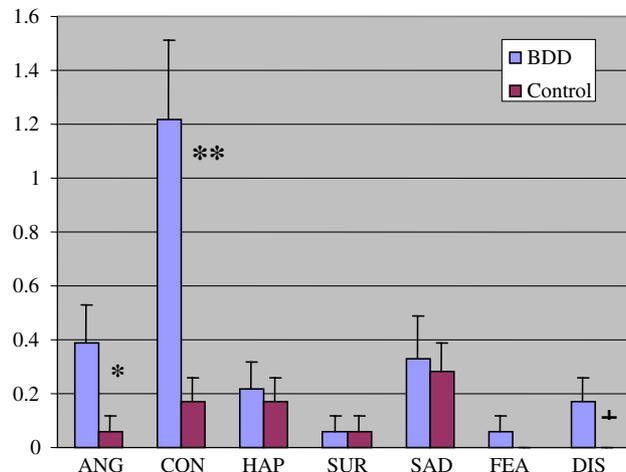* $p = 0.09$.
** $p = 0.07$.

Fig. 1. *Emotion Recognition Error Pattern in Self-Referent Scenarios. Notes*: ANG = neutral expressions misidentified as angry; CON = neutral expressions misidentified as contemptuous; HAP = neutral expressions misidentified as happy; SUR = neutral expressions misidentified as surprised; SAD = neutral expressions misidentified as sad; FEA = neutral expressions misidentified as fearful; DIS = neutral expressions misidentified as disgusted; ** – $p = 0.001$; * – $p < 0.05$; + – $p = 0.07$.

disgust than controls did. However, this difference fell short of significance, $F(1,34) = 3.40$, $p = 0.07$, $d = 0.63$. No further differences were obtained ($ps > .17$, ds between 0.00 and 0.35).

3.2. Self-referent versus other-referent scenarios

To investigate whether there were differences between emotion recognition ratings for the categories "contempt", "anger", and "neutral" in self-referent versus other-referent scenarios, we computed paired t tests, separately for BDD patients and controls. Within the BDD groups, we found significant differences with respect to "contempt", $t(17) = 2.24$, $p = 0.04$, $d = 0.62$, indicating that BDD patients rated more emotional expressions as contemptuous in self-referent scenarios than they did in other-referent scenarios. No difference was obtained with respect to "anger", $t(17) = 1.59$, $p = 0.13$, $d = 0.35$, and "neutral", $t(17) = 1.4$, $p = 0.18$, $d = 0.26$. Within the control group, no significant differences between self- and other-referent scenarios were found with respect to "contempt", $t(17) = 0.68$, $p = 0.51$, $d = 0.14$, "anger", $t(17) = 0.37$, $p = 0.72$, $d = 0.08$, and "neutral", $t(17) = 0.21$, $p = 0.83$, $d = 0.05$.

3.3. Attribution

To examine whether BDD patients, across all emotion categories, attributed other people's emotional expressions more often to themselves than they did to the situation or other reasons than did controls, we conducted t-tests. BDD patients attributed other people's expressions significantly more often to themselves than did controls, $t(34) = 2.04$, $p < 0.05$, $d = 0.68$. Moreover, no difference was obtained with respect to other-referent scenarios, $t(34) = 0.93$, $p = 0.36$, $d = 0.32$.

3.4. Comorbid diagnoses

To investigate whether comorbid diagnoses such as social phobia and depression may have influenced our results, we excluded BDD patients with comorbid social phobia (or depression, respectively) and computed simple t tests between BDD patients and healthy controls comparing the total scores for self-referent and other-referent scenarios. With respect to a comorbid diagnosis of social phobia, we still found a significant difference with respect to self-referent scenarios, $t(27) = 2.77$, $p = 0.01$, $d = 0.98$, suggesting that comorbid social phobia did not have a significant influence on our results. The group difference with respect to other-referent scenarios was nonsignificant, $t(27) = 1.49$, $p = 0.15$, $d = 0.55$, confirming our original results.

With respect to a comorbid diagnosis of depression, the group difference fell short of significance with respect to self-referent scenarios, $t(26) = 1.82$, $p = 0.08$,

$d = 0.68$. Thus, comorbid depression may have influenced our results. However, given the large effect size, this result may have been significant using a larger sample size. With respect to other-referent scenarios, we did not find a significant difference between the groups, $t(26) = 1.51$, $p = 0.14$, $d = 0.57$, confirming our original results.

4. Discussion

The aim of this study was to investigate whether BDD patients, relative to healthy controls, exhibit emotion recognition biases for negative emotions, such as contempt. Moreover, we investigated whether BDD patients, relative to controls, exhibit these biases in self-referent situations only (i.e., if they imagined themselves being in that situation) or also in other-referent situations (i.e., if they imagined somebody else being in that situation).

The main findings can be summarized as follows: BDD patients, overall, had more difficulty identifying emotional expressions in self-referent situations. This finding is consistent with our previous finding (Buhlmann et al., 2004) that also showed overall emotion recognition deficits in BDD patients, relative to healthy controls. When participants imagined a friend being in the same situation, BDD patients, however, were only marginally less significantly accurate than healthy individuals in identifying emotional expressions.

Furthermore, BDD patients rated significantly more neutral expressions as angry in self-referent scenarios, which is consistent with our previous findings (Buhlmann et al., 2004). We also found that BDD patients, relative to controls, rated significantly more neutral emotional expressions as contemptuous in self-referent scenarios as compared to other-referent scenarios. This finding is consistent with previous research on other body image disorders. Indeed, Cooper (1997) found that eating-disordered patients only exhibited a negative interpretive bias if they imagined themselves in the situation but not if they imagined somebody else being in that same situation.

Although contempt is related to other negative facial expressions such as anger and disgust, it differs from those emotions because it includes elements of condescension and superiority toward another person. Experiencing others as contemptuous has been related to medical and marital problems (e.g., Gottman et al., 2001) and might have serious implications in BDD as well. Specifically, ideas of reference which are common in BDD might be related to emotion recognition biases for contempt. Moreover, the misinterpretation of other people's facial expressions as contemptuous might foster beliefs that others are repelled by one's perceived

ugliness and, thus, might contribute to the maintenance of BDD. Thus, it may be important to address emotion recognition deficits and biases in psychotherapy settings and training programs as has successfully been done in patients with schizophrenia (Frommann et al., 2003) and in patients with acquired brain injury (Guercio et al., 2004).

We further investigated whether BDD patients attributed more facial expressions to themselves than did controls. The difference for attributional styles in self-referent scenarios fell short of significance. However, given the large effect size of $d = 0.68$, it is possible that this difference would have reached significance if we had tested a larger sample. No significant difference was found with respect to attributional styles in other-referent scenarios.

The current study has several limitations. First, it is possible that comorbidities (especially comorbid depression) may have influenced our results. Second, we did not include a psychiatric control group such as individuals with obsessive-compulsive disorder, social phobia or an eating disorder. Thus, future research is warranted to replicate these findings in a BDD sample without comorbidities and to compare them with other psychiatric disorders. For example, it may be that these emotion recognition biases for contempt are not specific to BDD but can be applied to a broader range of psychiatric disorders characterized by a strong fear of negative evaluation by others. Third, it is possible that the treatment length of those patients receiving cognitive behavioral therapy at the time of testing may have influenced emotion recognition biases. Also, the results of this study may have been influenced by experimenter demand effects. Lastly, participants were instructed to rate four emotion categories (neutral, disgusted, angry, and surprised) in terms of eight possible emotion response categories (anger, contempt, disgust, fear, happiness, neutral, sadness, and surprise). Thus, the results might have been different if all eight emotion categories were represented in the pictures.

Future research is needed to replicate our findings and to investigate the above-mentioned limitations of this study. For instance, without further study, it is impossible to determine whether cognitive-behavioral therapy or various other forms of treatment decrease or eliminate emotion recognition biases in BDD. This could be further analyzed by using paradigms that may partly control for response biases (e.g., presenting photographs varying in emotional expressions while recording psychophysiologic responses such as heart rate and skin conductance).

Overall, the current findings contribute to the literature regarding emotion recognition biases. The results suggest that individuals with BDD have difficulty correctly interpreting emotional expressions toward themselves, especially with regard to contempt and anger.

This field of study is important for understanding psychological symptoms, and it is clear that further research should be conducted with regard to emotion recognition biases in individuals with BDD.

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