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Psychological Treatment of Social Anxiety Disorder Improves Body Dysmorphic Concerns

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Abstract

Social anxiety disorder and body dysmorphic disorder are considered nosologically distinct disorders In contrast, some cognitive models suggest that social anxiety disorder and body dysmorphic disorder share similar cognitive maintenance factors. The aim of this study was to examine the effects of psychological treatments for social anxiety disorder on body dysmorphic disorder concerns. In Study 1, we found that 12 weekly group sessions of cognitive-behavioral therapy led to significant decreases in body dysmorphic symptom severity. In Study 2, we found that an attention retraining intervention for social anxiety disorder was associated with a reduction in body dysmorphic concerns, compared to a placebo control condition. These findings support the notion that psychological treatments for individuals with primary social anxiety disorder improve co-occurring body dysmorphic disorder symptoms.

Keywords

social anxiety disorder; body dysmorphic disorder; attention bias; cognitive bias modification

1. Introduction

A growing body of research suggests that BDD shares some similarities with social anxiety disorder (SAD) in diagnostic features, demographic characteristics, course and onset, clinical characteristics, and treatment outcome (Fang & Hofmann, 2010; Fang et al., 2011; Kelly, Walters, & Phillips, 2010). Prevalence studies show that among individuals with SAD, 4.8-12% also meet criteria for BDD, and among individuals with BDD, 12-68.8% also meet criteria for SAD (Fang & Hofmann, 2010).

Historically, most of the research on body dysmorphic disorder (BDD) has emphasized its relationship to obsessive-compulsive disorder (OCD). Cognitive models of both OCD and BDD propose that maladaptive cognitions maintain and exacerbate these disorders (Rachman, 1997; Wilhelm & Neziroglu, 2002; Wilhelm & Steketee, 2006). A further discussion of the relationship between BDD and OCD, and the inclusion of BDD on the

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putative obsessive-compulsive spectrum is discussed elsewhere (for a review, see Phillips et al., 2010). The current paper will focus on the relationship between BDD and SAD.

Several models of BDD have strong theoretical overlap with models of SAD. For example, cognitive-behavioral models of BDD emphasize dysfunctional cognitive processes (e.g., negative appraisals of body image, self-focused attention, post-event rumination) and maladaptive behaviors that maintain BDD (e.g., mirror checking, social avoidance, comparing appearance with others) (Wilhelm, Phillips, & Steketee, in press; Veale, 2004), which are consistent with processes that are proposed to maintain SAD (Hofmann, 2007; Rapee & Heimberg, 1997). In particular, cognitive-behavioral models of BDD highlight the cognitive aspects of the disorder such as the view of oneself as an aesthetic object, which contributes to distorted mental imagery from an observer perspective, self-focused attention, meta-cognitions about the importance of self-focused attention, and a loss of a self-serving bias (Neziroglu, Khemlani-Patel, & Veale, 2008). This literature shares strong similarities with cognitive behavioral models of SAD, which emphasize the view of the self as a social object and leads to hypervigilance of social threat cues (Clark & Wells, 1995; Hofmann, 2007; Rapee & Heimberg, 1997). For both BDD and SAD, it may be that the mental representation of the self is generated from both internal cues (e.g., physical symptoms) and external environmental cues (e.g., facial expressions).

In a study of BDD among individuals with anxiety disorders, Wilhelm and colleagues (1997) found that BDD was most common among individuals with SAD (12%) and less common among individuals with OCD (7.7%), generalized anxiety disorder (6.7%), and panic disorder (1.5%). Moreover, among all individuals with comorbid SAD and BDD in that study, the onset of SAD preceded that of BDD. This suggests that the presence of SAD may be related to the development of subsequent BDD concerns. Taken together, these findings suggest that BDD symptoms may be elevated among individuals with SAD and that SAD may be a risk factor for the development of BDD symptoms and full-blown BDD.

The treatment outcome literature further suggests that cognitive-behavioral therapy (CBT) is an efficacious psychological treatment for both BDD (e.g., Veale et al., 1996; Wilhelm, Otto, Lohr, & Deckersbach, 1999) and SAD (e.g., Hofmann & Otto, 2008). One study, which examined the effect of CBT for BDD and included SAD symptom outcome measures, found that compared to the wait list control group, individuals who received CBT had significantly less SAD symptoms at post-treatment (Veale et al., 1996). To our knowledge, no study has yet investigated the effect of CBT for SAD on BDD symptoms.

Furthermore, attentional mechanisms have been the subject of much research attention for both disorders. One study suggested that individuals with BDD selectively attended to appearance-related information and emotional appearance-unrelated information (Buhlmann et al., 2002). Similarly, studies suggest that individuals with SAD have an attentional bias, as demonstrated by faster detection of probes replacing social threat words than of those replacing neutral or positive words in a modified dot-probe paradigm (Amir et al., 2003). As such, an emerging line of research has begun to evaluate the potential therapeutic benefit of modifying attentional biases in SAD using attention bias modification interventions (Amir et al., 2008). Studies suggest that attention bias modification interventions, or attention retraining, leads to significantly reduced attentional biases in individuals with SAD, and improves social anxiety symptom severity (Amir et al., 2008; Amir et al., 2009; Schmidt et al., 2009). Recent meta-analyses, however, suggest that there may be mixed evidence for the efficacy of cognitive bias modification, and that the effect size of attention retraining for anxiety disorders may be smaller than what other studies suggest (Beard, Sawyer, & Hofmann, 2012; Hallion & Ruscio, 2011). Nevertheless, attention retraining is relevant to explore in BDD given the hypotheses set forth by cognitive-behavioral models of BDD that

individuals with BDD may be particularly attentive to threatening cues with a socio-evaluative component (e.g., threatening faces), and in light of existing evidence showing an attentional bias to appearance-related information.

The purpose of the current paper was to examine the effect of CBT and attention retraining for SAD on BDD-related cognitions and symptoms in individuals with a primary diagnosis of SAD. In Studies 1 and 2, we examined the effect of group CBT for SAD (Study 1) and an attention retraining intervention for SAD (Study 2) on BDD symptoms. We hypothesized that treatment in both studies would lead to a significant reduction of overall BDD symptoms in patients with primary SAD and co-occurring subclinical symptoms of BDD. In both studies, BDD symptoms were measured using the Body Dysmorphic Disorder Symptom Scale (BDD-SS; Wilhelm, 2006; Wilhelm et al., in press), which provides an overall severity score, as well as scores in seven different symptom domains. In particular, we hypothesized that the symptom domain reflecting BDD-related cognitions, or the "beliefs about appearance" subscale, would be significantly reduced following treatment in both studies.

2. Study 1

2.1. Participants

The initial sample consisted of 85 adult patients (18 years of age or older) who were participating in a multi-site clinical trial examining the efficacy of d-cycloserine (DCS) augmentation of cognitive-behavioral therapy for SAD. In this trial, participants were randomly assigned to receive cognitive-behavioral therapy augmented with either DCS or pill placebo. The main results of this trial are reported elsewhere (Hofmann et al., in press). There were no differences between DCS and Placebo in any demographic variables, except that more males received DCS-augmented CBT than pill placebo-controlled CBT (Hofmann et al., in press). Furthermore, the groups did not differ in BDD symptoms at pre-treatment, t (25) = -.89, p =.38. There was also no effect of DCS on BDD symptoms between pre- and post-treatment (Wilks' Lambda = .97, F(1, 25) = .661, p = .42). A greater proportion of participants in the current study were randomized to receive DCS (63%) than Placebo (37%), but the groups did not differ by gender (χ^2 (1, 27) = 1.56, p = .21).

Participants were treatment-seeking individuals presenting to an outpatient clinic specializing in anxiety disorders, or were recruited through online advertisements and flyers distributed in the community. Diagnostic status for participants was determined via administration of the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV-L) or the Mini-Anxiety Disorders Interview Schedule for DSM-IV (Mini-ADIS; Brown, DiNardo, & Barlow, 1994) at the time of their baseline visit for the study. Diagnostic interviews were conducted by masters-level clinicians. Reliability and integrity of the diagnostic interviews were observed by providing clinicians with weekly supervision and feedback about approximately 20% of audiotaped interviews. All participants met diagnostic criteria for SAD, generalized subtype, as the principal diagnosis, which was defined as the disorder that was most distressing or interfering to the patient. Only one participant met full criteria for a comorbid diagnosis of BDD. The rest of the sample did not meet full diagnostic status for BDD and indicated only subclinical symptoms of BDD. Participants also met a severity cut-off of 60 or greater on the Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987) and had no clinically significant abnormalities based on a physical examination, electrocardiogram, and laboratory findings.

Exclusion criteria included: lifetime history of bipolar disorder, schizophrenia, psychosis, delusional disorders or obsessive-compulsive disorder; eating disorder or posttraumatic stress disorder in the past six months; organic brain syndrome, mental retardation or other

cognitive dysfunction that could interfere with the ability to engage in therapy; history of substance abuse or dependence (except for nicotine and caffeine); significant suicidal ideation; concurrent psychotropic medication (e.g., antidepressants, anxiolytics, beta blockers) for at least two weeks prior to study baseline visit or concurrent use of isoniazid; significant personality dysfunction likely to interfere with study participation; serious medical illness or instability for which hospitalization was likely the following year; history of seizures; pregnancy; concurrent psychotherapy initiated within three months of baseline, or ongoing psychotherapy directed toward treatment of SAD; previous non-response to exposure therapy; and, history of head trauma. The final sample consisted of 27 patients. The remaining subjects were excluded from analyses due to insufficient data on BDD symptoms before and after CBT.

2.2. Measures

Participants completed pre- and post-treatment questionnaires assessing social anxiety symptoms using the LSAS and body dysmorphic disorder symptoms using the Body Dysmorphic Disorder Symptom Scale (BDD-SS; Wilhelm, 2006; Wilhelm et al., in press).

The LSAS is a clinician-administered 24-item scale that assesses fear and avoidance of social interaction and performance situations in the past week. The measure yields two subscales (fear and avoidance) as well as a total symptom severity score. The LSAS has demonstrated good psychometric properties with regard to internal consistency (Cronbach's alphas ranging from .82 to .92) and convergent validity with other social anxiety measures such as the Social Interaction Anxiety Scale and Social Phobia Scale (Clark et al., 1997; Heimberg et al., 1999). Example items include "speaking up at a meeting," "participating in small groups," and "meeting strangers." In the current study, a severity cut-off score of 60 or greater was used as an inclusion criterion, as this reflects the standard clinical threshold of SAD (Heimberg et al., 1999). The LSAS was administered by a clinician at pre- and post-treatment time points. Clinicians were blinded to patient's treatment condition.

The BDD-SS is a self-report questionnaire that measures the presence, frequency, and distress of BDD-related symptoms in the past week. The questionnaire is organized in a checklist format, such that 55 individual symptom items are scored as a binary variable (yes or no). There are a total of seven symptom subscales (checking and comparing, fixing and correcting, weight and shape concerns, skin picking and hair pulling, avoiding and hiding, seeking cosmetic surgery, and beliefs about appearance), and each symptom subscale is scored on a 1-10 Likert scale. The measure also yields a total BDD symptom severity score. Example items for the checking and comparing subscale were: "checking or comparing certain parts of my body" and "comparing my appearance to others' appearance (in person, in pictures or in the media)." Example items for the avoiding and hiding subscale were: "avoiding mirrors or reflective surfaces" and "hiding appearance (with make-up, clothing, hairstyle, jewelry, hats, hands, or body position)." Example items for the beliefs about appearance subscale were: "I believe others are thinking of my appearance" and "what I look like is an important part of who I am." The total score of the BDD-SS ranges from 0-70. Based on the current sample, the BDD-SS at pretreatment had high internal consistency for the severity scale (Cronbach's $\alpha = .82$), as well as for the symptom scale (Cronbach's $\alpha = .89$). The BDD-SS at post-treatment also had high internal consistency for the severity scale (Cronbach's $\alpha = .81$), and for the symptom scale (Cronbach's $\alpha = .88$).

2.3. Treatment

Treatment was based on the group CBT protocol described in detail elsewhere (Hofmann, 2007; Hofmann & Otto, 2008). It consisted of 12 weekly group CBT sessions, with 2 therapists and 4-6 patients per group. The first two sessions consisted of psychoeducation

about the nature of anxiety, providing a treatment rationale, describing cognitive distortions, and teaching cognitive restructuring. Session 3-7 consisted of conducting primarily public speaking exposures, with videotape feedback, to expose patients to feared cues. Sessions 8-12 consisted of individually-tailored in-vivo exposures, which were designed to challenge patients' maladaptive beliefs about feared consequences of social mishaps. Exposure exercises throughout the protocol were characterized by social mishap exposures (Fang et al., 2013), which targeted patients' overestimation of social costs, and also emphasized the elimination of avoidance and safety behaviors. Cognitive restructuring and exposure interventions did not specifically target appearance-based concerns. In other words, patients were not instructed to restructure maladaptive thoughts about being ugly or resisting the urge to check, hide, or fix one's appearance.

2.4. Data Analyses

A series of repeated measures ANOVAs were conducted to examine the effect of cognitive-behavioral therapy (across the entire sample) on overall and subscale-specific BDD-SS scores between baseline and post-treatment. A repeated measures ANOVA was also conducted to examine the effect of treatment on LSAS scores between baseline and post-treatment. Chi-square tests were conducted to compare categorical demographic data, and t-tests were used to examine continuous demographic data.

2.5. Results

Demographic characteristics for the sample were as follows: the mean age of the sample was 29.44 years (*SD*: 10.52). The majority of the sample was single (78%) and identified as Caucasian ($n = 19$; 70%). One participant identified as Hispanic (11%), four identified as Black/African American (15%), and three identified as Asian (11%). There was a relatively equal gender ratio (44% female) and the mean age of onset of SAD was 14.37 years (*SD*: 5.87). The mean BDD symptom severity score was 15.72 (*SD*: 10.93) and the mean LSAS symptom severity score was 81.41 (*SD*: 16.33). There were no differences between the final sample and the full sample on any demographic (age, sex, ethnicity, race, marital status, highest educational status, occupational status) or clinical measures (pre-treatment LSAS scores, pre-treatment BDD-SS scores) (all $ps > .05$).

A one-way repeated measures ANOVA was conducted to examine the effect of treatment on overall BDD-SS scores between baseline and post-treatment. There was a significant effect of treatment on BDD-SS scores at baseline and post-treatment, $F(1, 24) = 26.66$, $p < .001$, $\eta_p^2 = .53$. A series of repeated measures ANOVAs were then conducted by BDD symptom subscale. The following symptom subscales showed a significant effect of treatment between the two time points: checking and comparing; weight and shape concerns; avoiding and hiding; seeking cosmetic surgery; and, beliefs about appearance. See Table 1 for a summary of these analyses.

To examine the effect of treatment on SAD symptoms, we conducted a one-way repeated measures ANOVA with pre-treatment LSAS scores and post-treatment LSAS scores as within-subject factors. There was a significant decline of LSAS scores from pre-treatment and post-treatment, $\eta_p^2 = .76$, $F(1, 26) = 83.18$, $p < .001$.

3. Discussion of Study 1

Previous research suggests that SAD symptoms improve in patients with BDD after undergoing CBT for BDD, even when SAD is not specifically treated (Veale et al., 1996). The current study was the first to investigate the impact of CBT for SAD on BDD symptoms without directly treating BDD in patients with primary SAD and co-occurring BDD

symptoms. We hypothesized that CBT would improve BDD symptoms in patients with SAD.

Results from Study 1 suggest that group CBT for SAD leads to decreases in BDD symptoms in a small clinical sample of patients with primary SAD. In particular, CBT treatment reduced the BDD-related concerns about checking and comparing, weight and shape concerns, avoiding and hiding one's physical appearance, seeking cosmetic surgery, and beliefs about appearance. Notably, the interpretation of Study 1 findings is qualified by some limitations of the BDD-SS measure. Specifically, the psychometric properties on this measure are not yet published, and there is no available evidence demonstrating that each subscale of the BDD-SS specifically load onto a BDD construct at the exclusion of SAD constructs. Therefore, it must be noted that in the current study, cognitive-behavioral treatment for SAD led to decreases in symptom domains that may not necessarily be specific to BDD. Moreover, due to the sub-clinical BDD levels examined in the present sample, the BDD-SS needs to demonstrate sufficient sensitivity to BDD symptoms in the low to mid range in order to support our interpretation of change scores.

Furthermore, traditional CBT protocols for SAD and CBT for BDD have important similarities and differences. The improvement in BDD symptoms shown in the current study may reflect overlapping treatment components or targets of both protocols. For example, both protocols share the same treatment components including psychoeducation, cognitive restructuring, and in-vivo exposures, as well as similar treatment targets, such as maladaptive beliefs about rejection and being evaluated negatively by others. However, the two protocols also have major differences, as CBT for BDD utilizes a modular approach, in part to address the heterogeneity of appearance concerns in BDD (Wilhelm et al., in press). In addition, a core component of CBT for BDD that departs from traditional protocols for SAD involves perceptual mirror retraining, which trains patients to describe their appearance objectively and nonjudgmentally. Therefore, the mechanism behind the observed improvement in BDD symptoms remains unclear. Future research should examine the impact of CBT treatment components on variables that are specific to each disorder, such as fear of appearance-based rejection versus fear of personal rejection, in order to clarify the effects of CBT on shared and distinguishable aspects of SAD and BDD.

Finally, due to the absence of a clinical control group, it remains unclear whether the observed reductions in BDD symptoms are specific to CBT for SAD or generalize to CBT for anxiety disorders in general. Future studies can examine the impact of CBT for other anxiety disorders on BDD symptoms to increase our understanding of the specificity/generalizability of this effect.

Our findings raise the question whether CBT acts on similar cognitive mechanisms that maintain BDD and SAD. As cognitive restructuring instructs the patient to identify and challenge negative and dysfunctional automatic thoughts, patients may have applied this skill not only to dysfunctional thoughts about social situations, but also to dysfunctional thoughts about their appearance. Some of the treatment components, such as videotape feedback and social mishap exposures (Fang et al., 2013), might be particularly effective for challenging and modifying maladaptive body dysmorphic concerns. Many of the social mishap exposures used in the current protocol were intended to target the fear of being negatively evaluated. For example, as part of the exposure practices, patients were often asked to draw attention to themselves by, for example, wearing bright colored wigs or festive holiday Santa hats in public, which may have also addressed fears of being evaluated negatively based on appearance. In sum, these findings suggest that certain techniques in the CBT protocol which target SAD also reduce BDD concerns. In the next study, we

specifically examined whether changes in attention bias of social threat also changes BDD concerns.

4. Study 2

5.1. Participants

Participants were 32 adult participants (18 years of age or older) with generalized SAD who participated in an fMRI study investigating the neural correlates of attention retraining for SAD. Participants were treatment-seeking individuals presenting to an outpatient clinic specializing in anxiety disorders, or were recruited through online advertisements and flyers distributed in the community. As in Study 1, diagnostic status for participants was determined via administration of the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV-L) or the Mini-Anxiety Disorders Interview Schedule for DSM-IV (Mini-ADIS; Brown et al., 1994) at the time of their first visit for the study. No participants met full diagnostic criteria for BDD. Exclusion criteria for this study included the following: history of head injury resulting in prolonged loss of consciousness and/or neurological sequelae; history of prior neurosurgical procedure; metal in head or metal injury to the eyes; signs of increased intracranial pressure; implanted pacemaker, medication pump, vagal stimulator, deep brain stimulator, TENS unit, or ventriculo-peritoneal shunt; current pregnancy; chronic treatment with medications; current suicidal or homicidal ideation; history of or current psychosis; current alcohol or substance dependence (except nicotine); and patients who were not stable on medications (i.e., same medication and dose for at least three months) or who did not refrain from taking PRN medication during participation in the study.

The final sample consisted of 22 participants. Ten participants were excluded from analyses due to insufficient data on BDD symptoms before and after attention retraining. There were no differences between the final sample and the full sample on any demographic (age, sex, ethnicity, race, marital status, highest educational status, occupational status) or clinical measures (pre-treatment LSAS scores, pre-treatment BDD-SS scores, age of onset of SAD) (all $ps > .05$).

5.2. Overview of Procedure and Measures

The study consisted of ten sessions. The first and the last sessions involved conducting pre- and post-treatment fMRI scans, respectively. The middle eight sessions (sessions 2-9) occurred bi-weekly and involved participation in either eight brief (~15 minutes) active attention retraining sessions or eight placebo control sessions. Prior to the first training session participants were randomized to the active training or control condition, and were given the LSAS to assess SAD symptom severity, the BDD-SS questionnaire, and an attentional bias assessment task to measure pre-treatment attentional biases. After the last training session, participants completed a final attentional bias assessment task to measure post-treatment attentional biases.

5.3. Treatment

5.3.1. Attention modification intervention—Attention retraining attempts to manipulate attentional biases by training participants to attend to certain types of stimuli using a dot-probe detection task (Posner, Snyder, & Davidson, 1980). In the dot-probe paradigm, participants view on a computer screen two stimuli that are presented simultaneously, followed by the replacement of one of the stimuli with a target probe. An attentional bias toward threat is demonstrated when participants are faster to respond to probes that replace threatening (compared to non-threatening) stimuli. In this study, participants completed eight training sessions of a modified dot-probe task. The modified dot-probe task was as follows: a fixation cross (+) appeared on the computer screen. After

500 ms, the cross disappeared and two pictures appeared, one above and one below where the fixation cross had previously been. The pictures were neutral faces (i.e., expressionless) or disgust faces (i.e., socially threatening). The training stimuli were selected from the Matsumoto and Ekman (1989) standardized face set of emotional expressions. After 500 ms, the faces disappeared and either the letter “E” or “F” appeared where one of the faces had previously been. The participant was instructed to discriminate between “E” or “F” and indicate as quickly and accurately as possible which letter was presented by pressing the left or right button on the computer mouse. Immediately after the participant responded, a new fixation cross appeared and the next trial commenced. Each training session consisted of 160 trials. Thirty-two of the trials (20% of the trials) included only neutral faces in order to prevent participants from guessing the mechanism underlying the training paradigm. The remaining 128 trials (80% of the trials) included one neutral and one disgust face.

4.3.2. Attention retraining condition—In the active attention retraining condition, on trials including one neutral and one disgust face, the probe replaced the neutral face, thereby training the participant to focus his/her attention on the neutral (i.e., non-threatening) stimulus. This condition was designed to enhance attentional engagement away from social threat cues (i.e., disgust faces).

4.3.3. Placebo control condition—In the control condition, on trials including one neutral face and one disgust face, the probe was paired equally with neutral faces and disgust faces.

6. Results

Demographic characteristics for the sample were as follows: the mean age of the sample was 25.05 years (*SD*: 9.12). The sample consisted of 12 females (55%) and four participants identified as Hispanic (9%). Twenty participants identified as Caucasian (91%), one as Black/African American (5%), and one as Asian (5%). All participants were single and the mean age of SAD onset was 12.68 years (*SD*: 4.45). The mean BDD symptom severity score was 17.27 (*SD*: 9.93) and the mean LSAS symptom severity score was 76.10 (*SD*: 15.52). There were no significant differences between those in the active retraining condition and those in the placebo control condition on age, $t(20) = -1.01$, $p = .33$, gender, $\chi^2(1, 22) = .22$, $p = .64$, age of onset, $t(20) = -1.15$, $p = .27$, pre-treatment BDD symptom severity, $t(20) = .35$, $p = .73$, and pre-treatment LSAS symptom severity, $t(20) = .18$, $p = .86$.

To examine the effect of Condition on BDD symptom severity scores, we conducted a one-way analysis of covariance with Condition as the independent variable and BDD post-treatment symptom severity scores as the dependent variables, while controlling for BDD pretreatment symptom severity scores. We excluded one outlier who was < 1.5 SD below the mean at pre-test. There was a significant effect of Condition in favor of the active training condition (see Table 2). The relationship between attention bias modification and BDD symptom change was further examined by calculating attention bias change scores and conducting bivariate correlations using the Pearson product moment correlation coefficient. Attention bias change scores and BDD symptom change scores were strongly correlated ($r = .70$, $n = 21$, $p < .001$).

To examine the effect of Condition on different BDD symptom subscales, we conducted the same analyses separately for each symptom subscale, while controlling for the corresponding pre-treatment subscale score. There were no significant differences between the active retraining and placebo control conditions in pre-treatment BDD symptom subscales (all ps > 0.05). There was a significant decrease in the active retraining condition

for the checking and comparing and beliefs about appearance subscales. There were no significant between-group differences in other BDD symptom subscales (all *p*s > 0.05). See Table 2 for a summary of these analyses.

To examine the effect of Condition on SAD symptom severity scores, we conducted a one-way analysis of covariance with Condition as the independent variable and post-treatment LSAS scores as the dependent variable, while controlling for pre-treatment LSAS scores. There were no significant differences between groups in pre-treatment LSAS scores, $t(19) = .28$, $p = .785$. There was also no significant difference between the active training and placebo control conditions in post-treatment LSAS scores after controlling for pre-treatment LSAS scores, $F(1, 18) = .45$, $p = .51$. However, across conditions, LSAS scores were significantly reduced following treatment, $t(21) = 4.08$, $p = .001$.

Finally, we also examined whether LSAS symptom change was correlated with BDD symptom change using the Pearson product moment correlation coefficient. LSAS change was not significantly correlated with BDD symptom change, $r = .142$, $n = 21$, $p < .538$.

7. Discussion of Study 2

Our findings suggest that attention retraining using social stimuli (neutral and disgust faces) improved overall BDD symptom severity in patients with primary SAD after eight sessions of attention retraining. In addition, we demonstrated a significant effect of the active retraining condition on the BDD symptom subscales related to checking and comparing and beliefs about appearance. Interestingly, attention retraining improved the same subscales of BDD symptoms that have been shown in a previous study to be highly associated with SAD through mediation by rejection sensitivity (Fang et al., 2011). As rejection sensitivity represents a cognitive construct that reflects the tendency to anticipate rejection from others (Downey & Feldman, 1996; Harb et al., 2002), it is tenable that rejection sensitivity partially mediated BDD symptom reduction. Notably, attention retraining significantly impacted BDD-related cognitions and behaviors, but did not significantly alter SAD symptom severity, compared to the placebo group, suggesting that attention retraining may have improved attentional biases specific to BDD. In addition, SAD symptom change during attention retraining was not significantly correlated with BDD symptom change. Therefore, it could be argued that these results may suggest that the two disorders are less closely, rather than more closely, related. There are two potential explanations for this finding. First, although faces of disgust are relevant to the concerns of SAD patients and have been shown to activate areas of the brain involved in emotional evaluation (e.g., Amir et al., 2005), it is plausible that the use of disgust faces led to reductions in BDD symptoms because disgust may specifically reflect an emotion indicative of negative evaluation based on physical appearance. Indeed, one study using a dot-probe paradigm found that dysmorphic concern was positively associated with selective attention to disgusting images at short stimulus durations (200 ms) compared to long stimulus durations (1000 ms) (Onden-Lim, Wu, & Grisham, 2012). Therefore, being trained to allocate attention away from disgust faces during attention retraining may have contributed to improvements in BDD symptoms. Second, given the available research on visual processing impairments in BDD (Feusner et al., 2007; Feusner et al., 2010), it may also be possible that attention retraining improved selective visual processing by inhibiting detailed processing of faces to a greater degree than patients who were assigned to the placebo condition, which may have then led to BDD symptom improvement.

8. General Discussion

In summary, our findings from Study 1 and Study 2 are consistent with cognitive-behavioral theories of SAD and BDD, and demonstrated that interventions that target cognitive and

behavioral aspects of SAD improved co-occurring subclinical BDD symptoms in patients with primary SAD.

Results from Study 1 suggested that group CBT for SAD was associated with decreases in checking and comparing, weight and shape concerns, avoiding and hiding, seeking cosmetic surgery, and beliefs about appearance. In Study 2, we found that attention retraining improved BDD symptoms related to checking and comparing and beliefs about appearance, but not did impact symptoms related to fixing and correcting, weight and shape concerns, avoiding and hiding, skin picking and hair pulling, and seeking cosmetic surgery. Because BDD is a heterogeneous disorder, it may be possible that the improved subscales characterize symptoms that are more common to all BDD patients, whereas the other subscales characterize symptoms that are only relevant to certain cases. One of our earlier studies (Fang et al., 2011) showed that rejection sensitivity partially mediated the relationship between social anxiety and body dysmorphic concern. This link was the strongest for specific clusters of body dysmorphic concern—checking and comparing, avoiding and hiding, and beliefs about appearance.

Although both BDD and SAD may involve a fear of negative evaluation by others, it is tenable that they may be distinguished by a fear of rejection based on physical appearance and fear of rejection based on general personal attributes, respectively. This is in line with cognitive models of both disorders; the focus of the BDD model is the self as an aesthetic object (Neziroglu et al., 2008) whereas the focus of SAD models (Clark & Wells, 1995; Hofmann, 2007; Rapee & Heimberg, 1997) is the self as a social object. Appearance-based rejection sensitivity has been described as the tendency to expect, perceive, and overreact to signs of rejection based on one's physical appearance (Park, 2007). In fact, a study with university students found that appearance-based rejection sensitivity uniquely predicted self-reported BDD symptoms after controlling for other predictor variables such as gender, personal rejection sensitivity, social anxiety, body dissatisfaction, weight concern, and depressive symptoms (Calogero, Park, Rahemtulla, & Williams, 2010).

Findings from the current paper beg the question of mechanisms of BDD symptom change in both studies. Study 2 might give some hints for the mechanism through which attention retraining interventions influence BDD concerns. Emerging evidence suggests that training SAD patients away from threat-related cues through attention retraining may decrease anxiety (Amir et al., 2008). Since attention retraining modifies core attentional processes that are believed to maintain SAD, it is plausible that it would also decrease BDD symptom severity, as evidence suggests that selective attention to threatening faces may serve as a maintenance factor for BDD as well (Buhlmann et al., 2002; Grocholewski et al., 2012). In Study 2, we examined the effect of an attention retraining intervention for patients with SAD on BDD symptom severity and BDD-related behaviors and cognitions. We hypothesized that attention retraining would significantly decrease BDD overall symptom severity and particularly impact BDD-related cognitions.

Interestingly, in all reported attention retraining trials to-date, patients in the control condition have improved. For example, in the Schmidt et al. (2009) study, 11% of the patients in the control condition no longer met DSM-IV diagnostic criteria for SAD (compared to 72% of patients in the active condition). Similarly, in the Amir et al. (2009) study 14% of patients in the control condition no longer met diagnostic criteria for SAD (compared to 50% of patients in the attention retraining group). This consistent finding may be explained by two hypotheses. First, the placebo control condition may be a poor intervention, as 50% of the trials involved the probe replacing a neutral face, and these trials may be considered training trials for individuals with a bias towards threat such as patients

with SAD. Second, the patients who received the placebo control condition may have improved simply from exposure to threatening faces.

Our results have some important clinical implications. Both study samples were characterized by severe levels of SAD symptoms, but only sub-clinical levels of BDD symptoms. One participant in Study 1 had primary SAD and co-morbid BDD, but no other participants in either study met full diagnostic criteria for BDD. Although we found in Study 2 that attention retraining improved BDD symptoms independently of SAD symptoms, our findings from both studies demonstrate that BDD symptoms improved after treatment even when only subclinical levels of BDD symptoms were present in patients with primary SAD. Therefore, it may not be necessary to target BDD symptoms separately. This is important because BDD is the fourth most common comorbid disorder among patients with SAD (Hollander & Aronowitz, 1999), and comorbidity rates may be underestimated because BDD is a difficult disorder to detect. BDD and SAD are highly co-occurring and individuals with one of these disorders may have symptoms of the other.

There were some limitations to this study. Both Study 1 and 2 included small sample sizes. Participants were individuals with a primary diagnosis of SAD and no comorbid diagnosis of BDD (with the exception of one patient in Study 1), which limits the generalizability of the findings. In addition, there was a lack of inter-rater reliability data on LSAS administration and no kappa coefficients for reliability of diagnostic interviews were available.

Despite these limitations, the results of these studies inform current conceptualizations of BDD and SAD. The findings from Study 1 show that although CBT improved body dysmorphic concerns in patients with primary SAD, our findings from Study 2 suggest that SAD and BDD may be more distinct, as attention retraining specifically improved body dysmorphic concerns.

9. Conclusions

This was the first study to examine the effect of two psychological treatments for SAD on co-occurring BDD concerns. Our findings suggest that both cognitive-behavioral therapy and attention retraining appeared to improve body dysmorphic concerns in patients with a primary diagnosis of SAD. Although the constructs of SAD and BDD share much conceptual overlap, our findings provide empirical support that the two constructs are distinguishable and may partly be maintained by separate mechanisms. Further research is needed with patients with a diagnosis of BDD to confirm these findings, and to clarify the mechanism through which these disorders are linked.

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Research Highlights

- Cognitive-behavioral therapy for social anxiety improves body dysmorphic concerns.
- Attention retraining with social stimuli improves body dysmorphic concerns.
- Attention bias change scores were correlated with body dysmorphic change scores.

Table 1

Within-Subject Main Effects of CBT for SAD on BDD Symptoms by Symptom Subscale and Total Score in Study 1

	Wilks' Lambda	*F*	*p*	Partial eta squared (η_p^2)
Checking and comparing	.71	10.49(1,26)	.003*	.29
Fixing and correcting	.91	2.56(1,26)	.121	.09
Weight and shape concerns	.71	10.78(1,26)	.003*	.29
Skin picking and hair pulling	.99	.27(1,25)	.611	.01
Avoiding and hiding	.44	32.57(1,26)	.000**	.56
Seeking cosmetic surgery	.67	12.98(1,26)	.001*	.33
Beliefs about appearance	.50	25.24(1, 25)	.000**	.50
Total Score	.47	26.66(1,24)	.000**	.53

The Table shows means (standard deviations) and the results of the statistical tests (repeated measures ANOVAs).

*Denotes significance at $p < .01$;

**Denotes significant at $p < .001$.

Table 2

Effect of Attention Retraining versus Placebo Control on BDD Symptoms by Symptom Subscale and Total Score in Study 2

		Pre-Tx Mean (SD)	*Post-Tx Mean (SD)*	*F*	*p*	Partial eta squared (η_p^2)
Checking and comparing	Active	3.00(2.26)	2.00(1.49)	5.05(1,18)	.037*	.22
	Placebo	3.36(2.80)	3.91(2.66)			
Fixing and correcting	Active	2.00(2.00)	1.50(1.90)	1.36(1,18)	.259	.07
	Placebo	2.36(2.25)	2.55(2.21)			
Weight and shape concerns	Active	1.30(2.21)	1.80(2.62)	1.49(1,18)	.239	.08
	Placebo	1.55(2.66)	1.45(2.42)			
Skin picking and hair pulling	Active	2.90(3.32)	2.10(3.28)	.025(1,18)	.877	.001
	Placebo	2.00(2.83)	1.45(2.07)			
Avoiding and hiding	Active	4.50(2.55)	2.10(1.97)	3.74(1,18)	.069	.17
	Placebo	4.55(1.64)	3.91(2.43)			
Seeking cosmetic surgery	Active	.40(.97)	.10(.32)	1.41(1,18)	.250	.07
	Placebo	1.18(2.23)	1.18(2.09)			
Beliefs about appearance	Active	4.00(2.36)	2.80(2.30)	8.24(1,18)	.010*	.31
	Placebo	3.09(2.70)	3.82(3.25)			
Total Score	Active	18.10(8.05)	12.40(6.59)	5.50(1,18)	.031*	.23
	Placebo	18.09(10.84)	18.27(11.74)			

The Table shows means (standard deviations) and the results of the statistical tests (ANCOVAs)

*Denotes significance at $p \leq .05$.