Clinical Features, Cognitive Biases, and Treatment of Body Dysmorphic Disorder

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Abstract

In the past two decades, research advances have enhanced our understanding of the clinical features, cognitive biases, and treatment of body dysmorphic disorder (BDD). In this review, we critically examine the current state of the evidence on the proposed cognitive and emotional processing mechanisms of BDD. We describe how major findings in these areas made unique contributions to the development of an empirically informed cognitive-behavioral model of BDD, which in turn facilitated the translation of research to treatment strategies. Finally, we outline important areas of future research.

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INTRODUCTION

Although it has been described for centuries, body dysmorphic disorder (BDD) has only recently begun to gain increasing research attention. Characterized by a persistent preoccupation with a perceived flaw in physical appearance, it is a relatively common psychiatric disorder and can be severely debilitating if left untreated. Given the accumulation of evidence shedding light on the nosology, psychopathology, and treatment of BDD, the primary objective of this review is to critically examine the current status of the literature in these areas. We describe the clinical picture of BDD and review recent changes related to its classification. Thereafter, we highlight the ways in which research on cognitive and affective mechanisms in BDD has directly informed our conceptualization of BDD as well as our treatment strategies. We conclude our review with a discussion of several areas of future research in terms of mechanisms underlying treatment, predictors of treatment response, treatment development research, and treatment dissemination and implementation.

Body dysmorphic disorder (BDD): a psychiatric disorder marked by persistent preoccupation with perceived flaws in physical appearance

ISSUES IN THE DIAGNOSIS AND CLASSIFICATION OF BODY DYSMORPHIC DISORDER

Our understanding of BDD has evolved enormously since the earliest documented cases of "imagined ugliness" to its current conceptualization in the *Diagnostic and Statistical Manual of Mental*

Disorders, fifth edition (DSM-5; Am. Psychiatr. Assoc. 2013). In this section, we examine studies on the clinical features, prevalence, and course of BDD—as well as its relationships with other psychiatric disorders—that have greatly shaped the evolution of BDD as a diagnostic entity.

DSM-5: *Diagnostic and Statistical Manual of Mental Disorders, fifth edition*

OCD: obsessive-compulsive disorder

General Themes in BDD Diagnosis

BDD was introduced in the DSM-III in 1980 as "dysmorphophobia," which referred to an overconcern with appearance and was categorized as an atypical somatoform disorder (Am. Psychiatr. Assoc. 1980). In the DSM-III-R (Am. Psychiatr. Assoc. 1987), the disorder was relabeled as "body dysmorphic disorder," which was retained over the course of the revisions through DSM-IV-TR (Am. Psychiatr. Assoc. 2000), albeit still under the larger category of somatoform disorders. Currently, the DSM-5 diagnosis of BDD requires that the areas of concern are not observable or appear only slight to others and that the individual currently engages (or did engage at some point) in repetitive behaviors (such as mirror checking) in response to the appearance concerns (Am. Psychiatr. Assoc. 2013). The condition also has to cause clinically significant distress or impairment. Furthermore, the criteria make a distinction from eating disorders, in cases where individuals are primarily concerned with body shape and weight. Finally, the DSM-5 includes an insight specifier for those with "absent insight/delusional beliefs" to indicate the degree of insight impairment. Another specifier is given for a subtype of BDD called "muscle dysmorphia," in which individuals are specifically preoccupied with concerns about their body build being too small or insufficiently muscular. More broadly, the DSM-5 now subsumes BDD under an entirely new category called "obsessive-compulsive and related disorders," along with obsessive-compulsive disorder (OCD), hoarding disorder, trichotillomania (hair pulling), and excoriation (skin picking) disorder (Am. Psychiatr. Assoc. 2013).

Many nuances exist in the presentation and assessment of this complex disorder. In contrast to those with normal appearance concerns, individuals with BDD typically think about their appearance more often and between three and eight hours per day (Phillips 1998). The most common areas of concern are the skin, hair, and nose (Phillips & Diaz 1997, Phillips et al. 2005). Research suggests that individuals with BDD may be concerned with multiple body parts at the same time and that these areas of concern may shift over time (Phillips & Diaz 1997, Phillips et al. 2005). It is critical to distinguish between BDD-related concerns and appearance concerns due to other causes such as medical conditions (e.g., cancer) and actual deformities (e.g., severe scarring on burn victims). A functional link exists between these appearance concerns and the urge of individuals to engage in repetitive and time-consuming rituals to correct, fix, or hide their body parts. For example, common rituals include mirror checking, scrutinizing and comparing others' appearance, camouflaging, excessive grooming, asking others for reassurance, skin picking, and tanning (Albertini & Phillips 1999, Grant et al. 2006, Phillips & Diaz 1997). Relatedly, individuals with BDD often avoid social situations, such as going to family events, school, or work (Kelly et al. 2010, Phillips & Diaz 1997, Phillips et al. 1993). The range of impairment can also vary significantly, and in severe cases, individuals may become housebound because of the avoidance behavior related to their appearance concerns (Phillips et al. 1993).

Associated Clinical Features

BDD is commonly associated with shame, delusionality, and co-occurring depression and/or anxiety and suicidality, which are often directly related to BDD. BDD is often described as a silent disorder, as patients are often too ashamed to disclose their appearance concerns to others and perform the rituals in secret. In fact, patients with BDD often are too embarrassed to seek

psychiatric treatment for their appearance concerns. They may be concerned that others might consider them vain if they were to share their problems about their looks, or they may also be afraid to draw attention to their perceived flaw. An Internet study of 401 individuals with body dysmorphic symptoms demonstrated that shame and stigma constituted a major treatment barrier (Marques et al. 2011). Adding to the challenge of detecting BDD, some commonly used structured diagnostic clinical interviews do not include questions about BDD at all.

Delusions of reference: beliefs that others are talking about or taking special notice of one's appearance, which are commonly held among individuals with BDD

Insight occurs on a continuum in BDD (Phillips 2004, Phillips et al. 1994). Some individuals with BDD understand that they are just preoccupied with their appearance but that they actually look fine. Others have overvalued appearance-related ideas that they are ugly or deformed and/or ideas of reference that others are taking special notice of their appearance flaws. On the most impaired end of the spectrum, individuals with BDD are delusional, i.e., completely convinced that their appearance flaws are real, and they might describe themselves as looking "like a monster" or "like a freak." They might also have delusions of reference (i.e., unshakeable, firm beliefs that others are staring, laughing, or mocking defects). In one sample of 129 patients, 84% were classified as either delusional ($n = 68$) or having poor insight ($n = 40$) with regard to their primary appearance-related belief (Phillips 2004). Evidence suggests that individuals with the delusional form of BDD and nondelusional form do not differ significantly in demographic or clinical variables, and both groups do not appear to respond to antipsychotic medication alone (Phillips et al. 1994). As a consequence of beliefs that the appearance flaws are physical rather than psychological in nature, approximately 27–76.4% of individuals with BDD seek cosmetic solutions for their concerns, including surgical, dermatological, and dental procedures (Phillips et al. 1993, 2001). These procedures are usually not beneficial.

Co-occurring depression and anxiety, often secondary to BDD, are common, and suicidality is a major clinical concern (Gunstad & Phillips 2003, Phillips 2007). A four-year prospective study examining suicidality among individuals with BDD ($n = 185$) showed that on average, 57.8% of individuals reported suicidal ideation, 2.6% of individuals attempted suicide, and 0.3% ($n = 2$) completed suicide (Phillips & Menard 2006). Indeed, after adjusting for age, gender, and geographic region, the completed suicide rate is approximately 45 times higher in BDD than in the general population (Phillips & Menard 2006). These data underscore the severity of illness and mortality associated with BDD.

Prevalence and Course

BDD is a relatively common disorder, as population-based estimates from community and epidemiological samples indicate a prevalence of 1.7–2.4% (Buhlmann et al. 2010, Koran et al. 2008, Rief et al. 2006). Among nonclinical student samples, the prevalence of BDD is approximately 5.3% based on self-report questionnaires (Bohne et al. 2002). Estimates of the prevalence of BDD in cosmetic surgery and dermatologic patients range from 14.0–24.5% using structured clinical interviews (Alavi et al. 2011, Conrado et al. 2010). Furthermore, studies show that the gender ratio is approximately equal, with some studies suggesting a slight preponderance of BDD in women (Koran et al. 2008, Phillips et al. 2006). Sex differences exist in the body parts of concern, as men with BDD report being more concerned about their genitals, body build, and thinning hair, whereas women are more concerned with their skin, stomach, and weight, and tend to be preoccupied with more areas in comparison with men (Phillips et al. 2006, Phillips & Diaz 1997).

The mean age of onset of BDD is approximately age 16 (Coles et al. 2006), but the modal age of onset is approximately age 12–13 (Bjornsson et al. 2013). In addition, BDD tends to follows a chronic, unremitting course (Phillips et al. 2013). Recent evidence from a four-year prospective

observational study of adults and adolescents with BDD shows that BDD is typically chronic, with a low probability (20%) of full remission and a high probability (42%) of relapse (Phillips et al. 2013).

Differential Diagnosis

BDD shares similar features with several other disorders. A guiding principle for making a differential diagnosis of BDD is to assess whether the underlying problem is due to one's perceived appearance flaws. For example, although BDD and OCD are highly comorbid and share similarities in perfectionism, recurrent thoughts, repetitive behaviors, and avoidance behavior (Chosak et al. 2008), a diagnosis of BDD is appropriate when the concern is specifically appearance related (e.g., having intrusive thoughts about one's skin not looking smooth). Unlike compulsions in OCD, BDD-specific rituals are done to hide, improve, or check on the perceived appearance flaw (e.g., checking the appearance in the mirror repeatedly or seeking cosmetic surgery). Similarly, the differential diagnosis between BDD and social anxiety disorder (SAD) is made by understanding whether the fear of being negatively evaluated by others is specifically due to one's appearance rather than a more general concern about being embarrassed, being liked, or being viewed as unintelligent.

With regard to the diagnostic overlap between BDD and anorexia nervosa or other eating disorders, a distinction can be made by determining the presence of eating pathology, which is more atypical of BDD (for a review, see Hartmann et al. 2013). However, the presence of weight concerns may be less informative because clinically significant weight concerns may also be prevalent among individuals with BDD (Kittler et al. 2007). In particular, the subtype of BDD called muscle dysmorphia may exhibit more overlap with eating disorders due to the presence of excessive dieting and exercise as well as preoccupation with weight and shape. Muscle dysmorphia tends to be more common in males, but empirical research on the relationship between muscle dysmorphia and eating disorders is limited (Hartmann et al. 2013).

As described above, the level of delusionality in BDD can occur on a continuum, and in some cases, may resemble psychotic thinking akin to psychotic disorders. However, whereas schizophrenia or schizoaffective disorder might involve a range of psychotic symptoms and bizarre behavior, the only beliefs that may be delusional in BDD are those related to the patients' appearance.

In sum, BDD shares many overlapping features with other disorders, but it can be distinguished by a marked disconnect between physical appearance and body image, poor insight, and high levels of suicidality.

MECHANISMS UNDERLYING THE PSYCHOPATHOLOGY OF BODY DYSMORPHIC DISORDER

In the current section, we discuss factors that have been proposed to play a role in the etiology and maintenance of BDD from the cognitive and emotional processing perspectives.

Whereas studies examining cognition in BDD have explored the role of visual perception, attention, interpretations, and memory of appearance-related stimuli, studies investigating emotional processing have mainly examined selective processing of emotional information and emotion recognition deficits.

Cognitive Mechanisms

Studies on cognition in BDD have shed light on the etiology and maintenance of this disorder. This research has directly informed the cognitive-behavioral model, which proposes that biases

in the perception, interpretation, and memory of appearance-relevant stimuli contribute to the maintenance of BDD (Buhlmann & Wilhelm 2004). In the next few sections, we discuss the literature that informed the reciprocal translation between research on cognition in BDD and treatment. In particular, we focus on research examining (*a*) abnormalities in holistic processing, set shifting, and selective attention to perceived appearance flaws; (*b*) maladaptive beliefs about appearance under explicit and implicit processing; (*c*) reasoning and interpretive biases; and (*d*) memory deficits.

Holistic processing: the ability to perceive global features of a visual stimulus

Set shifting: the ability to flexibly update and shift cognitive strategies according to environmental demands

RCFT: Rey-Osterrieth Complex Figure Test

Abnormalities in holistic processing, set shifting, and selective attention to perceived appearance flaws. Clinical observations suggest that individuals with BDD selectively attend to their appearance flaws and mostly ignore the rest of their body. Several studies have investigated abnormalities in holistic processing in BDD, which support these observations. For example, one study using the Rey-Osterrieth Complex Figure Test (RCFT) showed that individuals with BDD exhibited a tendency to overfocus on small details of a complex figure rather than on global features when asked to draw the figure from memory (Deckersbach et al. 2000). The RCFT is a neuropsychological test that asks individuals to reproduce a complicated drawing, first by copying it directly and then by recalling it by memory. In the Deckersbach et al. (2000) study, a detailed style of processing, at the exclusion of larger organizational features, resulted in the selective recall of details. Indeed, a similar finding using the same task was previously observed in patients with OCD (Savage et al. 1999) and was later shown in patients with eating disorders (Lopez et al. 2009), perhaps suggesting common transdiagnostic mechanisms. Furthermore, a recent study investigated global and local processing on the Embedded Figures Task, which required individuals with BDD to detect which of three complex figures contained a simpler figure embedded within it (Kerwin et al. 2014). This study also included the Navon Task, in which a large letter (global level) is made up of different smaller letters (local level). Findings on both tasks showed that individuals with BDD were slower and less accurate than healthy controls. Performance on the Navon Task worsened even more when attention was shifted between the different levels of stimuli. This research is consistent with other evidence showing that individuals with BDD have deficits in global and local processing of faces (Feusner et al. 2010b). In this study, individuals with BDD performed a recognition task of upright and inverted (upside-down) faces. Typically, a face inversion effect is demonstrated when inverted faces are recognized more slowly and less accurately than upright faces. Individuals with BDD exhibited a smaller face inversion effect than did healthy controls, which may be due to greater detailed processing in BDD.

Neuroimaging studies on the neural correlates of aberrant visual processing in BDD complement the findings described above. Evidence suggests that individuals with BDD display hemispheric imbalance, which may contribute to visual detail biases in perception (Feusner et al. 2007). In one study examining the neural basis of visual face processing, individuals with BDD exhibited a general predominance of left-sided activation in frontal, temporal, and parietal regions, as compared to healthy controls who exhibited right predominance (Feusner et al. 2007). This was especially true when individuals matched photographs of faces that were manipulated under low spatial frequency to convey low detail and configural/holistic processing. Given that the left hemisphere generally serves analytical, local processing, and the right hemisphere dominates for holistic or global processing (Bradshaw et al. 1976, Evans et al. 2000), these results suggest that individuals with BDD rely more heavily on detailed, piecemeal processing (and recruit left hemisphere brain regions) during a face-matching task (Feusner et al. 2007).

Furthermore, research suggests that the neural substrates of visual processing abnormalities are not specific to one's own face and are not specific to symptom-related stimuli (e.g., faces). In one study, individuals with BDD demonstrated hypoactivity in primary and secondary visual

cortical systems for low-detail images of own and familiar faces, suggesting abnormal neural activity for processing holistic elements (Feusner et al. 2010c). In addition, this study showed that frontostriatal areas including the orbitofrontal cortex and caudate were hyperactive in BDD when individuals viewed unaltered images of their own face, compared to familiar faces. This hyperactivity was positively correlated with severity of BDD symptoms. Given that frontostriatal regions mediate inhibitory control and flexibility in responses, abnormalities in these circuits may explain executive dysfunction as well as repetitive thoughts and behaviors in BDD (Feusner et al. 2008). Another study investigated object visual processing in BDD and asked patients with BDD to match photographs of houses and shapes under normal-, low-, and high-spatial-frequency conditions while undergoing functional magnetic resonance imaging (Feusner et al. 2011). In comparison with controls, individuals with BDD displayed hypoactivity in visual association areas (parahippocampal gyrus, lingual gyrus, and precuneus) for low-spatial-frequency images (which typically convey low detail and prompt holistic processing) and greater activity in prefrontal regions (frontal pole, superior frontal gyrus, anterior cingulate gyrus, and paracingulate gyrus) for high-spatial-frequency images. These results suggest that there may be fundamental abnormalities in higher- and lower-order visual processing in BDD.

Given these abnormalities in selective attentional processing, one might ask whether individuals with BDD are more accurate in the perception of facial stimuli. Several studies have sought to examine exactly this, with mixed findings (Buhlmann et al. 2014, Reese et al. 2010, Stangier et al. 2008). Stangier et al. (2008) investigated whether female patients diagnosed with BDD were more accurate in detecting aesthetic deviations in a female facial stimulus depicting a neutral expression in specific areas such as the skin, nose, eyes, and hair, compared to patients with disfiguring dermatological conditions (disfigured controls) and patients with mild dermatological conditions (non-disfigured controls). Findings demonstrated that individuals with BDD were significantly more accurate in discriminating changes in aesthetically relevant features of the face compared to the other two control groups. This suggests that BDD may be associated with biased attention to perceive aesthetic details rather than holistic features of a face and that this enhanced perceptual ability may not necessarily be attributed to an excessive preoccupation with one's own face. Other studies have not been able to show that individuals with BDD were better able to detect visual changes (Buhlmann et al. 2014, Reese et al. 2010), which may be due to methodological study differences.

Indeed, visual attention toward the perceived appearance flaw may be a critical element in the development and maintenance of BDD. A recent study used eye-tracking methodology to examine selective visual attention of facial stimuli, as operationalized by the number of fixations and fixation durations in individually defined facial areas of interest in self and corresponding regions in other unfamiliar faces (Grocholewski et al. 2012). Compared to individuals with SAD and healthy controls, individuals with BDD showed selective visual attention to the perceived flaws in their own face as well as to corresponding regions in unfamiliar faces. In another eye-tracking study (Greenberg et al. 2014), individuals with BDD and healthy control participants rated levels of distress and perceived the most and least attractive features of their own and another face. Results showed that individuals with BDD tended to overfocus on their negative appearance attributes, whereas healthy participants had a more balanced focus.

A related construct in the area of selective attentional processing in BDD is self-focused attention, defined as a tendency to focus on internal, self-relevant thoughts, feelings, and perceptions rather than external cues. Self-focused attention in BDD is triggered by looking in the mirror (Veale 2004). Interestingly, people without BDD experienced more distress when looking in the mirror for a long period of time (10 minutes) compared to a short period of time (25 seconds), whereas individuals with BDD did not show differences in distress across short and long periods

of gazing (Windheim et al. 2011). This supports the idea that individuals with BDD are looking at themselves in the mirror in an entirely different way from healthy individuals.

Taken together, individuals with BDD demonstrate detail-focused, rather than holistic, processing of visual information. This processing style might prevent individuals with BDD from appropriately contextualizing visual details (such as scars or pimples) and thus they appear larger or distorted.

Maladaptive beliefs about appearance under explicit and implicit levels of processing. Individuals with BDD have maladaptive beliefs about their appearance. Indeed, individuals with BDD may exaggerate the importance of attractiveness and confuse attractiveness with happiness (e.g., "If I looked more attractive, my whole life would be better"). BDD-related beliefs have been examined on an explicit and implicit level. For example, one study found that individuals with BDD rated attractive faces as significantly more attractive than did those with OCD and healthy controls (Buhlmann et al. 2008a). In addition, the BDD group rated their own attractiveness as significantly lower than independent evaluators rated the attractiveness of the BDD subjects. These results suggest that the unusual significance of attractiveness is specific to the BDD group, and that to some degree individuals with BDD do acknowledge maladaptive beliefs on an explicit level. However, BDD patients often have reluctance to report their evaluations or may have evaluations that operate on an automatic and implicit level (Beck & Clark 1997). Accordingly, studies have measured implicit beliefs about the importance of attractiveness using the Implicit Association Test (IAT; Greenwald et al. 1998). The IAT measures implicit associations by asking participants to rapidly categorize words into superordinate categories that either match or contradict an individual's automatic associations. Faster response times are therefore indicative of stronger associations than are slower response times. However, studies using the IAT found no group difference between patients with BDD and healthy individuals (Buhlmann et al. 2009) and in undergraduates with high and low BDD symptoms (Clerkin & Teachman 2009).

A recent study examined implicit and explicit beliefs about attractiveness using a single-category version of the Go/No-Go Association Task (Buhlmann et al. 2011b). Participants were asked to categorize target words into one of two categories. Unlike the IAT, the Go/No-Go Task allows for the assessment of attitudes toward a single category (e.g., "Attractive" versus "Important"), rather than an assessment of attitudes of one category relative to another (e.g., "Attractive + Meaningful" versus "Ordinary + Unimportant"). Results showed that individuals with BDD endorsed higher implicit and explicit associations between "Attractive" and "Important" relative to individuals with dermatological conditions and healthy controls. Together, these results suggest that implicit associations may be more interpretable and easily measured using tasks that include a single target category rather than a relative comparison category, as in the IAT (Buhlmann et al. 2011b).

Reasoning and interpretive biases. As mentioned above, poor insight and delusionality are common features of BDD. Consequently, individuals with BDD may demonstrate cognitive biases that interfere with reasoning, such as a tendency to jump to conclusions without having sufficient information or difficulties interpreting ambiguous information. One study examined biases in probabilistic reasoning in BDD (Reese et al. 2011). In this study, it was hypothesized that individuals with BDD may require less information than those without BDD to make a decision, thus demonstrating a jumping-to-conclusions reasoning bias. Although no between-group difference was found between BDD patients, OCD patients, and healthy controls, patients with poor-insight BDD requested significantly less information before making a decision than did patients with fair-insight BDD, suggesting that those with particularly poor-insight BDD may be more susceptible to this kind of reasoning bias.

Relatedly, research suggests that individuals with BDD have a disorder-specific negative interpretive bias for ambiguous information (Buhlmann et al. 2002b), which may confirm distorted beliefs about themselves and their body image. On a self-report questionnaire involving ambiguous scenarios (e.g., "While talking to colleagues, you notice that some people take special notice of you. What thoughts occur to you?"), individuals with BDD tend to make negative interpretations ("I am sure they are judging the way I look") compared to individuals with OCD and healthy individuals (Buhlmann et al. 2002b). Those with BDD demonstrated a negative interpretive bias for general social information as well. This was interesting because no patients with BDD in the sample met criteria for comorbid SAD, suggesting that non-appearance-related social concerns are common in BDD. In addition, this finding has been replicated among undergraduate students with high levels of BDD symptoms (Clerkin & Teachman 2008).

Interpretive bias: the tendency to interpret ambiguous information inaccurately, for example, misinterpreting a look from others as, "They must be judging how ugly my appearance is"

Memory deficits. Few studies have assessed memory deficits in BDD. Available studies show equivocal findings in terms of deficits in short-term recall, as measured by the RCFT. As described above, the RCFT is a neuropsychological task that assesses many cognitive abilities, including attention, organizational planning, and working memory. One study found impaired performance in immediate recall of the figure (Deckersbach et al. 2000), whereas an earlier study did not (Hanes 1998). Potential reasons for difficulties with the RCFT are the impact of selective attention to details and problems with organizing holistic features of a visual stimulus, which one would expect to impact subsequent encoding and free recall. However, Deckersbach et al. (2000) found recall deficits in BDD even after accounting for the effects of organization, which suggests that other factors such as fundamental attentional or short-term memory consolidation difficulties may be playing a role (Feusner et al. 2008). In addition, Deckersbach and colleagues assessed verbal memory using the California Verbal Learning Test, which showed that individuals with BDD recalled significantly fewer words on short-term and delayed recall trials compared to healthy controls. Thus, although memory deficits have been demonstrated in BDD, more research is needed to better characterize the mechanism underlying impaired performance.

Another study examined spontaneously occurring images and early memories of individuals with BDD (Osman et al. 2004). This study found that the memories associated with spontaneously occurring appearance-related images involved two themes: being teased and bullied at school and being self-conscious about appearance changes during adolescence. This is consistent with research showing that individuals with BDD reported more appearance- and competence-related teasing than did healthy controls (Buhlmann et al. 2007). Osman et al. (2004) also found that 94% of BDD patients reported experiencing spontaneous images when worried about their appearance and that all BDD patients saw themselves from an observer perspective in these images ("viewing myself completely from an external viewpoint, as if through the eyes of another"). These findings suggest that appearance-related images and early stressful memories may contribute to the development of BDD (Osman et al. 2004).

The research summarized above indicates that dysfunctional cognitive processes are likely to play a major role in the development and maintenance of BDD. As we show in the section titled Cognitive-Behavioral Model and Treatment of Body Dysmorphic Disorder, research on cognition has also greatly informed cognitive and behavioral treatment strategies.

Emotional Processing Mechanisms

Research on abnormalities in emotional processing in BDD is limited. Studies have focused on deficits in threat processing and recognition of basic and complex emotions (Buhlmann et al.

2004, 2006, 2013; Feusner et al. 2010a), but they have not yet extensively explored deficits in emotion regulation, such as in SAD and eating disorders. In this section, we review evidence from experimental studies on the role of emotional processing in BDD.

Selective threat processing. One study by Buhlmann and colleagues (2002a) examined selective processing of threat using the emotional Stroop paradigm. Participants were instructed to name the color of a set of words that were positive, negative, or neutral in valence and were either relevant to BDD or not. An interference effect is demonstrated when participants are slower to name colors for disorder-relevant words than for non-disorder-relevant words. Results showed that relative to healthy controls, individuals with BDD demonstrated greater Stroop interference for positive and negative words, regardless of their relevance to BDD, than for neutral words. In other words, those with BDD were equally slow to name colors for BDD-related threat words, such as "hideous," and general non-BDD-related threat words, such as "dangerous," compared to other word types. Of note, Stroop interference was strongest for BDD-related positive words (e.g., "beauty" or "attractive") rather than for BDD-related threat words. This finding suggests that individuals with BDD may be distracted by cues with any emotional significance, and they may be particularly concerned about cues associated with their appearance ideal (Buhlmann et al. 2002a).

Emotion recognition deficits. The first study to examine emotion recognition deficits in BDD employed a simple emotion recognition task comprising female and male photographs of facial expressions (e.g., angry, disgusted, happy, neutral) from the Ekman & Friesen (1975, 1976) standardized stimulus set (Buhlmann et al. 2004). Individuals with BDD demonstrated a tendency to misidentify emotional expressions as angry, relative to individuals with OCD and healthy controls. Given the pervasive fear of negative evaluation and the presence of ideas of reference in BDD, a follow-up study used an emotion recognition task with more contextual cues involving self-referent (e.g., "Imagine that the bank teller is looking at you. What is his facial expression like?") and other-referent (e.g., "Imagine that the bank teller is looking at a friend of yours") scenarios (Buhlmann et al. 2006). Consistent with earlier findings, BDD patients tended to misinterpret facial expressions as contemptuous and angry in self-referent scenarios, compared to controls. This group difference disappeared for other-referent scenarios. These results suggest that individuals with BDD may have intact emotion recognition ability for interpreting facial expressions between other individuals, but given their pattern of referential thinking and poor insight, they are susceptible to misinterpreting facial expressions as negative, especially in ambiguous contexts. In a similar experiment, Feusner et al. (2010a) demonstrated that individuals with BDD are less accurate than healthy individuals are at matching identities of faces with emotional expressions than neutral faces or ovals and circles. This suggests that individuals with BDD have major abnormalities in visual information processing of emotional expressions.

Recent evidence suggests that emotion recognition impairments in BDD may not necessarily extend to complex emotional states. One study examined whether individuals with BDD exhibited an inability to interpret complex mental states such as insecurity, jealousy, or hostility using the Reading the Mind in the Eyes Test, which displays 36 photographs of pairs of eyes (Buhlmann et al. 2013). Results showed no group difference between individuals with BDD and healthy individuals. It is possible that individuals with BDD do not have a general impairment in emotion recognition and only show deficits in situations when they feel directly involved. This is consistent with data showing no deficit in overall emotion recognition abilities between BDD patients, patients with dermatological conditions, and healthy controls (Buhlmann et al. 2011a). In that study, BDD patients showed a tendency to misinterpret neutral expressions as disgusted;

however, there was no difference between groups on emotion recognition impairments when collapsing across emotion categories.

In summary, emotion recognition research in BDD shows that individuals with BDD falsely interpret others' facial expressions, which is consistent with their experience of delusions of reference that others may be mocking, staring, or talking about them. Research also suggests that individuals with BDD are not universally impaired in emotion recognition abilities.

Cognitive-behavioral therapy (CBT): a psychosocial intervention that addresses maladaptive thoughts and behaviors proposed to maintain psychopathology

COGNITIVE-BEHAVIORAL MODEL AND TREATMENT OF BODY DYSMORPHIC DISORDER

In the previous section, we discussed the seminal studies that have investigated the mechanisms implicated in the psychopathology of BDD from the cognitive and emotional processing perspectives. These findings have directly informed the development of a cognitive-behavioral model of BDD, which in turn have contributed to the advancement of a cognitive-behavioral treatment for BDD. Here, we discuss the translation of the research on mechanisms underlying BDD into a framework for treatment.

A Cognitive-Behavioral Model for BDD

Despite the prevalence and severity of BDD, few studies have developed and tested psychosocial treatments for BDD. Available research on psychosocial treatments has focused almost exclusively on cognitive-behavioral therapy (CBT). Several cognitive-behavioral theories have been proposed to explain the development and maintenance of BDD (Neziroglu et al. 2008, Veale 2004, Veale et al. 1996, Wilhelm & Neziroglu 2002). These theories share a common premise—that feelings and behaviors are determined by the way an individual interprets his or her own experience, and that modifying maladaptive patterns of thinking, beliefs, and behaviors will provide an improvement in BDD symptoms. Here, we briefly discuss an updated cognitive-behavioral model, which has been presented elsewhere (see Wilhelm 2006, Wilhelm et al. 2013) and represents an extension of Wilhelm & Neziroglu's (2002) and Veale and colleagues' (Veale 2004, Veale et al. 1996) models. This model also shares similarities to models for OCD (Salkovskis 1985). In general, our model proposes that individuals with BDD display an interpretive bias for visual information of normal appearance features or minor flaws, which results in negative cognitive, emotional, and behavioral consequences. We describe how each step of the model has been informed by research on cognition in BDD and how treatment strategies address each aspect of the model.

The first step of the model (see **Figure 1** for a schematic diagram) assumes that everyone occasionally has a negative thought about his or her appearance. What separates people with a healthy body image from individuals with BDD is the way they respond to these negative thoughts. Individuals with BDD react to ordinary negative thoughts about appearance in a biased way, such that they selectively attend to certain aspects of their appearance and make maladaptive interpretations about their appearance. This part of the model was informed by clinical observations, in addition to the research reviewed above, which show that individuals with BDD tend to engage in detailed rather than holistic processing of stimulus features (e.g., Deckersbach et al. 2000, Feusner et al. 2007, Greenberg et al. 2014, Grocholewski et al. 2012). Maladaptive interpretations might include thoughts such as "My skin is so disgusting, nobody will ever be able to love me" or "Everyone will think about my hideous face." The studies reviewed above suggest that a variety of factors may be involved in the maladaptive interpretation of perceived appearance flaws in persons with BDD, such as the overestimation of the importance of appearance (Buhlmann et al. 2009) and a high standard for beauty and perfection in their appearance (Buhlmann et al. 2002a), as well as negative

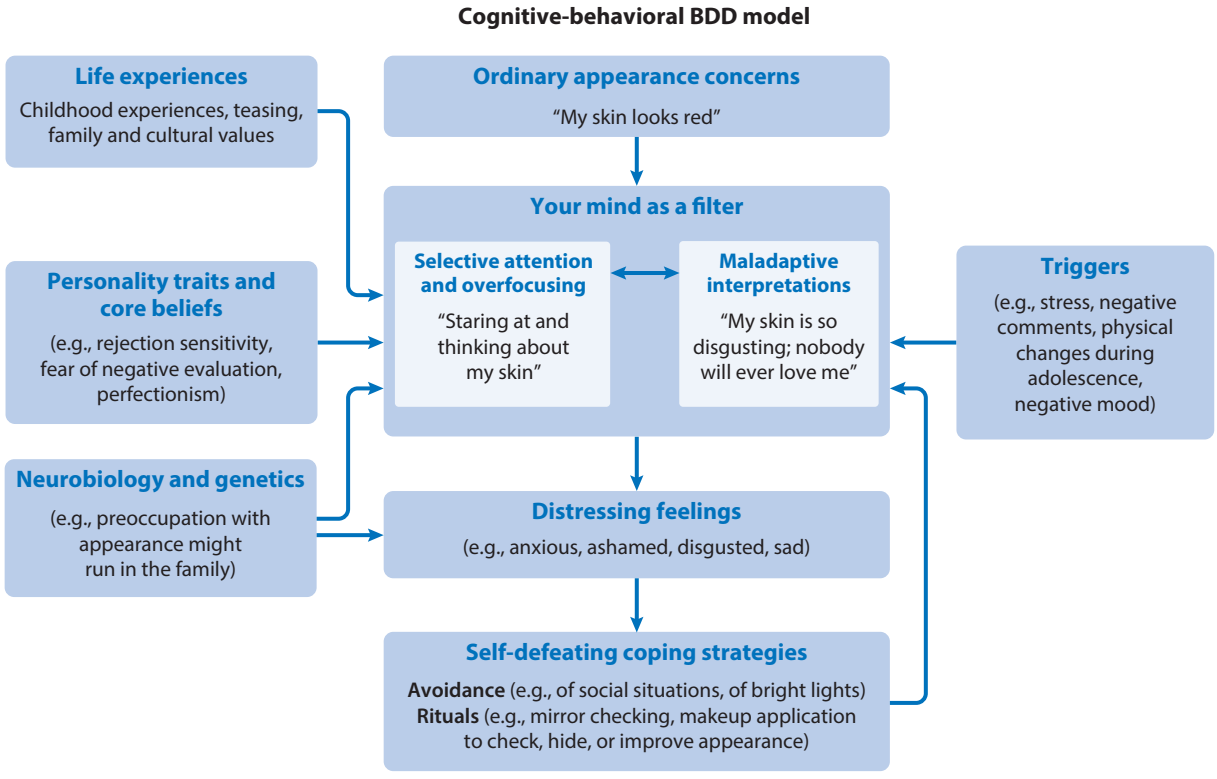

Figure 1

The cognitive-behavioral model of body dysmorphic disorder (BDD). Figure adapted with permission from Wilhelm S, 2006. *Feeling Good About the Way You Look. A Program for Overcoming Body Image Problems*. New York: Guilford.

interpretive biases of social situations (Buhlmann et al. 2002b) and facial expressions (Buhlmann et al. 2006). Together, these findings suggest that individuals with BDD may be susceptible to many different kinds of cognitive distortions and processing difficulties as a result of exposure to ordinary negative thoughts about their appearance.

The next step in the model proposes that maladaptive interpretations trigger negative emotions such as anxiety, shame, disgust, and depression.

The model then predicts that the individual tries to regulate the negative emotions, which then leads to maladaptive behaviors such as checking on, fixing, or hiding the perceived flaws (e.g., mirror checking, excessive grooming) and to avoidance of social situations, people, or places that might trigger these negative emotions. It is thought that these maladaptive rituals and avoidance behaviors maintain dysfunctional BDD beliefs via negative reinforcement because they help to reduce painful emotions in the short term. However, in the long term, they only maintain the negative beliefs because the individual with BDD never learns that things would have turned out okay if he or she would not have ritualized or avoided.

The model also acknowledges the influence of pathoetiologic factors, which may impact both the cognitive processing and emotional responses to perceived flaws. These factors may include rejection sensitivity (Phillips et al. 1996), fear of negative evaluation (Wilhelm et al. 1997), childhood experiences (Buhlmann et al. 2007), and family and cultural values (Phillips 2009, Veale

et al. 1996). Neurobiological factors and genetics might play a role in the development of BDD as well (e.g., appearance concerns might run in families). Moreover, certain triggers such as stress or physical changes during adolescence may also have an impact on appearance concerns.

In summary, the CBT model described in this section has been informed by research on cognition in BDD. It has also had a major impact on the development of CBT strategies.

Translation of Research on Phenomenology and Cognition in BDD to Treatment Strategies

Despite the prevalence and suffering associated with BDD, treatment studies on BDD (see the section titled Empirical Evidence on CBT for BDD below) usually are not based on a published manual. However, manuals are essential for the standardization and dissemination of a treatment. One exception is the cognitive-behavioral therapy for body dysmorphic disorder (CBT-BDD) treatment, which is manualized and has been tested in an open trial (Wilhelm et al. 2011) and a wait-list controlled trial (Wilhelm et al. 2014). It is currently being tested in a large randomized treatment comparison trial. In the current section, we briefly describe CBT-BDD and discuss how new advances in research on cognition in BDD have been translated into specific treatment strategies.

CBT-BDD utilizes standard core elements relevant to all BDD patients plus optional modules that can be used as needed. Core treatment elements include psychoeducation, motivational interventions, cognitive interventions, exposure to avoided situations and prevention of rituals, and mindfulness and perceptual retraining. Optional treatment modules allow therapists to flexibly tailor treatment to address symptoms that affect some but not all patients (e.g., cosmetic surgery seeking). For all patients, treatment ends with relapse prevention strategies and booster sessions focused on helping patients maintain their gains. Below, we describe the treatment in more detail.

Cognitive behavioral therapy for body dysmorphic disorder (CBT-BDD): a manualized treatment for BDD that includes core elements of CBT in addition to optional treatment modules

Mindfulness and perceptual retraining: a core component of CBT-BDD that addresses visual processing biases in BDD by training individuals to describe appearance objectively

Psychoeducation and case formulation. Based on the information collected during the initial assessment, the therapist and patient together develop a cognitive-behavioral model for the patient's specific BDD symptoms, including probable mechanisms that are causing and/or maintaining the symptoms.

Engaging the patient. BDD patients' appearance beliefs are often delusional, and therefore it can be challenging to engage patients in treatment. The manual offers techniques to motivate patients who are ambivalent about starting CBT, and these techniques can also be used as needed throughout therapy.

Cognitive interventions. Research on cognition in BDD has greatly informed cognitive-behavioral treatment of BDD (Wilhelm et al. 2013, 2014). BDD-related distortions include perfectionistic thinking/all-or-none thinking (e.g., "My pimple makes me look totally hideous") (Buhlmann et al. 2008a) and distorted emotion recognition/mind reading related to ideas or delusions of reference (e.g., "This guy who is sitting across from me has this weird look on his face. He is probably really disgusted by my skin") (Buhlmann et al. 2004, 2006; Feusner et al. 2010a). Patients learn cognitive restructuring skills to identify cognitive distortions and generate alternative appraisals of situations (e.g., "It is possible that the guy is thinking about other things more important to him, such as what to have for dinner or the conversation he is having with his friend"). Thus, cognitive restructuring targets the negative interpretive biases in BDD (e.g., Buhlmann et al. 2002b) by considering alternative explanations for one's observations, even if the explanations are not immediately accepted as true.

Research on explicit and implicit beliefs on the importance of attractiveness (e.g., Buhlmann et al. 2008a, 2011b) has also influenced the development of CBT-BDD (e.g., Wilhelm et al. 2013, 2014). CBT-BDD provides cognitive strategies that identify the ways in which attractiveness is conflated with self-worth. For example, many patients with BDD benefit from the downward arrow exercise, which is a cognitive strategy meant to identify deeper-level beliefs such as "I can only be happy if my appearance improves" or "I will end up alone because of how I look." Once these beliefs have been identified, patients learn strategies (e.g., the self-esteem pie) to broaden the basis of their self-worth to include factors other than appearance (e.g., talents, intelligence, moral values).

Mindfulness/perceptual retraining. As described above, patients with BDD show deficits in global processing and selective attention to perceived flaws (e.g., Deckersbach et al. 2000; Feusner et al. 2007, 2010c). Patients usually focus on the body parts they dislike while ignoring other body parts (Greenberg et al. 2014, Grocholewski et al. 2012). In CBT-BDD, perceptual retraining is combined with mindfulness skills to help patients learn to take a broad view and to attend to aspects of themselves other than the perceived flaws. Individuals are instructed to stand about an arm's length from the mirror and describe each body part from head to toe. They learn to observe and describe their appearance in a mindful, holistic, and nonjudgmental manner (Wilhelm et al. 2013, 2014). Rather than staring only at their disliked eyes and saying: "My eyes are ugly," patients are taught to devote an equal amount of time for each part, using descriptive and nonjudgmental language, such as "My eyes are brown and almond shaped. I have brown eyebrows. My skin color is pale." By attending to each body part equally regardless of level of concern, patients with BDD counteract their urges to scrutinize a small portion of their appearance. Patients are also asked to avoid "appearance-fixing" behaviors during this exercise. In addition, they learn to retrain their attention when interacting with other people; rather than just comparing their appearance to that of others, they learn to pay attention to other aspects of others, as well as their environment.

Exposure and ritual prevention. This intervention encourages individuals to enter anxiety-provoking situations through repeated exposure while abstaining from appearance rituals and other safety behaviors. Well-designed exposure exercises set specific behavioral goals and target specific feared predictions that individuals with BDD can make for a certain situation (e.g., "I will get laughed at if I go on the train without make-up"). In this way, individuals with BDD may learn that their feared predictions did not happen, or if they did, that they survived it. To reduce other rituals such as excessive mirror checking, participants monitor the frequency and settings in which they engage in their rituals and develop strategies to resist them.

Relapse prevention. At the end of treatment, patients focus on the consolidation of skills and maintenance of treatment gains.

Modular interventions. In addition to the core components described above, which all patients receive, CBT-BDD includes four optional treatment modules to be used if relevant to a patient's specific symptoms: (*a*) compulsive skin picking and hair pulling, (*b*) muscularity/shape/weight, (*c*) cosmetic treatment seeking, and (*d*) mood management.

Empirical Evidence on CBT for BDD

The most common psychological interventions tested for BDD have been behavior therapy (BT) and CBT using varied formats such as individual or group and daily or weekly. A recent

meta-analysis identified nine studies that have evaluated psychological treatments for BDD, including BT and CBT (Williams et al. 2006). The overall weighted mean effect size for psychological treatment outcomes was 1.63. Effect sizes were 1.43 for BT studies and 1.78 for CBT studies, which suggests strong effects of treatment on BDD symptoms. Three randomized-controlled studies (Rosen et al. 1995, Veale et al. 1996, Wilhelm et al. 2014) have been conducted to examine the efficacy of CBT for BDD compared to a wait-list or no-treatment control group, and all have shown significant reductions (51–53%) in BDD symptom severity by the posttreatment time point. However, these studies differed significantly in terms of standardization of the treatment and inclusion and exclusion criteria as well as the length and format of CBT (ranging from 12 to 22 sessions of individual CBT to eight 2.5-hour sessions of group CBT). Findings from the most recent randomized-controlled trial (Wilhelm et al. 2014), which investigated the efficacy of a modular form of 22 sessions of CBT for BDD (described as CBT-BDD above), showed that 81% of the intent-to-treat sample saw a ≥30-point reduction in their BDD-YBOCS (Yale Brown Obsessive Compulsive Scale) score by posttreatment (week 24) and that these gains were maintained even at six-month follow-up. Furthermore, patients saw meaningful improvements in their depression symptoms and delusionality at posttreatment, and these gains were also maintained at six-month follow-up.

SRI: serotonin reuptake inhibitor

In summary, treatment outcome research on CBT for BDD is still in the early stages, and studies have varied in terms of their methods and treatment lengths. However, available initial results are encouraging, and larger, more definitive studies are ongoing.

Other Treatments for BDD

Pharmacotherapy. Research indicates that the first-line pharmacotherapy for BDD (including for delusional BDD) involves the use of serotonin reuptake inhibitors (SRIs) such as fluoxetine (Phillips et al. 2002), fluvoxamine (Hollander et al. 1994, Perugi et al. 1996, Phillips et al. 1998), citalopram (Phillips & Najjar 2003), escitalopram (Phillips 2006a), and clomipramine (Hollander et al. 1999). These studies have typically been open trials and include a few randomized, placebo-controlled trials. Data also suggest that pharmacotherapy for BDD may require relatively higher SRI doses and longer trial durations than treatment for other disorders requires, with a mean SRI response time of 6–9 weeks (Phillips & Hollander 2008). More research is needed to compare the efficacy of different SRIs and to determine optimal dosing schedules and trial durations for them.

Combination therapies. No studies to date have directly compared the efficacy of monotherapies with CBT or pharmacotherapy against combination therapies. It therefore remains unclear whether CBT + pharmacotherapy offer an incremental benefit over monotherapy. Results from a meta-analysis (Williams et al. 2006) showed that CBT had a greater effect size than pharmacotherapy; however, these results should be interpreted with caution because many participants included in the CBT trials were on stabilized regimens of medication, which may confound the effect of CBT when given as a monotherapy.

Surgical and nonpsychiatric treatments. Many individuals with BDD seek nonpsychiatric treatments for their appearance concerns, such as cosmetic surgery or dermatologic treatment. In some cases, people with BDD will conduct self-surgery to improve their appearance (Phillips 2009, Veale 2000). Research shows that 27–76.4% of individuals with BDD sought nonpsychiatric medical treatment and surgery and that 66.0% of them actually received such services (Phillips et al. 1993, 2001). Furthermore, another study found that the most commonly received procedures

were collagen injections (50%), rhinoplasty (37.7%), microdermabrasion (19.2%), and breast augmentation (8.2%) (Crerand et al. 2010). Not surprisingly, the benefits from these treatments tend to be short-lived; data suggest that only 2.3% of surgical and minimally invasive procedures led to long-term improvements in BDD symptoms (Crerand et al. 2010). Some reports suggest that dissatisfied BDD patients may even legally or physically threaten their surgeons. A survey conducted by the American Society for Aesthetic Plastic Surgery in 2002 found that 29% of respondents were threatened legally, 10% of respondents were threatened both legally and physically, and 2% reported being threatened physically by patients with BDD (Sarwer 2002). In extreme cases, particularly in men with probable BDD who are dissatisfied with their procedures, there have been reports that such aggression toward surgeons has taken the form of murder (Wright 1987, Yazel & Tager 1999).

FUTURE RESEARCH DIRECTIONS FOR BODY DYSMORPHIC DISORDER

Although increasing efforts have been made to investigate BDD, many questions remain unanswered. For instance, mechanisms underlying the etiology and maintenance of BDD symptomatology, as well as mechanisms of action during treatment, are still not well understood. Furthermore, given the greater emphasis on personalized medicine in psychiatry (Insel 2014), more research needs to examine who benefits from treatments for BDD to better predict treatment outcomes and guide treatment planning. This is especially important in light of the fact that the best available psychological treatments for BDD still leave considerable room for improvement (Veale et al. 1996, Wilhelm et al. 2014). Future research should also prioritize ongoing treatment development, which may involve translational research based on findings from basic neuroscience. More work is also needed to adapt treatments to populations not typically included in treatment studies, such as children, suicidal patients, and patients with certain psychiatric comorbidities (e.g., substance use disorders), and to examine ways of disseminating such treatments to the greater community. In this section, we discuss potential avenues of future research on BDD in the areas outlined above.

Mechanisms Underlying BDD and Treatment Response

A better understanding of the basic mechanisms underlying BDD psychopathology is one of the most crucial areas of future research in BDD, as it represents an important rate-limiting step in the advancement of treatment approaches. The Research Domain Criteria (RDoC) project may provide a useful framework for identifying core, underlying constructs that may represent causal or maintenance factors of BDD. RDoC was launched in 2008 by the National Institute of Mental Health to ultimately develop a new classification system based on dimensions of observable behaviors and neurobiological measures (Insel et al. 2010). From the RDoC perspective, it is likely that the disrupted mechanisms involved in the psychopathology of BDD also play a role in related disorders such as OCD, SAD, and perhaps even eating disorders. Accordingly, future research should consider such a dimensional perspective and be particularly sensitive to sampling frames by recruiting participants not only with BDD but also related disorders, as well as participants with a range of severity. In addition, by conducting research from a multimodal perspective, including self-report, behavioral, psychophysiological, and brain measures, future research may better inform the distinct and overlapping boundaries between BDD and other mental disorders.

Future treatment studies should also further explore mediators of treatment rather than only examine the overall superiority of one treatment over another. For example, it is still unclear whether BDD-related cognitions (e.g., beliefs about the importance of attractiveness and core beliefs associated with beauty and self-worth) mediate changes in BDD symptom severity in CBT.

Another proposed mediator of treatment response may be improvements in the global processing of information. Such improvements might affect the perception of the perceived flaws (e.g., if patients are able to see the bigger picture versus just the flaw, the appearance flaw might look less distorted or smaller). Changes in emotion recognition might mediate changes in the delusions and ideas of reference so often associated with BDD. It may also be important that future research demonstrates the specificity of mediation for CBT versus psychopharmacologic treatments.

Predictors of Treatment Response

Although an increasing number of studies have investigated individual differences in patients with BDD, more research is needed to examine who benefits from treatment. This information would enhance efforts to personalize treatment and enable individuals to be matched to appropriate interventions (e.g., CBT or medication).

Predictors of response to CBT. One main area of future research is whether certain demographic or clinical variables predict CBT treatment response. One study showed that higher pretreatment levels of overvalued ideas in BDD predicted worse BT outcome (Neziroglu et al. 2001). However, it remains unknown whether other individual differences at pretreatment (e.g., illness severity, comorbid disorders) predict CBT outcome. Indeed, in a recent trial of CBT, patients with BDD who dropped out or were withdrawn from the study tended to have higher BDD symptom severity and depression scores and had at least one or more personality disorders at baseline, compared to treatment completers (Wilhelm et al. 2014).

Studies have shown that 57–87% of individuals with BDD meet criteria for a personality disorder using the Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II) assessment (Cohen et al. 2000, Phillips & McElroy 2000). However, one study found no relationship between comorbid personality disorders at pretreatment and CBT treatment response (Neziroglu et al. 1996). The authors note that this may be due to the particularly high rates of personality disorders in the sample (all 17 patients with BDD included in the study met criteria for at least one personality disorder).

Predictors of response to pharmacotherapy. Few studies have examined predictors of treatment response to pharmacotherapy in BDD. A randomized, placebo-controlled study of fluoxetine for BDD found that patients with poorer insight or delusional thinking are not less likely to respond to SRIs compared to patients with better insight (Phillips et al. 2002). However, delusional BDD patients may be less likely to respond to a placebo than are their nondelusional counterparts (Phillips et al. 2002). Indeed, in that study, delusionality was the only predictor of treatment response; BDD duration, BDD severity, and presence of a personality disorder, current OCD, or current major depression did not predict response to treatment. This is inconsistent with other data showing that personality impairment at pretreatment predicted less favorable response to pharmacotherapy at posttreatment (clomipramine versus desipramine) in individuals with BDD (Cohen et al. 2000). More systematic research using structured clinical interviews, such as the SCID-II, may help clarify these inconsistencies (Buhlmann et al. 2008b).

In addition to conducting research on psychosocial predictors of CBT and pharmacotherapy treatment response, future investigations should also examine genetic and neurobiological predictors. Growing evidence on neural correlates of cognitive therapy and CBT treatment response in disorders such as SAD (Doehrmann et al. 2013) and depression (Siegle et al. 2012) suggests that brain functioning at baseline may be associated with treatment response and can be used as an assessment tool to guide treatment decisions at the outset of treatment.

Treatment Development Research

Despite the growing research attention on BDD, there is a paucity of empirical research on whether CBT is effective for individuals who are often excluded from treatment trials. These include children and adolescents, suicidal patients, and those with comorbid substance use disorders. Extant data on CBT for youth comprise limited case reports (Aldea et al. 2009, Greenberg et al. 2010, Horowitz et al. 2002) and a small case series study (Krebs et al. 2012). These studies tended to include family involvement, and one case report (Horowitz et al. 2002) included multiple treatment modalities besides CBT, such as psychodynamic psychotherapy, medication, and physician consultations. Findings show preliminary support for the efficacy of CBT in adolescents. Although CBT for adolescents with BDD has strong face validity, specific age-appropriate and family-based adaptations to CBT have not been tested (Phillips & Rogers 2011). Future studies should develop and test adaptations of CBT for special populations to improve the generalizability of CBT.

In addition to investigating the effective components of CBT and ways of adapting CBT to certain populations, ongoing treatment development research should examine alternative novel therapeutic or augmentation strategies for BDD. In particular, findings from basic neuroscience have revealed the therapeutic potential of a certain class of pharmacologic agents called cognitive enhancers (for a review, see Hofmann et al. 2014) as well as new interventions that focus on cognitive processes in BDD. A cognitive enhancer called D-cycloserine (DCS) has been shown to augment extinction learning in exposure-based therapies in disorders that share many similarities with BDD, such as SAD and OCD, although with mixed results (Hofmann et al. 2013; Kushner et al. 2007; Storch et al. 2007, 2010; Wilhelm et al. 2008). Other agents might also be useful in alleviating BDD symptoms. For example, oxytocin is a hormone that plays an important role in social attachment and trust; it appears to improve social cognition and thus may hold promise as an intervention for BDD.

A similar approach to the translation of basic neuroscience to clinical applications involves the development of neurocognitive programs such as cognitive bias modification or cognitive remediation, which are brief computerized interventions that have been tested as stand-alone interventions or as an adjunct to CBT protocols. An example of a cognitive bias modification program is attention retraining, which can be used to address selective attentional biases in BDD and to teach individuals to attend to nonappearance, non-threat-related stimuli by providing feedback about accuracy after each training trial. Preliminary data suggest that attention retraining away from social threat stimuli may benefit BDD symptoms among a sample of SAD patients with BDD concerns (Fang et al. 2013). This study showed that the attention retraining intervention significantly improved BDD but not SAD symptoms, which suggests that the two disorders may be maintained by distinguishable cognitive mechanisms, such as selective attentional or visual processing of emotional stimuli. Along the same lines, a cognitive bias modification program may be developed that targets negative interpretive biases (Buhlmann et al. 2002b) in BDD.

Cognitive remediation therapy may also hold some promise for BDD. This treatment is typically computerized and is designed to improve neurocognitive functioning, such as attention, working memory, cognitive flexibility and planning, and executive functioning. Although this treatment has not been used with BDD, it has been used successfully in related populations (Brockmeyer et al. 2014, Buhlmann et al. 2006).

Research has already begun to translate findings on emotion recognition deficits in BDD to clinical applications. For example, Buhlmann et al. (2011) found that a single-session emotion recognition training intervention, in which feedback was provided after each trial about the correct emotional expression, was efficacious in modifying emotion recognition biases for neutral and

scared faces in individuals with BDD. However, given that all groups performed well across emotion categories, there was no overall effect of the intervention between the groups across emotion categories. This is an important area for future research, as deficits in emotion recognition may interfere with treatment. Patients who are unable to accurately interpret the facial expressions of others may have additional difficulty learning about others' behavior or challenging their beliefs about others after exposure exercises. For any future treatment development research, an important question will be whether the interventions also improve BDD symptom severity. It remains unclear from current studies (Buhlmann et al. 2006, 2013) whether improvement in organizational deficits or emotion recognition biases correlates with symptom improvement.

Treatment Dissemination and Implementation

Despite major improvements in the past decade, BDD is still underrecognized and undertreated. More work is needed to better identify individuals with BDD by developing prevention programs and improving screening procedures. For example, prevention efforts may begin in early education settings and target boys and girls during early adolescence, when BDD is likely to first develop. Improved screening procedures within nonpsychiatric clinical settings (e.g., dermatology clinics, cosmetic surgery offices, dentist offices, community mental health centers, primary care offices) may enhance the detection of individuals with BDD symptoms. Although some guidelines are available for screening for BDD in medical settings (Phillips 2006b), screening tools have yet to be validated in larger samples and are not routinely used. The Body Dysmorphic Disorder Questionnaire (Phillips et al. 1995) is a brief screening measure for use in psychiatric settings and has been modified for use in cosmetic dermatology settings (Dufresne et al. 2001); however, available data on its psychometric properties as a screening tool are limited to small samples. Given the poor insight associated with BDD, it is especially important not only to screen in psychiatric settings but also in nonpsychiatric settings (e.g., dermatology, cosmetic surgery). Relatedly, increased collaboration between healthcare providers in these disciplines, by streamlining referral procedures and providing psychoeducational or didactic opportunities, will only further enhance the recognition of BDD.

Additional research is also needed to disseminate effective treatments for BDD. Now that an empirically tested treatment manual for BDD is available, efforts to disseminate treatment and conduct workshops to train CBT therapists may begin to take shape. One major area of research involves the development of web-based platforms and applications to disseminate CBT interventions to a broader audience, including those who may be at risk for developing BDD and those who may already meet diagnostic criteria for BDD. Such applications have been developed and tested in related disorders such as OCD (Herbst et al. 2014), SAD (Berger et al. 2011), and eating disorders (Pretorius et al. 2009). In addition, Internet-based treatment may be particularly helpful in the context of stepped care for BDD. Patients with relatively good insight who are not suicidal could be offered Internet-based therapy as a first step. More complex patients or nonresponders to Internet-based CBT could be offered a higher level of care (i.e., CBT, pharmacotherapy, combination treatment, or residential or inpatient treatment as needed).

CONCLUSIONS

In sum, BDD is a relatively common and debilitating psychiatric illness. In this review, we showed how major findings on mechanisms in BDD have shaped the development of an empirically based cognitive-behavioral model of BDD. In particular, research on cognition has revealed that individuals with BDD display various cognitive biases (e.g., abnormalities in holistic processing

and selective attention, maladaptive beliefs about appearance, interpretive biases, memory deficits). This research has had a major impact on the development of new cognitive-behavioral treatments for BDD. We also discussed priorities for future research and emphasized the need to improve the screening of individuals at risk for BDD as well as the need to disseminate available treatments to the larger community.

SUMMARY POINTS

1. Body dysmorphic disorder (BDD) is a relatively common disorder that is characterized by time-consuming thoughts about perceived appearance flaws and rituals to correct, hide, or fix flaws. It is also associated with high rates of suicidality, delusional beliefs about perceived flaws, and seeking cosmetic surgery.
2. BDD shares similar features with many other disorders, including obsessive-compulsive disorder, social anxiety disorder, and eating disorders. A guiding principle for making a differential diagnosis of BDD is to assess whether the underlying problem is due to one's perceived appearance flaws. To differentiate BDD from eating disorders, eating pathology needs to be assessed.
3. Studies on cognition in BDD suggest that individuals with BDD may display a perceptual bias for processing visual information in a detail-focused, piecemeal manner rather than on a holistic, global level.
4. Individuals with BDD display other cognitive biases, including maladaptive beliefs about the importance of appearance and a negative interpretive bias for ambiguous information.
5. Emotional processing research in BDD has shown that individuals with BDD interpret others' facial expressions in a negative way, which is consistent with patients' experience of delusions of reference that others may be mocking, staring at, or talking about them.
6. In the recent past, several cognitive-behavioral treatment studies have been published for BDD. CBT-BDD was informed by research on cognition and emotional processing in BDD and reflected the translation of such research into specific treatment strategies.
7. A recent randomized-controlled trial comparing CBT-BDD to a wait-list control showed that 81% of the intent-to-treat sample showed a $\geq$30-point reduction in BDD symptom severity scores by posttreatment and that these gains were maintained at six-month follow-up.

FUTURE ISSUES

1. What are the mechanisms of action of CBT for BDD?
2. Who benefits from psychosocial and pharmacologic treatments for BDD (i.e., what are the factors that moderate treatment outcome)?
3. Is CBT-BDD effective for individuals who are often excluded from treatment trials (e.g., children and adolescents, suicidal patients, those with comorbid substance use disorders)?
4. What alternative novel therapeutic or augmentation strategies can be developed for BDD to enhance treatment outcomes?

5. How can screening and prevention efforts be improved to identify individuals at risk for developing BDD?
6. How can effective treatments for BDD be disseminated to a broader audience (e.g., by developing and testing an Internet-based intervention)?

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LITERATURE CITED

Alavi M, Kalafi Y, Dehbozorgi GR, Javadpour A. 2011. Body dysmorphic disorder and other psychiatric morbidity in aesthetic rhinoplasty candidates. *J. Plast. Reconstr. Aesthet. Surg.* 64:738–41

Albertini RS, Phillips KA. 1999. Thirty-three cases of body dysmorphic disorder in children and adolescents. *J. Am. Acad. Child Adolesc. Psychiatry* 38:453–59

Aldea MA, Storch EA, Geffken GR, Murphy TK. 2009. Intensive cognitive-behavioral therapy for adolescents with body dysmorphic disorder. *Clin. Case Stud.* 8:113–21

Am. Psychiatr. Assoc. 1980. *Diagnostic and Statistical Manual of Mental Disorders.* Washington, DC: Am. Psychiatr. Publ. 3rd ed.

Am. Psychiatr. Assoc. 1987. *Diagnostic and Statistical Manual of Mental Disorders.* Washington, DC: Am. Psychiatr. Publ. 3rd ed., rev.

Am. Psychiatr. Assoc. 2000. *Diagnostic and Statistical Manual of Mental Disorders.* Washington, DC: Am. Psychiatr. Publ. 4th ed., text rev.

Am. Psychiatr. Assoc. 2013. *Diagnostic and Statistical Manual of Mental Disorders.* Washington, DC: Am. Psychiatr. Assoc. 5th ed.

Beck AT, Clark DA. 1997. An information processing model of anxiety: automatic and strategic processes. *Behav. Res. Ther.* 35:49–58

Berger T, Caspar F, Richardson R, Kneubühler B, Sutter D, Andersson G. 2011. Internet-based treatment of social phobia: a randomized controlled trial comparing unguided with two types of guided self-help. *Behav. Res. Ther.* 49:158–69

Bjornsson AS, Didie ER, Grant JE, Menard W, Stalker E, Phillips KA. 2013. Age at onset and clinical correlates in body dysmorphic disorder. *Compr. Psychiatry* 54:893–903

Bohne A, Wilhelm S, Keuthen NJ, Florin I, Baer L, Jenike MA. 2002. Prevalence of body dysmorphic disorder in a German college student sample. *Psychiatry Res.* 109:101–4

Bradshaw JL, Gates A, Patterson K. 1976. Hemispheric differences in processing visual stimuli. *Q. J. Exp. Psychol.* 28:667–81

Brockmeyer T, Ingenerf K, Walther S, Wild B, Hartmann M, et al. 2014. Training cognitive flexibility in patients with anorexia nervosa: a pilot randomized controlled trial of cognitive remediation therapy. *Int. J. Eat. Disord.* 47:24–31

Buhlmann U, Cook LM, Fama JM, Wilhelm S. 2007. Perceived teasing experiences in body dysmorphic disorder. *Body Image* 4:381–85

Demonstrated an emotion recognition bias in BDD for misinterpreting facial expressions as angry and contemptuous.

Buhlmann U, Etcoff NL, Wilhelm S. 2006. Emotion recognition bias for contempt and anger in body dysmorphic disorder. *J. Psychiatr. Res.* 40:105–11

Buhlmann U, Etcoff NL, Wilhelm S. 2008a. Facial attractiveness ratings and perfectionism in body dysmorphic disorder and obsessive-compulsive disorder. *J. Anxiety Disord.* 22:540–47

Buhlmann U, Glaesmer H, Mewes R, Fama JM, Wilhelm S, et al. 2010. Updates on the prevalence of body dysmorphic disorder: a population-based survey. *Psychiatry Res.* 178:171–75

Buhlmann U, Gleiß MJL, Rupf L, Zschenderlein K, Kathmann N. 2011a. Modifying emotion recognition deficits in body dysmorphic disorder: an experimental investigation. *Depress. Anxiety* 28:924–31

Buhlmann U, McNally RJ, Etcoff NL, Tuschen-Caffier B, Wilhelm S. 2004. Emotion recognition deficits in body dysmorphic disorder. *J. Psychiatr. Res.* 38:201–6

Buhlmann U, McNally RJ, Wilhelm S, Florin I. 2002a. Selective processing of emotional information in body dysmorphic disorder. *J. Anxiety Disord.* 16:289–98

Buhlmann U, Reese HE, Renaud S, Wilhelm S. 2008b. Clinical considerations for the treatment of body dysmorphic disorder with cognitive-behavioral therapy. *Body Image* 5:39–49

Buhlmann U, Rupf L, Gleiss MJL, Zschenderlein K, Kathmann N. 2014. Seeing "changes" that aren't there: facial and object discrimination in body dysmorphic disorder. *Compr. Psychiatry* 55:468–74

Buhlmann U, Teachman BA, Kathmann N. 2011b. Evaluating implicit attractiveness beliefs in body dysmorphic disorder using the Go/No-Go Association Task. *J. Behav. Ther. Exp. Psychiatry* 42:192–97

Buhlmann U, Teachman BA, Naumann E, Fehlinger T, Rief W. 2009. The meaning of beauty: implicit and explicit self-esteem and attractiveness beliefs in body dysmorphic disorder. *J. Anxiety Disord.* 23:694–702

Buhlmann U, Wilhelm S. 2004. Cognitive factors in body dysmorphic disorder. *Psychiatr. Ann.* 34:922–26

Reported a negative interpretive bias for ambiguous information in BDD.

Buhlmann U, Wilhelm S, McNally RJ, Tuschen-Caffier B, Baer L, Jenike MA. 2002b. Interpretive biases for ambiguous information in body dysmorphic disorder. *CNS Spectr.* 7:436–43

Buhlmann U, Winter A, Kathmann N. 2013. Emotion recognition in body dysmorphic disorder: application of the Reading the Mind in the Eyes Task. *Body Image* 10:247–50

Chosak A, Marques L, Greenberg JL, Jenike E, Dougherty DD, Wilhelm S. 2008. Body dysmorphic disorder and obsessive-compulsive disorder: similarities, differences and the classification debate. *Expert Rev. Neurother.* 8:1209–18

Clerkin EM, Teachman BA. 2008. Perceptual and cognitive biases in individuals with body dysmorphic disorder symptoms. *Cogn. Emot.* 22:1327–39

Clerkin EM, Teachman BA. 2009. Automatic and strategic measures as predictors of mirror gazing among individuals with body dysmorphic disorder symptoms. *J. Nerv. Ment. Dis.* 197:589–98

Cohen LJ, Kingston P, Bell A, Kwon J, Aronowitz B, Hollander E. 2000. Comorbid personality impairment in body dysmorphic disorder. *Compr. Psychiatry* 41:4–12

Coles ME, Phillips KA, Menard W, Pagano ME, Fay C, et al. 2006. Body dysmorphic disorder and social phobia: cross-sectional and prospective data. *Depress. Anxiety* 23:26–33

Conrado LA, Hounie AG, Diniz JB, Fossaluza V, Torres AR, et al. 2010. Body dysmorphic disorder among dermatologic patients: prevalence and clinical features. *J. Am. Acad. Dermatol.* 63:235–43

Crerand CE, Menard W, Phillips KA. 2010. Surgical and minimally invasive cosmetic procedures among persons with body dysmorphic disorder. *Ann. Plast. Surg.* 65:11–16

Reported a tendency for patients with BDD to overfocus on small details of a complex figure.

Deckersbach T, Savage CR, Phillips KA, Wilhelm S, Buhlmann U, et al. 2000. Characteristics of memory dysfunction in body dysmorphic disorder. *J. Int. Neuropsychol. Soc.* 6:673–81

Doehrmann O, Ghosh SS, Polli FE, Reynolds GO, Horn F, et al. 2013. Predicting treatment response in social anxiety disorder from functional magnetic resonance imaging. *JAMA Psychiatry* 70:87–97

Dufresne RG, Phillips KA, Vittorio CC, Wilkel CS. 2001. A screening questionnaire for body dysmorphic disorder in a cosmetic dermatologic surgery practice. *Dermatol. Surg.* 27:457–62

Ekman P, Friesen W. 1975. *Unmasking the Face: A Guide to Recognizing Emotions from Facial Cues*. Englewood Cliffs, NJ: Prentice-Hall

Ekman P, Friesen W. 1976. *Pictures of Facial Affect*. Palo Alto, CA: Consult. Psychol. Press

Evans MA, Shedden JM, Hevenor SJ, Hahn MC. 2000. The effect of variability of unattended information on global and local processing: evidence for lateralization at early stages of processing. *Neuropsychologia* 38:225–39

Fang A, Sawyer AT, Aderka IM, Hofmann SG. 2013. Psychological treatment of social anxiety disorder improves body dysmorphic concerns. *J. Anxiety Disord.* 7:684–91

Feusner JD, Bystritsky A, Hellemann G, Bookheimer S. 2010a. Impaired identity recognition of faces with emotional expressions in body dysmorphic disorder. *Psychiatry Res.* 179:318–23

Feusner JD, Hembacher E, Moller H, Moody TD. 2011. Abnormalities of object visual processing in body dysmorphic disorder. *Psychol. Med.* 41:2385–97

Feusner JD, Moller H, Altstein L, Sugar C, Bookheimer S, et al. 2010b. Inverted face processing in body dysmorphic disorder. *J. Psychiatr. Res.* 44:1088–94

Feusner JD, Moody T, Hembacher E, Townsend J, McKinley M, et al. 2010c. Abnormalities of visual processing and frontostriatal systems in body dysmorphic disorder. *Arch. Gen. Psychiatry* 67:197–205

Feusner JD, Townsend J, Bystritsky A, Bookheimer S. 2007. Visual information processing of faces in body dysmorphic disorder. *Arch. Gen. Psychiatry* 64:1417–26

Feusner JD, Yaryura-Tobias J, Saxena S. 2008. The pathophysiology of body dysmorphic disorder. *Body Image* 5:3–12

Grant JE, Menard W, Phillips KA. 2006. Pathological skin picking in individuals with body dysmorphic disorder. *Gen. Hosp. Psychiatry* 28:487–93

Greenberg JL, Markowitz S, Petronko MR, Taylor CE, Wilhelm S, Wilson GT. 2010. Cognitive-behavioral therapy for adolescent body dysmorphic disorder. *Cogn. Behav. Pract.* 17:248–58

Greenberg JL, Reuman L, Hartmann AS, Kasarskis I, Wilhelm S. 2014. Visual hot spots: an eye tracking study of attention bias in body dysmorphic disorder. *J. Psychiatr. Res.* 57:125–32

Greenwald AG, McGhee DE, Schwartz JLK. 1998. Measuring individual differences in implicit cognition: the implicit association test. *J. Personal. Soc. Psychol.* 74:1464–80

Grocholewski A, Kliem S, Heinrichs N. 2012. Selective attention to imagined facial ugliness is specific to body dysmorphic disorder. *Body Image* 9:261–69

Showed biases in visual attention in BDD using eye-tracking technology (see also Greenberg et al. 2014).

Gunstad J, Phillips KA. 2003. Axis I comorbidity in body dysmorphic disorder. *Compr. Psychiatry* 44:270–76

Hanes KR. 1998. Neuropsychological performance in body dysmorphic disorder. *J. Int. Neuropsychol. Soc.* 4:167–71

Hartmann AS, Greenberg JL, Wilhelm S. 2013. The relationship between anorexia nervosa and body dysmorphic disorder. *Clin. Psychol. Rev.* 33:675–85

Herbst N, Voderholzer U, Thiel N, Schaub R, Knaevelsrud C, et al. 2014. No talking, just writing! Efficacy of an internet-based cognitive behavioral therapy with exposure and response prevention in obsessive compulsive disorder. *Psychother. Psychosom.* 83:165–75

Hofmann SG, Fang A, Gutner CA. 2014. Cognitive enhancers for the treatment of anxiety disorders. *Restor. Neurol. Neurosci.* 32:183–95

Hofmann SG, Smits JA, Rosenfield D, Simon N, Otto NW, et al. 2013. D-cycloserine as an augmentation strategy with cognitive-behavioral therapy for social anxiety disorder. *Am. J. Psychiatry* 170:751–58

Hollander E, Allen A, Kwon J, Aronowitz B, Schmeidler J, et al. 1999. Clomipramine versus desipramine crossover trial in body dysmorphic disorder: selective efficacy of a serotonin reuptake inhibitor in imagined ugliness. *Arch. Gen. Psychiatry* 56:1033–39

Hollander E, Cohen L, Simeon D, Rosen J, DeCaria C, Stein DJ. 1994. Fluvoxamine treatment of body dysmorphic disorder. *J. Clin. Psychopharmacol.* 14:75–77

Horowitz K, Gorfinkle K, Lewis O, Phillips KA. 2002. Body dysmorphic disorder in an adolescent girl. *J. Am. Acad. Child Adolesc. Psychiatry* 41:1503–9

Insel T, Cuthbert B, Garvey M, Heinssen R, Pine DS, et al. 2010. Research domain criteria (RDoC): toward a new classification framework for research on mental disorders. *Am. J. Psychiatry* 167:748–51

Insel TR. 2014. The NIMH Research Domain Criteria (RDoC) project: precision medicine for psychiatry. *Am. J. Psychiatry* 171:395–97

Kelly MM, Walters C, Phillips KA. 2010. Social anxiety and its relationship to functional impairment in body dysmorphic disorder. *Behav. Ther.* 41:143–53

Kerwin L, Hovav S, Helleman G, Feusner JD. 2014. Impairment in local and global processing and set-shifting in body dysmorphic disorder. *J. Psychiatr. Res.* 57:41–50

Reported deficits in global and local processing in BDD (see also Feusner et al. 2007).

Kittler JE, Menard W, Phillips KA. 2007. Weight concerns in individuals with body dysmorphic disorder. *Eat. Behav.* 8:115–20

Koran LM, Abujaoude E, Large MD, Serpe RT. 2008. The prevalence of body dysmorphic disorder in the United States adult population. *CNS Spectr.* 13:316–22

Krebs G, Turner C, Heyman I, Mataix-Cols D. 2012. Cognitive behavior therapy for adolescents with body dysmorphic disorder: a case series. *Behav. Cogn. Psychother.* 40:452–61

Kushner MG, Kim SW, Donahue C, Thuras P, Adson D, et al. 2007. D-cycloserine augmented exposure therapy for obsessive-compulsive disorder. *Biol. Psychiatry* 62:835–38

Lopez C, Tchanturia K, Stahl D, Treasure J. 2009. Weak central coherence in eating disorders: a step towards looking for an endophenotype of eating disorders. *J. Clin. Exp. Neuropsychol.* 31:117–25

Marques LM, Weingarden HM, LeBlanc NJ, Wilhelm S. 2011. Treatment utilization and barriers to treatment engagement among people with body dysmorphic symptoms. *J. Psychosom. Res.* 70:286–93

Neziroglu F, Khemlani-Patel S, Veale D. 2008. Social learning theory and cognitive behavioral models of body dysmorphic disorder. *Body Image* 5:28–38

Neziroglu F, McKay D, Todaro J, Yaryura-Tobias JA. 1996. Effect of cognitive behavior therapy on persons with body dysmorphic disorder and comorbid Axis II diagnoses. *Behav. Ther.* 27:67–77

Neziroglu F, Stevens KP, McKay D, Yaryura-Tobias JA. 2001. Predictive validity of the overvalued ideas scale: outcome in obsessive-compulsive and body dysmorphic disorders. *Behav. Res. Ther.* 39:745–56

Osman S, Cooper M, Hackmann A, Veale D. 2004. Spontaneously occurring images and early memories in people with body dysmorphic disorder. *Memory* 12:428–36

Perugi G, Giannotti D, Di Vaio S, Frare F, Saettoni M, Cassano GB. 1996. Fluvoxamine in the treatment of body dysmorphic disorder (dysmorphophobia). *Int. Clin. Psychopharmacol.* 11:247–54

Phillips KA. 1998. Body dysmorphic disorder: clinical aspects and treatment strategies. *Bull. Menninger Clin.* 62(4 Suppl. A):A33–48

Showed that 84% of BDD patients either were delusional or had poor insight.

Phillips KA. 2004. Psychosis in body dysmorphic disorder. *J. Psychiatr. Res.* 38:63–72

Phillips KA. 2006a. An open-label study of escitalopram in body dysmorphic disorder. *Int. Clin. Psychopharmacol.* 21:177–79

Phillips KA. 2006b. The presentation of body dysmorphic disorder in medical settings. *Prim. Psychiatry* 13:51–59

Phillips KA. 2007. Suicidality in body dysmorphic disorder. *Prim. Psychiatry* 14:58–66

Phillips KA. 2009. *Understanding Body Dysmorphic Disorder: An Essential Guide*. New York: Oxford Univ. Press

Phillips KA, Albertini RS, Rasmussen SA. 2002. A randomized placebo-controlled trial of fluoxetine in body dysmorphic disorder. *Arch. Gen. Psychiatry* 59:381–88

Phillips KA, Atala KD, Pope HG. 1995. *Diagnostic instruments for body dysmorphic disorder*. Paper presented at Annu. Meet. Am. Psychiatr. Assoc., 148th, Miami, FL

Phillips KA, Diaz SF. 1997. Gender differences in body dysmorphic disorder. *J. Nerv. Ment. Dis.* 185:570–77

Phillips KA, Dwight MM, McElroy SL. 1998. Efficacy and safety of fluvoxamine in body dysmorphic disorder. *J. Clin. Psychiatry* 59:165–71

Phillips KA, Grant J, Siniscalchi J, Albertini RS. 2001. Surgical and nonpsychiatric medical treatment of patients with body dysmorphic disorder. *Psychosomatics* 42:504–10

Phillips KA, Hollander E. 2008. Treating body dysmorphic disorder with medication: evidence, misconceptions, and a suggested approach. *Body Image* 5:13–27

Phillips KA, McElroy SL. 2000. Personality disorders and traits in patients with body dysmorphic disorder. *Compr. Psychiatry* 41:229–36

Phillips KA, McElroy SL, Keck PE, Hudson JI. 1994. A comparison of delusional and nondelusional body dysmorphic disorder in 100 cases. *Psychopharmacol. Bull.* 30:179–86

Phillips KA, McElroy SL, Keck PE, Pope HG, Hudson JI. 1993. Body dysmorphic disorder: 30 cases of imagined ugliness. *Am. J. Psychiatry* 150:302–8

Phillips KA, Menard W. 2006. Suicidality in body dysmorphic disorder: a prospective study. *Am. J. Psychiatry* 163:1280–82

Phillips KA, Menard W, Fay C. 2006. Gender similarities and differences in 200 individuals with body dysmorphic disorder. *Compr. Psychiatry* 47:77–87
Phillips KA, Menard W, Fay C, Weisberg R. 2005. Demographic characteristics, phenomenology, comorbidity, and family history in 200 individuals with body dysmorphic disorder. *Psychosomatics* 46:317–25
Phillips KA, Menard W, Quinn E, Didie ER, Stout RL. 2013. A 4-year prospective observational follow-up study of course and predictors of course in body dysmorphic disorder. *Psychol. Med.* 43:1109–17
Phillips KA, Najjar F. 2003. An open-label study of citalopram in body dysmorphic disorder. *J. Clin. Psychiatry* 64:715–20
Phillips KA, Nierenberg AA, Brendel G, Fava M. 1996. Prevalence and clinical features of body dysmorphic disorder in atypical major depression. *J. Nerv. Ment. Dis.* 184:125–29
Phillips KA, Rogers J. 2011. Cognitive-behavioral therapy for youth with body dysmorphic disorder: current status and future directions. *Child Adolesc. Psychiatr. Clin. N. Am.* 20:287–304
Pretorius N, Arcelus J, Beecham J, Dawson H, Doherty F, et al. 2009. Cognitive-behavioural therapy for adolescents with bulimic symptomatology: the acceptability and effectiveness of internet-based delivery. *Behav. Res. Ther.* 47:729–36
Reese HE, McNally RJ, Wilhelm S. 2010. Facial asymmetry detection in patients with body dysmorphic disorder. *Behav. Res. Ther.* 48:936–40
Reese HE, McNally RJ, Wilhelm S. 2011. Probabilistic reasoning in patients with body dysmorphic disorder. *J. Behav. Ther. Exp. Psychiatry* 42:270–76
Rief W, Buhlmann U, Wilhelm S, Borkenhagen A, Brahler E. 2006. The prevalence of body dysmorphic disorder: a population-based survey. *Psychol. Med.* 36:877–86
Rosen JC, Reiter J, Orosan P. 1995. Cognitive-behavioral body image therapy for body dysmorphic disorder. *J. Consult. Clin. Psychol.* 63:263–69
Salkovskis PM. 1985. Obsessional-compulsive problems: a cognitive-behavioural analysis. *Behav. Res. Ther.* 23:571–83
Sarwer DB. 2002. Awareness and identification of body dysmorphic disorder by aesthetic surgeons: results of a survey of American Society for Aesthetic Plastic Surgery Members. *Aesthet. Surg. J.* 6:531–55
Savage CR, Baer L, Keuthen NJ, Brown HD, Rauch SL, Jenike MA. 1999. Organizational strategies mediate nonverbal memory impairment in obsessive-compulsive disorder. *Biol. Psychiatry* 45:905–16
Siegle GJ, Thompson WK, Collier A, Berman SR, Feldmiller J, et al. 2012. Toward clinically useful neuroimaging in depression treatment: prognostic utility of subgenual cingulate activity for determining depression outcome in cognitive therapy across studies, scanners, and patient characteristics. *Arch. Gen. Psychiatry* 69:913–24
Stangier U, Adam-Schwebe S, Müller T, Wolter M. 2008. Discrimination of facial appearance stimuli in body dysmorphic disorder. *J. Abnorm. Psychol.* 117:435–43
Storch EA, Merlo LJ, Bengtson M, Murphy TK, Lewis MH, et al. 2007. D-cycloserine does not enhance exposure-response prevention therapy in obsessive-compulsive disorder. *Int. Clin. Psychopharmacol.* 22:230–37
Storch EA, Murphy TK, Goodman WK, Geffken GR, Lewin AB, et al. 2010. A preliminary study of D-cycloserine augmentation of cognitive-behavioral therapy in pediatric obsessive-compulsive disorder. *Biol. Psychiatry* 68:1073–76
Veale D. 2000. Outcome of cosmetic surgery and "DIY" surgery in patients with body dysmorphic disorder. *Psychiatr. Bull.* 24:218–21
Veale D. 2004. Advances in a cognitive behavioral model of body dysmorphic disorder. *Body Image* 1:113–25
Veale D, Gournay K, Dryden W, Boocock A, Shah F, et al. 1996. Body dysmorphic disorder: a cognitive behavioural model and pilot randomised controlled trial. *Behav. Res. Ther.* 34:717–29
Wilhelm S. 2006. *Feeling Good About the Way You Look: A Program for Overcoming Body Image Problems*. New York: Guilford
Wilhelm S, Buhlmann U, Tolin DF, Meunier SA, Pearlson GD, et al. 2008. Augmentation of behavior therapy with D-cycloserine for obsessive-compulsive disorder. *Am. J. Psychiatry* 165:335–41
Wilhelm S, Neziroglu F. 2002. Cognitive theory of body dysmorphic disorder. In *Cognitive Approaches to Obsessions and Compulsions*, ed. RO Frost, G Steketee, pp. 203–14. Amsterdam: Pergamon/Elsevier Sci.

Wilhelm S, Otto MW, Zucker BG, Pollack MH. 1997. Prevalence of body dysmorphic disorder in patients with anxiety disorders. *J. Anxiety Disord.* 11:499–502

Wilhelm S, Phillips KA, Fama JM, Greenberg JL, Steketee G. 2011. Modular cognitive-behavioral therapy for body dysmorphic disorder. *Behav. Ther.* 42:624–33

A recent randomized-controlled trial that tested CBT-BDD versus a wait-list control.

Wilhelm S, Phillips KA, Didie E, Buhlmann U, Greenberg JL, et al. 2014. Modular cognitive behavioral therapy for body dysmorphic disorder: a randomized controlled trial. *Behav. Ther.* 45:314–27

Provided treatment guidelines in a manual for CBT-BDD.

Wilhelm S, Phillips KA, Steketee G. 2013. *Cognitive-Behavioral Therapy for Body Dysmorphic Disorder: A Treatment Manual*. New York: Guilford

Williams J, Hadjistavropoulos T, Sharpe D. 2006. A meta-analysis of psychological and pharmacological treatments for body dysmorphic disorder. *Behav. Res. Ther.* 44:99–111

Windheim K, Veale D, Anson M. 2011. Mirror gazing in body dysmorphic disorder and healthy controls: effects of duration of gazing. *Behav. Res. Ther.* 49:555–64

Wright MR. 1987. The male aesthetic patient. *Arch. Otolaryngol. Head Neck Surg.* 113:724–27

Yazel L, Tager J. 1999. The serial-surgery murder. *Glamour* 97:108