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Evaluating implicit attractiveness beliefs in body dysmorphic disorder using the Go/No-go Association Task

Ulrike Buhlmann^a, Bethany A. Teachman^b, and Norbert Kathmann^a

^aHumboldt-Universität zu Berlin, Department of Clinical Psychology, Rudower Chaussee 18, 12489 Berlin, Germany

^bUniversity of Virginia, Department of Psychology, 102 Gilmer Hall, PO Box 400400, Charlottesville, VA 22904-4400, U.S.A.

Abstract

Cognitive-behavioral models of body dysmorphic disorder (BDD) suggest the disorder is characterized by exaggerated beliefs about the significance of appearance. However, previous studies assessing automatic associations regarding the importance of attractiveness failed to find any differences between individuals with BDD and healthy control participants using the Implicit Association Test (IAT; Greenwald, McGhee, Schwartz, 1998). An open question is whether the BDD and control groups indeed implicitly evaluate attractiveness comparably, or whether methodological factors (e.g., the IAT design requirement of a relative comparison category for attractiveness) made it difficult to observe group differences. To address this question, we evaluated explicit and implicit attractiveness beliefs among individuals with BDD ($n = 36$), individuals with a dermatological condition ($n = 36$), and psychiatrically healthy control participants ($n = 36$) using the single target category Go/No-go Association Task (GNAT; Nosek, & Banaji, 2001). Indeed, BDD participants had significantly stronger implicit associations between attractive and important, relative to the other groups, whereas there was no difference between the dermatology and control groups. Further, the GNAT was effective at classifying individuals with BDD above and beyond the prediction offered by an explicit measure of attractiveness beliefs. The GNAT may be a useful tool for assessing implicit associations in clinical populations because it does not require an explicit comparison target category, which is a restriction of many implicit measures.

Keywords

Body dysmorphic disorder; body image; importance of attractiveness; implicit associations; Go/No-go Association Task

1. Introduction

Individuals with body dysmorphic disorder (BDD) are preoccupied with perceived defects or flaws in their physical appearance, frequently tied to the face, skin, or hair (e.g., pimples, misshapen nose; American Psychiatric Association, 2000). They often misperceive the “defect” as repulsive and think about their appearance for many hours a day, even though others do not share their concerns. BDD is further characterized by significant avoidance of

social activities, which may even lead to being housebound (e.g., Phillips et al., 2006; Phillips, McElroy, Keck, Pope, & Hudson, 1993).

1.1 Cognitive-behavioral models of BDD

Recently, several cognitive-behavioral models have been developed to explain BDD's unique symptom pattern (e.g., Neziroglu, Khemlani-Patel, & Veale, 2008; Veale, 2004; Wilhelm, 2006; Wilhelm & Neziroglu, 2002). According to these models, individuals with BDD have maladaptive beliefs about their appearance, such as "If I am not good looking, I won't be able to be happy." These beliefs may be activated automatically (e.g., rapidly and outside conscious control or awareness) and trigger negative self-evaluation and low self-esteem, given that persons with BDD perceive themselves as unattractive or not attractive enough. In addition, these negative beliefs are thought to lead to anxiety, shame and sadness, which in turn lead to maladaptive coping strategies, such as mirror checking, and/or avoidance behaviors.

To date, several studies have supported the idea of maladaptive appearance beliefs and interpretive biases in BDD. For example, individuals with BDD interpret ambiguous situations related to appearance negatively and misinterpret others' facial expressions as threatening (Buhlmann et al., 2002; Buhlmann, Etcoff, & Wilhelm, 2006; Buhlmann, McNally, Etcoff, Tuschen-Caffier, & Wilhelm, 2004; Clerkin & Teachman, 2008; Feusner, Bystritsky, Helleman, & Bookheimer, in press). However, other elements of the cognitive-behavioral models of BDD have not been adequately tested, especially concerning the automatic nature of the maladaptive appearance beliefs.

1.2 Implicit Associations in BDD

Research in the field of social psychology has shown that people might be reluctant to report their evaluations, or the evaluations may reside outside conscious awareness or control (see Greenwald & Banaji, 1995). In addition, processing that occurs outside conscious control is thought to hold a significant role in perpetuating pathological anxiety (see Beck & Clark, 1997; McNally, 1995). Thus, given the close relationship between BDD and anxiety disorders (e.g., similarities with obsessive-compulsive disorder and social phobia; see Allen & Hollander, 2004), it is important to determine whether the same automatic biases operate in BDD. Both the reluctance about reporting certain associations and the uncontrollability of the associations may be evident in BDD. Specifically, BDD sufferers are often ashamed to talk about their concerns and perceive themselves as vain when admitting how much value they put on how they look. Also, in clinical practice, persons with BDD often describe the concerns about appearance as being involuntary. Thus, the current study sought to assess both explicit and implicit components of distorted appearance beliefs to more fully understand appearance evaluations and their relationship to BDD.

The Implicit Association Test (IAT; Greenwald et al., 1998) is a widely used paradigm that reflects relatively involuntary associations in memory, reducing the impact of social desirability and response biases. We recently conducted two studies examining explicit and implicit self-esteem and beliefs about the importance of attractiveness among individuals diagnosed with BDD, individuals with subclinical BDD, and psychiatrically healthy control participants (Buhlmann, Teachman, Naumann, Fehlinger, & Rief, 2009; Buhlmann, Teachman, Gerbershagen, Kikul, & Rief, 2008). As expected, using the IAT in both studies, we observed that the BDD group had significantly lower implicit self-esteem than the control group, and the subclinical BDD group was intermediate between these groups. Interestingly, neither study found a group difference on an IAT assessing associations about the importance of attractiveness. In addition, Clerkin and Teachman (2009) failed to obtain a

significant group difference on a similar IAT in a student population with high and low BDD symptoms.

Despite these null findings, we are reticent to conclude that persons with BDD do not have exaggerated implicit associations about the importance of attractiveness. In part this is because of the emerging support for cognitive-behavioral models of BDD. Also, Buhlmann et al. (2009) found that BDD participants had significantly stronger implicit associations on an IAT between attractiveness (compared to unattractiveness) and being competent (versus incompetent) than the subclinical and control groups, in line with a common stereotype about physical attractiveness. Further, both the IAT assessing attractiveness-competence associations and the IAT assessing self-esteem were significant predictors of BDD symptom severity, and distress and avoidance during a mirror exposure task (Buhlmann et al., 2009). Instead, we suspect that the null importance of attractiveness findings may have been due to the particular IAT design that was used. As outlined in Buhlmann et al. (2008), the IAT requires that the target category (attractiveness in this case) be evaluated relative to another target category. In the previous studies, we compared evaluations of attractiveness relative to kindness or looking plain. Thus, we can only conclude that individuals with BDD are no different in their associations about attractiveness relative to kindness or relative to being unattractive, leaving open the possibility that the comparison categories are driving the (lack of) effects. This is especially problematic when considering that evaluations of ugliness are extremely salient to people with BDD, and evaluations of kindness may trigger concerns tied to fears of negative evaluation, also a prominent concern in BDD.

In consequence, there is a need to evaluate implicit associations about the importance of attractiveness with a task that does not require the direct comparison category that is needed with an IAT. An alternative paradigm assessing implicit associations is the Go/No-go Association Task (GNAT; Nosek, & Banaji, 2001), which has the advantage that it measures implicit associations toward a single target category (de Houwer, 2002; Nosek & Banaji, 2001). Teachman (2007) used the GNAT to investigate implicit fear associations toward spiders in a student population and found that, consistent with predictions, the high fear group exhibited significantly stronger spider fear associations than the low fear group. Further, implicit associations towards spiders were associated with explicit measures of spider fear and self-reported anxiety during a subsequent behavioral avoidance test involving a live spider. Moreover, Schoenleber and Berenbaum (2010) administered the GNAT to assess associations between shame and Cluster C personality disorders and found that, as predicted, associations between shame and pain were uniquely associated with dependent personality disorder. In addition, Lee and colleagues, found in two longitudinal samples that positive implicit partner evaluations, as assessed with the GNAT, were associated with a diminished risk of the couple breaking up over a 12 month follow-up period (Lee, Rogge, & Reis, 2010). Thus, there is growing evidence that the GNAT may be an effective task for assessing implicit associations in clinical and non-clinical populations.

The purpose of the current study was to investigate implicit associations about the importance of attractiveness using the GNAT to determine if it would be sensitive to group differences in BDD symptoms. Specifically, we evaluated associations between attractive and important among individuals diagnosed with BDD, individuals diagnosed with a dermatological condition, and a control group that reported no current or past Axis-I psychiatric disorders. We included the dermatology group as a non-psychiatric comparison group in order to control for general skin concerns. We hypothesized that the BDD group would be characterized by stronger associations between attractive and important, relative to the other groups. In contrast, we expected no difference between the dermatology and psychiatrically healthy control groups because despite possible differences in appearance of

and concerns about skin, the distorted beliefs about the importance of attractiveness that are thought to characterize BDD were not expected to be evident.

2. Material and Methods

2.1 Participants

All participants were recruited through posted flyers in the greater Berlin area, Germany. Specifically, the BDD group was recruited via flyers advertising for a research study on appearance concerns. The dermatology group was recruited with flyers advertising for a research study on dermatological problems. Flyers for the control group advertised for individuals who did not report any current or past psychological problems.

The BDD group was comprised of 36 Caucasian individuals (12 males) whose diagnoses were confirmed by the first author administering the German version of the structured clinical interview for DSM-IV (SCID; Wittchen, Zaudig, & Fydrich, 1997). To further characterize the sample, BDD symptom severity was assessed with the German version of the clinician-administered Body Dysmorphic Disorder Modification of the Yale-Brown Obsessive-Compulsive Scale (BDD-YBOCS; Phillips et al., 1997; Stangier, Hungerbühler, Meyer, & Wolter, 2000). It consists of 12 items that measure the severity of BDD symptoms during the past week. BDD-YBOCS interviews indicated moderate BDD symptom severity in the BDD group, supporting the diagnostic classification (see Table 1). The BDD-YBOCS was administered to the BDD group only, given that the measure was developed for and only validated in a sample of diagnosed BDD patients (Phillips et al., 1997). Internal consistency in the current sample was $\alpha = 0.75$.

BDD participants could report multiple perceived appearance “defects.” The reported appearance concerns centered on skin ($n = 24$), breasts ($n = 17$), hair ($n = 18$), hands ($n = 9$), nose ($n = 8$), eyes ($n = 7$), mouth ($n = 7$), arms ($n = 6$), stomach ($n = 6$), buttock ($n = 5$), muscle build ($n = 6$), genitals ($n = 6$), back ($n = 3$), feet ($n = 3$), shape of head ($n = 2$), chin ($n = 1$), ears ($n = 1$), ethnicity-relevant features (e.g., skin color; $n = 2$), forehead ($n = 1$), neck ($n = 1$), and shoulders ($n = 1$). Although BDD was the primary diagnosis in all cases (based on symptom severity), SCID interviews revealed the following current comorbid Axis I diagnoses: major depression ($n = 13$), social phobia ($n = 13$), dysthymia ($n = 5$), binge eating disorder ($n = 3$), bulimia nervosa ($n = 2$), obsessive-compulsive disorder ($n = 2$), impulse control disorder ($n = 1$), panic disorder with agoraphobia ($n = 1$), panic disorder without agoraphobia ($n = 2$), posttraumatic stress disorder ($n = 1$), substance dependence ($n = 1$), and specific phobia ($n = 6$), alcohol abuse ($n = 1$), alcohol dependence ($n = 1$).

The dermatology group was comprised of 36 Caucasian individuals (13 males) whose diagnoses were confirmed by their dermatologist. Specifically, the following multiple dermatological conditions were obtained: acne conglobata ($n = 1$), acné excoriée des jeunes filles ($n = 1$), allergic rhinitis due to pollen ($n = 1$), allergy, unspecified ($n = 1$), candidal stomatitis ($n = 1$), cheilitis ($n = 1$), dyshidrosis ($n = 1$), hyperhidrosis, unspecified ($n = 1$), infective dermatitis ($n = 1$), dermatitis, unspecified ($n = 1$), localized hyperhidrosis ($n = 1$), nonscarring hair loss, unspecified ($n = 1$), orchitis, epididymitis and epididymo-orchitis without abscess ($n = 1$), perioral dermatitis ($n = 1$), tinea corporis ($n = 1$), tinea pedis ($n = 1$), atopic dermatitis, unspecified ($n = 2$), viral warts ($n = 1$), acne vulgaris ($n = 6$), psoriasis vulgaris ($n = 7$), and neurodermatitis ($n = 13$). Current or past BDD was an exclusion criterion for the dermatology group; however, SCID interviews revealed the following other current comorbid Axis I diagnoses: major depression ($n = 2$), alcohol abuse ($n = 2$), substance abuse ($n = 1$), and social phobia ($n = 1$).

The control group was comprised of 36 Caucasian individuals (15 males) with no current or past Axis-I psychiatric history, as determined by the SCID. The three groups did not significantly differ with respect to age, gender, or years of education, all $ps \geq .09$ (see details on demographic information in Table 1).

2.2 Explicit Measures

Participants completed the following self-report measures: the *Body Dysmorphic Symptoms Inventory* (FKS; Fragebogen Körperdysmorpher Symptome; Buhlmann, Wilhelm, Glaesmer, Brähler, & Rief, 2009), the German version of the *Beck Depression Inventory-II* (BDI-II; Beck & Steer, 1987; Hautzinger, Bailer, Worall & Keller, 1995), and the German modification of the *Beliefs About Appearance Scale* (Fragebogen zur Einstellung gegenüber physischer Attraktivität [FEPA]; Kikul, Gerbershagen, Buhlmann, & Rief, 2005), which is adapted from Petrie, Rogers, Johnson, and Diehl's (1996) *Beliefs About Appearance Scale* (BAAS). The FKS is an 18 item self-report inventory assessing the severity of body dysmorphic disorder symptoms during the past week. Internal consistency in the current sample was $\alpha = .95$. The BDI-II is a widely used 21 item scale examining depressive symptoms during the past week. Internal consistency in the current sample was $\alpha = .95$. The FEPA consists of 10 items examining beliefs about the importance of physical attractiveness. In contrast to the BAAS, the FEPA includes gender-neutral items (e.g., "It is important to be physically attractive", "Physically attractive people have a happier life than physically unattractive people"). Each item is rated on a scale from 1 ("do not agree at all") to 7 ("agree very much"). Internal consistency in the current sample was $\alpha = .91$.

2.3 Implicit Measure

Implicit attractiveness beliefs were examined using the GNAT, which was presented on a 15" computer screen using Inquisit software (Draine, 1999). The GNAT involves classifying stimuli into superordinate categories using speed of classification as a measure of the strength of automatic associations in memory. To assess the perceived importance of being attractive, response latency was measured when the categories Attractive and Important were jointly presented versus when the categories Attractive and Unimportant were presented. During the critical blocks, participants are presented with two category labels on the computer screen at the same time, followed by a single stimulus presented in the middle of the screen. They are instructed to evaluate whether or not the stimulus in the middle of the screen belongs to one of the two categories whose labels appear on the screen. If the stimulus belongs to either of these categories (e.g., Attractive and Important), participants are told to press the space bar (the 'Go' response). If the stimulus is a distracter item and does not belong to either of the two categories (e.g., the item Unimportant), they are told not to press any key (the 'No-go' response). Error feedback is given after each trial. Specifically, for those trials where distracter items are incorrectly categorized as target items (i.e., the participant chooses the 'Go' response instead of the 'No-go' response), a red "X" appears below the stimulus for 100 ms. In addition, for those trials where target items are correctly categorized as targets ('Go' response) or where distracter items are correctly identified as distracters ('No-go' response), a green "O" appears below the stimulus for 100 ms. Strength of associations between attractive and important is indicated by relatively faster responses when the category Attractive is paired with the category Important, compared with being paired with Unimportant.

Three single categorization blocks were initially completed to familiarize participants with classifying items into the categories. Specifically, blocks categorizing items into Important and Unimportant were first completed in random order, followed by a block categorizing items into the category Attractive. These blocks included 12 trials each. Next, the critical combined blocks (Attractive and Important jointly presented or Attractive and Unimportant

jointly presented) were completed in counterbalanced order. These blocks consisted of 14 practice trials followed by 63 critical trials. During the critical combined blocks, stimuli from the target, descriptor or distracter categories could appear. The target category was Attractive, and either Important or Unimportant was the descriptor category (depending on the block), and the other was the distracter category. Presentation of the four stimuli (see Table 2) from within categories was random, but each stimulus appeared once before repetition within a given category occurred. Following Teachman (2007), the window for target and correct descriptor trials was 1400 ms; the window for incorrect descriptor trials (e.g., a word from the Unimportant category when Important was the category label on the screen) and for distracter trials was 1000 ms. The inter-stimulus interval was 850 ms.

2.4 Data Reduction and Scoring

Data were scored based on recommendations from Nosek and Banaji (2001) and Greenwald, Nosek, and Banaji (2003). Specifically, data were checked to see if any participants had more than 10% trials with unusually fast responses (under 300 ms), or very high error rates (no more than 40% on a given critical block or over 30% overall). Data from three participants had to be excluded based on these criteria. Further, as recommended, distracter trials (e.g., Unimportant) were not included in the analyses. The GNAT D score was calculated by computing the difference in mean reaction time across critical blocks divided by the standard deviation across blocks, which is conceptually similar to Cohen's d (see Greenwald et al., 2003). Higher scores indicate greater implicit associations between attractive and important.

2.5 Procedure

The study consisted of two separate visits. During the first appointment, following informed consent, a SCID interview was conducted by the first author. Diagnosed BDD participants additionally underwent the BDD-YBOCS interview and dermatology participants gave us written permission to access their current dermatological diagnosis from their dermatologist. During the second appointment, between two to five days later, participants completed the Attractive Important GNAT task, followed by the questionnaires before being fully debriefed and receiving compensation for their participation.

3. Results

3.1 Group Differences on Markers Tied to BDD

3.1.1 Explicit BDD-related Beliefs and Associated Symptoms—As expected, the groups differed significantly with respect to BDD symptoms, as assessed with the FKS, $F(2,107) = 166.11, p < .001, \eta_p^2 = 0.76$. Follow up Scheffe tests indicated that the BDD group had higher FKS scores, relative to both the control group, $p < .001$, Cohen's $d = 6.28$, and the dermatology group, $p < .001, d = 2.50$. The dermatology group had higher FKS scores than the control group, $p = .001, d = 1.11$ (see Table 1). Further, the groups differed significantly with respect to depressive symptoms, as measured with the BDI-II, $F(2,107) = 37.00, p < .001, \eta_p^2 = 0.41$. Specifically, follow up Scheffe tests indicated that the BDD group had higher BDI scores, relative to both the control group, $p < .001, d = 2.26$, and the dermatology group, $p < .001, d = 1.03$, and the dermatology group had higher BDI scores than the control group, $p = .007, d = 0.88$. In addition, as expected, the groups differed significantly with respect to explicit beliefs about the importance of attractiveness, as measured with the FEPA, $F(2,107) = 20.53, p < .001, \eta_p^2 = 0.28$. Follow up Scheffe tests indicated that the BDD group rated physical attractiveness as significantly more important than did the other groups, $ps \leq .006, ds \geq 0.71$. Interestingly, the dermatology group rated physical attractiveness as more important than did the control group, $p = .009, d = 0.72$.

3.1.2 Implicit Importance of Attractiveness—On the implicit measure assessing associations between attractive and important (the GNAT), the expected significant group difference was observed, $F(2, 107) = 6.58, p = .002, \eta_p^2 = 0.11$, indicating that the BDD group had significantly stronger implicit beliefs about the importance of attractiveness, relative to the control group, $p = .009, d = 0.65$, and the dermatology group, $p = .009, d = 1.03$. No difference was observed between the dermatology and control groups, $p > .99, d = 0.00$. This pattern helps to establish the known-groups validity of the new GNAT. It should be noted that the reported results include all BDD participants, irrespective of whether or not they have skin concerns; however, the results do not change when including only BDD participants with skin concerns.

We then calculated the split-half reliability for the GNAT by correlating two GNAT D scores, each reflecting half the critical trials within the task. Split-half reliability was .71, suggesting good reliability for reaction time data (e.g., see Bosson, Swann, & Pennebaker, 2000, for comparison of reliabilities across implicit measures of self-esteem).

3.2 Relationships Among Markers of BDD

To help establish the convergent validity of the GNAT as a marker related to BDD, correlations among the full sample (i.e., collapsing across all groups) between the GNAT and the explicit measures tied to BDD were tested (see Table 3). Results indicated positive relationships between the GNAT and most of the other BDD-relevant measures, indicating that higher implicit beliefs about the importance of attractiveness were associated with higher explicit attractiveness beliefs and depressive symptoms. These results suggest considerable implicit-explicit relationships among those indicators that are sensitive to BDD status.

3.3 Independent Prediction by Explicit and Implicit Attractiveness Measures

Finally, to examine whether the GNAT explained additional variance in BDD group classification beyond the explicit measure, a logistic regression was conducted, in which we entered the explicit measure of attractiveness beliefs (FEPA) in the first step and the GNAT in the second step, with the goal of predicting whether the group had BDD or not (thus, the dermatological and healthy control group were combined for this analysis). Results indicated that the overall model with both the explicit and then implicit predictors entered was significant ($\chi^2 = 35.56, p < .001$) and produced 76% concordant BDD group classifications. Moreover, both the FEPA and the GNAT effectively explained BDD group membership when both variables were in the model (FEPA: Wald's $\chi^2_{(1, N=108)} = 14.99, p < .001, B = .08$, odds ratio = 1.09, $CI_{.95} = 1.04$ to 1.14; GNAT: Wald's $\chi^2_{(1, N=108)} = 7.59, p = .006, B = 2.15$, odds ratio = 8.58, $CI_{.95} = 1.86$ to 39.59), supporting the unique predictive and incremental validity of the GNAT.

4. Discussion

The purpose of this study was to further examine implicit and explicit measures of attractiveness beliefs to evaluate cognitive-behavioral models of BDD. Consistent with previous research (e.g., Buhlmann et al., 2008, 2009), our findings indicated group differences on each explicit measure in the expected direction: individuals with BDD endorsed more BDD and depressive symptoms and stronger beliefs that attractiveness is important, relative to the other groups. Further, individuals with skin concerns (dermatology group) scored intermediate between the BDD and healthy control groups, providing initial evidence that individuals with (non-psychiatric) skin concerns are somewhat more concerned about the importance of appearance than individuals without a dermatological diagnosis. However, most importantly and consistent with our hypotheses, these concerns

are significantly weaker than those observed in the diagnosed BDD sample, suggesting that appearance concerns among persons with an *actual* physical (dermatological) condition are less severe than the concerns of persons who become obsessed with a *perceived* physical defect. Further, although the dermatology group exhibited more depressive symptoms than the control group, their mean score is still considered to be in the minimum range.

In contrast to previous studies (Buhlmann et al., 2008, 2009; Clerkin & Teachman, 2009), we used the single category GNAT task, rather than a measure like the IAT that requires an explicit relative target comparison category. Using the GNAT and consistent with cognitive-behavioral models of BDD (e.g., Neziroglu et al., 2004, 2008; Veale, 2004; Wilhelm & Neziroglu, 2002; Wilhelm, 2006), we obtained a significant group difference on the implicit measure evaluating associations between attractive and important. That is, even when using a measure that is less amenable to conscious control, the differences in appearance beliefs were evident. Moreover, the logistic regression analysis suggested that the explicit and implicit measures of appearance beliefs were each uniquely effective at classifying individuals as having BDD or not.

Our findings support the hypothesis that the previous null findings regarding group differences on implicit beliefs about the importance of attractiveness (Buhlmann et al., 2008, 2009; Clerkin & Teachman, 2009) were likely related to the relative comparison design feature of the IAT (though the use of different samples across studies precludes a clear conclusion). In addition, our findings provide further evidence for the GNAT as a useful tool for investigating implicit associations in clinical samples (see Teachman, 2007). Future research is now needed to examine whether these implicit appearance beliefs are causally related to BDD symptoms, and how these beliefs may change over the course of psychotherapy (e.g., as a function of cognitive restructuring and/or mirror exposures). Further, we look forward to examining the possible role of additional BDD-relevant associations such as “ugly” with “defective” or “permanent.”

In sum, while further research using the GNAT is clearly necessary, the clinical relevance of biased implicit appearance associations seems plausible given the observed significant positive relationships between implicit and explicit BDD-relevant measures. Specifically, consistent with cognitive-behavioral formulations of BDD, higher implicit beliefs about the importance of attractiveness were associated with higher analogous explicit beliefs, and with self-reported BDD and depressive symptoms. At the same time, these correlations should be interpreted with caution because of the difficulty in examining relationships using an extreme groups design. Also, to date, there is little research trying to tease apart the different roles of implicit and explicit biases in predicting BDD symptoms (though see Clerkin & Teachman, 2009). Further, it will be helpful to include multiple implicit measures within the same sample to disentangle the roles of implicit bias task versus sample differences in leading to prior discrepant results, and to determine the unique predictive validity of different implicit measures.

The current study has several limitations. First, some individuals in our BDD sample met current criteria for additional Axis I disorders (mostly depressive disorders). Although it might be interesting to compare our results to those based on BDD samples without any comorbidity, it remains questionable whether such a “pure” sample would be representative of this severe disorder. Second, it would be interesting to further explore how implicit appearance evaluations predict behavior and other key BDD symptoms (see Buhlmann et al., 2009; Clerkin & Teachman, 2009).

In sum, our findings provide further support for cognitive-behavioral models of BDD that emphasize the importance of negative appearance beliefs for BDD’s unique symptom

presentation. Moreover, clinically, these results suggest that beliefs and evaluations that reside outside conscious control or awareness may play an important role in BDD symptoms; whether our current cognitive-behavioral interventions that focus on explicit cognitive biases will also help to alter maladaptive implicit associations needs to be explored in future studies. In addition, assessing implicit biases seem to be especially important in treatment research where there may be demand effects at post-treatment to report improvement. Further, implicit measures could be applied with populations who do not self-identify as having BDD (e.g., as a screener or measure of vulnerability). Moreover, there is initial evidence that implicit self-esteem (Baccus, Baldwin, & Packer 2004; Dijksterhuis, 2004) and implicit rejection associations (Clerkin & Teachman, 2010) can be enhanced by computer-based conditioning paradigms. Thus, it remains a critical question whether implicit appearance beliefs can also be altered in BDD samples using analogous conditioning paradigms. If so, this might be an exciting, additional intervention technique.

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Table 1

Means and standard deviations by group for demographic items and the explicit and implicit measures.

Measure	BDD Group (n = 36)		Dermatology Group (n = 36)		Control Group (n = 36)	
	Mean	SD	Mean	SD	Mean	SD
Age (years)	33.4 _a	6.0	32.3 _a	11.7	30.5 _a	10.3
Education (years)	14.6 _a	3.0	13.1 _a	3.0	13.7 _a	2.9
Explicit Measures						
BDD-YBOCS	29.2	5.8	--	--	--	--
FKS	34.7 _a	6.3	12.4 _b	10.9	3.5 _c	3.1
BDI-II	20.1 _a	10.7	9.2 _b	10.4	2.6 _c	2.3
FEPA	56.1 _a	11.3	47.2 _b	13.4	38.4 _c	11.0
Implicit Measure						
Attractive Important GNAT	0.60 _a	0.31	0.30 _b	0.27	0.30 _b	0.58

Notes. BDD = Body Dysmorphic Disorder; BDD-YBOCS = Body Dysmorphic Disorder Modification of the Yale Brown Obsessive-Compulsive Scale; FKS = Body Dysmorphic Symptoms Inventory; BDI-II = Beck Depression Inventory-II; FEPA = German modification of the Beliefs About Appearance Task. Means sharing subscripts do not differ (post hoc Scheffe tests, $ps > .05$).

Table 2

GNAT category labels and associated stimuli.

Category label	Stimuli to be classified			
Attractive (Attraktiv)	Attractive (Attraktiv)	Beautiful (Schön)	Good looking (Gut aussehend)	Pretty (Hübsch)
Important (Wichtig)	Important (Wichtig)	Meaningful (Bedeutend)	Crucial (Wesentlich)	Significant (Vorrangig)
Unimportant (Unwichtig)	Unimportant (Unwichtig)	Irrelevant (Irrelevant)	Trivial (Trivial)	Meaningless (Bedeutungslos)

Note. Stimuli (in German) used in the study in parentheses; GNAT = Go/No-go Association Task.

Table 3

Relationships among the implicit and explicit measures.

Measure	Attractive Important GNAT	FKS	FEPA
Attractive Important GNAT	--		
FKS	.27**	--	
FEPA	.24*	.57***	--
BDI-II	.18 ⁺	.70***	.40***

Notes. BDD = Body Dysmorphic Disorder; FKS = Body Dysmorphic Symptoms Inventory; BDI-II = Beck Depression Inventory-II; FEPA = German modification of the Beliefs About Appearance Scale; GNAT = Go/No-go Association Task.

*
p < .05;

**
p < .01;

p < .001;

⁺
p = .07