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Psychometric Evaluation of the Yale-Brown Obsessive-Compulsive Scale Modified for Body Dysmorphic Disorder (BDD-YBOCS)

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Abstract

The Yale-Brown Obsessive-Compulsive Scale Modified for Body Dysmorphic Disorder (BDD-YBOCS) is a semi-structured, clinician-rated measure of current BDD severity used in many BDD studies, but only one previous study has examined its psychometric properties. We examined the BDD-YBOCS's psychometric properties in 200 BDD subjects from a prospective, observational study. Test-retest reliability (n = 64) and sensitivity to change with SRI treatment (n = 63) were examined in subjects from serotonin-reuptake inhibitor efficacy studies in BDD. Intraclass correlation coefficients demonstrated excellent interrater and test-retest reliability; internal consistency was strong. Principal components factor analysis identified two factors accounting for 66% of the variance. Analyses with measures of depression, social phobia, and global symptoms/psychosocial functioning indicated good convergent and discriminant validity. Mean BDD-YBOCS scores significantly decreased with treatment, indicating sensitivity to change. A ≥30% decrease in BDD-YBOCS score corresponded well to at least "much improved," and ≥50% to "very much improved," on the Clinical Global Impressions–Improvement scale. These results provide additional support for the BDD-YBOCS's psychometric properties.

Keywords

Body dysmorphic disorder; assessment; scales; measurement; severity

Body dysmorphic disorder (BDD), classified in DSM-5's new chapter of Obsessive-Compulsive and Related Disorders, is characterized by distressing or impairing preoccupation with one or more perceived defects or flaws in appearance that are not observable or appear only slight to others (American Psychiatric Association, 2013). At

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some point during the disorder, repetitive behaviors or mental acts are performed in response to the appearance preoccupations (e.g., mirror checking, skin picking, excessive grooming, comparing with others) (APA, 2013). BDD is common, with a prevalence in the general population of 1.7 – 2.4% yet is underdiagnosed (Buhlmann et al., 2010; Conroy et al., 2008; Koran, Abujaoude, Large, & Serpe, 2008). BDD is often severe and associated with markedly poor psychosocial functioning and quality of life as well as high rates of suicidality (Phillips & Menard, 2006; Phillips, Quinn, & Stout, 2008).

The Yale-Brown Obsessive Compulsive Scale Modified for Body Dysmorphic Disorder (BDD-YBOCS; Phillips et al., 1997) is a 12-item, semi-structured, rater-administered measure that assesses BDD severity during the past week. It was adapted from the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS), the most widely used measure of obsessive-compulsive disorder (OCD) severity (Goodman et al., 1989a,b), because BDD has many similarities to OCD (Phillips et al., 2010). The BDD-YBOCS has been the most widely used measure of BDD severity in research studies, including studies evaluating the efficacy of psychosocial (cognitive-behavioral) and pharmacologic treatments for BDD (e.g., Phillips & Najjar, 2003; Phillips, Albertini, & Rasmussen, 2002; Wilhelm, Otto, Lohr, & Deckersbach, 1999; Wilhelm, Phillips, Fama, Greenberg, & Steketee, 2011). A total score of ≥ 20 is the cut point used in most studies to determine the presence of BDD (e.g., Phillips, 2006), which is consistent with the widely used cut point of 16 on the Y-BOCS to determine the presence of OCD (taking into account the additional two items on the BDD-YBOCS).

Other BDD symptom measures have limitations. For example, the Body Dysmorphic Disorder Examination (Rosen & Reiter, 1996) is time-consuming to administer, is not suitable for assessment of more severe BDD, and does not assess certain compulsive behaviors that are common in BDD (e.g., skin picking). The Dysmorphic Concern Questionnaire (Oosthuizen, Lambert, & Castle, 1998) includes items that are not symptoms of BDD (e.g., concern with body odor and sweating).

In the only previous study that examined the psychometric properties of the BDD-YBOCS, the scale had strong reliability, validity, and sensitivity to change in individuals who were seeking a clinical evaluation or treatment for BDD (Phillips et al., 1997). In that study, the BDD-YBOCS demonstrated good interrater and test-retest reliability, internal consistency, convergent and discriminant validity, and sensitivity to change with pharmacologic treatment. Factor analysis identified three factors that together explained 60% of the total variance: 1) DSM-IV criteria for BDD (preoccupation, interference in functioning, and distress due to thoughts) plus interference due to compulsions, insight, and avoidance; 2) compulsions; and 3) resistance and control of thoughts (Phillips et al., 1997).

Research on BDD, and use of the BDD-YBOCS, is substantially increasing. Therefore, further examination of the BDD-YBOCS's psychometric properties seems warranted. This report has several advantages over the only prior report on the BDD-YBOCS's psychometric properties (Phillips et al., 1997), including larger sample sizes (n = 200 versus 125 BDD subjects for most analyses, and n = 63 versus n = 30 for assessment of sensitivity to change with SRI treatment). The sample is also more broadly ascertained, has a broader range of BDD severity, and includes adolescents, which may increase the generalizability of

the findings to this age group, an understudied subgroup of individuals with BDD. Furthermore, this report examines the change in BDD-YBOCS score that best corresponds to a score of "very much improved" on the Clinical Global Impressions–Improvement (CGI-I) scale, which has not previously been reported and is relevant to treatment outcome studies.

Methods

Subjects

The sample consisted of 200 subjects (*n* = 63 [31.5%] male, *n* = 137 [68.5%] female; mean age = 32.61 ± 12.08, age range = 14 to 64, *n* = 21 [10.5%] subjects age ≤ 18 years; *n* = 171 [86.4%] white and 176 [92.6%] non-Hispanic). Subjects were obtained from a prospective, observational study of the course of BDD, which is described in greater detail elsewhere (e.g., Phillips, Menard, Fay, & Weisberg, 2005; Phillips, Menard, Quinn, Didie, & Stout, 2013; Phillips, Pagano, & Menard, 2006). This report includes only data from the initial (baseline) interview (which was obtained by subject interview). Study inclusion criteria were the presence of DSM-IV BDD or its delusional variant (which DSM-5 classifies as the same disorder as BDD [APA, 2013]), age 12 or older, and ability to be interviewed in person. The only exclusion criterion was the presence of an organic mental disorder that would interfere with the collection of valid interview data. Subjects were obtained from a broad range of sources: mental health professionals, physicians, advertisements, self-referral, and family members (Phillips et al., 2013).

Of the 200 subjects, 176 met diagnostic criteria for current BDD, and 24 met criteria for past BDD at the time of intake into the study. Current comorbid Axis I disorders that were present in at least 25% of subjects were major depressive disorder (*n* = 69, 34.5%) and social phobia (*n* = 67, 33.5%). Among the 38 subjects (22.2%) for whom BDD was not the primary disorder at study intake, the following disorders were primary: a mood disorder (n=22), an anxiety disorder (n=11), or an eating disorder (n=5). At study intake, 67% (*n* = 134) of participants in the observational course study were currently receiving mental health treatment (psychotropic medication or psychosocial treatment), primarily in the community.

Because our observational course study did not prospectively re-interview subjects at weekly intervals or administer treatment, we used other BDD samples to examine test-retest reliability and sensitivity to change. Test-retest data over the course of one week were obtained from 64 individuals with current DSM-IV BDD who participated in the placebo run-in phase of a fluoxetine efficacy study in BDD (Phillips et al., 2002). For analyses of sensitivity to change, 63 subjects were obtained from three studies of serotonin-reuptake inhibitors (SRIs) for BDD that are described elsewhere (Phillips, 2006; Phillips et al., 2002; Phillips & Najjar, 2003). One of these studies was placebo-controlled (Phillips et al., 2002); only subjects assigned to active treatment (fluoxetine) are included in sensitivity to change analyses. Subjects in the treatment studies met standard inclusion and exclusion criteria for medication efficacy studies.

Assessments

The ***BDD-YBOCS*** is a 12-item semi-structured, rater-administered scale that assesses BDD severity during the past week (Phillips et al., 1997). The first five items assess obsessional preoccupations about perceived appearance defects (*time preoccupied*, *interference in functioning* and *distress* due to perceived appearance defects, *resistance* against preoccupations, and *control* over preoccupations). Items 6–10 assess BDD-related repetitive behaviors (e.g., excessive grooming, mirror checking) and are similar to items 1–5 (*time spent* performing the behaviors, *interference in functioning* due to the behaviors, *distress* experienced if the behaviors are prevented, and *resistance* of and *control* over the behaviors). Item 11 assesses insight into appearance beliefs (e.g., "I am ugly"), and item 12 assesses avoidance (e.g., of work/school or social activities) because of BDD symptoms. Scores for each item range from 0 (no symptoms) to 4 (extreme symptoms); the total score ranges from 0 to 48, with higher scores reflecting more severe symptoms.

The reliable ***Structured Clinical Interview for DSM-IV Axis I Disorders, Non-Patient Edition (SCID-NP)*** (First, Spitzer, Gibbon, & Williams, 1996) diagnosed lifetime (past or current) BDD as well as comorbid disorders. The ***CGI-I Scale*** (National Institute of Mental Health, 1985) is a widely used 7-point scale that assessed change in BDD symptoms in the three SRI studies at all visits after the baseline visit. Ratings range from "very much worse" (score of 7) to "very much improved" (score of 1); improvement is scored as minimally improved, much improved, or very much improved. The ***Body Dysmorphic Disorder Examination (BDDE)*** (Rosen & Reiter, 1996) is a reliable and valid 34-item, interviewer-administered scale that assesses severity of BDD and negative body image in the past month. This scale was administered to the first 98 subjects in the observational course study (we subsequently discontinued using it to decrease subject burden). Scores range from 0 to 168, with higher scores indicating greater BDD/body image disturbance severity. The 25-item ***Modified Hamilton Depression Rating Scale (HAM-D)*** (Miller, Bishop, Norman, & Maddever, 1985) is a reliable and valid clinician-administered measure of current severity of depressive symptoms. Scores range from 0 to 72, with higher scores reflecting greater depressive symptom severity. The ***Duke Brief Social Phobia Scale (BSPS)*** (Davidson et al., 1997) is an 18-item measure of the severity of social anxiety symptoms within the past week that has good psychometric properties. Total scores range from 0 to 72; higher scores reflect more severe social anxiety symptoms. The ***Global Assessment of Functioning (GAF) Scale*** (APA, 1994) assesses global symptoms and psychosocial functioning. Scores range from 1 to 100, with lower scores reflecting greater symptom severity/poorer functioning.

Experienced clinical interviewers conducted interviews for the course study. They were trained and closely supervised by this report's first author. Senior staff thoroughly edited all interviews both clinically and clerically. This report's first author did all ratings for the treatment studies.

Data Analysis

Cronbach's alpha coefficient evaluated internal consistency; an alpha of .70 or above was used as a cutpoint. Intraclass correlation coefficients (ICCs) were used to examine interrater and test-retest reliability. For analyses of interrater reliability, one of the interviewers from

the BDD course study independently rated audiotaped interviews conducted by another interviewer for that study (n = 29) and was blind to the other interviewer's ratings. To examine test-retest reliability, baseline ratings from the 64 subjects in the fluoxetine study were compared to ratings obtained by the same rater after one week of placebo run-in. To evaluate the contribution of each item to the total score, Pearson's correlation coefficient examined the association between each BDD-YBOCS item and the total BDD-YBOCS score minus that item.

Principal components factor analysis using varimax rotation was conducted with all twelve BDD-YBOCS items. The number of factors identified was based on an examination of eigenvalues greater than one and the scree plot. Convergent and discriminant validity were analyzed using Pearson's correlation, which examined the association between total BDD-YBOCS score and total scores on other scales that were administered on the same day.

To examine sensitivity to change, data from the three SRI studies were pooled, and pre-treatment and post-treatment total scores were compared using a paired-sample t test for the 63 subjects who received active medication. A cut score for clinically significant improvement was calculated by determining the sensitivity and specificity of a variety of percent change scores between 20% and 40%; we used a rating of at least "much improved" on the CGI-I as the gold standard. We also determined a BDD-YBOCS cut score that best corresponded to "very much improved" on the CGI-I by examining BDD-YBOCS change scores between 50% and 80%.

Results

Mean BDD-YBOCS total score reflected moderate symptom severity: 27.53 ± 10.15 for the full sample, 30.42 ± 6.60 for subjects with current BDD. Means and standard deviations for individual scale items are presented in Table 1. Cronbach's alpha coefficient was 0.92, indicating strong internal consistency. Correlations between each item and the total score minus that item were all positive and significant (all p's < .001), ranging from 0.48 to 0.77 (median = 0.72) (Table 1). ICCs demonstrated excellent inter-rater reliability across two raters for each BDD-YBOCS item and the total score (Table 1). For individual items, interrater reliability ICCs ranged from 0.77 to 1.00 (all p's < .001), with a median of 0.98. ICCs also showed good test-retest reliability over one week for the total score and all individual items (Table 1). Test-retest ICCs for individual item scores ranged from 0.73 to 0.93 (all p's < .001), with a median of 0.83.

Factor analysis identified two factors with eigenvalues >1 and factor loadings of 0.4 or higher (Table 1). The scree plot also suggested a two-factor solution. The two factors accounted for a total of 65.7% of the variance. One factor accounted for 56.2% of the variance, with factor loadings of .41 to .82, and included all items except for interference due to thoughts and avoidance. The other factor had factor loadings ranging from .41 to .91 and accounted for 9.6% of the variance; it included avoidance as well as "core DSM-5 symptoms" (i.e., preoccupation, interference, and distress due to thoughts as well as time spent, distress, and interference due to repetitive behaviors; it additionally included control over thoughts).

As expected, the BDD-YBOCS total score was significantly and positively correlated with the BDDE total score (r = .82, p < .001), indicating good convergent validity (Table 2). Also as expected, the BDD-YBOCS total score was significantly and negatively correlated with GAF scores (r = −.63, p < .001). The BDD-YBOCS total scale score was significantly and positively correlated with the total score on the HAM-D (r = .53, p < .001). Discriminant validity was evidenced by more modest correlation with the Duke BSPS (r = .24, p = .001).

In a pooled analysis of data from the SRI treatment studies, mean BDD-YBOCS total score decreased significantly, by 43.5%, from baseline (31.18 ± 5.43) to post-treatment (18.06 ± 10.12; $t(63)$ = 12.78, p < .001), indicating that the scale is sensitive to change. Cut scores of 30% or greater decrease in BDD-YBOCS score, and of 35% or greater decrease in BDD-YBOCS score, best corresponded to a rating of at least “much improved” on the CGI-I (see Table 3). A cut score of 30% produced 4 false negatives (90.2% sensitivity); that is, 4 patients who were rated as at least much improved on the CGI-I were not classified as responders on the BDD-YBOCS. The specificity was 86.4%; that is, 3 patients were considered only minimally improved on the CGI-I but were classified as responders on the BDD-YBOCS using the 30% threshold. A cut score of 35% had a sensitivity of 85.4% and a specificity of 95.5%. A 50% or greater decrease in BDD-YBOCS score best corresponded to a rating of “very much improved” on the CGI-I (see Table 3). This cut score had a sensitivity of 95.2% and a specificity of 92.9%.

Discussion

This report provides further evidence that the BDD-YBOCS is a reliable and valid measure of current BDD severity. The findings are similar to those from the only prior study that examined this scale’s psychometric properties (Phillips et al., 1997). It is interesting that in both the prior and present reports, the lowest correlation between each item and the total score minus that item was for resistance against thoughts (r = 0.29 and r = 0.48, respectively), similar to what has been found for OCD (Goodman et al., 1989a). The only notable difference between the two studies is the somewhat different factor structure, the present study finding a two-factor solution that explained 66% of the variance, with most items loading on one factor, and the prior study finding a three-factor solution, which explained 60% of the total variance.

Both studies indicate that the BDD-YBOCS has good convergent and discriminant validity. The relatively high correlation with the GAF is perhaps to be expected, given that BDD was the primary disorder for 77.8% of the sample at the time of assessment. Correlations with the social phobia and depression measures were significant, perhaps reflecting the fact that 33.5% and 34.5% of the sample currently had comorbid social phobia and comorbid major depressive disorder, respectively. However, the social phobia and depression scales explained only 6% and 28% of the BDD-YBOCS score variance, respectively.

The present study also indicates that the BDD-YBOCS is sensitive to change. In the prior report (Phillips et al., 1997), the scale was sensitive to change in 30 BDD subjects who were treated with the SRI fluvoxamine, with a statistically significant decrease in mean BDD-YBOCS score of 50.8% (Phillips et al., 1997). In the present report, cut points of both 30%

and 35% had similarly high sensitivity and specificity when compared to clinically significant improvement on the CGI-I (at least “much improved”). Because in our prior report a cut point of ≥30% best corresponded to at least “much improved” on the CGI-I, we recommend that research studies continue to use 30% or greater improvement on the BDD-YBOCS to designate clinically significant improvement in BDD symptoms (i.e., responder status) in order to maintain continuity with previous research studies.

Study strengths include the relatively large sample size, broad ascertainment of subjects, and examination of numerous aspects of reliability and validity. Limitations include relatively small sample sizes for analyses of interrater and test-retest reliability. Interrater reliability ratings were based on audiotaped interviews conducted by only one rater, rather than separate interviews conducted by each rater; thus, these ratings provide an upper-bound estimate of reliability.

Further research is needed on the BDD-YBOCS to determine whether a self-report version of the scale is reliable and valid, which has not previously been investigated. More subjective items, such as level of distress, might be fairly accurately captured by a self-report measure. Other items, however, such as functional impairment and avoidance due to BDD thoughts and repetitive behaviors, typically require careful clinical questioning and clinical judgment to accurately capture and score the broad range of behavioral consequences of this disorder.

Conclusions

The BDD-YBOCS demonstrated strong internal consistency, interrater and test-retest reliability, convergent and discriminant validity, and sensitivity to change. Two factors were identified, which accounted for 65.7% of the variance. A 30% or greater decrease in BDD-YBOCS score corresponded well to at least “much improved” on the CGI-I, and a 50% or greater decrease best corresponded to “very much improved” on the CGI-I. These findings provide further evidence that the BDD-YBOCS is a reliable and valid measure of current BDD severity and a suitable outcome measure in BDD treatment studies.

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Highlights

- The BDD-YBOCS had excellent interrater and test-retest reliability.
- Internal consistency was strong.
- The BDD-YBOCS had good convergent and discriminant validity.
- Scores significantly decreased with SRI treatment, indicating sensitivity to change.
- These results indicate that the BDD-YBOCS is a suitable measure of BDD severity.

Table 1

Means, Correlations, Reliability Data, and Factor Loadings for Individual Item Scores and Total Score on the BDD-YBOCS

	Item Score[a] (*n* = 200)		Correlation of Item Score With Total Score[b] (*n* = 200)		Interrater Reliability ICC (*n* = 29)	Test-Retest Reliability ICC (*n* = 64)	Factor Loadings (*n* = 200)	
Scale Item	***Mean***	***SD***	***r***	***p***			**Factor 1**	**Factor 2**
Time preoccupied with thoughts	2.44	0.91	0.71	<.001	0.98	0.93	**.56**	**.53**
Interference due to thoughts	2.39	1.05	0.75	<.001	0.98	0.86	.29	**.88**
Distress due to thoughts	2.24	0.91	0.74	<.001	1.00	0.77	**.41**	**.73**
Resistance against thoughts	1.73	1.28	0.48	<.001	0.92	0.78	**.67**	.07
Control over thoughts	2.52	1.17	0.72	<.001	0.98	0.83	**.66**	**.41**
Time spent in behaviors	2.22	0.93	0.73	<.001	0.99	0.82	**.68**	**.42**
Interference due to behaviors	1.69	1.08	0.76	<.001	0.97	0.90	**.53**	**.63**
Distress due to behaviors	2.50	1.27	0.72	<.001	0.98	0.89	**.66**	**.44**
Resistance against behaviors	2.41	1.34	0.68	<.001	0.83	0.78	**.82**	.17
Control over behaviors	2.61	1.26	0.77	<.001	0.85	0.73	**.80**	.32
Insight	2.85	1.19	0.57	<.001	0.77	0.78	**.54**	.38
Avoidance	2.06	1.25	0.60	<.001	0.96	0.85	.10	**.91**
Total Score	27.53	10.15	--	--	0.97	0.93	--	--

[a] Each item is rated on a 5-point scale; higher ratings indicate greater severity. Scores are for the full sample (past or current BDD).

[b] Correlation coefficient for correlation between item score and total scale score minus the item score.

Table 2

Descriptive Statistics for Measures Assessing Convergent and Divergent Validity and Correlations with BDD-YBOCS Total Score

Variable	Mean	SD	*r*	r^2	*p*
BDDE (*n* = 98)	86.32	30.32	.82	.67	<.001
HAM-D (*n* = 198)	15.25	10.83	.53	.28	<.001
Duke BSPS (*n* = 197)	16.58	13.62	.24	.06	.001
GAF (*n* = 200)	48.06	13.43	−.63	.40	<.001

Table 3

Sensitivity and Specificity of a Range of Percentage Change Scores on the BDD-YBOCS using the CGI-I as the Gold Standard

At least much improved				Very much improved			
Percent Change	***n***	**Sensitivity (%)**	**Specificity (%)**	**Percent Change**	***n***	**Sensitivity (%)**	**Specificity (%)**
≥20%	47	1.00	.727	≥50%	23	.952	.929
≥25%	45	1.00	.818	≥55%	18	.810	.976
≥30%	40	.902	.864	≥60%	18	.810	.976
≥35%	36	.854	.955	≥65%	17	.762	.976
≥40%	30	.707	.955	≥70%	15	.714	1.00
				≥75%	12	.571	1.00
				≥80%	9	.429	1.00