

Symptom Presentation and Outcome of Cognitive–Behavioral Therapy for Obsessive–Compulsive Disorder

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Previous researchers have classified obsessive–compulsive disorder (OCD) patients by the themes of their obsessions and compulsions (e.g., washing, checking); however, mental compulsions have not been adequately assessed in these studies. The authors conducted 2 studies using a large sample of OCD patients ($N = 132$). In the 1st study, they categorized patients on the basis of symptom presentation, giving adequate consideration to mental compulsions. Five patient clusters were identified: harming, contamination, hoarding, unacceptable thoughts, and symmetry. Mental compulsions were most prevalent among patients with intrusive, upsetting religious, violent, or sexual thoughts. In the 2nd study, they compared response to cognitive–behavioral therapy across symptom categories, finding poorer outcomes among patients with hoarding symptoms compared with those with other symptom themes.

Obsessive–compulsive disorder (OCD) is a heterogeneous condition involving unwanted distressing thoughts and compulsive rituals concerning one or more general themes such as contamination, religion, or symmetry (Rasmussen & Eisen, 1992). Research findings generally converge to suggest that patients with OCD can be grouped reliably into subgroups¹ on the basis of symptom content (e.g., Summerfeldt, Richter, Antony, & Swinson, 1999); some have suggested that such classification schemes may have use in understanding the phenomenology of OCD and predicting treatment response (e.g., Baer, 1994). In the present article, we describe two studies of this issue involving a large sample of patients with OCD ($N = 132$). The aim of the first study was to empirically categorize patients on the basis of symptom presentation and directly compare our results with previous research. In the second study, we aimed to compare outcome of cognitive–behavioral therapy across the empirically derived symptom categories.

Study 1

Early methods for characterizing OCD patients used the theme of the principal compulsive behavior (e.g., “washers and checkers”; Rachman & Hodgson, 1980). Recognition that many patients evidence multiple symptom themes gave rise to self-report measures that more broadly assessed the topography of OCD (e.g., Sanavio, 1988). One problem with most OCD self-report measures

is that they tend to include many items that assess quintessential obsessions and compulsions such as washing and checking, yet fewer (or none) address more obscure symptoms such as mental rituals or hoarding. Consequently, symptom categories derived with factor analyses of these instruments (e.g., Van Oppen, Hoekstra, & Emmelkamp, 1995) are likely biased in favor of “high profile” OCD symptoms.

To correct for this prevailing bias, recent attempts to identify OCD subtypes have used the Yale–Brown Obsessive–Compulsive Scale (Y-BOCS; Goodman, Price, Rasmussen, & Mazure, 1989a, 1989b), a semistructured clinical interview that assesses the presence or absence of a wide variety of OCD symptom themes. The Y-BOCS contains a checklist of over 60 specific OCD symptoms (e.g., concerns with insects or animals) that are organized into 15 investigator-derived obsession and compulsion categories. Baer (1994) conducted a factor analysis of the 15 Y-BOCS categories using data from 107 OCD patients and identified three factors: (a) symmetry and hoarding, (b) contamination and cleaning, and (c) pure obsessions. Using similar methods, Leckman et al. (1997) found four factors: (a) obsessions and checking, (b) symmetry and ordering, (c) cleanliness and washing, and (d) hoarding. A five-factor solution was reported by Mataix-Cols, Rauch, Manzo,

¹ Previous authors often used the term *subtype* or *subgroup* to describe the classification of OCD patients on the basis of overt themes of obsessions or compulsions. However, this terminology implies that overt symptom theme forms the basis of fundamental differences among OCD symptoms, and this has not been supported by empirical research (e.g., Rachman & Hodgson, 1980). We prefer the term *OCD symptom presentation*, which more clearly conveys that the thematic content of obsessions and compulsions is superficial to the function of these symptoms: Obsessions evoke anxiety, and compulsive rituals are efforts to neutralize anxiety. Indeed this functional relationship between obsessions and compulsions is more or less consistent across the various content themes (Rachman & Hodgson, 1980).

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Jenike, and Baer (1999) that included (a) symmetry and ordering, (b) contamination/cleaning, (c) hoarding, (d) aggressive/checking, and (e) sexual/religious obsessions. Finally, using cluster-analytic methodology, Calamari, Wiegartz, and Janeck (1999) also identified five groups: (a) harming, (b) hoarding, (c) contamination, (d) certainty, and (e) obsessional.

Despite advantages of the Y-BOCS Symptom Checklist, one limitation of this instrument is that it inadequately assesses covert (mental) compulsive rituals, now known to be prevalent among individuals with OCD (e.g., Foa et al., 1995). In particular, the checklist contains only a single item for mental compulsions, and it appears within the *miscellaneous compulsions* category. Moreover, authors of previous OCD subtype studies (e.g., Leckman et al., 1997) usually excluded this category from their analyses because it was assumed to contain a rare and heterogeneous set of symptoms. Thus, covert rituals have not been adequately accounted for in most previous attempts to characterize OCD patients. This constitutes a major oversight in light of the conceptual importance of these symptoms (e.g., Rachman, Shafran, Mitchell, Trant, & Teachman, 1996). Indeed, mental rituals are functionally equivalent to their overt counterparts: The urge to perform them is provoked by obsessional anxiety, and they lead to a reduction in subjective distress (de Silva, Menzies, & Shafran, 2003).

Thus, the aim of our first study was to derive OCD symptom subgroups using methods that give sufficient weight to mental compulsions. To accomplish this, we used a revised form of the Y-BOCS Symptom Checklist that was more sensitive than the original version to the presence of mental rituals.² On the basis of clinical observations that mental rituals are performed to neutralize highly distressing ego dystonic thoughts, we hypothesized that such symptoms would be most strongly associated phenomenologically with aggressive, sexual, and religious obsessions.

Method

Participants

Participants were 132 adults with a primary diagnosis of OCD who were seeking outpatient cognitive-behavioral treatment at one of two specialty clinics: 107 were evaluated and treated at the Center for Treatment and Study of Anxiety in Philadelphia, Pennsylvania, and the remaining 25 were at the OCD/Anxiety Disorders Program at Mayo Clinic, Rochester, Minnesota. Participants at the Philadelphia site were OCD patients consecutively evaluated and treated in a fee-for-service outpatient clinic from 1995–2000. Patients at the Mayo Clinic site were consecutive referrals who completed the OCD evaluation and/or treatment program during 2001. Exclusion criteria from the treatment programs at each site included the presence of current suicidal ideation, active psychotic symptoms, active substance abuse, and developmental disability.

Each participant received a description of all research procedures and provided written consent to have his or her clinical data included in the study. The sample (70 men, 62 women) ranged in age from 18 to 65 years ($M = 36.1$, $SD = 13.9$); 93% were Caucasian, 4% were Asian, 1% were African American, 1% was Arab, and 1% was Native American. At least a 4-year undergraduate degree had been obtained by 48% of the sample, and 43% were employed full-time. Almost half (46%) met *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., *DSM-IV*; American Psychiatric Association, 1994) criteria for comorbid diagnoses including depressive disorders (23.5%), additional anxiety disorders (18.2%), bipolar disorder (1.5%), attention-deficit disorder (1.5%), and Tourette's Syndrome (1.5%), as established by means of clinical interview.

Assessment

Diagnostic interview. A diagnosis of OCD using *DSM-IV* criteria was established in an evaluation during which each patient was assessed by two diagnosticians. The first interviewer met with each patient for approximately 90–120 min to assess OCD (using the revised Y-BOCS) and depressive complaints. Patients completed the Beck Depression Inventory (BDI; Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961) as a measure of depressive symptoms. Patients were also screened for the presence of additional mood and anxiety disorder symptoms (e.g., mania, panic, social phobia). If comorbidity was suspected, additional diagnoses were made on the basis of *DSM-IV* criteria. Following this initial evaluation, the first assessor presented the interview data to a second assessor who subsequently met with the patient to confirm the diagnosis of OCD (and other conditions) as well as the primary obsession(s) and compulsion(s). Interviewers were trained by (a) observing others conduct this assessment on at least three occasions and (b) administering the interview satisfactorily under the direct observation of a senior expert clinician. Patients were included in the present study only if both assessors agreed that OCD was the principal diagnosis.

Y-BOCS. The Y-BOCS is a semistructured interview that contains a symptom checklist and a severity scale. The symptom checklist version used in this study included a list of 40 obsessions and 29 compulsions organized by content into 16 intuitively derived categories. The obsession categories included (a) aggressive, (b) contamination, (c) sexual, (d) hoarding/saving, (e) religious, (f) symmetry/order, (g) somatic, and (h) miscellaneous. Compulsion categories included (a) cleaning/washing, (b) checking, (c) repeating activities, (d) mental rituals, (e) counting, (f) ordering/arranging, (g) hoarding, and (h) miscellaneous. Up to three specific *primary* obsessions and compulsions were identified for each patient. Primacy was defined as the most frequent or distressing obsession and compulsion.

The Y-BOCS Severity Scale is considered the gold standard severity measure of OCD. It contains 10 items: 5 for obsessions and 5 for compulsions. Each symptom is rated for time, interference, distress, resistance, and control on a scale from 0 (*none*) to 4 (*extreme*), yielding two subscales (Obsessions and Compulsions), each ranging from 0 (*no symptoms*) to 20 (*severe*). Subscale scores are summed to produce a total score that ranges from 0 to 40. Goodman et al. (1989a, 1989b) reported satisfactory reliability and validity of this widely used instrument.

Statistical Analyses

Following the methodology described by Baer (1994) and used in previous studies (e.g., Summerfeldt et al., 1999), we assigned each patient a score on each of the 16 Y-BOCS Symptom Checklist categories (8 obsession, 8 compulsion). Scores were assigned on the basis of responses to the individual checklist items: A score of 0 was given if the patient endorsed no specific symptom in that category. A score of 1 was given if at least one symptom in the category was present, but it was not considered a primary symptom. A score of 2 was assigned when at least one symptom in the category was considered a primary or major OCD symptom.

As suggested by Calamari et al. (1999), we used cluster analysis, rather than factor analysis, in the present study. An advantage of cluster analysis is that variance is partitioned among several sources, whereas in factor

² This updated version of the Y-BOCS checklist, used in the *DSM-IV* OCD field trial (Foa et al., 1995), was identical to the original Y-BOCS except for the addition of a new category of mental compulsions with individual items such as praying, thought suppression, mental neutralization (i.e., repeating phrases to oneself), and mental reviewing (e.g., one's behavior).

analysis, the total variance is allocated to a single underlying source (Borgen & Weiss, 1971). In factor analytic studies of the Y-BOCS, symptom categories have been assumed to be homogeneous and each specific to only one OCD subtype. Cluster analysis, however, allows one to examine the degree to which symptoms are present across different patient subgroups. Finally, whereas cluster analysis groups individuals into discrete clusters, results of factor analysis are typically less clear, with portions of variance attributable to each of several factors (Borgen & Weiss, 1971). Thus, cluster analysis not only is superior to factor analysis for identifying subgroups of patients and their symptoms but also is the preferred method for examining differences between derived subgroups (Kachigan, 1986).

Following Calamari et al.'s (1999) strategy, initial clustering of the 16 symptom categories was examined using Ward's hierarchical agglomeration analysis, a minimum variance technique that identifies the number of clusters by finding groupings that have the smallest ratio of within-group to between-groups variance. Squared Euclidian distance was used as the similarity measure. Ward's procedure is often used because it is proficient in identifying underlying structure and highly interpretable (Borgen & Barnett, 1987). The percentage change in agglomeration coefficients was evaluated for solutions of two to nine clusters. This analysis, along with interpretability, was used to decide the number of clusters for the hierarchical solution.

We cross-validated the hierarchical solution by performing a separate *k*-means cluster analysis. The specified number of clusters and the starting points for the cluster centers (centroids) were derived from the hierarchical solution. This two-stage approach maximizes the reliability of the final solution (Borgen & Barnett, 1987). To examine the stability of the resultant clusters, we calculated the percentage of cases assigned to the same cluster across clustering methods. Next, the clusters derived from the *k*-means analysis were described on the basis of symptom profiles obtained from quantification of the Y-BOCS Symptom Checklist scores. Last, we examined between-cluster differences on demographic and symptom measures.

Results

The hierarchical cluster analysis yielded the five-cluster solution depicted in Figure 1. Solutions of six or more clusters neither resulted in substantial reductions in agglomeration coefficients nor improved the interpretability of the clusters. Cross-validation of this five-cluster solution using a *k*-means clustering procedure starting with the centroids obtained from the previous analysis resulted in a 78% agreement between methodologies. The percentage agreement between clustering methodologies on each of five clusters was as follows: harming, 56%; contamination, 70%; hoarding, 100%; unacceptable thoughts, 90%; and symmetry, 100%.

Y-BOCS Symptom Checklist category mean scores for each of the *k*-means clusters were calculated and are displayed in Figure 1. To determine the most prevalent symptoms in each cluster, we compared obsessions and compulsions scores using multivariate analyses of variance. Significant differences among obsessions and compulsions were detected in each cluster (all *ps* < .01); thus, follow-up *t* tests were performed. As each set of follow-up analyses entailed 28 *t* tests (e.g., to compare different obsessions in the harming cluster), we set the alpha level to .002 (.05/28). We also compared obsessions and compulsions across clusters using one-way analyses of variance with Bonferroni-corrected post hoc tests.³

A harming cluster (*n* = 29) was identified in which patients evidenced a preponderance of aggressive obsessions concerning

responsibility for harm and checking rituals. The aggressive obsessions mean score for patients in this cluster was significantly greater than in all other clusters and was greater than all other obsessions categories in this cluster except for contamination. Similarly, the checking compulsions mean score for this cluster was significantly greater than for all other clusters and was greater than all other compulsions in this cluster.

A contamination cluster (*n* = 33) was found in which patients evidenced primarily contamination obsessions and washing rituals. These symptoms were significantly elevated compared with other symptoms in this cluster. Furthermore, this cluster evidenced higher contamination and washing scores compared with all other clusters.

A cluster of hoarding symptoms (*n* = 16) was also identified. Patients in this cluster had significantly higher hoarding obsessions and compulsions scores compared with those in other clusters. As can be seen in Figure 1, scores on hoarding symptoms were significantly elevated compared with other Y-BOCS categories within this group.

An unacceptable thoughts cluster (*n* = 41) was identified, characterized by various types of obsessions along with mental, checking, and miscellaneous (e.g., asking for reassurance) compulsions. Scores for aggressive, sexual, and religious obsessions were higher compared with contamination, hoarding, and symmetry but not somatic or miscellaneous obsessions. Scores on sexual and religious obsessions were higher among members of this cluster compared with other clusters, and aggressive obsessions were higher than all other clusters except for harming. Scores for mental and checking compulsions did not differ, yet were higher than all other rituals in this cluster; checking, however, was not significantly higher than miscellaneous compulsions. Mental rituals were significantly more prevalent in this cluster than in any other clusters. Aggressive obsessions were more prevalent here than among all except the harming cluster.

Finally, a symmetry cluster (*n* = 13) was characterized by significantly higher scores on symmetry obsessions compared with other obsession categories. This group had higher symmetry obsessions scores compared with all other clusters. Within this cluster, the ordering compulsions scores were greater than all other compulsions and greater than ordering compulsions scores found in the other clusters.

Table 1 displays demographic and clinical characteristics of the patients in each symptom cluster. Between-groups comparisons indicated no differences in gender, $\chi^2(4, N = 132) = 2.10, p > .05$; age, $F(4, 127) = 1.87, p > .05$; or the BDI, $F(4, 104) = 0.18, p > .05$. With respect to OCD symptom severity, the groups did not differ on the Y-BOCS total, $F(4, 127) = 1.87, p > .05$, or Compulsions subscale, $F(4, 127) = 1.56, p > .05$. However, there were differences on the Y-BOCS Obsessions subscale, $F(4, 127) = 5.61, p < .01$. Post hoc comparisons indicated that the unacceptable thoughts cluster had more severe obsessional symptoms compared with each of the other groups and that the harming cluster had more severe obsessional symptoms compared with the symmetry cluster.

³ Space limitations preclude the reporting of all statistical analyses here. However, the results of these analyses (all SPSS printouts) may be obtained from Jonathan S. Abramowitz.

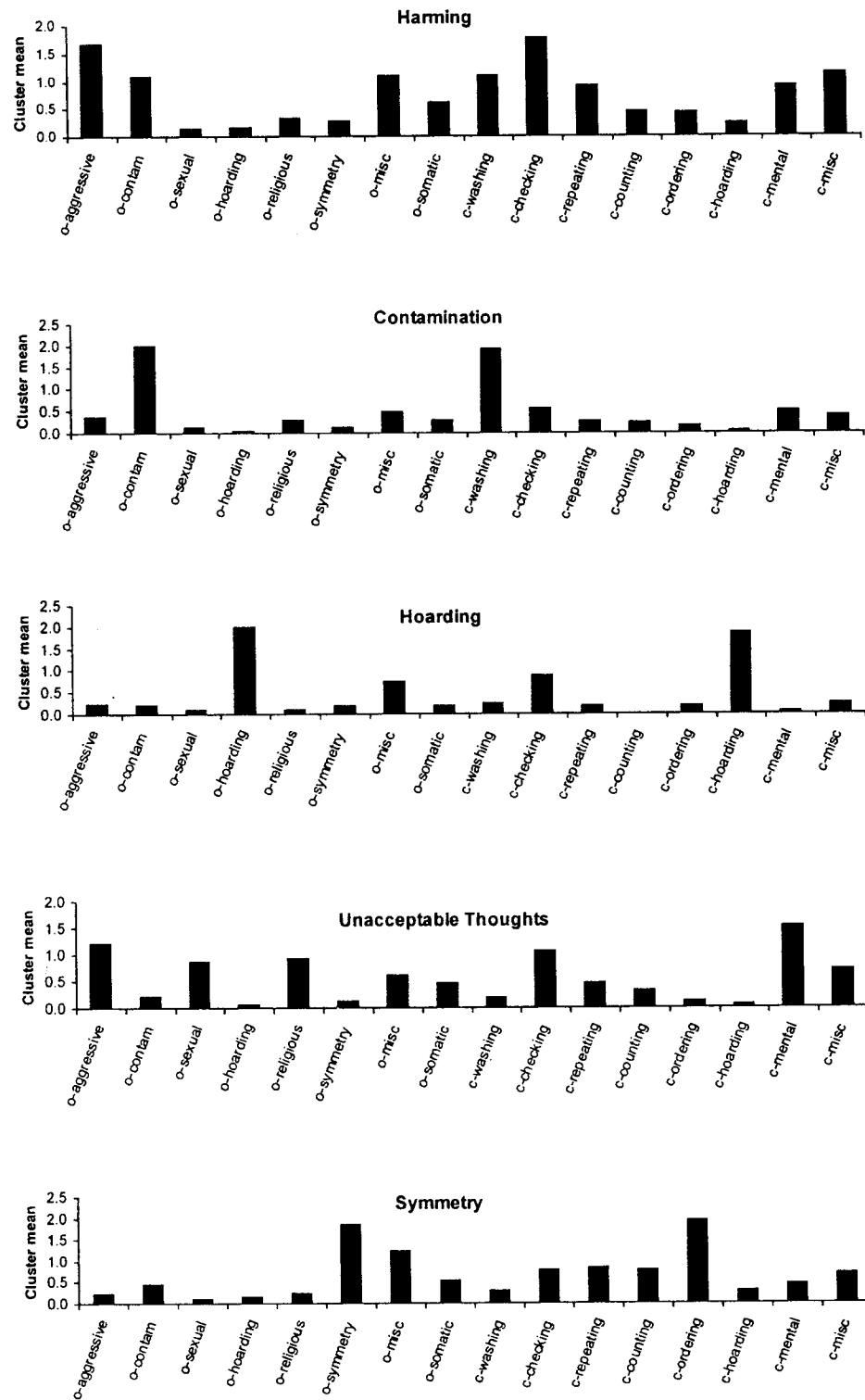


Figure 1. Mean scores on the Yale-Brown Obsessive-Compulsive Scale checklist symptom categories for each patient cluster. o = obsession; c = compulsion; contam = contamination; misc = miscellaneous.

Chi-square analyses indicated no differences across the symptom clusters in the rates of comorbid mood disorders, $\chi^2(4, N = 132) = 1.77, p > .05$, or other anxiety disorders, $\chi^2(4, N = 132) = 0.81, p > .05$.

Discussion

Hierarchical cluster analysis of the Y-BOCS Symptoms Checklist yielded five stable OCD symptom clusters: (a) harming, (b)

Table 1
 Characteristics of Patients in OCD Symptom Clusters

Variable	OCD symptom cluster				
	Harming (<i>n</i> = 29)	Contamination (<i>n</i> = 33)	Hoarding (<i>n</i> = 16)	Symmetry (<i>n</i> = 13)	Unacceptable thoughts (<i>n</i> = 41)
Percentage male	51.7	51.5	48.3	69.2	56.1
Age, in years; <i>M</i> (<i>SD</i>)	32.04 (11.9)	37.05 (13.8)	37.55 (16.6)	39.00 (12.1)	29.43 (10.6)
Y-BOCS total, <i>M</i> (<i>SD</i>)	27.07 (4.7)	26.18 (4.0)	25.94 (3.5)	23.23 (6.2)	26.66 (4.3)
Obsessions	13.75 (2.5)	13.06 (2.3)	13.00 (2.6)	11.54 (3.1)	14.81 (2.1)
Compulsions	13.35 (2.5)	13.12 (2.3)	12.94 (2.8)	11.69 (3.2)	12.07 (3.2)
BDI, <i>M</i> (<i>SD</i>)	17.95 (8.6)	18.94 (7.9)	16.50 (6.2)	18.85 (8.1)	18.6 (8.8)
Comorbidity, <i>n</i> (%)					
Mood disorders	8 (27.6)	9 (27.3)	2 (12.5)	4 (30.8)	10 (24.4)
Anxiety disorders	5 (17.2)	7 (21.2)	2 (12.5)	3 (23.1)	7 (17.1)

Note. OCD = obsessive-compulsive disorder; Y-BOCS = Yale-Brown Obsessive-Compulsive Scale; BDI = Beck Depression Inventory.

contamination, (c) hoarding, (d) unacceptable thoughts, and (e) symmetry. Whereas the clusters did not differ in their severity of compulsions, obsessional symptoms were more severe among patients in the unacceptable thoughts and harming clusters as compared with other groups. Interestingly, both of these subgroups evidenced a preponderance of aggressive obsessions; thus, these kinds of intrusive thoughts may be particularly distressing, functionally impairing, and difficult to resist and control.

The hoarding, symmetry, and contamination clusters we identified are consistent with similar symptom-based subtypes found in previous studies using the Y-BOCS Symptom Checklist (Baer, 1994; Calamari et al., 1999; Leckman et al., 1997; Mataix-Cols et al., 1999). Thus, these three symptom themes appear to represent distinct categories of obsessive-compulsive phenomena. Our harming cluster, composed of aggressive obsessions and checking compulsions, was similar to symptom categories reported in two previous studies (Calamari et al., 1999; Mataix-Cols et al., 1999). However, in other subtyping studies, aggressive obsessions and checking compulsions were grouped with additional kinds of symptoms and did not form a unique symptom category themselves (e.g., Baer, 1994; Leckman et al., 1997).

The obsessions in our unacceptable thoughts cluster resemble subtypes described in each of the four previous studies. However, we also identified mental rituals as part of this symptom category, whereas previous researchers did not. This is likely due to the fact that mental rituals were not considered in previous subtyping studies. One reason for this oversight is that mental compulsions can be difficult to distinguish from obsessions without a careful functional assessment of these symptoms: Obsessions give rise to distress, and mental rituals represent efforts to reduce or neutralize distress.

Study 2

The aim in our second study was to examine the relationship between OCD symptom presentation and outcome of cognitive-behavior therapy by exposure and response prevention (ERP). Surprisingly, few studies have addressed this issue, yet some researchers have proposed that certain OCD presentations (i.e., "pure obsessions") respond less favorably than others to this

treatment (e.g., Baer, 1994). Some studies found that patients with washing compulsions improved more than those with checking symptoms (Basoglu, Lax, Kasvikis, & Marks, 1988), yet others reported the reverse (e.g., Drummond, 1993). Another study found that hoarding symptoms respond poorly to ERP (Saxena et al., 2002). Importantly, patients in these studies were characterized on the basis of clinical observations of their most severe compulsive rituals rather than by empirical methods such as the Y-BOCS or cluster analysis. In the only study using empirically derived symptom subtypes, Mataix-Cols et al. (1999) found that hoarding symptoms responded more poorly than other OCD symptoms to medication by serotonin reuptake inhibitors (SRIs).

Another limitation of previous outcome research is that studies have underrepresented patients with certain symptom presentations (e.g., hoarding; Ball, Baer, & Otto, 1996). Perhaps some presentations of OCD are more strongly associated with comorbid conditions (e.g., depression) that are grounds for exclusion from treatment trials. Our present sample consisted of clinic patients who were not excluded because of most comorbid conditions, treatment history, or symptom presentation (see Table 1). Thus, Study 2 extends previous research on OCD symptoms and ERP outcome by examining differences between empirically derived patient clusters in a highly representative sample of OCD patients.

Relative to other OCD presentations, patients with primarily hoarding symptoms have significantly more personality disorder traits (e.g., dependent and schizotypal) and poor insight into the senselessness of their symptoms (Frost, Steketee, Williams, & Warren, 2000). These characteristics are thought to negatively impact outcome of ERP because of reluctance to confront feared situations (i.e., during exposure) and failure to incorporate information that is inconsistent with fixed beliefs (Foa, Abramowitz, Franklin, & Kozak, 1999). Thus, we predicted that patients in the hoarding cluster would show attenuated rates of response to ERP compared with other clusters. On the basis of the notion that patients with primarily cognitive OCD symptoms do not respond well to ERP (e.g., Baer, 1994), we also hypothesized that the unacceptable thoughts cluster would fare more poorly than other clusters.

Method

Participants

Participants were the 132 OCD patients described in Study 1.⁴ Each patient was assigned to a symptom cluster on the basis of results obtained in the cluster analysis described in Study 1 (Ward's hierarchical agglomeration analysis).

Assessment

The Y-BOCS Severity Scale was administered at both pre- and post-treatment by assessors not otherwise involved in the patient's treatment.

Treatment

Following the initial evaluation, patients began individual ERP with 1 of 12 doctoral- or master's-level therapists. Therapist training involved didactics, observing treatment as a cotherapist, and conducting individual therapy under close supervision by an ERP expert. In the current study, experience with ERP ranged from 1 to 16 years. Weekly supervision meetings were held during which therapy cases were reviewed.

All patients received ERP involving 15 treatment sessions 60 to 90 min in length. Session frequency ranged from one to five therapy visits per week and was determined by the severity of the OCD symptoms and the schedules of both the therapist and patient. Recent findings suggest that less intensive (i.e., weekly or twice-weekly) ERP schedules are generally as effective as more intensive schedules (Abramowitz, Foa, & Franklin, 2003). In the present study, the mean number of sessions per week was 3.3 ($SD = 1.2$; mode = 5.0).

Therapy began with two treatment planning sessions during which information about the patient's obsessional fears and rituals was collected and a hierarchy of anxiety-evoking situations and thoughts was developed. The rationale for ERP procedures was also introduced. Sessions 3–15 included therapist-supervised in vivo and imaginal exposure. Early exposures were to moderately distressing situations with progression toward those more anxiety evoking. Exposure homework was also assigned. During exposure, therapists drew attention to patients' mistaken cognitions about the likelihood of catastrophic consequences. Response prevention included instructions to refrain from all compulsive behaviors. Patients used self-monitoring forms to keep track of situations that triggered compulsive urges that could not be resisted. Details of this treatment are described in Franklin, Abramowitz, Kozak, Levitt, and Foa (2000).

Eighty-one patients (61.3%) were receiving concomitant pharmacotherapy by SRIs (e.g., fluvoxamine). In each case, pharmacotherapy had been started at least 3 months prior to beginning ERP. A chi-square analysis indicated that the proportion of patients using medication did not differ across symptom clusters, $\chi^2(4, N = 132) = 8.40, p > .05$. Therapists inquired about medication use on an ongoing basis and encouraged patients not to change their doses during ERP. The failure to find an advantage for SRI pharmacotherapy plus ERP over ERP alone (e.g., Franklin, Abramowitz, Bux, Zoellner, & Feeny, 2002; McLean et al., 2001) suggests that it is appropriate to include medicated OCD patients in such research as long as patients' medication use remains stable. No patients were undergoing simultaneous psychotherapy for anxiety or mood disorders.

Results

Preliminary Analyses

Eighteen patients (14%) discontinued treatment prematurely: 3 in the harming cluster; 3 in the contamination cluster; and 4 each in the hoarding, symmetry, and unacceptable thoughts clusters. Chi-square analysis indicated no significant differences in discontinuation rates across symptom clusters, $\chi^2(4, N = 132) = 6.37,$

$p > .05$. We used an intent-to-treat approach to examining treatment outcome. Because patients who dropped out were retained in these analyses by substituting their pretreatment score for the missing posttreatment scores, this approach represents a conservative test of the effectiveness of treatment.

The mean pre- and posttreatment Y-BOCS total scores for the entire sample of 132 patients were 26.21 ($SD = 4.78$) and 11.46 ($SD = 5.64$), respectively. This corresponds to a 56.3% reduction in OCD symptoms. Correlational analysis indicated no significant relationship between improvement and session frequency, $r(127) = -.12, p > .05$.

Effects of Symptom Presentation on Treatment Response

Statistical significance. Table 2 presents the mean Y-BOCS scores for the five symptom clusters at pre- and posttreatment. To examine the effects of symptom presentation, we conducted a 2×5 (Time \times Symptom Cluster) repeated measures analysis of variance. As expected, this analysis revealed a significant main effect for time, $F(1, 127) = 558.32, p < .01$. Although the main effect of symptom cluster was not significant, $F(4, 127) = 1.43, p > .05$, the Time \times Symptom Cluster interaction was significant, $F(4, 127) = 3.59, p < .01$. Post hoc comparisons indicated no significant differences on the Y-BOCS at pretreatment, $F(4, 127) = 1.87, p > .05$. However, at posttreatment, significant differences were observed, $F(4, 127) = 2.49, p < .05$. Patients in the hoarding cluster had more severe posttreatment Y-BOCS scores than did those in the harming, contamination, and unacceptable thoughts clusters (all $ps < .01$) but not those in the symmetry cluster. There were no other between-groups differences. Paired t tests indicated that each cluster improved significantly from pre- to posttreatment (all $ps < .001$).

Clinical significance. Rather than classify patients as responders or nonresponders on the basis of their symptom reduction rate (e.g., 25% or 33% on the Y-BOCS), we used the more conservative methods described by Jacobson and Truax (1991) to determine whether patients attained clinically significant improvement (i.e., high endstate functioning and reliable change). Normative Y-BOCS data reported by Steketee, Frost, and Bogert (1996) were used to establish high endstate functioning. The percent of patients in each cluster that met both criteria for clinical significance is also displayed in Table 2. A chi-square analysis revealed significant between-groups differences, $\chi^2(4, N = 132) = 12.02, p < .05$, and inspection of the standardized residuals indicated that patients in the hoarding cluster achieved a lower rate of clinically significant improvement than those in the other clusters.

Discussion

The general improvement rate among patients in Study 2 was comparable to those reported in controlled studies of ERP (e.g.,

⁴ Some data from this study are overlapping with those from an earlier study on the overall effectiveness of ERP (Franklin et al., 2000). In particular, mean pre- and posttreatment Y-BOCS scores from 88 participants in the present study (66.7% of the sample) were included in analyses reported in Franklin et al. (2000), a study in which the issue of OCD symptom subtyping was not explored. The present study therefore includes (a) data from a third of the sample collected since the previous article and (b) novel analyses of treatment outcome.

Table 2
Improvement for Patients Within Each OCD Symptom Cluster

OCD symptom cluster	n	Y-BOCS total score		Clinical significance (%)
		Pretreatment M (SD)	Posttreatment M (SD)	
Harming	29	27.07 (4.6)	10.79 (6.7)	59
Contamination	33	26.18 (3.9)	11.03 (4.0)	70
Hoarding	16	25.94 (4.2)	15.50 (4.7) ^a	31
Unacceptable thoughts	41	26.66 (4.2)	10.71 (5.6)	46
Symmetry	13	23.23 (5.0)	11.47 (7.1)	76

Note. OCD = obsessive-compulsive disorder; Y-BOCS = Yale-Brown Obsessive-Compulsive Scale.

^a Posttreatment Y-BOCS scores for hoarding cluster were significantly greater than for the harming, contamination, and unacceptable thoughts clusters.

62% in Lindsay, Crino, & Andrews, 1997) that used highly selected research samples. Consistent with our hypothesis, patients in the hoarding cluster evidenced more severe posttreatment OCD symptoms compared with patients in all other symptom clusters except for symmetry, which fell in between. Although improvement among the hoarding cluster was statistically significant, fewer hoarding patients met the criterion for clinically significant improvement compared with other patient groups. Perhaps the somewhat poorer response to ERP for hoarders is due to difficulty with compliance or habituation during exposure. Given accumulating evidence that the two established OCD treatments (i.e., ERP and SRIs) are of decreased benefit for hoarding, the continued development of therapies tailored especially for this particular symptom presentation (e.g., Hartl & Frost, 1999) is important. Contrary to our hypothesis, patients in the unacceptable thoughts cluster did not fare significantly worse than patients in other clusters. Thus, it appears that ERP procedures are beneficial in reducing severe obsessional symptoms and mental compulsive rituals.

General Discussion

In the present research, we used the Y-BOCS Symptom Checklist to derive symptom-based subgroups from a large sample of patients with OCD. Our cluster-analytic approach yielded five patient categories that were largely comparable to those identified in previous OCD subgrouping studies. Notably, we found that covert mental rituals were present in most patient clusters, yet primarily among those with unacceptable sexual, aggressive, and/or religious obsessions. Although previous studies identified an OCD subtype comprising these same obsessions (e.g., Mataix-Cols et al., 1999), none identified compulsive symptoms within this subtype, perhaps because of the failure to explicitly consider mental compulsions in past research. Thus, our data suggest the presence of mental rituals among OCD patients previously considered to have "pure obsessions."

Our findings therefore add to the scant empirical literature on mental compulsions and shed light on the psychopathology of OCD. In addition to overt compulsions, most patients perform covert mental rituals, which may involve conjuring up "safe" phrases, numbers, or images to neutralize "unacceptable" or "dangerous" ones or silently repeating prayers to reduce doubts regarding the probability of disastrous consequences. Other covert rituals

involve mentally reviewing knowledge to allay doubts that one will forget information (e.g., one's spouse's name) and reviewing one's own behavior to relieve obsessional doubt regarding whether one committed unlikely mistakes (e.g., put the cat in the freezer) or offensive acts (e.g., raped a coworker). Recent findings (de Silva et al., 2003) support clinical observations that the functional properties of mental rituals are similar to those of overt rituals.

The results of Study 1 also have implications for the diagnostic assessment and conceptualization of OCD. Currently, a diagnosis of OCD requires the presence of *either* obsessions or compulsions (i.e., *DSM-IV*). Moreover, the repetitiveness of these symptoms is emphasized, leading to the widespread view that it is the *repetition* of symptoms that defines OCD. Indeed, some have proposed that numerous other conditions (i.e., compulsive gambling, kleptomania, and trichotillomania) belong to a spectrum of OCD-related disorders because all involve repetitive symptoms (Hollander & Wong, 1995). However, the finding that each patient cluster in our study evidenced both obsessions and compulsions suggests that OCD is more than a mere collection of repetitious or compulsive symptoms. We propose that the defining feature of OCD lies in the functional relationship between obsessional thoughts and compulsive phenomena as we have described above. This phenomenology is internally consistent across different symptom presentations of OCD yet is not present in most other disorders that involve repetitious behaviors (for a review see Abramowitz & Houts, 2002). That is, only OCD patients perform repetitive behaviors (i.e., rituals) to escape from obsessional doubt and distress.

The findings from Study 2 are also relevant to the psychopathology of OCD. Controlled studies (e.g., Lindsay et al., 1997) indicate that ERP reduces OCD symptoms specifically by weakening associations between (a) obsessional thoughts and anxiety and (b) compulsive rituals and anxiety reduction. We found that these basic treatment principles were generally successful in reducing OCD symptoms across patient clusters, suggesting that there are phenomenological similarities between the clusters beyond the presence of repetitive thoughts and behaviors. An important consideration in using ERP is that these procedures must be tailored to the patient's idiosyncratic fears and rituals. Thus patients with hoarding symptoms, who showed somewhat attenuated response compared with those in other groups, may have symptoms that function to maintain hoarding (e.g., poor organizational

skills) yet are more difficult to address with ERP. Perhaps more specific attention to such associated phenomena in treatment is warranted. The effectiveness of ERP for hoarding may be also affected by other characteristics of these patients (e.g., dependent personality traits, poor insight), which might interfere with the implementation of the treatment procedures (e.g., Foa et al., 1999). As recent research has improved the application of ERP procedures in the treatment of OCD patients with severe obsessions and no overt compulsive rituals (i.e., primarily mental rituals; Freeston et al., 1997), so too may further research on the psychopathology of hoarding lead to more effective application of ERP to these symptoms.

Limitations of our study that warrant consideration include the fact that the Y-BOCS Symptom Checklist is not an empirically derived inventory of OCD symptoms. Thus, despite our addition of mental compulsions, it still may not include the entire range of symptoms present in this disorder. Also, when conducting cluster analysis to create subtypes, validation of the cluster solutions on independent samples increases confidence in the results, yet no such validation procedure was implemented in Study 1. Further, although therapists in Study 2 used a treatment manual and received expert supervision, formal adherence ratings were not gathered, so it remains possible that protocol noncompliance on the part of the therapists explains the attenuated response to ERP found in hoarders. It should also be considered that our findings related to the hoarding cluster are the least reliable because of the smaller group size. Finally, although we did not exclude patients with secondary Axis I and II disorders, standardized assessment of comorbid conditions was not conducted.

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