



A critical evaluation of obsessive–compulsive disorder subtypes: Symptoms versus mechanisms[☆]

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Abstract

Recently, experts have suggested that obsessive–compulsive disorder (OCD), a highly heterogeneous condition, is actually composed of distinct subtypes. Research to identify specific subtypes of OCD has focused primarily on symptom presentation. Subtype models have been proposed using factor analyses that yield dimensional systems of symptom categories, but not necessarily distinct subtypes. Other empirical work has considered the role of neuropsychological functioning and comorbidity as part of a comprehensive scheme for subtyping OCD. The identified dimensions from all of these studies have implications for the treatment of OCD. In this article, we review the research on subtypes of OCD, focusing on subtype schemes based upon overt symptom presentation and neuropsychological profiles. We also review research pertinent to alternative subtyping schemes, both conceptually and methodologically. The research is critically examined and implications for treatment are discussed. Recommendations for future investigations are offered.

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1. The empirical status of obsessive–compulsive disorder subtypes

Obsessive–compulsive disorder (OCD) is a heterogeneous condition composed of multiple symptoms. Individuals seeking treatment have clinical presentations associated with many different types of obsessional concerns and compulsive behaviors. The *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association [APA], 2000)* offers a general definition of OCD that includes obsessions and/or compulsions (either may be present in conjunction with or in the absence of the other), although the specific manifestation of these symptoms varies widely from patient to patient. For example, obsessions about contamination, illness, harming, morality, exactness, and intrusive unwanted disturbing images are all common (Rachman & Hodgson, 1980). In response to these obsessions, patients may perform a variety of compulsions or neutralizing responses, such as washing, checking, arranging, or mental rituals, as well as avoidance of situations that provoke the obsessions. While the *DSM-IV* definition of OCD captures a broad array of symptoms, researchers and clinicians have observed for some time that patients with specific types of symptoms are less responsive to available treatments. The broad range of symptoms seen in OCD along with the differential response to treatment has led researchers and clinicians to propose that important subtypes of OCD exist. In turn, these proposals have prompted the development of methods for identifying subtypes of OCD and evaluate possible differences in treatment response or disorder etiology.

The existing literature purporting to identify subtypes relies almost exclusively on overt symptoms as a basis (i.e., classifying patients as washers, checkers, hoarders, etc.) for subtyping schemes. However, what has been ignored is the possibility that meaningful differences in clinical manifestation may be related to a mechanism of action, apart from symptom presentation. For example, it has been recently observed that some children develop OCD following streptococcal infection (Swedo, Leonard, & Garvey, 1998). While the symptom manifestation may resemble that of other children with OCD, differences may exist in treatment response. Other methods of subtyping, such as age of onset, family history of OCD, the presence of other psychiatric disorders, or gender differences, may also be reasonable means of subtyping, but have been left relatively unexamined.

The more general conceptualization of OCD in *DSM-IV* may result from an assumption that the symptoms are parts of a broader psychopathology dimension. A hierarchical model would be congruent with this position where heterogeneous symptoms are viewed as manifestations of a unitary condition. Alternately, if important subtypes of the condition exist, multiple conceptualizations of the disorder may be needed, as well as subtype-specific treatments. A hierarchical model of OCD could ultimately accommodate multiple subtypes that would all be part of the same diagnostic condition (Taylor, 2004). The unique features of subtypes would lead to specific interventions.

In the present article, we review the existing literature on the classification of subtypes of OCD. The review is divided into the following sections: First, a review and critique of the rationales for subtyping, characteristics of satisfactory subtyping schemes, and barriers to reaching these schemes, is offered. Second, major approaches that have been applied in an effort to determine subtypes on the basis of obsessional and compulsive themes are discussed. Third, the relationship between symptom subtype and treatment response is surveyed. Fourth, the phenomenology and empirically supported treatment procedures for identified subtypes are reviewed with an emphasis on cognitive–behavioral conceptualization and therapy. Fifth, the literature on neuropsychological features of OCD is reviewed

as an alternative method of identifying important subtypes of OCD. Sixth, the literature on the neuropsychiatric correlates of OCD subtypes is reviewed. Finally, methodological issues in subtyping are discussed and recommendations for future research are provided.

2. Why subtypes? Rationale and validation

2.1. *Categorical approaches to classification*

The question of why researchers are interested in identifying subtypes of OCD can be answered by considering why we delineate psychiatric syndromes in the first place. [Blashfield and Livesley \(1999\)](#) observed that this is done to facilitate communication among mental health professionals, develop a basis for theories of psychopathology, predict clinical course, and identify which treatments are most likely to be effective for which patients. Numerous schemes for classifying psychiatric disorders have been proposed and researched. The OCD subtyping research, like *DSM-IV*, is couched in the idea that psychiatric disorders can be usefully classified into categories. The categorical approach works best “when all members of a diagnostic class are homogeneous, when there are clear boundaries between classes, and when the different classes are mutually exclusive” ([APA, 2000](#), p. xxxi).

As with the *DSM-IV* approach to defining psychiatric disorders, OCD subtyping efforts have been based, to a greater or lesser extent, on the framework laid out in the classic paper by [Robins and Guze \(1970\)](#). These authors proposed that advances in understanding and treating psychiatric disorders are most likely to occur if we study homogeneous groups:

“Homogeneous diagnostic grouping provides the soundest base for studies of etiology, pathogenesis, and treatment. The roles of heredity, family interactions, intelligence, education, and sociological factors are most simply, directly, and reliably studied when the group studied is as homogeneous as possible” (p. 984).

To identify and validate such groups, [Robins and Guze \(1970\)](#) outlined five phases that interact with one another so that new findings in any one of the phases may lead to modifications in one or more of the other phases. The process has as its aim ongoing self-rectification and increasing refinement, which may lead to more homogeneous diagnostic grouping. The five phases are as follows:

- (1) *Clinical description*. The clinical description of a proposed diagnostic syndrome (or subtype) may be based on some striking clinical feature, or on a combination of descriptive features that are thought to be associated with one another (e.g., signs and symptoms and demographic features).
- (2) *Laboratory studies*. These include chemical, physiological, radiological (e.g., neuroimaging), and anatomical (biopsy and autopsy) findings. Psychological studies (e.g., tests of cognitive abilities or functioning) may also be included. When laboratory tests are consistent with the defined clinical picture, they permit a more refined classification.
- (3) *Exclusion of other disorders*. Exclusionary criteria (including criteria for discriminating subtypes) are developed on the basis of clinical descriptions and laboratory findings. The criteria should permit exclusion of borderline or doubtful cases so that the index group may be as homogeneous as possible.

- (4) *Follow-up studies*. These studies can be used to determine whether the diagnostic category or subtype is stable over time. Do patients with one putative OCD subtype, for example, tend to switch to another subtype over time? Follow-up studies can also investigate whether members from a putative homogeneous group differ in their course of disorder or treatment response. A putative subtype may not be homogenous if it can be clearly divided into patients with good versus poor prognosis.
- (5) *Family studies*. The validity of a proposed type or subtype of psychiatric disorder would be supported by showing that it runs in families or is of increased prevalence in first-degree relatives, reflecting the effects of genetic or shared environmental factors.

Researchers interested in identifying OCD subtypes have used a number of the approaches outlined above. Some have focused primarily on clinical descriptions, while others have focused on family studies or laboratory tests. As a result of these efforts, proposed subtyping schemes have included the following: (a) early vs. later onset OCD; (b) presence vs. absence of tics; (c) presence vs. absence of childhood diseases, such as streptococci-related autoimmune disorders; (d) presence vs. absence of psychotic or neurological features; and (e) subtyping schemes based on clusters of presenting symptoms (e.g., “washers” vs. “checkers”; e.g., Albert, Maina, Ravizza, & Bogetto, 2002; Allen, Leonard, & Swedo, 1995; Calamari, Wiegartz, & Janeck, 1999; Eichstedt and Arnold, 2001; Geller et al. 1998; Sobin et al., 2000). The merits of various subtyping schemes depend on a number of factors, including the empirical support for each subtype and whether some subtypes have advantages over others.

3. Identification of subtypes based on symptom theme

The most popular basis for deriving OCD subtypes has been the overt symptom theme. While some authors have attempted to delineate the latent structure of OCD symptom measures via factor analysis, others have aimed to classify patients into distinct symptom-based subgroups using cluster analysis. In this section, we examine research that has used this methodology and summarize the important contributions this work has made to understanding OCD.

Early symptom subtyping approaches characterized OCD patients by their principal compulsive behavior (e.g., “washers” and “checkers”; Lewis, 1936). An “impulsive” vs. “nonimpulsive” taxonomy was proposed by Hoehn-Saric and Barksdale (1983), who aimed to distinguish OCD patients with tics from those without tics. Rasmussen and Eisen (1991) later proposed that OCD symptoms fall into three subgroups: (a) abnormal risk assessment, (b) pathological doubt, and (c) incompleteness. Although conceptually appealing, these rational approaches for deriving subtypes were not subjected to empirical study.

The first use of a psychometrically validated instrument to identify symptom subtypes was reported by Hodgson and Rachman (1977), who developed the Maudsley Obsessional Compulsive Inventory (MOCI). Factor analysis of the MOCI revealed three major symptom dimensions: washing, checking, and doubting-conscientiousness (Hodgson & Rachman, 1977). Sanavio and Vidotto (1985) replicated this finding using a nonclinical sample, suggesting that this symptom structure could be generalized to other populations. The compulsive activity checklist (CAC; Philpott, 1975), another commonly used self-report measure of OCD symptoms, has also been subjected to factor analysis to identify symptom subtypes. Freund, Steketee, and Foa (1987) found a two-factor solution: (a) washing and cleanliness and (b) checking.

The Padua Inventory (PI; [Sanavio, 1988](#)) is another self-report measure used to evaluate the structure of OCD symptoms. The PI was developed to assess symptoms associated with senseless, repugnant thoughts and unacceptable urges (i.e., obsessional phenomena). Factor analysis of the PI using a nonpatient sample ([Sanavio, 1988](#)) revealed four main symptom dimensions, including three that corresponded to MOCI and CAC factors: (a) becoming contaminated, (b) checking behavior, and (c) impaired control over mental activities (which corresponded to the MOCI doubting-conscientiousness subscale). The fourth PI factor, “urges and loss of control over motor behavior,” had not been identified in previous subtype schemes and included items assessing unwanted urges to commit violent or harmful acts, such as murdering one’s own child or throwing oneself in front of an approaching train. Subsequent development of a revised version of the PI using a clinical OCD sample (e.g., [van Oppen, Hoekstra, & Emmelkamp, 1995](#)) resulted in identification of five stable symptom dimensions: (a) washing, (b) checking, (c) rumination, (d) impulses, and (e) precision.

Taken together, the results of initial efforts to identify symptom subtypes of OCD pointed to several replicable dimensions: washing, doubting-checking, and obsessional phenomena. These dimensions have emerged in evaluations of both clinical and nonclinical samples. However, closer examination of these initial studies suggests two limitations. First, the self-report measures employed in these investigations were developed to assess symptoms generally considered to characterize OCD patients’ clinical presentations. Thus, these measures focus on contamination, doubting, checking, and other more frequently identified obsessional themes. Therefore, the emergence of corresponding latent dimensions across studies is not remarkable. Additionally, several authors have noted that the item content in self-report OCD measures is too narrow and weighted toward what are often considered the more quintessential obsessions and compulsions, such as washing and checking. Few (or no) items on these measures address the less studied symptoms of OCD, such as mental rituals, symmetry, or hoarding ([Baer, 1994](#); [Summerfeldt, Richter, Antony, & Swinson, 1999](#)). Consequently, there are priori limitations on the potential OCD symptom subtypes that can be derived with these instruments, measures heavily weighted to assess OCD symptoms long recognized as characteristic of the condition.

3.1. Symptom-based subtypes identified with the Y–BOCS Checklist

Growing appreciation for the substantial diversity of OCD patients’ symptom presentation has led researchers to more widely assess the range of obsessions and compulsions in identifying symptom subtypes. Many have turned to the symptom checklist of the Y–BOCS (YBOCS-SC; [Goodman et al., 1989](#)) because of the more comprehensive array of symptoms contained in this measure. The YBOCS-SC is a semistructured interview that contains a checklist of over 60 specific OCD symptoms (e.g., concerns with contamination from insects or animals) organized into eight obsession categories (aggressive, contamination, sexual, hoarding, symmetry, religious, somatic, and miscellaneous) and seven compulsion categories (washing, checking, counting, ordering/arranging, hoarding, repeating, and miscellaneous).

3.1.1. Latent dimensions of the Y–BOCS Checklist

A summary of all investigations of OCD symptom subtypes with the YBOCS-SC is shown in [Table 1](#). Most often, factor analysis has been used to identify the underlying dimensions of the YBOCS-SC. [Baer \(1994\)](#) was the first to employ the YBOCS-SC to derive symptom subtypes. He coded patients’ symptoms with ordinal ratings of the scale’s 15 symptom categories as follows: If a patient did not

Table 1
Dimensions or subgroups identified in studies of OCD

Study	Number	Measure	Identified dimensions or subgroups								
			Number of dimensions/subgroups	Contamination/washing	Harming/checking	Hoarding	Symmetry/ordering	Obsessionals	Sexual/religious	Certainty	Sexual/somatic
<i>Factor analysis</i>											
Baer (1994) ^{a,b}	3	Y-BOCS	+1	+1	+2	+2	+	–	–	–	–
Leckman et al. (1997) ^{a,b}	4	Y-BOCS	+	+	+	+	–	–	–	–	–
Hantouche and Lancrenon (1996) ^{a,b}	3	Y-BOCS	+1	+1	+2	+2	+	–	–	–	–
Mataix-Cols et al. (1999) ^{a,b}	5	Y-BOCS	+	+	+	+	–	+	–	–	–
Mataix-Cols et al. (2002) ^{a,b}	5	Y-BOCS	+	+	+	+	–	–	–	+	–
<i>Confirmatory factor analysis</i>											
Summerfeldt et al. (1999) ^c	4	Y-BOCS	+	+	+	+	–	–	–	–	–
<i>Cluster analysis</i>											
Calamari et al. (1999)	5	Y-BOCS	+	+	+	–	+	–	+	–	–
Abramowitz et al. (2003) ^d	5	Y-BOCS R	+	+	+	+	+	–	–	–	–
Calamari et al. (2004) ^e	7	Y-BOCS	+	+	+	+	+	–	–	+	+

(+) Indicates the dimension or subgroup was identified in the study.

Symptom categories that share the same numeric subscript were identified as a single dimension in the study while categories with multiple subscripts were identified as separate dimensions.

Y-BOCS = Yale-Brown Obsessive-Compulsive Scale.

^a Principal component analysis with Varimax rotation was used.

^b The miscellaneous obsession and compulsion categories of the Y-BOCS were not scored.

^c Summerfeldt et al.'s (1999) harming/checking dimension showed high loadings on aggressive obsessions, checking compulsions, sexual obsessions, religious obsessions, and somatic obsessions.

^d Abramowitz et al. (2003) used a revised Y-BOCS checklist that included an additional compulsion category for mental rituals.

^e The Calamari et al. (2004) findings were based on combining a new sample with their 1999 sample.

endorse any of the specific symptoms under that heading, that category (e.g., checking compulsions) was assigned a score of 0. If the patient endorsed at least one of the specific symptoms (e.g., checking for mistakes) in a category, but the category was not considered a *primary* or *principal* symptom by the clinician, that category was assigned a score of 1. If a patient reported at least one of the specific symptoms in a given category as a *primary* obsession or compulsion, that category was assigned a score of 2. Thus, a score of 0, 1, or 2 was assigned to each of the seven obsession categories and each of the eight compulsion categories of the YBOCS-SC.

Baer (1994) conducted a principal components analysis of the YBOCS-SC and identified three factors. A *symmetry and hoarding* factor included symmetry and hoarding obsessions and hoarding, ordering, repeating, and counting compulsions. Baer suggested that the common theme of this factor was a sense of imperfection and incompleteness, symptoms also experienced in proposed OCD spectrum disorders, such as Tourette's syndrome and trichotillomania. The second factor, *contamination and cleaning*, included contamination, somatic, and hoarding obsessions with cleaning and checking compulsions. The finding that checking and washing symptoms loaded together on a single factor was incongruent with previous studies based on self-report OCD measures. The third factor included religious, sexual, and aggressive obsessions, and was termed *pure obsessions* because no compulsion categories loaded with these obsessional symptoms. Baer noted that the subtypes derived in this study did not refer to mutually exclusive groups of patients, but rather to groups of symptoms that a given individual might evidence to varying degrees.

As is shown in Table 1, Hantouche and Lancrenon (1996) obtained results almost identical to Baer's (1994). Using data from a sample of 208 OCD patients, Leckman et al. (1997) found four symptom factors that were different in several ways from the three factors reported by Baer. Leckman et al. also used a different strategy for quantifying the YBOCS-SC. Symptoms endorsed within each YBOCS-SC category were summed to produce a category score. Both present and past symptoms were quantified (lifetime symptoms). Leckman et al. found an *obsessions and checking* factor suggesting a strong correlation between aggressive obsessions and checking compulsions, a finding not previously reported. Sexual and religious obsessions also loaded on this factor. Consistent with earlier studies, Leckman et al. identified factors of *cleanliness and washing*, *hoarding*, and *symmetry and ordering*. Although hoarding obsessions and compulsions loaded together along with symmetry and ordering in Baer's study, Leckman et al. identified a more homogeneous *hoarding* factor. Leckman et al. also replicated their four-factor solution in a second sample of 98 OCD patients.

Summerfeldt, Richter, Antony, and Swinson (1999) conducted a confirmatory factor analysis with the YBOCS-SC items and obtained support for a latent structure similar to Leckman et al.'s (1997) model. Summerfeldt et al. found that the discrete symptoms listed on the Y-BOCS checklist did not load well on the specific YBOCS-SC dimensions they were supposed to measure. This suggests that the within-category symptoms listed on the YBOCS-SC may not be the best examples of the obsessional concerns or compulsive behavior categories listed on the measure.

Mataix-Cols et al. (1999) factor analyzed YBOCS-SC data from 354 OCD patients and identified five factors, which were quite similar to the four-factor model proposed by Leckman et al. (1997). Mataix-Cols et al.'s fifth factor was sexual and religious obsessions, which was separate from aggressive obsessions and checking compulsions. Otherwise, the *symmetry and ordering*, *contamination/cleaning*, and *hoarding* factors were identical to those found by Leckman et al. Mataix-Cols et al. suggested that consistent findings regarding the multidimensionality of OCD supported the view that the heterogeneity of the disorder is mediated by different neuroanatomical structures (e.g., Rauch, Whalen, Dougherty, &

Jenike, 1998). It is unclear how multidimensionality speaks to specific etiology, and this biological conceptualization certainly does not explain the fact that sometimes the themes of patients' OCD symptoms change over time (Skoog & Skoog, 1999). In a further factor analytic study of 153 patients, Mataix-Cols et al. (2002) found a factor structure similar to their earlier work. Religious obsessions loaded with aggressive obsessions and checking rituals as in Leckman et al.'s study. Sexual and somatic obsessions formed a singular factor that included no compulsions.

3.1.2. *The formation of patient subgroups with the Y-BOCS Checklist*

Calamari et al. (1999) suggested that cluster analysis might be preferable to factor analysis in identifying OCD subtypes. Cluster analysis is a collection of multivariate techniques often used to empirically identify subgroups of individuals (Bailey, 1994). Individuals are unambiguously assigned to groups with cluster analysis. In comparison, a limitation of using factor analysis to identify subtypes becomes apparent when factor scores are estimated for individuals. A score is obtained on each of the identified factors, and these scores may not connect the person unambiguously to a specific dimension or subtype (Calamari et al., 2004).

Calamari et al. (1999) identified five symptom-based clusters in a sample of 106 OCD patients: (a) *harming*, (b) *hoarding*, (c) *contamination*, (d) *certainty*, and (e) *obsessionals*. The *hoarding*, *contamination*, and *obsessionals* clusters have obvious overlap with previously identified dimensions, and the *certainty* and *harming* clusters had similarities with Leckman et al.'s (1997) *obsessions and checking* factor. The *certainty* and *harming* clusters differed from each other in that the *harming* subgroup's symptom elevations were restricted largely to aggressive obsessions and checking compulsions whereas patients in the *certainty* subgroup had elevations on multiple YBOCS-SC obsession and compulsion categories. Calamari et al. characterized their *certainty* subgroup as needing absolute certainty regarding many issues, sometimes to prevent harmful outcomes, but suggested that an overriding theme was the need to create a "just right" feeling.

One difference between Calamari et al.'s (1999) study and previous research is the absence of a symmetry subtype. Calamari et al. found that symmetry obsessions were prevalent among the *harming* cluster and *certainty* cluster, and substantial levels of compulsive ordering rituals were observed in the *certainty* subgroup. It is also important to note that this study was the first to include the categories of miscellaneous obsessions and compulsions in the analyses. The authors found that these symptoms were elevated in the *obsessional* and *certainty* clusters.

The exclusion of the miscellaneous obsessions and compulsions categories of the YBOCS-SC from analyses in previous subtyping studies is problematic. Although these are heterogeneous categories, the only assessment of the presence of mental compulsions is included in the miscellaneous compulsions category. The YBOCS-SC was developed before recognition that mental (or covert) rituals were recognized as being a highly prevalent and theoretically significant OCD symptom (Foa & Kozak, 1995). Mental rituals are not only common among OCD patients, but also functionally equivalent to their overt compulsive behavior counterparts; the urge to perform this type of compulsion is provoked by obsessional anxiety and mental compulsions lead to a reduction in subjective distress (de Silva, Menzies, & Shafran, 2003). However, as a result of this limitation of the YBOCS-SC, mental rituals have not been adequately accounted for in OCD subtype taxonomies.

Calamari et al. (2004) further evaluated and refined a symptom-based OCD subgroup taxonomy, again using cluster analysis. The miscellaneous obsession and compulsion categories were scored and included in the analysis of a sample of 114 OCD patients. Calamari et al. (2004) found support for a

seven-subgroup taxonomy: (a) *contamination*, (b) *harming*, (c) *hoarding*, (d) *obsessionals*, (e) *symmetry*, (f) *certainty*, and (g) *contamination/harming*. The *contamination*, *harming*, *hoarding*, *symmetry*, and *obsessional* groups had characteristics congruent with previously identified dimensions or subgroups. The identification of a *symmetry* subgroup in the Calamari et al. study, a group not found in their previous investigation, may have resulted from the significantly higher levels of symmetry obsessions in their new sample. The *certainty* subgroup again showed multiple obsession and compulsion elevations on the YBOCS-SC, and evaluation of patient exemplars suggested that a need for certainty or just right feelings broadly characterized the group. High levels of contamination and aggressive obsessions, and washing and checking compulsions characterized the *contamination/harming* subgroup. Some patients in this subgroup were concerned with “contamination” by evil or harm and washed or avoided “contamination” to prevent harm.

3.1.3. Subgroups identified with a revised Y-BOCS Checklist

To derive subtypes of OCD patients using methods that give sufficient weight to mental compulsions, Abramowitz, Franklin, Schwartz, and Furr (2003) used a revised form of the YBOCS-SC that was more sensitive than the original version to the presence of these symptoms. Specifically, these authors used the version of the YBOCS-SC developed for the *DSM-IV* field study of OCD (Foa & Kozak, 1995), which contained a separate category for assessing mental rituals (e.g., mental neutralizing, praying, counting, list making, and reviewing events or conversations in one’s mind). Using cluster analysis with 132 OCD patients, Abramowitz et al. identified five subgroups. The *harming*, *contamination*, *hoarding*, and *symmetry* clusters were identical to those described by previous authors. Similar to Baer’s (1994) *pure obsessions* factor and Leckman et al.’s (1997) *obsessions and checking* factor, Abramowitz et al. found that aggressive, religious, and sexual obsessions covaried. However, mental rituals were also included in this cluster. This cluster was named *unacceptable thoughts* because patients in this group tended to use mental and checking rituals to neutralize or reassure themselves concerning their unwanted thoughts.

3.2. Validation of subtypes based on symptom theme

Phenomenological descriptions of the prominent symptom-based subtypes identified in the studies reviewed previously are presented further below. However, a handful of studies have been conducted to evaluate the utility of OCD symptom subtype schemes, mostly focused on how different subtypes respond to treatment. In general, the identification of reliable predictors of response to pharmacological interventions for OCD has been difficult. Mataix-Cols et al. (1999) found that higher scores on their factor analytically derived hoarding dimension predicted poorer outcome with serotonergic medications. Hoarding symptoms were also associated with dropout and attenuated response to behavior therapy in two studies (Abramowitz et al., 2003; Mataix-Cols et al., 2002). Scoring on the sexual/religious obsessions dimension predicted poor treatment response to serotonergic medication in the Mataix-Cols et al. (2002) study, whereas Abramowitz et al. (2003) found that patients in their *unacceptable thoughts* subgroup, a group with high levels of mental compulsions, responded quite well to behavior therapy. Jenike, Baer, Minichiello, Rauch, and Buttolph (1997) found that a subgroup of OCD patients with *symmetry* obsessions responded to treatment with phenelzine while other subgroups did not.

Dysfunctional beliefs and information-processing deficits in OCD also appear to differ across symptom subtypes. Several authors (e.g., Rachman, 1998) have suggested different processes for

checking as opposed to washing, noting for example, that slowness, indecisiveness, and concerns about memory are more characteristic of checkers than cleaners. Checkers and washers differ with respect to perception/memory of threat stimuli, and response to responsibility manipulations (Lopatka & Rachman, 1995; see Frost & Steketee, 2002 for review). Attention biases for the processing of OCD threat-relevant stimuli have been reported particularly in patients with contamination fears, while enhanced memory for threat cues has been found for checkers, who may experience uncertainty about the accuracy of their memory despite objectively unimpaired performance. Checkers have been found to show visual processing deficits on neuropsychological testing, where washers did not show any deficit (Bouvard, Dirson, & Cottraux, 1997; Radomsky & Rachman, 1999). Frost and Hartl (1996) have proposed information-processing, organization, and categorization deficits that may distinguish patients with the hoarding subtype from other subtypes. The important question of which domains of beliefs are particularly characteristic of each of the symptom subtypes requires further examination.

4. Neuropsychological deficits in symptom-based subtypes

While a variety of etiological models have been proposed to account for the development of OCD, neuropsychiatric models have emerged with technological advances in radiological and neuropsychological domains. Functional and structural imaging (PET, MRI, SPECT, and fMRI) studies have implicated frontal–striatal dysfunction in OCD (Greisberg & McKay, 2003; Schwartz, 1998; Saxena, Brody, Schwartz, & Baxter, 1998; Zald & Kim, 1996), although some researchers have disputed this conclusion (Tallis, Pratt, & Jamani, 1999).

Neuropsychological studies of OCD have been characterised by inconsistent findings, which may be due to disorder heterogeneity; elucidation of reliable OCD subtypes may be particularly important. If OCD subtypes are found to be associated with distinctive neurocognitive profiles, then this would have important implications for models of etiology and management, and it could be argued that neurocognitive profiling is a valid method of subtyping OCD patients. For instance, given current concerns about the ecological and syndromal validity of subtypes, profiling of distinct neurocognitive dysfunction may have some heuristic value in predicting treatment choice and outcome, severity and course of OCD, comorbidity, and other vulnerabilities.

Most neuropsychological research on OCD regards the disorder as homogeneous (Hollander, Schiffman, Cohen et al., 1990; Zielinski, Taylor and Juzwin, 1991). Although it is possible that OCD, or subtypes of OCD, may be associated with neuropsychological deficits, recent studies suggests that the putative deficits can be attributed to comorbid disorders, such as coexisting mood disorders (Basso, Bornstein, Carona & Morton, 2001; Berman et al., 1998; Matsui et al., 2001; Moritz et al., 2001). In some more recent investigations, psychiatric control groups were included to control for the effects of anxiety, depression, and other symptoms (e.g., schizophrenia) on neuropsychological performance (Abbruzzese, Bellodi, Ferri, & Scarone, 1995; Purcell, Maruff, Kyrios, & Pantelis, 1998).

Other studies have examined subtypes based on nonsymptom criteria, such as medication status (e.g., Mataix-Cols et al., 2002), family history of OCD (Boone, Ananth, Philpott, Kaur, & Djenderedjian, 1991; Christensen, Kim, Dysken, & Hoover, 1992), and history of onset (Berthier, Kulisevsky, Gironell, & Heras, 1996; Geller et al., 1998). A significant body of literature also deals with obsessive–compulsive spectrum disorders, considered by some to be OCD subtypes. Neuropsychological studies have been conducted with paraphilias (Balyk, 1997), trichotillomania (Keuthen et al., 1996; Stanley,

Hannay, & Breckenridge, 1997), and body dysmorphic disorder (Deckersbach et al., 2000), with findings similar to those in OCD.

Research investigating distinctive neuropsychological features across symptom-based OCD subtypes has focused mainly on patients with checking rituals (e.g., Sher, Frost, & Otto, 1983; Tallis et al., 1999; Zitterl et al., 2001), although less common subtypes, such as hoarding (Wincze, 2001) and obsessional slowness (Hymas, Lees, Bolton, Epps, & Head, 1991) have also been investigated. One approach has been to contrast individuals with one subtype (e.g., checkers) with others who do not present with the same symptoms (e.g., noncheckers). Compared to noncheckers, checkers have tended to exhibit (a) deficits in general memory and memory for actions (Sher, Frost, Kushner, Crews, & Alexander, 1989; Sher et al., 1983; Sher, Mann, & Frost, 1984); and (b) deficits in memory confidence (Zitterl et al., 2001). Personality factors, such as perfectionism also contribute to checking compulsions and poor memory performance (Gershuny & Sher, 1995). While differences between OCD subtypes have been found on these factors (Frost & Steketee, 2002), their influence on neuropsychological differences across subtypes has yet to be ascertained.

Another approach to examining possible differences across subtypes has been to make direct comparisons of performance on standardized neuropsychological tests. For example, Abbruzzese, Ferri, and Scarone (1995) examined performance on the Wisconsin Card Sorting Test (WCST) in 33 OCD patients and matched controls. They found no differences between various OCD subtypes as classified on the basis of YBOCS-SC responses (checkers, washers, mental checkers, and mixed cohorts), although, contrary to other studies, Abbruzzese, Ferri et al. (1995) failed to find differences between OCD and control groups on the WCST. Abbruzzese, Bellodi, Ferri and Scarone (1993) also failed to find memory differences between OCD subtypes on the revised Wechsler Memory Scale (WMS-R; Wechsler, 1987).

Kyrios, Wainwright, Purcell, Pantelis, and Maruff (1999a) compared neuropsychological performance of OCD subtypes on the Cambridge Automated Neuropsychological Test Battery (CANTAB). Fifty-nine OCD patients were categorized into subtypes on the basis of their *current* primary and secondary obsessions and compulsions as indicated on the YBOCS-SC. Four OCD subtypes were identified: (a) washers; (b) checkers; (c) obsessionals; and (d) others or mixed symptom profile. Comparisons between washers, checkers, and obsessionals revealed few neuropsychological differences between these subtypes. While washers performed significantly better than checkers and obsessionals on a pattern recognition task, checkers took longer to respond motorically, but not cognitively, during a planning task. Effect sizes were small, and differences disappeared when differences in symptom severity were partialled out. Current research by Kyrios et al. is examining whether subtype differences in dysfunctional beliefs could influence neuropsychological performance (e.g., beliefs about one's tolerance for uncertainty, perfectionism, and memory confidence) might influence any neuropsychological differences between subtypes.

Given that methodological issues currently limit conclusions from neuropsychological studies of OCD subtypes, such studies have failed to provide further clarity regarding the syndromal validity of subtypes. Firstly, a range of neuropsychological tasks has been used in such research, making it difficult to review profiles of performance or abilities. Secondly, sample sizes have been generally small; thus power concerns may mask possible significant differences. Differences in the relative severity of symptoms may also mask neuropsychological differences associated with such symptoms, although severity of OCD has not necessarily been found to be associated with poorer neuropsychological performance (Abbruzzese et al., 1997; Pujol et al., 1999; Purcell et al., 1998; Schmidtke, Schorb, Winkelmann, & Hohagen, 1998).

In an attempt to overcome problems with the reliability of subtype classification schemes as we have discussed above, some studies used a dimensional approach by examining correlations between neuropsychological performance and ratings on subscales of OCD measures that assess symptoms associated with particular “subtypes.” For instance, Mataix-Cols et al. (1999) found that poorer performance on a planning task positively correlated with score on the checking scale of the PI in a subclinical OCD cohort. However, this approach has not revealed replicable results. Kyrios et al. (1999a) found that obsessional symptoms in a clinical OCD group were correlated significantly with spatial working memory and movement time on a planning task although, in this case, severity of symptoms was associated with *better* neuropsychological performance. A similar pattern was found for contamination concerns and performance on a pattern recognition task.

Probably the greatest challenge to research in this area is that the neuropsychological tasks themselves may be open to diverse influences, such as metamemory (Gershuny & Sher, 1995). Evidence of improved memory for symptom-relevant stimuli may support the notion that factors other than memory per se may influence performance on memory tasks. Radomsky and Rachman (1999), for example, found better memory for “contaminated” than “noncontaminated” objects in a sample of OCD “washers.” A similar pattern of threat-relevant memory bias was demonstrated in a sample of OCD “checkers” (Radomsky, Rachman, & Hammond, 2001). Furthermore, there may be an interaction between certain symptom and task requirements, whereby certain OCD subtypes are disadvantaged over and above other subtypes on particular tasks. For instance, obsessionals may be more disadvantaged than washers on tasks requiring online cognitive management of complex information (e.g., working memory tasks) at times of high performance anxiety or when they are experiencing intrusive thoughts. If certain symptoms may influence neuropsychological performance more than others, tasks and symptoms need to be matched evenly before conclusions can be reached. This is not a challenge specific to OCD research, but is underscored by the peculiarities of OCD.

Overall, neuropsychological research has yet to add to our understanding of how to subtype individuals with OCD. Subtyping in an ecological sense (e.g., OCD with memory deficits, OCD without executive deficits) may have some heuristic value, but the utility of this approach has yet to be established conclusively. Kyrios, Wainwright, Purcell, Pantelis, and Maruff (1999b) reported that those with greater pretreatment executive function deficits were less likely to respond to cognitive-behavior therapy. However, methodological limitations of that study preclude strong conclusions. From an etiological perspective, researchers have yet to examine the relative effects of the variety of influences on OCD symptoms and severity. Frontostriatal dysregulation, psychological factors such as personality, beliefs or schemas, metamemory, learning history, attachment styles, and their interaction with experiential influences may all determine the particular form of OCD with which an individual presents. Future research of OCD subtypes will need to account for such complexity.

5. Neuropsychiatric correlates of symptom subtypes

Functional neuroimaging techniques are being used to study neural correlates of OCD in a growing number of studies (for a review, see Whiteside, Port, & Abramowitz, submitted for publication). Whereas most studies have combined patients with different symptom presentations, four investigations addressed the issue of symptom subtypes. Using positron emission tomography (PET), Cottraux, Gerard,

Cinotti, & Froment (1996) found that OCD patients with primarily checking rituals evidenced greater orbitofrontal and temporal lobe activity, and lesser basal ganglia activity, relative to nonpatient controls when the urge to check was evoked. In a small study of 14 patients, Rauch et al. (1998) also used PET and had patients carry out a continuous performance task during imaging. They identified positive relationships between (a) the obsessions and checking subtype and activation in bilateral striatum, and (b) the contamination and washing subtype and activation in the bilateral anterior cingulate, left orbitofrontal, and other cortical areas. In contrast, symmetry and ordering symptoms tended to be negatively related to regional cerebral blood flow in the right striatum.

In another imagining study, Phillips et al. (2000) used functional magnetic resonance imaging (fMRI) to compare OCD patients with primarily washing and checking symptoms, and healthy controls while they viewed pictures of normally disgusting or washing-relevant scenes. While viewing washing-related pictures, patients with OCD washing symptoms evidenced activations in visual regions and the anterior insula, brain regions previously implicated in the experience of disgust (Phillips et al., 1998, 1997). Patients with primarily checking rituals showed activation in frontostriatal regions and the thalamus.

Finally, using a symptom provocation paradigm, Mataix-Cols et al. (2003) subjected 10 healthy individuals to fMRI while they viewed pictures and imagined confrontation with a variety of neutral, universally distressing, and OCD-relevant stimuli associated with the different subtypes (e.g., contamination/washing [public toilet], checking [light switch], and hoarding [old toys]). Anxiety associated with different OCD symptom dimensions was associated with different patterns of activation. Mataix-Cols et al. concluded that their findings supported a dimensional model of OCD in which (a) brain systems that mediate anxiety are similar in OCD patients and nonpatients, and (b) anxiety associated with different OCD symptoms is associated with different patterns of neural activation.

Although functional neuroimaging studies of OCD and OCD subtypes have resulted in interesting findings, the results are based on small samples, and those studies that have included individuals with OCD have reported discrepant findings. More work is needed before any firm conclusions can be drawn regarding differential neural correlates of OCD symptom-based subtypes.

6. OCD symptom subtypes: implications for treatment outcome evaluations

Ball, Baer, and Otto (1996) examined the prevalence of different OCD symptom subtypes in patient samples across studies of cognitive behavior therapy (CBT) and found that patients with cleaning and/or checking rituals predominated, accounting for 75% of samples. Patients with multiple rituals, or those with exactness, counting, repeating, symmetry, slowness, or hoarding were underrepresented, comprising only 12% of the population which is considerably less than epidemiological estimates. Pure obsessionals, or patients with comorbid depression, were excluded in some studies (e.g., Cottraux et al., 2001; Emmelkamp, van Oppen, & van Balkom, 2002). Checking and cleaning may respond better to treatment either because these symptoms are easier to treat or, perhaps, because years of research have paid off in terms of fine-tuning treatment for these symptoms. Rates of improvement reported in many treatment studies may not generalize to other subgroups, and indeed, symptoms that have been relatively understudied appear to be less responsive to current treatments.

6.1. Symptom subtypes as prognostic indicators

Relatively few studies have specifically examined subtypes as predictors of treatment response. In one behavior therapy study, the type of compulsion (washing vs. checking) was not predictive (Foa & Goldstein, 1978), yet in others, women with washing rituals responded better than men with checking rituals at 1-year follow-up (Basolgu, Lax, Kavikis, & Marks, 1988; Boulougouris, 1977). Hoarding symptoms have been consistently found to respond less well to standard CBT and to pharmacotherapy (Abramowitz et al., 2003; Baer, 1994; Basoglu et al., 1988; Black et al., 1998; Mataix-Cols et al., 1999; Saxena et al., 2002; Winsberg, Cassic, & Koran, 1999). A recent study of 153 individuals who participated in computer versus clinician-guided behavior therapy for OCD found that patients with hoarding were more likely to drop out, or improve less. This study also found that after controlling for symptom severity, higher scores on the sexual/religious factor predicted worse outcome with behavior therapy, especially when the treatment was computer guided (Mataix-Cols et al., 2002). This is consistent with other reports that presence of obsessive thoughts without compulsive behavior has shown poorer response (Alonso et al., 2001; Christensen, Hadzi-Pavlovic, Andrews, & Mattick, 1987). Van Oppen et al. (1995) examined the efficacy of cognitive therapy (CT) vs. exposure and response prevention (ERP) without the use of cognitive methods, in subgroups of washers, checkers, and combination of washing and checking. There were marginally better outcomes for patients with checking rituals and for those who received CT compared to ERP. McLean et al. (2001) compared group CT versus group ERP among 63 OCD patients who were subtyped according to primary symptom theme. Categories included washing/cleaning ($n=23$), checking ($n=18$), harm/blasphemous/sexual obsessions ($n=10$), and miscellaneous (ordering, hoarding, counting, repeating, and mental rituals, $n=12$). Results showed a significant relationship between symptom subtype and recovery status. Relatively few washers (2/23 or 9%) met recovered criteria (as defined by Jacobson and Truax, 1991) compared with patients classified as obsessionals (2/10, 20%), checkers (6/18, 33%), or miscellaneous (7/12, 58%). The relative efficacy of treatment also varied by subtype. No washers recovered with CT, compared with 2/10 (20%) in ERP. For checkers, 2/7 (29%) recovered in CT compared with 4/11 in ERP (36%).

The studies reviewed here exemplify the recent trend toward greater specificity in assessment and treatment strategies for OCD, inclusion of samples with multiple subtypes, multidimensional assessment of outcome, and more stringent, clinically meaningful criteria of efficacy. However, restricting the method of subtype categorization to dominant symptom theme, or even use of empirically derived symptom subtypes, limits the conclusions that can be drawn about the relationship between possible OCD subtypes and treatment outcome.

Recent studies on the importance of dysfunctional beliefs that characterize OCD (Obsessive Compulsive Cognitions Working Group, 1997, 2001, 2003; Sookman, Pinard, & Beck, 2001; Steketee, Frost, & Cohen, 1998) suggest that the delineation of subtypes requires an examination of cognitive underpinnings that are potentially relevant to the etiology and maintenance of symptoms. For example, effective treatment for obsessions without overt compulsions (e.g., Freeston et al., 1997) was developed following identification of the pathogenic role of dysfunctional appraisals of intrusions related to responsibility (Salkovskis, 1985, 1989). However, responsibility appraisals, while particularly characteristic of patients with aggressive/harm obsessions, may be less relevant for washers who fear “feeling” contaminated, or patients preoccupied with symmetry or order.

7. Symptom-based OCD subtypes: phenomenology and treatment

The section below reviews cognitive and behavioral phenomenology characteristic of the various symptom-based OCD subtypes defined in previous research. Because CBT is a treatment approach involving the use of procedures determined by idiopathic case formulation, we describe therapeutic approaches developed (and in some cases tested) for four of the OCD symptom-based subtypes identified in previous studies (e.g., Abramowitz et al., 2003; Calamari et al., 2004): contamination/washing, harm obsessions/checking, pure obsessions, and hoarding.

7.1. Contamination and washing/cleaning

Feinstein, Fallon, Petkova, and Liebowitz (2003) found evidence of two distinct groups of OCD patients with washing rituals: (a) those who report feeling discomfort or contamination without fears of harm; and (b) those with specific fears of harm (to self or others) as a result of contamination. Patients in the first category typically focus on the feeling of contamination and report fewer obsessions. They wash or clean excessively to reduce the feeling of contamination. Patients in the second category are more focused on threatening consequences of contamination, including responsibility for spreading contaminants to others. Washing or checking rituals among such individuals are performed to avert perceived danger.

While treatment by ERP for both washing subgroups would involve education about “normal” washing, graduated exposure to avoided stimuli, and response prevention of behavioral rituals, effective CT to foster reappraisal and facilitate ERP could differ considerably for the subgroups. For the first group, strategies to tolerate, reappraise, and decatastrophize feelings of discomfort would specifically target the emotional and sensorial distress that washing is an attempt to relieve. For the second group, CT would involve identification and reappraisal of threat and beliefs about responsibility for harm associated with washing. Response prevention would be applied to behavioral rituals, as well as to cognitive checking where present (e.g., revisualizing degree of contact). Krochmalik, Jones, and Menzies (2001) described an exposure-free intervention, Danger Ideation Reduction Therapy (DIRT), that included cognitive restructuring, microbiological experiments, interviews with people having regular contact with “contaminants” (e.g., bank tellers, laboratory workers, and nurses), and progressive relaxation. They found DIRT to be effective in reducing contamination/cleaning symptoms among a group of patients who had not responded to either ERP or serotonergic pharmacotherapy.

7.2. Harm obsessions and checking rituals

Checking compulsions and aggressive obsessions show the most variability with respect to how they cluster in factor analytic studies (Feinstein et al., 2003) and the diversity of obsessional content and related checking behavior illustrates the enormous heterogeneity in OCD, even within this subtype. Checkers may report intrusions relating to harm (e.g., thoughts of fire, flood, and theft) which they feel may actually increase the likelihood of specific feared events, and ritualize to avert occurrence to self or others perceived as vulnerable (Rachman, 1997, 1998; Sookman & Pinard, 2002). Patients with unwanted aggressive or sexual thoughts or images may check to relieve doubt as to their actual dangerous behavior (e.g., “did I run over anyone on the street?”). Neutralizing responses carried out to decrease anxiety about intrusions paradoxically increase the frequency of intrusions (Salkovskis &

Campbell, 1994). Other patients overestimate the likelihood of making mistakes, or they overestimate their responsibility for possible disasters and therefore check to ensure safety (e.g., If I make a mistake, my client will face financial ruin). More commonly than washers, checkers evidence cognitive biases such as thought–action fusion (e.g., Shafran, Thordarson, & Rachman, 1996; e.g., “a bad thought is as bad as an action”) leading to the catastrophic misappraisal of spontaneously occurring intrusions as dangerous. All domains of cognition characteristic of OCD patients may be observed in this subgroup, including overestimation of threat, intolerance of uncertainty, overimportance/control of thoughts, responsibility for harm, perfectionism, and perceived inability to cope with anxiety and other strong emotions (Obsessive Compulsive Cognitions Working Group, 2001, 2003). This heterogeneity highlights the need for case conceptualization to design CT and ERP interventions tailored for each patient’s specific emotional/cognitive/behavioral experience. For example, several studies have shown that CT, which targets responsibility appraisals of checkers, reduces related symptoms (e.g., Ladouceur, Leger, Rheume, & Dube, 1996; Williams, Salkovskis, Forrester, & Allsopp, 2002).

7.3. Obsessions without overt compulsions

Approximately 25% of OCD patients report distressing obsessions without overt compulsive rituals. Common obsessional themes in this presentation are sex, harm/violence, and religion/blasphemy. This subgroup was, until recently, considered resistant to CBT and medication (e.g., Griest, 1990). Patients characterized by these symptoms often appraise their distressing thoughts as dangerous, overly important, and hence they try to control such thoughts (Obsessive Compulsive Cognitions Working Group, 2001). Mental rituals and neutralizing (e.g., reciting “good” words after having a “bad” thought, counting, and praying) may be carried out to decrease anxiety associated with intrusions when they are experienced as involuntary and overwhelming. These responses appear to be functionally similar to overt compulsions (Salkovskis, 1985). Patients may be reluctant to report intrusions due to feelings of shame or guilt (Newth & Rachman, 2001), and cognitive rituals may be viewed as essential to prevent harm or reduce anxiety. Patients who have (inevitably unsuccessfully) tried thought suppression fear ERP will similarly increase obsessions (“I’m constantly flooded by bad thoughts, I can’t risk doing anything to make them worse”). This group of patients often avoids external triggers of feared intrusions, for example, avoiding an attractive woman on the street if a sexual thought is appraised as equivalent to behavioral infidelity (thought–action fusion). Research has shown that changes in beliefs specifically related to obsessions correlate with reduction in obsessive symptoms (Freeston, Ladouceur, Provencher, & Blais, 1995; Freeston, Leger, & Ladouceur, 2001; Freeston, Rheume, & Ladouceur, 1996).

Freeston et al. (1997) reported substantial treatment response with a CBT approach specifically developed for patients with obsessive thoughts and covert neutralizing. In this program, patients were first educated about the normalcy of intrusive thoughts, the deleterious effects of neutralizing responses. CT then involved targeting specific appraisals associated with neutralizing and anxiety. Alternate explanations of obsessions were suggested, for example, “I have thoughts that seem crazy and that I interpret in a way that makes me anxious” instead of “I have crazy thoughts that mean I am dangerous.” Underlying assumptions were identified with the use of “downward arrow” technique (i.e., Freeston et al., 1996) and disconfirmatory behavioral experiments were constructed. ERP procedures involved the use of “loop tapes” in which obsessional thoughts were tape recorded and played back while the patient listened without ritualizing. To date, there has only been one published case report describing the

successful cognitive treatment of obsessions, which did not include exposure or response prevention (Wilhelm, 2003).

7.4. Hoarding

Hoarding, defined as the acquisition of (and difficulty discarding) items that appear worthless to others (Frost & Hartl, 1996), appears to be among the more disabling forms of OCD (Frost, Steketee, Williams, & Warren, 2000). Compared with other subtypes, patients with primary hoarding symptoms report higher anxiety and depression, poorer insight/more overvalued ideas, with severe psychosocial consequences (Greenberg, 1987; Frost & Gross, 1993, Frost et al., 2000). These patients report obsessional fears of losing items or possessions which may eventually be needed; beliefs about importance of, and excessive emotional attachment to, possessions; deficits in decision making and categorization/organization; doubt (and overimportance) about memory, perfectionism, procrastination, and behavioral avoidance (Frost & Hartl, 1996).

Frost, Steketee, and colleagues (e.g., Frost & Hartl, 1996; Kyrios, Steketee, Frost & Oh, 2002) have proposed a cognitive–behavioral theoretical model of hoarding. This has led to CBT specifically aimed at reducing hoarding symptoms and their consequences. Specific CBT for hoarding addresses the distinct characteristics of these patients: identification of target areas of clutter with photos and/or home visits; categorization of items to be discarded; and “throwing out” exposure tasks which may be therapist assisted. Skill acquisition techniques, such as decision making, are combined with exposure. CT focuses on excessive emotional attachments to possessions, beliefs related to perfectionism, doubt about memory, negative consequences of clutter, and responsibility. Steketee, Frost, Wincze, Greene, and Douglass (2000) examined this treatment approach with seven patients, finding substantial improvement in several hoarding symptoms for five individuals, although none were recovered. Whereas CBT for other OCD presentations is typically of brief duration (e.g., 16 sessions), Steketee et al. suggest that longer term treatment of up to 1 year may be necessary for the successful treatment of hoarding.

7.5. Research directions

Specialized cognitive and behavioral treatment procedures that target specific characteristics of OCD subtypes appear to improve outcome. Modular treatment protocols, such as that developed by Wilhelm and Steketee (2002), incorporate specific procedures into the treatment protocol depending on the presence of various cognitive and behavioral symptoms. These OCD subtype-specific protocols better address specific symptom-related beliefs than do traditional treatment packages, and initial outcome evaluations have been very positive (Steketee et al., 2003, Wilhelm, Steketee, Fama, & Golan, 2003). Similarly, an integrative schema focused CBT approach developed by Sookman, Pinard, and Beauchemin (1994) and Sookman and Pinard (1999) have resulted in more effective interventions for patients previously labelled as treatment resistant or refractory. This approach involves individualized assessment and application of specialized treatment strategies for patient characteristics hypothesized to contribute to resistance during standard CT and ERP. These aspects include perceived vulnerability to danger, difficulty coping with strong emotions, and behavioral risk aversion. Dysfunctional beliefs related to symptom subtype are case conceptualized with each patient based on those most strongly endorsed on cognitive measures, idiographic record keeping, and during therapist-assisted ERP. Cognitive and

emotional schemas, which appear particularly intransigent to disconfirmation, and relevant attachment and developmental experiences, are also addressed. Specialized approaches for OCD improve outcome as first-line treatment for milder cases (Frost & Steketee, 2002). A crucial treatment implication of the delineation of OCD subtypes, therefore, could be further development of such integrated CBT protocols specialized for OCD subtypes and related characteristics.

8. Symptom theme-based subtypes: conclusions and future directions

Attempts to identify important subgroups of OCD on the basis of differences in obsessional and compulsive themes have been productive as evidenced by the finding of differential responsiveness to the empirically supported treatments for OCD: behavioral therapy and serotonergic medication. In these initial studies, hoarding symptoms or subgroups were identified as an important OCD subtype. As shown in Table 1, hoarding emerged as a distinct symptom dimension in almost all studies using the YBOCS-SC. The unique characteristics of this subtype have begun to be elucidated and a cognitive-behavioral model of hoarding has been formulated (Frost & Hartl, 1996; Frost & Steketee, 1999; Kyrios et al., 2002). Specific modifications in standard treatments have been recommended to address the unique characteristics of these individuals (see Frost & Steketee, 1999).

Although progress has been made in identifying symptom subtypes of OCD, the literature contains inconsistencies in the symptom subgroups reported. Discrepant findings may result from limitations of the symptom measures used, in particular the attempts to quantify the YBOCS-SC. Methodological differences, including differences in the analytic strategies employed and in the sizes of the clinical samples evaluated, may also explain variability in identified subtypes.

Psychometric evaluations of the YBOCS have focused on the 10 symptom severity items, whereas the reliability or validity of the YBOCS-SC is unexplored (Taylor, 1998). The three-point ordinal rating scheme used by many investigators (e.g., Baer, 1994; Calamari et al., 1999; Holzer et al., 1994; Mataix-Cols et al., 1999) to quantify the YBOCS-SC has clear limitations and the psychometric features of this scoring approach have not been studied. Although some investigators have created YBOCS-SC obsession and compulsion category scores by summing each symptom that is endorsed within the particular category to produce a category score (e.g., Leckman et al., 1997), this method may also be problematic. While summing symptoms within a category produces a measure with a better range than the three-point ordinal rating used in several investigations, this approach rests on an assumption that endorsing more types of symptoms within a category is reflective of greater importance of the obsession or compulsion. Patients may have limited specific symptoms within specific YBOCS-SC categories, but the categories, nonetheless, may represent major obsessional foci or compulsive behavior activities (Calamari et al., 2004). Additionally, the results of Summerfeldt et al.'s (1999) confirmatory factor analysis of the specific symptoms listed on the checklist suggest that refinements may be needed. They did not find a good fit between checklist items and the four latent dimensions they identified.

Researchers and clinicians have been attracted to the YBOCS-SC because it is a relatively comprehensive OCD symptom measure. Nevertheless, the scale provides for limited assessment of several types of obsessions and compulsions, symptoms related to subgroups or dimensions identified in more complex OCD symptom taxonomies. Hoarding obsessions and compulsions, symmetry and exactness, somatic concerns, and counting and ordering symptoms receive limited attention on the YBOCS-SC. The YBOCS-SC's miscellaneous obsession and compulsion categories are significantly

heterogeneous, and although important symptoms are assessed (e.g., mental compulsions), these sections of the checklist have no logical coherence let alone empirical support (Calamari et al., 2004). Existing revisions of the YBOCS-SC, such as the modification for the *DSM-IV* field trial that included a separate checklist category for mental compulsions (Foa & Kozak, 1995), appear to produce a good taxonomy of symptom subtypes. Abramowitz et al. (2003) found that the mental compulsions component of the revised YBOCS-SC was important to the composition of their *unacceptable thoughts* subgroup, which appeared to have significantly better coherence than the *obsessional* subgroups identified in other investigations (e.g., Calamari et al., 1999, 2004).

The development of more comprehensive measures of OCD symptoms is tied to increasing understanding of the less well-studied manifestations of the disorder. For example, as researchers have carefully evaluated OCD patients with hoarding symptoms, more subtle behavioral (e.g., difficulties categorizing possessions) and cognitive (e.g., beliefs about the importance of remembering) differences have been identified (Kyrios et al., 2002). As these and other characteristics are identified in OCD patients (e.g., just right feelings; Coles, Frost, Heimberg, & Rheume, 2003), measurement of such important cognitive and behavioral characteristics will need to be included in comprehensive symptom profiles.

The potential for an empirically validated OCD subtyping scheme to elucidate etiologic processes and improve treatment interventions is strong. However, researchers in this area face several significant challenges. Very large clinical samples are needed to evaluate the complex taxonomies to adequately characterize OCD symptom heterogeneity. Multisite investigations will be necessary to obtain these samples. Researchers have extracted much information from the YBOCS-SC, a seminal measure of OCD symptom heterogeneity. These efforts to adequately characterize the symptom heterogeneity of OCD have gone beyond the psychometrics of this measure, though, and additional comprehensive symptom measures are needed. The number and types of symptom characteristics that will need to be assessed in evaluations of OCD are increasing as less well-studied manifestations of the disorder are evaluated. This suggests that symptom-based taxonomies of OCD will not be static, but will evolve in relation to the increased understandings of the less understood symptoms of the disorder.

9. OCD subtypes based on comorbidity

9.1. Tic-related versus non-tic-related OCD

In addition to the theme of obsessions and compulsions, researchers have aimed to identify OCD subtypes on the basis of comorbidity with tics and other Axis I and II symptoms. Leckman et al. (2000) proposed a categorical distinction between “tic-related” and “non-tic-related” OCD. Individuals with the tic-related subtype experience symptoms associated with exactness and symmetry, with compulsive urges to carry out rituals that appear similar to tics as in Tourette’s syndrome (e.g., touching, tapping, and blinking) until there is a sense that things seem, look, or feel “just right.” In contrast, those with non-tic-related OCD have more prominent obsessional worries about harm, responsibility, and carry out compulsive behavior to reduce anxiety. This distinction is supported by findings that males and individuals with an early OCD onset are overrepresented among the tic-related subtype (Leckman et al., 1995). Neurobiological differences have also been observed between these subtypes (Hanna, McCracken, & Cantwell, 1991).

McDougle et al. compared pharmacotherapy outcome between tic- and non-tic-related OCD in two studies. Whereas in the first study, McDougle, Goodman, & Price (1994) found that haloperidol successfully augmented fluvoxamine for individuals with tic-related OCD only, in the second study (McDougle, Epperson, Pelton, Wasylink, & Price, 2000), augmentation with resperidone did not differentiate between the two groups. Only one comparative study of psychotherapy has been published to date. In an investigation of group behavior therapy, Himle, Fischer, Janeck, & Hanna (2003) found no differences in outcome between adolescents with and without tic-related OCD. Taken together, the results of treatment outcome studies so far question the clinical utility of the distinction between tic-related and non-tic-related OCD.

9.2. Subtypes based on comorbidity with other conditions

Given the wide range of comorbid disorders occurring among individuals with OCD (Fireman, Koran, Leventhal, & Jacobson, 2001; Tuekel, Polat, Oezdemir, Aksevet, & Tuerksoy, 2002) there is potential to identify OCD subtypes based on the presence of many additional diagnoses or symptoms. Nestadt et al. (2003) used latent class analysis (LCA), which may be understood as a categorical analog of factor analysis, to identify subpopulations of 450 patients according to the lifetime presence of OCD, OC personality disorder, tic disorders, a variety of anxiety, mood, eating, and somatoform disorders, and pathological skin picking or nail biting. They found four subgroups of patients including (a) those with minimal comorbidity or “pure” OCD; (b) a group with primarily comorbid depression and generalized anxiety disorder; (c) a “highly comorbid” group with cooccurring depression, anxiety, and somatoform disorders; and (d) a group with comorbid panic disorder and agoraphobia and lifetime separation anxiety disorder. Taken together, the existing evidence points to the need for further replication of OCD subtyping schemes based on comorbidity.

10. Methodological issues in subtyping

Most researchers and practitioners who have dealt in any serious manner with OCD address the issue of subtypes. As we have discussed above, efforts to document differences between subtypes have been underway for a long time. Washing and checking subtypes have received considerable attention (Khanna & Mukherjee, 1992; Steketee, Grayson, & Foa, 1985), and few doubt the validity of these two groupings within the broader classification of OCD, although multivariate analyses of these symptoms suggests complex overlaps and subgroups. However, in the larger community of treatment studies, less attention has been paid to a number of other proposed subtypes with high levels of symptoms involving the need for exactness, hoarding, symmetry, and pure obsessions (Ball et al., 1996). Some proposed subtypes have garnered more support than have others, often due to vigorous investigation by a particular research group. Such is the case presently with hoarding, where most of the available findings have come from the work of Frost and Steketee. They have shown that individuals with primary hoarding problems differ from others with OCD in clinical presentation and in underlying cognitive and behavioral processes (Frost & Steketee, 1999; Frost et al., 2000). While work of this kind has shed important light on the nature and treatment of hoarding, research remains in the earliest phase en route to identifying homogenous groups within the larger category of OCD.

Of all the efforts to subtype symptoms of OCD, the majority of studies have relied upon a small set of methodologies that can be roughly categorized as follows: factor or cluster analyses of symptoms, differences in clinical variables among priori defined symptom subtypes, and treatment response among priori or posteriori defined symptom subtypes. All of these approaches have merit in delineating distinct response patterns between individuals with different subtypes. Yet, at the same time, each of these methods can be challenged on the grounds that they only define dimensions of symptoms rather than distinct taxometric entities within the broader category of OCD.

Recent advances in taxometric methods suggest that distinct groups may be defined statistically (Waller & Meehl, 1998). In the main, these procedures can determine whether a diagnostic indicator (i.e., in the case of OCD, a particular symptom, such as washing or checking) is a distinct entity or part of a continuum. These methods rely on large differences between indicators (again, symptoms or other dimensions for taxonic distinction) across a heterogeneous set of participants. One of the barriers to applying this methodology is the necessity of large samples (> 300) to effectively detect taxa (or, for the purposes of this discussion, subtypes). An alternative, also described in Waller and Meehl, but based on classic factor analytic techniques, is referred to as L-mode (Waller & Meehl, 1998, pp. 56–72), and, by extension MAXEIG (for maximum eigenvalue). MAXEIG examines the covariation of one obtained factor along levels of a different obtained factor. Typically, in conjunction with MAXEIG, multivariate taxometric procedures include the application of mean above minus mean below a cut (MAMBAC). MAMBAC examines the scores on one measure against a series of indicators above and below a cutoff score. Taxonicity occurs when the plot of these differences peaks against a specified cut score (for a detailed illustration, see Ruscio, Ruscio, & Keane, 2002). Using this approach, distinct groups would be present if the factor analysis results in bimodal distributions for the indicator(s). This approach is appealing, for many existing subtyping studies have relied upon factor analysis, and this approach is simply a modification to the statistical methods applied previously within this same literature base. As additional research accumulates on subtypes, both in clinical description and treatment outcome, it will be increasingly necessary that investigators have confidence the subgroups within OCD possess syndromal validity.

10.1. Challenges to address in the development of subtypes

Of course, there are important challenges to be addressed when considering the development and/or creation of OCD subtypes. In addition to some of the concerns raised above, a number of theoretical and empirical issues may impede the simple creation of a set of subtypes, or even of a simple method by which one can determine the specific subtype or subtypes that characterize an OCD patient.

While there have not been many investigations of the longitudinal course of OCD, there are suggestions that symptom types fluctuate over time (see Rachman & Hodgson, 1980). Contrary to these suggestions, some empirical evidence supports the idea that symptom types are relatively stable over time (Mataix-Cols et al., 2002). However, even this evidence supporting the temporal stability of symptom types also contains intriguing information suggesting that a small minority of individuals with OCD will show fluctuations in symptom theme over the course of their disorder (Mataix-Cols et al., 2002). For example, an individual may begin to experience problems with OCD in the context of compulsive checking, but later in life, he/she may abandon checking in favor of another symptom, such as compulsive counting. As such, at least for these individuals, symptom-based subtype classifications

vary over time and limited reliability would result. Furthermore, it is possible that some types of symptoms and symptom subtypes may prove to be more stable than others. The statistical and diagnostic implications of this are not small and require careful consideration. Should subtype stability differences be demonstrated it could call into question the diagnostic integrity of OCD subtype taxonomies. While there is no question that different presentations of OCD require different attention both in research and in the clinic, it would be much more controversial (although not entirely new) to propose that the diagnostic category of OCD be revised to include several separate, yet related disorders.

Furthermore, there is no reason to suspect that individuals diagnosed with OCD will be easily allocated to just one specific symptom subtype, particularly if subtypes are formed on the basis of one or two highly salient symptoms. Not only might such symptoms have differential longitudinal courses, they might also have different cooccurrence rates with other OCD symptoms and with other disorders. Indeed, clinical reports rarely reveal that an individual has always been, and is only engaged in, one particular compulsion or tormented by one and only one particular obsession. As such, it is likely that, just as in the diagnosis of individuals with comorbid disorders, it may be necessary to determine primary, secondary, and possibly tertiary OCD subtypes if groupings are to be based largely on symptoms. Alternatively, complex multivariate methods may be needed to identify complex patterns of cooccurring symptoms, comorbid conditions, and yet other important characteristics. The statistical, clinical, and research implications of this complexity are substantial.

Other statistical challenges to be faced emerge from decisions about OCD symptom measure choices and other OCD-related measures selected to determine the specific subtypes of OCD. As mentioned above, relying on factor and/or cluster analyses of item responses in specific scales, such as the YBOCS-SC or the PI will produce a subtype classificatory system with the psychometric limitations of these scales already in tow. The maximum reliability and validity to be expected from the use of these or any other measures will be limited by the validity and reliability of the measures themselves. Moreover, some items in these scales may be relevant to psychopathology other than OCD, such as that in eating, somatoform, and impulse control disorders. Similarly, aspects of neuropsychology or cognition found in OCD may also be relevant to other psychopathology. As such, it will be important to ensure that the development of subtypes does not produce categories within OCD that are equally relevant or applicable to other disorders.

One particularly difficult challenge will be to determine whether or not functional aspects of obsessions or, more likely, compulsions will be an important consideration in determining which subtype(s) an individual manifests. It is unclear whether the case of an individual who repeatedly checks the doorknob to determine if it is clean belongs within the same subtype as the case of an individual who repeatedly checks the doorknob to determine if it has been properly locked. Are these individuals both “checkers?” Is one a “washer” and the other a “checker?” Is one a “pure checker” while the other is a “washer and a checker?” More complex obsessions and compulsions may further complicate this process. Consider an individual who counts in 4 s while checking the stove until it feels “just right.” This may or may not involve checks of the cleanliness of the stove or concerns that the stove is off to prevent a fire. While this kind of presentation of OCD is relatively common, determining the function or motive behind the symptom could be exceedingly difficult. A solution to this might be to evaluate the function of the compulsion(s) in question (i.e., is the purpose of the checking to determine cleanliness, risk of fire, to reach the number 4, or to feel “just right?”). Unfortunately however, even this determination is unlikely to be straightforward and measures that differentiate motives are not currently available.

One possible resolution to some of the above challenges to determining subtypes could come from some of the excellent work already done to conceptualize some of the manifestations of OCD. While early models of OCD were likely intended to be quite broad and thereby describe a variety of manifestations of the disorder (e.g., Salkovskis, 1985), newer advances in theoretical models of OCD have been focused on specific types of symptom presentations. Empirically supported conceptualizations of compulsive hoarding (Frost & Hartl, 1996), obsessions without compulsions (Rachman, 1997, 1998), and of compulsive checking (Rachman, 2002), as well as new investigations relevant to symmetry, ordering, and arranging compulsions (Radomsky and Rachman, 2004) have been developed. While these models should not dictate the way in which we arrive at subtypes (or even what those subtypes should be), they may provide helpful guidelines or areas of focus that could be useful in this difficult endeavor.

10.2. “Lumpers” versus “splitters”

There are two broad approaches to classifying psychopathology. Following from Robins and Guze’s approach, some psychopathologists—called *splitters*—have sought to define smaller and smaller diagnostic categories. The concept of *neurosis*, for example, has been split into distinct disorders (e.g., the *DSM-IV* anxiety disorders), and, in turn, these disorders have been split into smaller units (e.g., the various subforms of specific phobia are listed in *DSM-IV*). Researchers proposing OCD subtypes have continued this tradition.

Lumpers take a contrasting approach, arguing for broad diagnostic categories. Tyrer (1985) is perhaps the best-known advocate of this approach. Lumpers begin with the observation that disorders, such as OCD are commonly comorbid with many other conditions, such as other anxiety and mood disorders (APA, 2000). Comorbidity may be concurrent or lifetime. A common diathesis may account for much of the comorbidity among the disorders. Tyrer and others have argued that the frequent comorbidity among anxiety and mood disorders indicates the presence of a unitary, general neurotic syndrome.

“Acceptance of the existence of a broad neurotic syndrome does not necessarily deny the existence of separate neurotic disorders. ... However, such diagnoses can only be retained for those patients who have pure syndromes, maintain their diagnostic appearance, and who do not pass, chameleon-like, through different diagnostic hues depending on the nature of the stresses they encounter” (Tyrer, 1985, p. 687).

A challenge for proponents of OCD subtyping schemes is to demonstrate that splitting OCD into subtypes has advantages over other, broader classifications, such as the current *DSM-IV* definition of OCD or the general neurotic syndrome. Researchers and clinicians would be more likely to adopt a given subtyping scheme if it can be shown to have clear advantages over other schemes.

10.3. *Categorical versus dimensional models*

A further challenge for OCD subtype researchers is to demonstrate that a system consisting of multiple syndromes (subtypes) has advantages over dimensional models. A dimensional model classifies clinical features in terms of a quantification of attributes rather than the assignment of categories. Which system works better: multiple subtypes or multiple dimensions? A subtyping system is superior in cases

in which a critical attribute is not dimensional. For example, if some sorts of OCD arise from streptococcal infections, a categorical system would seem more appropriate (i.e., you either have the infection or you don't).

11. Conclusions

While there have been a number of investigations designed to determine whether subtypes of OCD exist, the current review suggests significant limitations to how subtypes are conceptualized. Studies on the structure of obsessions and compulsions have consistently identified the following subtypes: contamination/washing, checking, hoarding, and symmetry/ordering. Given that these symptom themes have been repeatedly identified, across various statistical methodologies with self-report and interview assessment measures, we preliminarily conclude that these represent reliable and valid symptom subtypes, rather than dimensions, of OCD. On the other hand, the following proposed subtypes have had mixed empirical support: pure obsessionals, sexual/religious obsessions, and harming obsessions. A caveat to this assertion, however, is that the available research is limited by the reliance on symptom measures (e.g., the YBOCS-SC) that limit our conceptualization of latent subtypes to the manifest items available. An excellent example is the failure to include mental compulsions in most subtyping schemes based on the YBOCS-SC because mental rituals are not adequately assessed by this measure.

Alternatively, several lines of investigation have emerged that, when combined with the subtyping approach based on checklists of symptoms, may serve to clarify the presence of distinct subtypes in OCD. For example, research investigating typical comorbidities in OCD (i.e., tic disorders, [Leckman et al., 2000](#)) has shown that individuals with OCD who also suffer from other conditions are distinguishable from those without such comorbidities. Another possibility exists with neuropsychological test data (i.e., [Kyrios et al., 1999a](#)). These investigations, while designed principally to determine the global neuropsychological differences between those with OCD and those without, often show differences between OCD sufferers based on symptom manifestation. In light of the diversity of literature available that endeavors to distinguish different forms of OCD, it appears timely that these diverse approaches become unified in an effort to determine with greater certainty whether subtypes of OCD exist. If these approaches were unified, along with the application of modern taxometric procedures ([Waller & Meehl, 1998](#)), it might go a long way toward determining the utility of subtypes, versus dimensions, within the larger diagnosis of OCD.

Beyond the descriptive psychopathology of subtypes, there is ample evidence to suggest that to be effective, cognitive-behavioral treatment procedures must be adjusted to address the specific symptom manifestation of OCD. This conclusion is supported by theoretical and experimental work investigating particular categories of symptoms (e.g., [Frost & Hartl, 1996](#); [Rachman, 2002](#)), and characteristics of CBT resistant samples ([Sookman & Pinard, 1999](#)). As we move to more robust classifications within OCD, it will become possible to empirically validate treatments for these specific subtypes.

Although researchers have employed many different approaches for identifying OCD subtypes with no clear methodology or strategy emerging as superior on the basis of empirical work, initial efforts have been productive. The distinct phenomenologies of several important types of OCD symptom presentations, presentations that reliably emerge as subtypes, have been elucidated. Clinicians and researchers have begun to modify OCD treatment to address the unique characteristics of these subgroups and initial results are promising. Improvements in understanding the heterogeneity of OCD will likely emerge from

future studies employing any of the strategies reviewed (e.g., symptoms presentation patterns, comorbid conditions, neuropsychological and information processing differences, or OCD-related beliefs and thought appraisals). Development of comprehensive batteries of measures that address multiple domains will advance this work as will the development of subtype models that integrate these dimensions. These efforts will likely impact psychopathology taxonomies of OCD, advance etiologic theories of the condition, and promote further refinements in the treatment of OCD. Although there are many methodological challenges to be overcome in understanding OCD heterogeneity, initial success warrant continued efforts.

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