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Do dysfunctional beliefs play a role in all types of obsessive–compulsive disorder?

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Abstract

Some but not all models of obsessive–compulsive disorder (OCD) emphasize the role of dysfunctional beliefs in the etiology and maintenance of this disorder. Clinical observations suggest that some OCD patients have prominent dysfunctional beliefs associated with their obsessions and compulsions, while other patients do not show this pattern. It is possible that dysfunctional beliefs play a role in only a subgroup of cases of OCD and, by extension, that different models might apply to different subtypes of the disorder. To examine this issue, patients with OCD ($N = 244$) completed measures of dysfunctional OC-related beliefs, along with measures of OC symptoms and demographics. These measures were also completed by three comparison groups; anxious ($N = 103$), student ($N = 284$), and community ($N = 86$) controls. Cluster analysis revealed two OCD clusters: low versus high scores on beliefs (OC-low, OC-high). Belief scores for OC-low were in the range of scores for the comparison groups, which were all significantly lower than those of OC-high. Thus, a cluster of OCD patients was identified who did not have elevated scores on measures of dysfunctional beliefs. OC-low and OC-high did not differ on some OC measures

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(contamination, checking, grooming), but OC-high had higher scores on measures of harming obsessions. These results are consistent with the view that dysfunctional beliefs may play a role in only some types of OCD.
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1. Introduction

Obsessive–compulsive disorder (OCD) is a severe, often chronic disorder, with a lifetime prevalence of approximately 2.3% (Weissman et al., 1994). It is characterized by obsessions, compulsions, or both. Obsessions are intrusive and distressing thoughts, images, or impulses. Common examples include intrusive thoughts of being contaminated, recurrent doubts that one has not locked the door, and disturbing thoughts of harming loved ones. Compulsions are repetitive, intentional behaviors or mental acts that the person feels compelled to perform, often with a desire to resist. Compulsions are typically intended to avert some feared event or to reduce distress. They may be performed in response to an obsession, such as repetitive hand washing evoked by obsessions about contamination. Alternatively, compulsions may be performed in accordance to certain rules, such as checking three times that the stove is switched off before leaving the house (American Psychiatric Association, 2000).

There are numerous theoretical models of OCD, with none emerging as a clearly leading candidate to explain the disorder. The most promising models include the recent cognitive-behavioral approaches (Clark, 2004; Frost & Steketee, 2002; Salkovskis, 1996), which propose that OCD arises from a particular set of dysfunctional beliefs. Research from an international group of leading OCD investigators, the Obsessive Compulsive Cognitions Working Group (OCCWG), suggests that there are three factor-analytically distinguishable types of OC-related beliefs: (a) inflated personal responsibility and the tendency to overestimate threat, (b) perfectionism and intolerance of uncertainty, and (c) over-importance and over-control of thoughts (OCCWG, in press). These dimensions were identified as the result of a comprehensive survey of all the OC-related beliefs that had been previously delineated in the research literature (Frost & Steketee, 2002; OCCWG, 1997).

Other models of OCD do not regard dysfunctional beliefs as playing an important role (Jakes, 1996; Swedo, 2002; Szechtman & Woody, 2004; Taylor, McKay, & Abramowitz, in press). Swedo's model, for example, proposes that some cases of OCD, and some other disorders, arise from pediatric streptococcal infection that damages the basal ganglia and associated structures. Szechtman and Woody (2004) suggest that OCD arises from a dysfunction in a "non-cognitive/emotion-based" security motivation system located in the brain. Neither of these

models includes dysfunctional beliefs as explanatory constructs. These models are consistent with the clinical observation that dysfunctional beliefs, such as those identified by the OCCWG, are not always identified in cases of OCD (Taylor, Thordarson, & Söchting, 2001). Some patients, for example, state that they feel compelled to perform their compulsions not because of any associated beliefs (such as a belief in personal responsibility for preventing harm), but because of the need to attain a sensory-affective ''feeling'' that things are ''just right'' (Leckman, Grice, et al., 1995). For example, a person might feel compelled to wash repeatedly until he or she ''feels'' clean, without being able to articulate the criterion for ''cleanliness.''

Various frameworks for subtyping OCD have been proposed, including subtypes based on patterns of symptoms (e.g., washers vs. checkers), and subtypes based on etiological mechanisms (e.g., whether or not OCD is associated with pediatric streptococcal infection). Given the growing evidence that OCD is a heterogeneous disorder (or group of disorders) rather than a unitary syndrome (McKay et al., 2004; Taylor, in press), it is possible that different theoretical models apply to different subtypes of OCD. That is, models emphasizing the role of dysfunctional beliefs might apply only to a subgroup of cases of OCD, or to particular symptom presentations.

The purpose of the present investigation was to examine this issue. Participants completed measures of OC-related beliefs, OC symptoms, and demographic variables. OCD participants were cluster analyzed on the basis of their scores on a measure of OC-related dysfunctional beliefs, and then the clusters were compared to comparison groups (anxious, student, and community controls). It was predicted, on the basis of the above-mentioned theories and clinical observations, that there would be at least two OCD clusters; one with elevated scores (in comparison to the control groups) on the measure of OC-related beliefs, and a cluster that did not have elevated scores (again in comparison to the control groups). A further aim of this study was to characterize the OCD clusters by comparing them on measures of OC symptoms, general distress (anxiety and depression), and demographics.

2. Method

2.1. Participants

The sample consisted of participants from OCCWG (2003). It included patients with OCD as their primary (most severe) disorder ($N = 244$), patients with some other anxiety disorder (anxious controls or AC, $N = 103$), student controls (SC, $N = 284$), and people recruited from the general community (community controls or CC, $N = 86$). The most common disorders in the anxious controls were panic disorder (72%), agoraphobia (58%), posttraumatic stress disorder (25%), generalized anxiety disorder (17%), specific phobia (16%), and

Table 1
Means (S.D.s) on measures of OC-related beliefs, psychopathology, and background variables

	OC-high	OC-low	Anxious controls (AC)	Student controls (SC)	Community controls (CC)	F^{***}	*df*	Significant SNK post hoc comparisons ($P < .05$)
OBQ Responsibility/ Threat	78.3 (17.8)	50.4 (17.4)	59.8 (22.8)	48.4 (18.7)	34.1 (13.0)	89.09	4, 712	OC-high > AC > (SC, OC-low) > CC
OBQ Perfectionism/ Certainty	80.2 (17.0)	59.2 (21.6)	65.7 (21.7)	55.5 (20.1)	41.4 (18.1)	56.75	4, 712	OC-high > AC > (SC, OC-low) > CC
OBQ Importance/ Control of thoughts	53.7 (12.2)	27.1 (7.2)	41.4 (18.1)	27.5 (7.2)	20.6 (9.5)	138.53	4, 712	OC-high > AC > (SC, OC-low) > CC
Interpretation of Intrusions Inventory	1913.9 (503.9)	1261.5 (656.8)	1352.9 (793.9)	739.1 (578.0)	514.6 (454.3)	97.01	4, 637	OC-high > (AC, OC-low) > SC > CC
PI-R Harming impulses	4.4 (5.1)	2.1 (3.7)	2.3 (3.5)	1.2 (1.8)	0.8 (1.4)	15.49	4, 410	OC-high > (OC-low, AC, CC, SC)
PI-R Harming thoughts	8.5 (5.7)	4.5 (3.8)	4.6 (5.9)	1.7 (2.8)	0.8 (1.4)	50.17	4, 410	OC-high > (OC-low, AC) > (CC, SC)
PI-R Grooming	3.6 (4.0)	3.0 (3.3)	1.4 (2.3)	0.9 (1.9)	0.6 (1.3)	19.63	4, 412	(OC-high, OC-low) > (AC, CC, SC)
PI-R Checking	15.4 (10.7)	12.3 (9.8)	8.0 (10.0)	8.9 (4.9)	1.9 (2.2)	43.88	4, 412	OC-high > OC-low > AC > (CC, SC)
PI-R Contamination	14.1 (11.4)	12.2 (11.2)	6.3 (7.8)	4.1 (3.9)	3.5 (3.6)	29.19	4, 412	(OC-high, OC-low) > (AC, CC, SC)
Beck Anxiety Inventory	21.2 (10.8)	11.9 (8.4)	24.4 (13.8)	10.5 (8.0)	3.9 (3.9)	78.60	4, 635	AC > OC-high > (OC-low, SC) > CC
Beck Depression Inventory	20.3 (10.2)	13.3 (9.2)	19.5 (10.1)	9.7 (7.6)	4.7 (5.4)	62.38	4, 650	(OC-high, AC) > OC-low > SC > CC
Age (years)	32.6 (10.5)	37.8 (11.3)	35.5 (10.6)	20.8 (5.3)	42.2 (14.6)	122.03	4, 692	CC > (AC, OC-high) > OC-low > SC
Education (years)	14.5 (2.3)	14.9 (2.7)	14.1 (2.7)	15.4 (2.0)	16.5 (2.3)	13.05	4, 462	CC > (OC-high, OC-low, AC, SS)

OBQ: Obsessive Beliefs Questionnaire; PI-R: revised Padua Inventory. d.f.: Degrees of freedom vary because of missing data.
*** $P < .001$ for all F values.

social phobia (13%). (Percentages do not add up to 100 because patients could have more than one disorder.)

Demographic details of the samples appear in Tables 1 and 2. DSM-IV diagnoses were established with either the Structured Clinical Interview for DSM-IV (First, Spitzer, Gibbon, & Williams, 1996), the Anxiety Disorders Interview Schedule for DSM-IV (Brown, DiNardo, & Barlow, 1994), or an unstructured interview by an experienced clinician. (All ACs and 86% of OCD patients received a structured diagnostic interview.) CCs included friends or family of OCCWG members as well as teachers and community service organization members who were naïve to the study's purpose. SCs were primarily first year university or college students, most of whom received course credit for participating in the study.

2.2. Measures

The revised Obsessive Beliefs Questionnaire (OBQ; OCCWG, in press) consists of 44 belief statements considered characteristic of obsessive thinking (OCCWG, 1997). OBQ items form three factor analytically distinguishable subscales: (a) inflated personal responsibility and the tendency to overestimate threat, (b) perfectionism and intolerance of uncertainty, and (c) over-importance and over-control of thoughts. Respondents indicate their general level of agreement with items on a 7-point rating scale that ranges from (−3) ''disagree very much'' to (0) ''neutral'' to (+3) ''agree very much.'' Item responses were transformed to a 1–7 scale, and subscale scores were calculated by summing across their respective items. Higher scores represent a greater strength of beliefs. The OBQ has been previously shown to perform well on various tests of reliability and validity, including indices of internal consistency, test-retest reliability, convergent validity, and discriminant validity (OCCWG, 2001, 2003, in press).

The Interpretation of Intrusions Inventory (III) is a 31-item scale that assesses immediate appraisals or interpretations of unwanted, distressing intrusive thoughts, images, or impulses (OCCWG, 2001). Instructions to respondents include a definition of unwanted intrusions and illustrative examples. Participants write down two intrusive thoughts, images or impulses that they experienced

Table 2
Demographic variables (%)

	OC-high	OC-low	Anxious controls	Student controls	Community controls	$\chi^2(4)$
Female	62	49	68	67	67	13.79*
Caucasian	84	97	88	88	94	14.66**
Married/cohabiting	38	41	57	28	62	29.03***
Unemployed/disability	19	28	32	0	0	60.22***

* $P < .01$
** $P < .005$
*** $P < .001$.

recently, and then rate 31 statements as they pertain to intrusive thoughts like those recorded on the questionnaire using a scale from 0 (''I did not believe this idea at all'') to 100 (''I was completely convinced this idea was true''). The scale is a unifactorial measure of three appraisal domains; importance of thoughts, control of thoughts, and responsibility for thoughts. The III has been shown to perform satisfactorily on various measures of reliability and validity (OCCWG, 2001, 2003, in press).

Participants at most data-collection sites also completed measures of psychopathology and demographics. The revised Padua Inventory (PI-R; Burns, Keortge, Formea, & Sternberger, 1996) contains five OC symptoms subscales; harming thoughts, harming impulses, contamination, checking, and grooming. The Beck Anxiety Inventory (BAI; Beck & Steer, 1993a) and Beck Depression Inventory (BDI; Beck & Steer, 1993b) were administered as indices of general distress. Each of these measures has been shown to have good psychometric properties, including good reliability, convergent validity, and discriminant validity (e.g., Beck & Steer, 1993a, 1993b; Beck, Steer, & Garbin, 1988; Burns et al., 1996; Taylor, 1995).

2.3. Procedure

Participants were recruited from 12 research sites (clinics or university settings) from the U.S., Canada, and Australia. OC and AC participants were recruited primarily from specialty clinics for anxiety disorders. SCs were recruited from university or college classes. CCs were recruited through workplaces, acquaintances of OCCWG members, and from community service associations. Informed consent was obtained before participants completed the assessment battery. The latter consisted of a clinical interview plus questionnaires for the OC and AC participants, and a questionnaire battery for the SC and CC participants. Further details of participant recruitment are described elsewhere (OCCWG, 2003).

3. Results

3.1. Cluster analyses

To identify subgroups of OCD patients, defined by differences in the strength of OC-related beliefs, the sample of OCD patients was cluster analyzed on the basis of their scores on the three OBQ subscales. Then, as a methodological check on the differences between clusters, they were compared on their scores on the III.

Ward's method and squared Euclidean distance was used as the primary clustering approach because this procedure is superior to other algorithms in identifying known clusters (Overall, Gibson, & Novy, 1993), although other algorithms often yield roughly similar results. The dendrogram for the Ward

clustering suggested a 2-cluster solution, consisting of 124 and 120 participants (dendrograms are available on request). There was no cluster-by-data site difference; $\chi^2(11, N = 244) = 14.51, P > .1$. In other words, the sites did not differ with respect to the proportion of cases they contributed to specific clusters.

A methodological replication using a different cluster algorithm would strengthen our confidence in clustering results. Accordingly, cluster analysis was repeated using the *K*-means method. *K*-means requires that the number of clusters be specified in advance. Therefore, it was set to the number of clusters indicated by the Ward clustering. Centroids were not seeded for the *K*-means clustering.

The 2-cluster solution from *K*-means clustering produced a result similar to the Ward solution. Of the 124 participants assigned to Ward cluster 1, 106 were assigned to *K*-means cluster 1. Of the 120 participants assigned to Ward cluster 2, 101 were assigned to *K*-means cluster 2. Thus, 207 of 244 participants (85%) were classified into the same clusters by the Ward and *K*-means methods. The correspondence between cluster methods was significant, $\chi^2(1, N = 244) = 118.41, P < .001$.

A second, within sample, methodological replication was also conducted. The sample of 244 OCD participants was randomly split in two (subsample 1, $N = 119$, and subsample 2, $N = 125$). Ward clustering using squared Euclidean distance was conducted separately for each subsample. In each case the dendrogram indicated a 2-cluster solution. For subsample 1, most of the participants classified in cluster 1 in the subsample analysis were also classified in cluster 1 in the original analysis (based on the Ward clustering of the total OCD sample). Similarly, most of the people classified into cluster 2 were also allocated to this cluster in the original Ward clustering. For subsample 1, 80% of participants were classified into the same cluster in the subsample analyses as they were in the full-sample clustering. This correspondence was significant, $\chi^2(1, N = 119) = 47.75, P < .001$. The same pattern of results was obtained for subsample 2; 86% of corresponding classifications, $\chi^2(1, N = 125) = 70.82, P < .001$.

In summary, data from 244 OCD participants were clustered with Ward's method and squared Euclidean distance, which is the best cluster algorithm for recovering known clusters (Overall et al., 1993). The results were very similar to results obtained from the *K*-means method. The Ward clusters were replicated within randomly selected subsamples of participants. These findings suggested that the Ward 2-cluster solution, based on the 244 participants, was a robust solution.

3.2. Group comparisons and cluster characterization

The goals of this study involved comparisons between clusters, and comparisons of the clusters with the control groups. The most efficient means of conducting these comparisons is to compare all five groups (the two OCD samples, AC, SC, and CC) with post hoc comparisons on the variables of interest (Table 1). Degrees of freedom vary because some research sites did not administer the entire battery of measures.

To protect against inflated Type I error, the five groups were compared on all of the variables in Table 1 by means of a MANOVA. The result was significant; Pillai $F(52, 1124) = 10.24$, $P < .001$. The univariate comparisons for each variable were also significant at $P < .001$ (Table 1). Accordingly, Type I error was adequately constrained, and so the post hoc comparisons were conducted at the conventional $P < .05$ level.

Table 1 shows that the OCD clusters significantly differed on their OBQ scores; cluster 1 had comparatively high scores (OC-high subgroup) and cluster 2 had low scores (OC-low subgroup). OC-high had significantly higher scores on another OC-related cognitive measure, the III. Recall that the III was not included as a cluster variable; it was included as a methodological check or consistency test on the clustering results.

Table 1 also shows that OC-high was associated with significantly higher scores than the control groups on all measures of OC-related beliefs, and on the OC symptom measures. In comparison, OC-low was associated with scores on the measures of OC-related beliefs that were no greater than those of most of the control groups. In other words, compared to the control groups, OC-low was not characterized by elevated scores on beliefs that have been previously associated with OCD. Table 1 also shows that OC-high was associated with higher scores than OC-low on some measures of OC symptoms, although the groups did not differ on Padua Inventory scores related to contamination or grooming symptoms. As expected, both OC groups had significantly higher scores than the comparison groups on several measures of OC symptoms.

Table 2, presented here largely to characterize the nature of the groups, suggests that the clusters were approximately similar to one another in terms of demographics. To more clearly characterize the differences between OCD clusters, they were contrasted in a discriminant function analysis, where the discriminant variables were all those listed in Tables 1 and 2. (This is except for the OBQ and III; the OBQ subscales were used as cluster variables and so scores on these subscales would, by definition, discriminate between the groups. The III was also not included in the discriminant analyses because it is a very similar measure to the OBQ.) Table 3 shows the loadings for the discriminant function (i.e., the correlation between each variable and the discriminant function). Salient loadings are those that make a relatively strong contribution to distinguishing the clusters. By convention, these are $>.30$ (Gorsuch, 1983). The results, which are consistent with those of the other tables, show that the clusters were distinguished in terms of harming impulses, harming thoughts, and general distress (anxiety and depression). The clusters were not discriminated in terms of other OC symptoms (contamination, checking, or grooming).

4. Discussion

Results of this study show that it was possible to identify two cognitive subtypes of OCD. The OC-high subtype was characterized by relatively high

Table 3
Loadings for discriminant function analysis, distinguishing OC-high and OC-low clusters on psychopathology and demographic variables

Variable	Loading
Beck Anxiety Inventory	.64[a]
PI-R Harming thoughts	.62[a]
Beck Depression Inventory	.47[a]
PI-R Harming impulses	.31[a]
Age	−.28
Caucasian	−.27
Unemployed/disability	−.24
PI-R Checking	.20
PI-R Contamination	.17
Female	.11
Education	−.08
PI-R Grooming	.07
Married/cohabiting	−.02

PI-R: revised Padua Inventory.
[a] Salient loading.

scores (compared to the control groups) on measures of OC-related beliefs, including inflated responsibility, perfectionism, and the importance of thoughts. The OC-low subtype generally did not differ from most controls on these beliefs (with the exception of the CCs, whom had abnormally low scores compared to the SC and AC control groups). In other words, the patients in the OC-low group were approximately normal in their scores on measures of dysfunctional beliefs. OC-high and OC-low subtypes did not differ in their severity of contamination and grooming OC symptoms, although there were differences in terms of harming obsessions.

Results are consistent with the hypothesis that different models explain different subtypes of OCD; one in which dysfunctional beliefs play a role, and one in which dysfunctional beliefs are not required as explanatory constructs. Dysfunctional beliefs are not required in several contemporary models of OCD (Jakes, 1996; Swedo, 2002; Szechtman & Woody, 2004). The syndrome we currently call OCD may actually be a set of topographically similar disorders, each characterized by obsessions and compulsions, but arising from different causal mechanisms. This possibility is supported by research demonstrating differences in neuroimaging patterns and neuropsychological functioning across identified OCD subtypes (McKay et al., 2004; Rauch et al., 1998).

Results of the present study are broadly consistent with findings of a similar study by Calamari, Cohen, Riemann, and Norberg (2004). Those investigators cluster analyzed scores on the OBQ and III from a sample of OCD patients. Scores on the OBQ and III subscales were moderately-to-highly intercorrelated, indicating that cluster solutions were most likely to differ in score elevation (e.g., high, medium, low scores on all scales) rather than in terms of score profile.

Consistent with this, their cluster analysis yielded five clusters that differed mainly in the relative elevation of scores on the OBQ and III. Thus, like the present study, a group of OCD patients was identified who had comparatively low (and possibly normal) scores on the OBQ and III. Differences in the number of clusters identified in the present study and the Calamari et al. research may have been due to differences in clustering methodology (i.e., their study differed from the present investigation in terms of cluster variables and statistical clustering procedures).

There are several strengths and limitations of our study. In terms of strengths, the study was based on large samples and included multiple comparison groups. Limitations include the possibility that the OC-low group might have had elevated scores on dysfunctional beliefs that were not measured in the present study. It is noteworthy that the belief measures included in this study—the OBQ and III—a were developed on the basis of an extensive review of the literature on beliefs pertinent to OCD, and that every effort was made to ensure that these measures were comprehensive (Frost & Steketee, 2002; OCCWG, 1997).

It is possible, however, that additional domains of dysfunctional beliefs need to be added to the OBQ. Obsessions and compulsions (e.g., washing rituals or ordering compulsions) are sometimes associated with feelings of incompleteness or ''not just right'' experiences (Coles, Frost, Heimberg, & Rheaume, 2003; Leckman, Walker, Goodman, Pauls, & Cohen, 1995). Compulsions associated with ''not just right'' experiences can be difficult to distinguish from tics, and OCD patients with these experiences often display classic tic symptoms (e.g., facial grimacing or excessive blinking) in addition to obsessions and compulsions (Leckman, Walker, et al., 1995). Further research is needed to determine whether ''not just right'' experiences are best regarded as OC phenomena, or whether they are better conceptualized as an expression of a tic disorder. Relatedly, it is currently unclear whether ''not just right'' experiences are purely sensory or affective phenomena, or whether they have a cognitive (dysfunctional belief) component. If the latter is the case, then the OBQ may not adequately assess this component, even though the OBQ does assess beliefs about perfectionism and the intolerance of uncertainty.

Janeck, Calamari, Riemann, and Heffelfinger (2003) assessed cognitive self-consciousness (CSC), the tendency to view thoughts as important and to focus attention on thoughts, in OCD patients and anxious controls. Janeck et al. found that CSC scores discriminated OCD patients from patients with other anxiety disorders even after controlling for differences on the III and OBQ. Cohen and Calamari (in press) likewise found that a CSC measure and the III were largely independent predictors of OCD symptoms in a nonclinical sample. Whether CSC should be conceptualized as a belief or an information processing abnormality that increases thought salience (Marker, Calamari, Woodard, & Riemann, submitted for publication) remains to be determined. As measures of OCD-related beliefs are refined, theorists will need to clarify the distinctions and the interrelationships between beliefs and cognitive and emotional processing constructs.

The question also arises as to whether the OCD subgroups differed from one another, and from comparison groups, in terms of dysfunctional beliefs that are associated with various forms of psychopathology (and not specific to OCD), such as extreme beliefs associated with sociotropy, automony, extreme moral values, and beliefs about the value of one's self (Bhar & Kyrios, 1999; Wade, Kyrios, & Jackson, 1998). However, the etiological significance of such beliefs for OCD is questionable; due to their non-specific nature, such beliefs might play a role in contributing to distress in general. Non-specific beliefs offer no explanation as to why one person develops OCD while another develops some other disorder, such as another anxiety disorder or a mood disorder.

OCD clusters may have differed on measures of obsessions or compulsions that were not assessed in the present study. We used the PI-R, which assesses most of the common forms of obsessions and compulsions, but does not measure ordering or hoarding obsessions and compulsions. Subsequent research could examine these and other variables that are relevant to subtyping OCD.

Swedo (2002) conjectured that a subset of cases of OCD (including ''not just right'' OCD) and other disorders such as tic disorders arise from pediatric streptococcal infection. Disorders arising in this way are said to form the PANDAS syndrome (pediatric autoimmune neuropsychiatric disorders associated with streptococcal infection). In future cluster analytic research it would be important to compare the clusters in terms of age of onset and medical history, to investigate whether some subtypes of OCD arise shortly after childhood streptococcal infection. Such research may shed light on whether proposed OCD subtypes are part of a unitary disorder or whether they fall into a spectrum of phenomenologically similar, yet etiologically distinct, syndromes. These sorts of studies may eventually yield important implications for developing subtype-specific treatments for OCD. At this stage, however, it seems premature to speculate on treatment issues until more basic research has been done on the nature of possible OCD subtypes.

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