Chapter 2

DIMENSIONAL AND SUBTYPE MODELS OF OCD

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Although obsessive-compulsive disorder (OCD) is recognized in *DSM-IV* as a unitary syndrome (American Psychiatric Association [APA], 2000), clinical investigators have increasingly come to regard it as a heterogeneous condition (eg, Pato, Pato, & Pauls, 2002). Some regard OCD as being composed of sets of dimensions, with each dimension corresponding to a distinct set of mechanisms. A dimension may be defined by an aggregate of causal factors that incrementally influence the risk for a particular set of obsessive-compulsive (OC) symptoms (eg, contamination obsessions and washing compulsions).

A different approach to understanding OCD holds that there are discrete subtypes (categories or taxa) of the disorder. Subtypes are defined on the basis of being, in some way, more homogenous than OCD in general. A subgroup can be defined, for example, by whether or not OCD is associated with tic disorders. Tic-related OCD is a more homogenous collection of symptoms than OCD in general. By identifying homogenous phenotypes, researchers hope to identify discrete sets of mechanisms.

The purpose of this chapter is to consider the merits of dimensional and subtype approaches to understanding OCD, with particular attention to the most widely used or innovative approaches. We will consider the relative advantages and disadvantages of the various approaches, with the goal of identifying the most promising ways of conceptualizing and investigating OCD.

The dimension versus subtype distinction has important implications for theory and research (Strube, 1989). A categorical (subtype) variable implies a different set of causes than a continuous variable. Subtypes presumably arise from a small set of causal factors (eg, the presence versus absence of an agent damaging the brain circuits implicated in OCD). In comparison, dimensional variables are probably the result of a multitude of factors. For example, numerous, additive genetic factors, with each making a small but important contribution to the risk of OCD. Dimensional approaches are consistent with current thinking about the role of genes in psychiatric disorders; investigators are increasingly interested in identifying numerous genes that each make only tiny (eg, 1–2%) contributions to phenotypic variance (Plomin, Defries, Craig, & McGuffin, 2003). Thus, the assumption about whether OCD is dimensional

focuses research efforts differently than does the assumption that OCD is composed of subtypes.

Conceptually, typologies lead us to expect that disorders have an all-or-nothing state, with no intermediaries. That is, either the person has an OCD subtype or does not. Typologies imply that treatments should have a similar effect on the disorder; once the critical mechanism is addressed the disorder should rapidly remit. Change may be difficult to initiate with a class variable, but once initiated should be more complete and dramatic (Strube, 1989). In comparison, dimensional approaches assume both a continuum of disorder severity (ranging from absent to very severe) and a continuum of treatment effectiveness (ranging from weak to very strong interventions).

DIMENSIONAL APPROACHES

Factor Analytic Studies

Dimensional approaches to OCD arose from the observation that OC symptoms vary in severity, ranging from very mild (eg, the so-called "normal" obsessions and compulsions: Rachman & de Silva, 1978) to very severe. Scales measuring OC symptoms were developed to capture this range of severity. Factor analyses of these scales suggest that OC symptoms can be decomposed into a small number of dimensions (eg, Baer, 1994; Goodman et al., 1989; Leckman et al., 1997; Mataix-Cols, Rauch, Manzo, Jenike, & Baer, 1999; Summerfeldt, Richter, Antony, & Swinson, 1999; Taylor, 1995). Factor solutions have varied to some extent from study to study, depending on the nature of the sample, the scale used to assess OC symptoms, and the factor analytic techniques. Even so, a number of consistencies have emerged, suggesting that OC symptoms can be partitioned into what may eventually emerge as a set of reliable (replicable) dimensions. Currently, one of the best supported factor solutions is that reported by Leckman et al. (1997), which had been replicated in the author's original samples and by Summerfeldt et al. (1999). This solution, which is similar to many other factor analytic solutions, consisted of four dimensions:

- Obsessions (aggressive, sexual, religious, or somatic) and checking compulsions.
- Symmetry obsessions and ordering, counting, and repeating compulsions.
- Contamination obsessions and cleaning compulsions.
- Hoarding obsessions and collecting compulsions.

Factor analytic studies have typically not assessed cognitive compulsions in much detail, so the factor solutions may change to some extent when a broader range of OC symptoms is assessed.

The dimensions identified in factor analytic studies tend to be naturally correlated with one another, although the correlations are typically not large ($r < .50$). Even so, the correlations suggest that many of these factors probably load on a higher-order factor. The assumption underlying factor analysis is that each factor corresponds to a distinct set of mechanisms (Cattell, 1978). The finding that dimensions are often correlated suggests that OCD may arise from a combination of general factors (ie,

those influencing OCD in general, and possibly other disorders), and specific factors (corresponding to a given set of symptoms).

Evaluating Dimensional Models

Factor analytic studies do not *prove* that OCD is dimensional. Factor analysis creates dimensions, just like cluster analysis creates categories. Taxometric statistical procedures (Waller & Meehl, 1998) can be used to determine whether a variable is dimensional or categorical, however, these procedures have yet to be applied to OCD. Accordingly, the question of dimensions versus categories must be addressed by considering the relative strengths and limitation of these approaches.

Dimensional models, such as those identified by factor analysis of OC symptom scales, have the advantage of being consistent with the fact that OC symptoms vary in severity. Longitudinal studies suggest that OC symptoms tend to be stable in adults but not in children (Mataix-Cols et al., 2002; Rettew, Swedo, Leonard, Lenane, & Rapoport, 1992). In adults, changes in symptoms tend to occur within rather than between symptom dimensions; shifts from one dimension to another are rare (Mataix-Cols et al., 2002). In other words, if OCD symptoms change in adults, the changes tend to consist of movement up or down the symptom dimensions. Rettew et al. (1992) similarly suggested that in children, the observed changes had actually occurred within rather than between symptom categories, although their design did not allow them to test this. In summary, the available research is consistent with the idea that the dimensions of OC symptoms tend to be stable over time. Changes tend to be within dimensions, which is what one would expect if discrete sets of mechanisms were being modified over time (eg, with treatment).

The merits or usefulness of dimensional models can be further gauged by whether they have meaningful correlates, such as correlations with other symptoms, biometric variables associated with OCD, or treatment response. A number of such findings have emerged. For example, the extent to which OCD runs in families also varies across the symptom dimensions; aggression, sexual, and symmetry OC symptoms have a familial component, whereas hoarding and contamination symptoms do not (Alsobrook, Leckman, Goodman, Rasmussen, & Pauls, 1999). Scores on a dimension assessing counting and repeating compulsions, but not other OC dimensions, tend to be associated with an insertion/deletion polymorphism in the promoter region of the serotonin transporter gene (5-HTTLPR; Cavallini et al., 2002). Scores on the hoarding dimension are correlated with poor response to selective serotonin reuptake inhibitors and to behavior therapy (Abramowitz, Franklin, Schwartz, & Furr, 2003; Alonso et al., 2001; Black, Monahan, Gable, Blum, Clancy, & Baker, 1998; Mataix-Cols et al., 1999).

Comment

To summarize, dimensional models, in which OC symptoms are regarded as arising from a small number of dimensions, shows promise for understanding OCD. Future research, using taxometric methods (Waller & Meehl, 1998), is needed to investigate whether the dimensions are truly continua, or whether they are better conceptualized as categories. Additional research, using expanded assessments of OC symptoms, is also needed to firmly establish the best-fitting dimensional model.

SUBTYPING APPROACHES

General Approaches to Subtyping

Obsessive-compulsive disorder subtyping research, like *DSM-IV*, is couched in the idea that psychiatric disorders can be usefully partitioned 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 outlined five phases, which 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 entire process is therefore one of continuing self-rectification and increasing refinement leading 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 features that are thought to be associated with one another. The clinical description need not simply be based on signs and symptoms; it can include demographic features (eg, age, sex, and ethnicity), age of onset, precipitating factors, and any other descriptive features that can define the clinical picture most precisely.
2. *Laboratory studies*. These include chemical, physiological, radiological (eg, neuroimaging), and anatomical (biopsy and autopsy) findings. Psychological studies (eg, tests of cognitive processing) 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 OC 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 group may not be a homogenous disorder if it can be clearly divided into patients with good versus poor prognosis.