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CATEGORICAL AND DIMENSIONAL MODELS OF PERSONALITY DISORDER

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■ **Abstract** We review major categorical and dimensional models of personality pathology, highlighting advantages and disadvantages of these approaches. Several analytic and methodological approaches to the question of the categorical versus dimensional status of constructs are discussed, including taxometric analyses, latent class analyses, and multivariate genetic analyses. Based on our review, we advocate a dimensional approach to classifying personality pathology. There is converging evidence that four major domains of personality are relevant to personality pathology: neuroticism/negative affectivity/emotional dysregulation; extraversion/positive emotionality; dissocial/antagonistic behavior; and constraint/compulsivity/conscientiousness. Finally, we discuss how dimensional approaches might be integrated into the diagnostic system, as well as some of the major issues that must be addressed in order for dimensional approaches to gain wide acceptance.

CONTENTS

INTRODUCTION

For some years, researchers and clinicians alike have debated whether the categorical system of personality disorder diagnosis embodied in the various versions of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM; American Psychiatric Association 1980, 1987, 1994, 2000) is clinically useful and adequately captures the "true nature" of these forms of psychopathology (Livesley 1985, Widiger & Frances 1985). Despite decades of research on this topic, there is still no consensus on this matter. Although most would agree that the case for a dimensional model of personality disorders is strong, there are those who would disagree and favor keeping with the medical tradition of assigning categorical diagnoses. More importantly, the current diagnostic manuals of mental disorder [including the DSM-IV-TR (American Psychiatric Association 2000) and the *International Classification of Diseases*, Tenth Revision] continue to represent the personality disorders in a categorical way. Personality disorder diagnoses are coded as either present or absent, consistent with the categorical perspective that "Personality Disorders are qualitatively distinct clinical syndromes" (American Psychiatric Association 2000, p. 689). However, the DSM-IV-TR does acknowledge that an "alternative perspective to the categorical approach is the dimensional perspective that personality disorders represent maladaptive variants of personality traits that merge imperceptibly into normality and into one another" (American Psychiatric Association 2000, p. 689). Recently, a joint committee of the American Psychiatric Association and the National Institute of Mental Health reviewed and evaluated many of the most pressing issues for DSM-V and concluded that "there is a clear need for dimensional models to be developed and for their utility to be compared with that of existing typologies" (Rounsaville et al. 2002, p. 13). They emphasized in particular the development of a dimensional model of personality disorder.

The purpose of this paper is to review the latest evidence for and against major categorical and dimensional approaches to the description of personality disorders and personality pathology. We do recognize that, in theory, categorical and dimensional approaches at not mutually exclusive (they are not categorical!) (Blashfield & McElroy 1995, Kraemer et al. 2004, Oldham & Skodol 2000, Tellegen 1993). However, as applied to personality pathology, there are clear differences in categorical and dimensional approaches. We hope this critical review will provide a useful overview of the current state of knowledge as well as a springboard for the work and consideration that must be done in anticipation of the DSM-V, due out in 2010.

CATEGORICAL MODELS OF PERSONALITY DISORDER

Though personality disorders have a long history and originate from a variety of theoretical traditions, the modern conceptualization of personality disorders (PDs) first appeared with the publication of DSM-III in 1980 (American Psychiatric Association 1980). In DSM-III, PDs were described as constellations of personality

traits that are "inflexible and maladaptive, and cause either significant functional impairment or subjective distress." (p. 305). PDs were classified on a diagnostic axis separate from the more acute and/or episodic illnesses described on Axis I in order to distinguish the former based on the properties of pervasiveness, chronicity, age of onset, and resistance to treatment. Through DSM-III-R (American Psychiatric Association 1987) and DSM-IV (American Psychiatric Association 1994), considerable effort was invested in refining the criteria for personality disorders, especially toward the goal of increasing diagnostic reliability.

Examples of Categorical Models

DSM-IV-TR The current categorical diagnostic system for personality disorders has its origins in Kraepelinian assumptions about mental illness. That is, mental illnesses are considered to be medical conditions that are discrete, with boundaries between normality and illness. Accordingly, the DSM-IV-TR defines personality disorders within a categorical, hierarchical taxonomic system. The 10 PDs are polythetic categories defined by approximately seven to nine items, of which a subset must be fulfilled to meet diagnostic threshold. The presence of personality disorder is defined by a cutting score, usually requiring that about five symptoms be present. Therefore, two individuals meeting criteria for the same disorder may share as many as the total set of items for the PD, or as few as one or two items. As we point out below, this system produces great heterogeneity (e.g., there are 126 ways to meet diagnostic criteria for borderline personality disorder). In addition, the DSM-IV-TR includes a hierarchical system of three clusters of PDs. Cluster A, the odd/eccentric cluster, includes schizotypal, schizoid, and paranoid personality disorders. Cluster B, the dramatic/erratic cluster, includes antisocial, borderline, histrionic, and narcissistic personality disorders. Cluster C, the anxious/inhibited cluster, includes avoidant, dependent, and obsessive-compulsive personality disorders. The cluster organization is designed to make the PDs easier to remember by grouping those with similar features, and is not based on theory or empirical evidence.

A categorical system does offer several pragmatic advantages. A categorical diagnostic system maps neatly onto the decision of whether to provide treatment: Those who have a diagnosis require treatment; those who do not have a diagnosis do not require treatment. Further, Gunderson has stated that making a personality disorder diagnosis "orients the clinical approach toward the primary psychopathology" (1992, p. 16). A single categorical diagnosis simplifies the choice of clinical focus and appropriate treatment. Another commonly cited advantage is that categorical systems are easier to use for purposes of communication and conceptualization. Much information is conveyed using a single diagnostic label regarding features, associated conditions, and possible treatment options. Below, we review several of the more prominent categorical models of personality pathology, including two concerned with a range of PDs as well a model focusing on psychopathy, a diagnostic construct with a long clinical and research tradition.

GUNDERSON'S RESEARCH ON AXIS II Gunderson (1988) developed a model of personality disorders according to level of severity, defined as functional impairment. According to his model, the "trait disorders," including obsessive-compulsive, histrionic, avoidant, and dependent PDs, are closest to normality, the "self disorders," including schizoid, narcissistic, antisocial, and borderline PDs, are in the middle range of severity, and the "spectrum disorders," including schizotypal, paranoid, and depressive PDs, are closest to psychosis (and hence the most severe). The model is hierarchical in the sense that more severe disorders take primacy over less severe disorders, and categorical distinctions are stronger as personality pathology deviates more from normalcy.

Gunderson's model of PDs is a hybrid approach, combining categorical diagnoses with a dimensional rating of subjective distress and social dysfunction. The categorical diagnoses in his model are closely related to those outlined in DSM-IV-TR, though he proposes removing criteria that assess functional impairment from individual PDs and grouping them together in a general rating of impairment. A minimum rating of distress or functional impairment on this scale is then necessary for any personality disorder diagnosis. In support of this model, measures of functional impairment have been found to discriminate personality disorder diagnoses, with schizotypal and borderline PDs associated with more impairment, avoidant PD with moderate impairment, and obsessive-compulsive PD with the least impairment (Skodol et al. 2002). These results closely parallel Gunderson's theoretical model of severity in PDs. However, it is important to note that the same results would be obtained even if a dimensional model of severity were adopted. Thus, these results, in and of themselves, cannot be cited as demonstrating the superiority of a categorical over a dimensional model.

KERNBERG'S MODEL Otto Kernberg (1984) has proposed a psychodynamic structural classification of personality pathology. He argues that psychopathology falls into three broad classes ranging from least to most severe: neurotic, borderline, and psychotic. Although he links both Axis I and Axis II forms of pathology in his structural classes, only the classification of Axis II disorders is described here.

The mild, "lower-level" character disorders that fall under the neurotic class include the hysterical, obsessive-compulsive, and depressive personalities. The neurotic class is distinguished by intact reality testing, solid ego identity, and the use of high-level defensive operations such as repression. Most personality disorders are located within the borderline level of personality organization (BPO), a more severe class of psychopathology. BPO is defined by broadly intact reality testing yet a predominance of primitive psychological defenses such as splitting, magical thinking, and projection, and marked identity diffusion. Identity diffusion is a poorly integrated concept of the self and of significant others. BPO also can be distinguished by the presence of nonspecific signs including low anxiety tolerance and poor impulse control. The specific personality disorder as clinically manifested within BPO is determined by a mixture of neurobiological (e.g., temperament, aggression) and environmental (e.g., abuse, neglect) factors as well as

a severity dimension. Intermediate-level BPO includes higher-functioning narcissistic, passive-aggressive, and "infantile" personalities; antisocial, schizoid, and paranoid personalities are considered more severe and fall under lower-level BPO. Finally, in the psychotic class of personality organization, the capacity to test reality is absent. Kernberg reserves this category for schizophrenia spectrum disorders and severe affective illness.

Although these three classes can be organized along a dimension of severity, the classes are thought to be distinguishable by primarily considering three qualitative features: the presence or absence of reality testing, the presence of identity diffusion, and the types of defenses that the patient uses (primitive versus nonprimitive). A patient's personality organization can be assessed by means of a clinical interview (Kernberg 1984) or by a self-report measure, the Inventory of Personality Organization (IPO; Kernberg & Clarkin 1995). Consistent with Kernberg's theory, the IPO measures the three factors of reality testing, identity diffusion, and primitive psychological defenses (e.g., Lenzenweger et al. 2001). To date, however, there have been relatively few explorations of the relations between these qualitative features and personality pathology in clinical samples.

HARE'S CONCEPTUALIZATION OF PSYCHOPATHY Hare's conceptualization of psychopathy is a quasi-categorical model of one form of personality pathology. Psychopathy was arguably the first recognized personality disorder, and has a long clinical tradition. The modern concept of psychopathy was first outlined by Cleckley (1941) in his classic work, *The Mask of Sanity*. According to Cleckley's criteria, a psychopath is an intelligent person characterized by poverty of emotions, no sense of shame, superficial charm, duplicity, irresponsible behavior, and inadequate motivation. Since that time, considerable research on the construct has narrowed psychopathy to a personality disorder. Contemporary conceptualizations of psychopathy include personality traits (including affective and interpersonal factors) and socially deviant behaviors such as delinquency and criminality.

Hare has invested considerable effort in the assessment and diagnosis of psychopathy since his time as a prison psychologist in the early 1960s. At that time, as now, personality measures typically took the form of self-report questionnaires. When administered to psychopaths expert at impression management, these instruments had questionable validity. Hare constructed a new measure entitled the Psychopathy Checklist in order to have a psychometrically sound method of distinguishing psychopaths from the rest of the prison population. The assessment itself involves a semistructured interview as well as collateral records review. Now in its second edition, the Psychopathy Checklist-Revised (PCL-R) is the predominant method of assessment for psychopathy (Hare 2003).

Hare's PCL-R is based on a two-factor, hierarchical model of psychopathy. Each factor is now subdivided into two facets (Hare 2003). The first factor highlights the key emotional and interpersonal symptoms of psychopathy. The interpersonal facet of factor 1 is composed of glibness and superficial charm, grandiosity, pathological lying, and conning. The affective facet is composed of lack of remorse

or guilt, shallow affect, lack of empathy, and failure to accept responsibility for own actions. The second factor encompasses the socially deviant tendencies and behaviors in psychopathy. The lifestyle facet of factor 2 is composed of proneness to boredom, parasitic lifestyle, lack of realistic long-term goals, impulsivity, and irresponsibility. The antisocial facet is composed of poor behavioral controls, early behavior problems, juvenile delinquency, and criminal versatility.

The DSM-IV Antisocial Personality Disorder (APD) has some overlap with the construct of psychopathy. However, APD emphasizes antisocial and criminal behaviors and places less emphasis on personality traits than does the construct of psychopathy. Therefore, APD is a broader diagnosis with greater prevalence. The community prevalence of APD is about 3% in males and 1% in females (American Psychiatric Association 2000), but the prevalence of psychopathy in males according to the Cleckley/Hare criteria is about 1% (Hare et al. 1999). In forensic settings, the prevalence of APD is 50%–80%, yet the prevalence of psychopathy is 15%–25% (Hare 2003). Only about one third of those individuals meeting criteria for APD also exceed the PCL-R cutoff for psychopathy. Generally, measures of APD including diagnosis and symptom counts correlate much more highly with factor 2 of the PCL-R than with factor 1, confirming that the overlap between the two has to do with socially deviant behaviors, and that it is the affective and interpersonal symptoms that distinguish psychopaths from individuals with APD.

There is not yet consensus as to whether psychopathy is best conceived as categorical or dimensional. Hare himself is agnostic on this point (Hare 2003), even though the PCL-R has cutoff scores to distinguish psychopaths from nonpsychopaths. Some have argued that psychopathy is best described dimensionally as extreme variations of normal personality traits, such as the traits of the Five-Factor Model (Widiger 1998b). However, other theories of psychopathy support a categorical view. Bolstering this view is evidence from a taxometric study conducted by Harris and colleagues (1994). These researchers reported evidence for a taxon of psychopathy using Psychopathology Checklist scores as well as other information tapping antisocial behavior. However, several have questioned these findings (see Hare 2003).

Problems with the Categorical Model of Personality Disorders

It is clear that the DSM-IV-TR categorical approach to personality disorder diagnosis is incredibly influential in terms of both the conceptualization and practice (e.g., clinical assessment). However, there are a number of problems with the categorical system of personality disorder diagnosis that is codified in DSM-IV-TR (Clark 1999, Livesley 1998, Widiger & Frances 1985). For example, the personality disorder categories are quite heterogeneous with regard to symptoms and traits, and a great deal of comorbidity among personality disorder diagnoses is frequently observed. Further, the Axis II diagnoses do not appear to be very stable over time,

and poor diagnostic agreement among Axis II assessment instruments is the rule, not the exception. These empirical findings suggest that these disorders, although described as such, may not represent distinct diagnostic entities. Their overlap indicates that the classification is not efficient or optimal, and their conceptualization and operationalization in existing assessment instruments may be problematic.

DIMENSIONAL MODELS OF PERSONALITY DISORDER

One attractive alternative to representing personality pathology and disorder in a categorical manner is a dimensional model of classification (Widiger 1993). Dimensional models provide more reliable scores (e.g., across raters, across time), help us understand symptom heterogeneity and the lack of clear boundaries between categorical diagnoses, retain important information about "subthreshold" traits and symptoms, and more accurately reflect scientific findings concerning the distribution of personality traits and associated maladaptivity.

Unfortunately, the term "dimensional" is used to describe several different approaches to quantifying personality and personality pathology. In this review, we highlight the alternative ways that investigators have sought to "dimensionalize" personality disorder classification. Next, we discuss several different alternative models as well as findings that bear on their validity and utility. Finally, we integrate the findings and point to future research directions in this area.

Quantifying Diagnostic and Statistical Manual Personality Pathology

There are several possible dimensional approaches to the understanding and classification of personality disorders (Livesley et al. 1998). First, one possibility is simply to "quantify" each personality disorder construct such that a score would indicate the degree to which the symptoms for each disorder are present. For example, scores might simply represent the actual number of criteria present for each personality disorder or a rating indicating the degree to which criteria for the disorder are present (Widiger 1993).

OLDHAM AND SKODOL'S PROTOTYPE MATCHING APPROACH Another similar possibility is to rate the degree to which an individual's presentation matches that of a prototypic case of that particular DSM-IV-TR personality disorder (Oldham & Skodol 2000). Individuals meeting all the diagnostic criteria for a personality disorder would be characterized as "prototypic," as "moderately present" if one or two criteria beyond the threshold for a categorical diagnosis are present, as "threshold" if they just meet diagnostic threshold, as "subthreshold" if symptoms are present but are just below diagnostic threshold, as "traits" if no more than three symptoms are present, and as "absent" if no diagnostic criteria are present (Oldham & Skodol 2000). Further, Oldham & Skodol propose that if a patient

meets diagnostic criteria for just one or two diagnostic categories, then these one or two diagnoses would be provided. If the patient meets diagnostic criteria for three or more personality disorders, then a diagnosis of "extensive personality disorder" would be provided, along with an indication of the extent to which each personality disorder is present.

SHEDLER AND WESTEN'S ASSESSMENT PROCEDURE MODEL Westen & Shedler (2000) have also proposed a prototype-matching approach to describing personality pathology. Recently outlined in Shedler & Westen (2004), their proposal suggests that the diagnostic manual present a brief narrative description (instead of a specific diagnostic criteria set) of a prototypic case of each personality disorder. The task of the clinician is then to use a 5-point scale to indicate the degree to which the current patient's presentation "matches" the prototype for each disorder (1 = description does not apply; 2 = only minor features of prototype; 3 = significant features of prototype; 4 = strong match, patient has the disorder; and 5 = exemplifies the disorder, prototypic case). The descriptions of each personality disorder come from the Shedler-Westen Assessment Procedure-200 (Westen & Shedler 1999a,b), a set of 200 clinical descriptors that were developed to describe both DSM-IV personality pathology as well as personality pathology that is not included in the diagnostic manual. The authors believe that these descriptors provide a more comprehensive and clinically relevant account of the DSM personality disorders, including features that are not presented in DSM-IV-TR (Shedler & Westen 2004). These descriptors are derived from both the psychoanalytic literature on personality pathology as well as from the other literature on personality disorders (Shedler 2002).

Identifying Traits That Underlie the DSM-IV Personality Disorder Constructs

A second alternative is to attempt to identify those personality traits that underlie the personality disorder constructs and, thus, to provide a fairly comprehensive description of personality pathology from a trait perspective. In this vein, some investigators have factor analyzed ratings or scores on individual personality disorder criteria or on personality disorder constructs to reveal the major dimensions underlying these variables. Other investigators have systematically collected descriptions of symptoms and traits thought to be relevant to various personality disorders (or, more generally, to personality pathology), obtained data or ratings on these, and then factor analyzed these to uncover major dimensions underlying these symptoms and traits. The main advantage of this second alternative is that the dimensions or scales that result are fairly homogeneous and provide information regarding the major traits underlying personality disorder.

LIVESLEY'S 18-DIMENSION MODEL Livesley and colleagues (Livesley & Jackson 1986, Livesley et al. 1987) reviewed the literature relevant to the DSM-III

personality disorders and compiled a list of behaviors or traits that were representative of each disorder. The authors asked clinicians to rate the prototypicality of each behavioral act or trait for the target disorder and then added traits that represented less prototypic features of personality disorders. Self-report items were written to assess each trait, and subsequent data collections and psychometric analyses resulted in a model of personality disorder that contains 18 trait dimensions and is operationalized through a 290-item self-report measure. The 18 trait dimensions that are measured by Livesley & Jackson's (2004) Dimensional Assessment of Personality Pathology-Basic Questionnaire (DAPP-BQ) are affective lability, anxiousness, callousness, cognitive dysregulation, compulsivity, conduct problems, identity problems, insecure attachment, intimacy problems, narcissism, oppositionality, rejection, restricted expression, self-harm, social avoidance, stimulus seeking, submissiveness, and suspiciousness.

Much of the research from Livesley and colleagues has focused on how the 18-dimension model relates to other models of personality (e.g., Clark et al. 1996, Jang & Livesley 1999, Jang et al. 1999, Schroeder et al. 1992). In addition, research has explored the factor structures and genetic heritabilities of DAPP-BQ scores in both clinical and nonclinical populations (e.g., Jang & Livesley 1999; Jang et al. 1998a, 1999; Livesley et al. 1992, 1993, 1998). These studies have consistently shown that Livesley's 18 dimensions of personality disorder features, as measured by the DAPP-BQ, are reliable and are relevant to both clinical and nonclinical participants. Further, four higher-order factors of personality disorder features can be extracted: emotional dysregulation, dissocial behavior, inhibitedness, and compulsivity. Interestingly, these resemble higher-order dimensions of "normal" personality (Widiger 1998a). Second, DAPP-BQ dimensions relate to other measures of personality disorder symptoms [e.g., the Schedule for Nonadaptive and Adaptive Personality (SNAP), Clark 1993] and of personality (e.g., the Eysenck Personality Questionnaire-Revised, Eysenck & Eysenck 1994; the NEO-Five Factor Inventory, Costa & McCrae 1992) in expected ways, supporting a dimensional approach to the assessment of personality disorders. Third, several twin studies suggest that both higher-order and lower-order dimensions of personality disorder are heritable (e.g., Livesley et al. 1998). Livesley and colleagues argue that both levels of the trait hierarchy (i.e., higher-order and lower-order) are important to the differentiation and understanding of personality disorders.

CLARK'S SCHEDULE FOR NONADAPTIVE AND ADAPTIVE PERSONALITY MODEL The development of Clark's SNAP model of personality pathology was similar to that of Livesley, and the resulting dimensions of personality pathology have been shown to be similar as well (e.g., Clark et al. 1996). Briefly, Clark (1993) asked clinicians to sort DSM-III-R personality disorder criteria as well as trait-like manifestations of some Axis I disorders into conceptually similar symptom clusters. These 22 symptom clusters were factor analyzed and results indicated 12 dimensions of maladaptive personality functioning (e.g., mistrust, self-harm, entitlement, impulsivity). These 12 dimensions of maladaptive personality functioning have been

shown to be related to several models of higher order personality dimensions, including that of Watson & Tellegen (negative affectivity, positive affectivity, constraint), the Five-Factor Model (Clark & Livesley 2002), and Livesley's model (Clark et al. 1996). One limitation of the SNAP model is that it may map on to the DSM personality disorder constructs too well (given the original method of item generation), limiting its ability to identify and define non-DSM varieties of personality pathology.

SIEVER AND DAVIS'S PSYCHOBIOLOGICAL MODEL Siever & Davis (1991) proposed a model of neurobiologically based dimensions of psychopathology that addresses the comorbidity between personality disorders and Axis I disorders. Specifically, they hypothesized that the four dimensions of cognitive/perceptual organization, impulsivity/aggression, affective instability, and anxiety/inhibition provide a useful heuristic for understanding both the variety and the continuity of psychopathology. According to their model, the Axis II personality disorders are early-onset, chronic versions of Axis I disorders. For example, they argue that borderline personality disorder could be reconceptualized as a combination of an affective dysregulation disorder (like mood disorder) and an impulsive aggressive disorder (like antisocial personality disorder and conduct disorder). No measure exists to assess the fit of their conceptualization; however, there is evidence to suggest that the personality dimensions of internalization and externalization cut across Axis I and Axis II (Krueger 1999, Krueger & Tackett 2003). Therefore, the propositions of Siever & Davis are intriguing, especially with the movement to perhaps "reclassify" personality disorders onto Axis I where they would be grouped with putatively near-neighbor diagnoses.

Personality Trait Models

A third alternative is, in effect, to both characterize current personality constructs and perhaps redefine personality disorder by using personality trait models that were developed independently from a diagnostic nomenclature perspective (e.g., DSM-IV). That is, one might adopt a well-conceived personality model that is operationalized in psychometrically sound assessment measures. The major advantages of this alternative are that (*a*) a greater understanding, from a trait perspective, of current personality disorder constructs is possible; (*b*) a number of additional etiological hypotheses concerning the development of personality disorders may be generated because much is known about correlates of and factors influencing the development of major personality traits; and (*c*) these models of personality may help identify and define varieties of personality pathology that are not currently represented in official diagnostic systems. Below, we discuss the two models that have received the most research attention to date: Cloninger's seven-factor model and the Five-Factor Model of personality. There are other models as well, including Millon's dimensional polarities (pleasure versus pain, active versus passive, self versus other; Millon & Davis 1996) and the dimensions of the Interpersonal Circumplex (dominance versus submission, affiliation/love versus hate; Wiggins 2003), for example. However, space constraints necessitate our primary focus on

the two personality models that have received the most research attention in the context of personality pathology.

CLONINGER'S SEVEN-FACTOR MODEL Cloninger and colleagues (1993) described a revised version of Cloninger's (1987) original psychobiological model of personality. The revised model, which includes dimensions of both temperament (heritable styles or biases in information processing by the perceptual memory system) and character (individual differences in self-concepts), is purportedly more relevant to a range of PD diagnoses. The four temperament dimensions included in Cloninger's model reflect individual differences in associative learning in response to novelty (Novelty Seeking), to danger or punishment (Harm Avoidance), and to reward (Reward Dependence). In addition, a fourth dimension of temperament reflects individual differences in perseverance despite frustration and fatigue (Persistence). In contrast to temperament, character traits represent conscious insight learning or reorganization of self-concepts. The three dimensions of character identified by Cloninger's model reflect individual differences in the degree to which one tends to view oneself as an autonomous individual (Self-Directedness), as an integral part of humanity and society (Cooperativeness), and as an important component of all things/the universe (Self-Transcendence).

Svrakic and colleagues (Svrakic et al. 1993) tested several hypotheses concerning the relations between Cloninger et al.'s (1993) seven-factor model and personality disorder diagnoses and symptoms. Results were generally supportive of the hypotheses that low Self-Directedness and low Cooperativeness will indicate the presence of general personality disorder, whereas scores on the temperament dimensions will distinguish among specific PDs and PD clusters. In their study, patients with personality disorder did score significantly lower on Self-Directedness than both patients without personality disorder and community residents. However, personality-disordered patients' Cooperativeness scores, although lower than those of patients without personality disorder, did not differ significantly from community residents' scores. As predicted, Reward Dependence (low), Novelty Seeking (high), and Harm Avoidance (high) characterized Cluster A (odd/eccentric), Cluster B (dramatic/erratic/emotional), and Cluster C (anxious/fearful) personality disorder symptoms, respectively. Finally, Svrakic et al. (1993) reported that unique seven-factor profiles characterized each of the individual personality disorders.

A number of additional studies have investigated various aspects of Cloninger's theory and of his instruments that operationalize dimensions of temperament and character (Cloninger 1998). For example, several studies of twins have examined the factor structure of the Tridimensional Personality Questionnaire (TPQ; Cloninger et al. 1991) as well as the evidence for the heritability of temperament scores (Heath et al. 1994, Stallings et al. 1996). These studies found support for a four-dimension model of temperament (Novelty Seeking, Harm Avoidance, Reward Dependence, and Persistence) and for the genetic independence of these dimensions. Other molecular genetics and neurobiological studies have evaluated Cloninger's theories regarding associations between neurotransmitter systems and temperament scores (Cloninger 1998). Finally, a number of studies have assessed

the relations between individual personality disorders, personality disorder clusters or factors, and scores on Cloninger's dimensions of temperament or character (Bayon et al. 1996, Goldman et al. 1994, Mulder & Joyce 1997, Mulder et al. 1994, Nagoshi et al. 1992, Starcevic et al. 1995). In general, these studies have found mixed support for Cloninger's predictions. Clearly, the weakest support has been garnered for Cloninger's predictions of temperament scores' relations to *individual* personality disorder categories, whereas these studies found stronger support for predictions regarding temperament and personality disorder *cluster* score relations. However, more recent studies using Cloninger's Temperament and Character Inventory (TCI; Cloninger et al. 1994), the current seven-factor model instrument, to assess personality and personality disorder relations show mixed support for the predicted relations between TCI dimensions and PD clusters (Ball et al. 1997, Bejerot et al. 1998, de la Rie et al. 1998, Svrakic et al. 2002).

Cloninger (2000) has described how one might, using his framework, diagnose personality pathology. According to Cloninger, all personality disorders are characterized by low scores in Self-Directedness, most are also characterized by low Cooperativeness, and the more severe personality disorders (like borderline personality disorder) are characterized by low Self-Transcendence. Cloninger proposes a two-stage process in which general criteria for personality disorder are evaluated (low Self-Directedness, low Cooperativeness, low Affective Stability, and low Self-Transcendence). If at least two of the general criteria are deemed present, then the patient is subsequently rated on the dimensions of Novelty Seeking, Harm Avoidance, and Reward Dependence in order to subtype the personality pathology. For example, borderline personality disorder is characterized by high Novelty Seeking, high Harm Avoidance, and low Reward Dependence. This system would provide eight subtypes of personality pathology, six of which are recognized as DSM-IV personality disorders (antisocial, histrionic, borderline, obsessional, schizoid, and avoidant).

THE FIVE-FACTOR MODEL The Five-Factor Model (FFM) of personality is a popular way to conceptualize major personality traits. The five major domains of this model typically are referred to as neuroticism versus emotional stability, extraversion versus introversion, openness versus closedness to experience, agreeableness versus antagonism, and conscientiousness versus negligence. The FFM originally was developed using normal or nonclinical samples, and the goal was to provide a comprehensive account of major personality traits and dimensions. However, several investigators came to realize that the FFM might also be applied to issues relating to various forms of psychopathology. Further, the hierarchical structure of FFM traits (i.e., higher-order domains and lower-order facets) has been replicated across populations (i.e., nonclinical and clinical) and cultures, and evidence suggests a heritable and biological basis for both higher-order and lower-order FFM traits (e.g., Jang et al. 1998b).

Over the past decade, a host of studies have assessed the relations between FFM constructs and personality disorders (Widiger & Costa 2002). These studies have sampled clinical subjects, community residents, and college students.

Three early studies deserve brief mention. Wiggins & Pincus (1989) published the first study directly examining relations between the FFM and personality disorder symptoms. In their study of college students, Wiggins & Pincus administered several self-report measures of the FFM and of personality disorders. Based on their results, they concluded that personality disorders were strongly associated with FFM personality traits. Costa & McCrae (1990) demonstrated that FFM scores were associated with various personality disorders in predicted fashion in a community sample of adults and that many of these associations were replicated across self-, peer, and spousal FFM ratings. The third notable early study was that by Trull (1992). This study was the first to demonstrate strong relationships between the FFM and personality disorder features in a clinical sample of outpatients. Importantly, FFM scores accounted for significant amounts of variance in individual personality disorders in almost every case, and many of the patterns of FFM relations for individual personality disorders were replicated across three different personality disorder measures (a semistructured interview and two self-report inventories).

Following these early studies, researchers have assessed FFM relations with personality disorders using alternative measures of the FFM and of personality disorders. Based on an understanding of the FFM as well as of personality disorders, Widiger and colleagues (1994) offered a set of predicted correlates between the five major dimensions of the FFM, as well as the facets comprising each dimension, and the DSM-III-R and DSM-IV personality disorders. These predictions were updated, and they are presented in Trull & Widiger (1997) and Trull et al. (2001). These predictions have guided and informed much of the more recent research concerning FFM and personality disorder relations.

Studies have found general support for the relevance of the FFM to the full range of personality disorders. For example, O'Connor & Dyce (1998) used a confirmatory factor analytic strategy to evaluate the "fit" of the FFM across 12 data sets of personality disorder symptoms. The authors used the proposals of Widiger et al. (1994) to predict the covariational structure, and results supported the FFM as a way of conceptualizing personality disorder pathology. Other researchers have found that the FFM is related in expected ways to personality disorder features as measured by Axis II structured interviews (Soldz et al. 1993), self-report measures of Axis II symptoms (Ball et al. 1997, Clark et al. 1994, Duijsens & Diekstra 1996, Hyler et al. 1994, Lehne 1994, McCrae et al. 2004, Pukrop et al. 1998, Ramanaiah & Sharpe 1998, Schroeder et al. 1992), and other assorted ratings (Blais 1997, Shopshire & Craik 1994).

More recent studies have examined FFM and personality disorder relations at the facet level. The main reason for this more detailed focus is that better differentiation among the personality disorders is possible at the level of first-order versus higher-order traits. Most of the personality disorders are associated with elevations on neuroticism, introversion, antagonism, and negligence. However, it appears that the personality disorders *can* be distinguished by the patterns of relations at the first-order, facet-trait level (Axelrod et al. 1997, Dyce & O'Connor 1998, Trull et al. 2001).

In addition to the studies that have assessed the relations between FFM dimensions or facets and the full range of personality disorders, a number of studies have focused on the FFM and specific personality disorder constructs. For example, investigators have reported that FFM traits help characterize and distinguish antisocial personality disorder or psychopathy (Brooner et al. 1993, Harpur et al. 1994, Hart & Hare 1994, Lynam et al. 1999, Miller et al. 2001). FFM traits also have been found to distinguish borderline personality disorder (Clarkin et al. 1993, Trull et al. 2003, Wilberg et al. 1999), narcissism (Bradlee & Emmons 1992, Ramanaiah et al. 1994), dependent personality disorder (Pincus & Gurtman 1995), avoidant personality disorder (Wilberg et al. 1999), and depressive personality disorder (Lyoo et al. 1998).

Integration of Dimensional Models

Although we have presented several major dimensional models of personality/personality disorder separately, it is important to note that these models are more similar than they are different. Similar personality dimensions are assigned different names, and some theorists' dimensions may represent combinations of dimensions from other models. The overlap becomes more apparent if we focus on the broad domains of personality and personality disorder functioning that are proposed by these models (although, admittedly, Cloninger's model is more difficult to map onto the others). For example, each major model proposes a dimension that represents neuroticism/negative affectivity/emotional dysregulation. Likewise, these models contain a dimension related to extraversion/positive emotionality, and a more interpersonally relevant dimension related to dissocial/antagonistic behavior. Finally, a dimension of constraint/compulsivity/conscientiousness is also apparent. There is less agreement on a fifth domain related to openness/cognitive-perceptual disturbance; this domain is represented only in the FFM, Siever and Davis's model, and Cloninger's model. These propositions concerning shared higher-order dimensions are generally supported by empirical studies that have compared these models to each other (e.g., Ball et al. 1997, Clark & Livesley 2002, Larson et al. 2002, Livesley et al. 1998, O'Connor & Dyce 1998, Widiger 1998a). Thus, it may now be time for "dimensionalists" to begin exploring how these models fit with each other in the trait hierarchy, as well as to begin integrating empirical findings from the field of personality which in turn will implicate specific neurobiological and genetic etiologic factors for the personality disorders.

METHODOLOGICAL AND THEORETICAL ADVANCES

What Methods Can Inform Us of the Appropriate Model for Personality Disorders?

How might one decide which of the alternative models of personality disorder should be adopted? Research is needed to identify those models that incorporate

fundamental biobehavioral dimensions of temperament and personality, that best account for the behavioral, neurobiological, genetic, and epidemiological data, and that show the best clinical utility and predictive validity (First et al. 2002). Space constraints prohibit us from addressing each of these in turn. However, here we highlight several recent methodological and analytic developments that may aid researchers in focusing on whether constructs appear to be categorical and dimensional from both a phenotypic and genetic perspective.

TAXOMETRIC METHODS Taxometric analyses are a family of analytic procedures that seek to provide data addressing the categorical versus dimensional status of a variable, for example a diagnosis or syndrome. Three of the more commonly used taxometric approaches include: (*a*) mean above minus below a sliding cut; (*b*) maximum covariation analysis; and (*c*) maximum eigenvalue analysis (Cole 2004). For example, maximum covariation analysis is a taxometric technique used on dichotomous indicators that takes advantage of the statistical truism that, if a construct is categorical, two valid indicators of the construct will maximally covary among the group of individuals that is composed of approximately equal numbers of taxon (category) members and taxon nonmembers.

Since their introduction almost 40 years ago (Meehl 2004), these methods have been applied by a number of investigators to a variety of diagnostic constructs, including Axis II constructs like schizotypal personality disorder, antisocial personality/psychopathy, and borderline personality disorder. Although taxometric evidence supports the notion that a taxon of schizotypy may exist, evidence for an antisocial or psychopathy taxon or for a borderline taxon is less consistent (e.g., see Hare 2003, Haslam 2003, Rothschild et al. 2003). Further, a number of critiques of taxometric methods point out their limitations and inappropriate uses, as well as some of the ambiguities in interpretation that may result (e.g., see Cole 2004, Lenzenweger 2004, Ruscio & Ruscio 2004, Ruscio et al. 2004, Widiger 2001). For example, as noted by Widiger & Samuel (2004), evidence for taxonicity may be a function of cognitive biases of raters (Beauchaine & Waters 2003), of preselecting indicators that are most likely to produce a taxon (Widiger 2001), or of sample selection (Beauchaine 2003).

Our general view of these techniques remains the same since a prior review (Sher & Trull 1996). These methods should be used only by those knowledgeable about the potential limitations, and taxometric methods should be used only in combination with other methods aimed at identifying the nature of the underlying structure of a syndrome. In this way, consistency across methods will serve as a replication, and ultimately place one's conclusion on stronger footing. Further, even if a taxon is identified, there remains the important question, "What does it mean?" Taxonicity does not imply a specific etiology or treatment, the typical goal of diagnostic classification (Frances et al. 1995). The meaning or interpretation of taxa can only be determined through the traditional process of construct validation (Watson 2003, Widiger & Samuels 2004).

LATENT CLASS ANALYSIS Latent Class Analysis (LCA) is used to identify categorical classes (or types) of individuals that may underlie the indicators of that construct. LCA is typically used when the indicators of the latent class(es) are categorical (although there are now extensions of the model that can incorporate continuous indicators). Thus, several psychopathology researchers have used LCA to assess the presence of types or subtypes that may underlie diagnostic criteria (rated as present versus absent) for DSM disorders, including several personality disorders (Bucholz et al. 2000; Fossati et al. 1999, 2001; Kovac et al. 2002). LCA differs from taxometric analyses in that the latter do not involve fitting specific mathematical models to sample data and evaluating, statistically and quantitatively, the fit of these models (Krueger et al. 2004).

LCA has several appealing properties (Lanza et al. 2003). First, because LCA uses multiple indicators, measurement error can be estimated and the latent classes that are identified are more reliable. Second, LCA estimates informative parameters (e.g., the proportion of the population that falls into a particular class, and the item endorsement probability, conditional on class membership) and provides fit statistics. Concerning the latter, the model in which the likelihood ratio statistic (G^2) is close to or less than the degrees of freedom indicates reasonable fit. Because models positing different numbers of classes are technically not nested models, models with different numbers of classes can be compared using the Akaike information criterion or the Bayesian information criterion, which will provide information as to the relative fit of the models.

Although LCA has many advantages, to date the application of LCA to personality disorder data has yielded somewhat ambiguous results. The LCA studies in this area have identified latent subtypes in almost every case. However, these findings have not yet been replicated using other methods. More importantly, many of the LCA solutions appear to reflect types that differ primarily by symptom severity (e.g., see Bucholz et al. 2000). This raises the issue of whether the results are more consistent with a dimensional or a categorical perspective on personality disorders. Specifically, three or more ordered categories may suggest that a dimensional model of diagnosis is appropriate (Kraemer et al. 2004).

Comparisons of Categorical and Dimensional Models Within the Same Data Set

To date very few studies have compared the relative "fits" of categorical and dimensional models within the same data set. For example, taxometric analyses provide a test of the categorical model, but no quantitative index of the fit of this model is provided nor is it compared to the fit of a dimensional model to the same data. Rather, the investigator examines a variety of plots (e.g., average covariance curves), and from this visual inspection, one pronounces the best model for the data. Likewise, a latent class analysis specifically searches for the existence of categories of respondents, but does not simultaneously test for the appropriateness of a dimensional model (although, as mentioned above, many of the latent

classes identified in the literature represent gradations of severity, suggesting that a dimensional model might be appropriate).

A new and important development is to test the fit of a categorical and dimensional model to the same data. For example, Krueger and colleagues (2004) conducted a variety of latent class analyses and latent trait analyses to assess the relative fits of categorical and dimensional models, respectively, for externalizing psychopathology (e.g., substance use disorders, antisocial personality disorder). Although their focus was on models of comorbidity among externalizing disorders (and thus, whether externalizing problems could be considered categorical or alternatively as gradations of severity along a general externalizing spectrum), this same approach could be used to evaluate the categorical or dimensional status of a single diagnostic entity or syndrome. Importantly, indices of fit for a variety of categorical and dimensional models can be compared to empirically guide the selection of the most appropriate conceptualization. For example, Bayesian information criterion values that take into account the parsimony of the model can be compared. Finally, as pointed out by Krueger et al. (2004), these analyses can accommodate a variety of indicators, not just phenotypic symptoms or diagnoses. For example, these kinds of analyses can be conducted using endophenotypes or other biological or genetic markers of the disorder or syndrome of interest. Thus, these comparative analyses can be applied to a wide variety of data, increasing the utility of this approach.

Multivariate Genetic Analyses

Most attempts to address the dimensional versus categorical status of personality disorders have focused on manifest indicators of the personality disorders, at the phenotypic level of analysis. However, it has been shown that the phenotypic structure underlying indicators of a construct does not always correspond with the genotypic structure of the items (e.g., see Heath et al. 1994). Therefore, to the extent that the genetic structure of a dimensional model or assessment of personality overlaps to a large degree with the genetic structure underlying personality disorder symptoms, then a stronger case could be made for the appropriateness of a dimensional model of personality disorders. Using multivariate genetic analysis, the extent to which DSM personality disorder constructs and dimensional models of personality are assessing the same dimensions of genetic or environmental variation can be addressed. Further, these analyses allow us to determine the extent to which genetic influences are shared by several constructs and the extent to which genetic influences are construct-specific.

This approach has not been used previously for several reasons. First, genetically informative twin samples are needed to be able to tease apart the genetic and environmental influences on personality disorder symptom data. Furthermore, these analyses require a large number of participants (i.e., thousands), and relevant data from such large samples of twins typically are not available. Finally, although familiar to those who are expert in behavior genetics, these analyses are quite

complex and require specialized expertise. Despite these hurdles, it is hoped that such a study will be conducted in the future.

CONCLUSIONS AND FUTURE DIRECTIONS

Our review suggests that, currently, there is little compelling evidence that the categorical model of personality disorder should be retained to the exclusion of a dimensional model of personality pathology. Although we presented several categorical models of personality disorder as well as several methods investigators might use for assessing the categorical versus dimensional nature of personality disorder constructs, the evidence clearly favors dimensional models. One can convert a dimensional system of diagnosis to a, perhaps, more convenient categorical model by applying cutoffs and thresholds. However, the reverse is not true; it is not possible to begin with a categorical system (e.g., present versus absent) and then expand this to a dimensional one. One might argue that the DSM-IV-TR system of assessing personality disorder symptoms (i.e., assessing separate features of the diagnosis) could be conceptualized as a group of 10 quantitative symptom count scales. However, this approach really avoids the issue of what the best dimensional representation of personality disorders might be. Our position is that the field should embrace a dimensional representation of the personality disorder traits and initially use this as an adjunct to the DSM system. A dimensional approach would address the problems of the DSM-IV-TR categorical system of personality disorder, including diagnostic co-occurrence, heterogeneity of membership, inconsistent and illusory diagnostic distinctions, and inadequate coverage.

Of course, this raises the question of which dimensional system to adopt. We admit to a preference for the Five-Factor Model, but we hope that others appreciate from our review that no matter which dimensional system is preferred, there is general consensus for the relevance of at least four higher-order domains of personality functioning that are clearly related to personality pathology: neuroticism/negative affectivity/emotional dysregulation, extraversion/positive emotionality, dissocial/antagonistic behavior, and constraint/compulsivity/conscientiousness. These personality trait domains have been recognized for decades, and are relevant to both normal and abnormal variants of personality. Individuals could be described by using these major dimensions, as well as by using facets or subtraits of these dimensions. Such a description is consistent with evidence that the personality features of individuals differ in degree, not in kind. Furthermore, personality research has established psychosocial, neurobiological, and genetic correlates of these traits. The incorporation of these findings from personality research can greatly inform the study of the etiology, assessment, and treatment of personality pathology.

However, there is much work to be done to facilitate the adoption of a dimensional model of personality disorder. The dimensional perspective must be embraced by both the psychopathologists who study these disorders as well as by

clinicians who assess and treat these conditions. Several issues must be addressed in the future; we briefly mention three related concerns. First, there is the perception that dimensional models are more cumbersome and less user-friendly. Many prefer categorical systems because clinical decisions are often categorical as well (e.g., to diagnose or not, to treat or not). However, as we have stated, dimensional systems can be converted to suit one's "categorical" needs provided the appropriate cutoffs are available, as well as decision algorithms. Furthermore, to the extent that dimensional models provide a more reliable and valid description of patients, these models will be preferred by clinicians and researchers alike (Widiger & Mullins-Sweatt 2004).

Second, how will appropriate cutoffs be established? This is a complex issue. Most agree that personality pathology is not simply a composite of elevations on certain personality traits; personality traits are judged maladaptive only if they cause significant distress or impairment. The crucial issue then becomes what constitutes "significant" distress or impairment. DSM-IV included general diagnostic criteria for personality disorder to encourage clinicians to consider this issue when making a judgment about personality disorder diagnosis. Although most see this as a very important addition to the nomenclature (e.g., Livesley 1998, 2003), it is not clear that these general criteria have made much of an impact. In order for dimensional models to gain some favor, empirically defensible cutoffs must be developed. However, these cutoffs, representing significant trait elevations, will vary according to the trait in question and according to the clinical decision being made (Widiger & Mullins-Sweatt 2004). Furthermore, an independent evaluation of distress or impairment will likely be required because high or low levels of certain traits do not necessarily suggest maladaptivity. As for how this might be incorporated into a diagnostic system, Livesley (2003) suggests a two-step approach. In the first step, a diagnosis of general or generic personality disorder is made. According to Livesley, three important indicators of a diagnosis of personality disorder should be assessed independently from individual differences in personality traits: a failure to establish and maintain stable representations of self and of others; interpersonal dysfunction; and a failure to develop prosocial behavior and cooperative relationships. Livesley (2003) argues that the presence of general personality disorder should be represented on Axis I. The second step involves presenting, on Axis II, an individual's dimensional scores on lower-order personality traits that have been shown to be descriptive of personality variation (e.g., the 18 traits of the DAPP-BQ). Thus, Livesley's (2003) proposed system would provide the categorical diagnosis of personality disorder as well as a dimensional characterization of the patient's personality pathology.

A third important issue that must be addressed is that of coverage. Most would agree that the 10 official PDs presented in the DSM-IV do not represent all forms of personality pathology that the clinician is likely to encounter and to treat (Shedler & Westen 2004). It is well known that PD Not Otherwise Specified is the most frequently assigned PD diagnosis, suggesting a need for considering other varieties of personality pathology in our diagnostic nomenclature. Dimensional models that

are not tied so closely with DSM-IV conceptualizations of personality disorder diagnosis will facilitate research on this issue. Systematic studies of important constellations of personality trait elevations can determine the frequency of occurrence of certain trait profiles as well as the forms of impairment that are associated with these constellations. In short, important varieties of personality pathology may have been overlooked because of an adherence to the DSM diagnostic system.

We are optimistic about the future of dimensional models of personality pathology. Great strides have been made over the last two decades concerning the conceptualization of personality disorder diagnoses, the relations between personality traits and personality disorders, and the application of methods that can inform us regarding the best way to represent these forms of psychopathology. It is our hope that changes in DSM-V will reflect these advances and considerations, leading to an improvement in the diagnosis of personality pathology.

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CONTENTS