BRIEF REPORTS

A Dimensional Model of Personality Disorder: Incorporating DSM Cluster A Characteristics

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The authors articulate an expanded dimensional model of personality pathology to better account for symptoms of DSM-defined Cluster A personality disorders. Two hundred forty participants (98 first-degree relatives of probands with schizophrenia or schizoaffective disorder, 92 community control participants, and 50 first-degree relatives of probands with bipolar disorder) completed a dimensional personality pathology questionnaire, a measure of schizotypal characteristics, and Chapman measures of psychosis proneness. Scales from all questionnaires were subjected to an exploratory factor analysis with varimax rotation. A 5-factor structure of personality pathology emerged from the analyses, with peculiarity forming an additional factor to the common 4-factor structure of personality pathology (consisting of Introversion, Emotional Dysregulation, Antagonism, and Compulsivity). These results support a 5-factor dimensional model of personality pathology that better accounts for phenomena encompassed by the Cluster A personality disorders in DSM–IV–TR (4th ed., text revised; American Psychiatric Association, 2000). This study has implications for the consideration of a dimensional model of personality disorder in DSM–V by offering a more comprehensive structural model that builds on previous work in this area.

Keywords: personality pathology, DSM–V, dimensional models, five-factor model, schizotypal personality disorder

As progress toward the next edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM) continues, the importance of research that addresses potential changes in DSM–V becomes more salient. The question of what will happen to personality disorders in the transition between DSM–IV–TR (4th ed., text revised; American Psychiatric Association, 2000) and DSM–V has gained increasing attention. Comprehensive, empirically based proposals have been put forth that argue for a move to a dimensional system for personality pathology in DSM–V (Widiger, Simonsen, Krueger, Livesley, & Verheul, 2005; Widiger & Trull, 2007). Such a shift would represent a paradigmatic change in the conceptualization of psychiatric disorder (Kupfer, First, & Regier, 2007). A primary concern related to making such a change is how to obtain an empirically based, comprehensive consensus structure (Widiger & Simonsen, 2005; Widiger & Trull, 2007).

One of the predominant nominees for such a dimensional system is a four-factor structure of maladaptive personality (De Clercq, De Fruyt, Van Leeuwen, & Mervielde, 2006; Livesley, 2005; Widiger & Simonsen, 2005) that largely corresponds to maladaptive variants of four of the five factors in the five-factor model (FFM), a common approach to conceptualizing and measuring normal-range personality in adult populations. Specifically, the FFM consists of the following higher order traits: Neuroticism, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience (Goldberg, 1993; McCrae & Costa, 2001). Proposed four-factor models of personality pathology often define the following higher order dimensions: Emotional Dysregulation (roughly corresponding to extreme Neuroticism), Introversion (corresponding to the maladaptive opposite of Extraversion), An-
tagonism (corresponding to the maladaptive opposite of Agreeableness), and Compulsivity (corresponding to extreme Conscientiousness). The proposed four-factor model is based on points of convergence among numerous dimensional models and is, in part, a response to the concern that there are presently too many dimensional systems from which to choose ( Widiger & Simonsen, 2005).

Most of this work on understanding personality pathology in terms of dimensional models of personality has failed to find a direct pathological analog to the fifth factor, Openness to Experience (Livesley, 2005; Widiger, 1998). Researchers have also noted questions concerning how cognitive and perceptual aberrations (e.g., symptoms characterizing Cluster A personality disorders in the DSM-IV-TR) might fit into such a four-factor model ( Widiger & Costa, 1994; Widiger & Simonsen, 2005).

Amidst this convergence on a potential four-factor dimensional model of personality pathology that might be considered for DSM-V, important issues remain to be resolved before such a significant change could be put in motion. Specifically, a primary issue that has been discussed is whether the four-factor model of personality pathology provides comprehensive coverage of those characteristics currently codified in Axis II. In A Research Agenda for DSM-V, First et al. (2002) wrote

Future research should address such questions as . . . whether there are particular components or aspects of the DSM-IV personality disorders that are not adequately represented within or covered by existing dimensional models (e.g., identity disturbances, attachment conflicts, cognitive aberrations, or perceptual abnormalities). (p. 144)

It has been suggested that characteristics that index cognitive aberrations and perceptual abnormalities (e.g., those associated with Cluster A personality disorders such as schizotypal personality disorder) represent too small a factor to be meaningful or that they do not have a place in a dimensional system of personality pathology ( Widiger & Simonsen, 2005). Similarly, researchers have called for empirical investigations (First et al., 2002) to determine whether these Cluster A characteristics would fit into a dimensional model for Axis II.

In this brief report, we respond to this call by investigating a comprehensive higher order factor structure that may better account for the Cluster A disorders. Specifically, we question whether the predominant four-factor structure of personality pathology fully accounts for additional variation in personality pathology, such as the tendency to have unusual perceptual experiences. The Dimensional Assessment of Personality Pathology (DAPP; Livesley & Jackson, in press) is a self-report measure that assesses 18 factorially derived lower order scales that together index the consensus four-factor structure at a higher order level. In addition to the DAPP, we employ existing measures that typically are used to assess characteristics associated with the Cluster A personality disorders from DSM-IV-TR and the schizophrenia spectrum more broadly, and we investigate whether such measures capture additional meaningful variance beyond the four-factor structure as assessed by the DAPP. Through the use of a sample of first-degree relatives of individuals with schizophrenia or schizoaffective disorder or bipolar disorder, we expect to increase the variance in such measures compared to a typical, or “normal,” population while avoiding some of the potential limitations in assessing a group that is actively disordered (e.g., the ability of such a group to provide extensive personality data).

Method

Participants

We studied 98 first-degree relatives of probands with schizophrenia or schizoaffective disorder, 50 first-degree relatives of probands with bipolar disorder, and 92 nondiagnosed participants from the community who acted as controls, for a combined sample of 240 participants. Demographics of the groups are presented in Table 1. Probands were recruited through the Minneapolis Veterans Affairs Medical Center, community support programs for persons with mental illness, and a county mental health clinic. Probands provided personal contact information and permission to contact relatives to study staff. A trained doctoral level clinical psychologist confirmed probands’ diagnoses by administering the Diagnostic Interview for Genetic Studies (Nurnberger et al., 1994). A trained graduate student or doctoral level psychologist then completed a consensus diagnosis process through the use of medical records and information from a family informant as well as the original interview. In order to maximize the number of participating relatives, first-degree relatives were excluded from participating only if they had a physical problem that would render study measures impossible to administer (e.g., blindness) or if they were younger than age 18. Control participants were recruited through posted announcements in the Minneapolis Veterans Affairs Medical Center and in the greater community (e.g., libraries, fitness centers). Trained study staff screened control participants for an absence of affective disorders and psychotic disorders. Recruitment and study procedures are described further elsewhere (Sponheim, McGuire, & Stanwyck, 2006). All participants completed an informed consent process. The Minneapolis Veterans Affairs Medical Center and University of Minnesota Institutional Review Board approved the study protocol. Participants were paid for their time.

Instruments

Participants completed the Dimensional Assessment for Personality Pathology—Basic Questionnaire (DAPP–BQ; Livesley & Jackson, in press). The DAPP–BQ is a 290-item, 1–5 Likert scale questionnaire that consists of 18 subscales: Affective Lability, Anxiousness, Callousness, Cognitive Distortions, Compulsivity, Conduct Problems, Identity Problems, Insecure Attachment, Intimacy Problems, Narcissism, Oppositionality, Rejection, Restricted Expression, Self-Harm, Social Avoidance, Stimulus Seeking, Sub-
missiveness, and Suspiciousness. Scale reliability as assessed by Cronbach’s alpha for the DAPP–BQ scales ranged from .81 (Conduct Problems) to .92 (Self-Harm), with an average Cronbach’s alpha across all scales of .87.

Participants also completed a 298-item, true–false questionnaire designed to measure psychosis proneness entitled “Survey of Attitudes and Experiences” that consisted of the Schizotypal Personality Questionnaire (SPQ; Raine, 1991), Chapman Psychosis Proneness Scales—namely, Perceptual Aberration, Magical Ideation, revised Physical Anhedonia (Chapman, Chapman, & Raulin, 1976, 1978; Eckblad & Chapman, 1983), and revised Social Anhedonia (Eckblad, Chapman, Chapman, & Mishlove, 1982)—the Chapman Infrequency Scale (Chapman & Chapman, 1983), and the L and K scales from the Minnesota Multiphasic Personality Inventory–2 (MMPI–2; Pope, Butcher, & Seelen, 2000). The SPQ consists of nine subscales: Constricted Affect, Excessive Social Anxiety, Ideas of Reference, No Friends, Odd Beliefs, Odd Behaviors, Odd Speech, Suspiciousness, and Unusual Perceptions. Scale reliability as assessed by Cronbach’s alpha for the SPQ scales ranged from .63 (Unusual Perceptions) to .85 (No Friends), with an average Cronbach’s alpha across all scales of .74. Scale reliability as assessed by Cronbach’s alpha for the Chapman scales ranged from .74 (Magical Ideation) to .86 (Social Anhedonia), with an average Cronbach’s alpha across all scales of .80.

The SPQ was designed with subscales that tap directly into various DSM criteria for schizotypal personality disorder in order to measure traits of the disorder. In the validation study (Raine, 1991) and subsequent research (Kremen, Faraone, Toomey, Seidman, & Tsuang, 1998), it has been shown that individuals who score in the top 10% on the SPQ have high rates of schizotypal personality disorder. Although initially designed to measure psychosis proneness, the Chapman Psychosis Proneness Scales yield elevated scores in individuals with schizophrenia spectrum personality disorders (Thaker, Moran, Adami, & Cassady, 1993), and Magical Ideation and Perceptual Aberration are most strongly associated with symptom counts of schizotypal personality disorder among DSM personality disorders (Meyer & Hautzinger, 1999).

**Procedures**

Full participants, which included all control participants and most (n = 109) relatives, were mailed the questionnaires. Participants completed the questionnaires at home and brought them to the study site on the day of their participation. In order to maximize the number of participating relatives, relatives who were over the age of 60 or unable or unwilling to come to the study site were given the option of limited participation. Limited participants were mailed a copy of the questionnaires. These participants mailed the questionnaires to study offices upon completion (n = 39).

**Statistical Analyses**

The distributions of all variables were examined for extreme skewness and kurtosis. A variety of transformations (logarithmic, natural logarithmic, and square root) were performed on skewed and kurtotic variables, and distributional properties were reexamined. When distributional properties improved, the transformation was applied. This resulted in a natural logarithmic transformation of five variables: DAPP Conduct Problems, Chapman Magical Ideation, Chapman Social Anhedonia, Chapman Perceptual Aberrations, and Chapman Physical Anhedonia. Additionally, a number of variables with restricted range of endorsement rates were not amenable to transformations and were treated as categorical in these analyses (i.e., all of the scales from the SPQ as well as the DAPP Self-Harm scale). Missing values were estimated using the expectation-maximization (EM) algorithm, a maximum likelihood estimation procedure, which resulted in the data used for the factor analysis. We conducted an exploratory factor analysis with the statistical analysis program Mplus (Muthén & Muthén, 1998–2006) using a weighted least squares mean and variance adjusted estimator.

**Results**

Five factors with eigenvalues greater than 1 were extracted (11.12, 3.50, 2.28, 1.84, and 1.41), which converged with examination of the scree plot, indicating a break after extraction of five factors. See Table 2 for factor loadings from the five-factor structure with varimax rotation and a root-mean-square error of approximation (RMSEA) of .075. This solution accounted for 65% of the overall variance. Further, extraction of a four-factor solution showed a poorer fit (RMSEA = .093). Four of the factors in the five-factor solution correspond to the four-factor structure established for the DAPP–BQ scales (Schroeder, Wormworth, & Livesley, 2002): Interoversion/Inhibition, Antagonism/Disocial, Emotional Dysregulation, and Compulsivity. The fifth factor (emerging third in the analysis), which we labeled Peculiarity, is indexed by scales from the SPQ and Chapman measures that reflect unusual perceptual experiences.

**Discussion**

These results support a five-factor structure of personality pathology that encompasses the perceptual aberrations and cognitive distortions characterizing Cluster A personality disorders in DSM–IV–TR. Specifically, the common four-factor structure of personality pathology established in the literature (De Clercq et al., 2006; Livesley, 2005; Widiger & Simonsen, 2005) is replicated in these data. However, a substantial fifth factor also emerges that seems to dispel previous suggestions that such a factor does not fit into a dimensional structure of personality pathology or that it might be too small to be meaningful. Through the use of data from a unique sample of first-degree relatives of patients who are severely disordered, a substantial five-factor model of personality pathology emerged that provides more comprehensive coverage of existing Axis II disorders. We believe these results provide support for a dimensional model of personality pathology in DSM–V that might address the numerous limitations of the current system (Widiger & Trull, 2007) without neglecting characteristics currently codified in the DSM–IV–TR personality disorders.

This work is consistent with structural studies of the schizotypy construct that have differentiated negative schizotypal characteristics (e.g., constricted affect, having few friends, anhedonia) from positive schizotypal characteristics (e.g., unusual perceptual experiences; e.g., Kerns, 2006; Reynolds, Raine, Mellingen, Venables, & Mednick, 2000). This distinction is evidenced in the present study by the differential loadings of the Chapman and SPQ scales.
on the Introversion factor and the Peculiarity factor. An exception is the SPQ Suspiciousness scale which loads on both factors, consistent with other factorial work on schizotypal characteristics (e.g., Reynolds et al., 2000). To further distinguish disorganized schizotypal characteristics (which load with the positive schizotypal personality disorders; DAPP = Dimensional Assessment of Personality Pathology—Basic Questionnaire).

One notable result was that the DAPP Cognitive Distortions scale loaded on Emotional Dysregulation rather than on Peculiarity. This is consistent with structural analyses of the DAPP–BQ when the Cognitive Distortions scale is included (Livesley, Jang, & Vernon, 1998), perhaps suggesting that the Cognitive Distortions scale taps into aspects of cognitive dysregulation that are closely associated with emotional experiences and that are distinct from aberrant perceptual experiences. For example, some items on this scale inquire about behaviors such as difficulty thinking clearly under pressure and may be heavily influenced by characteristics such as anxiety proneness or stress reactivity. In addition, other structural studies with the DAPP have been unable to include the Cognitive Distortions scale due to low endorsement (e.g., Schroeder et al., 2002), which leaves some questions as to the best way to conceptualize the scale content in a comprehensive framework. Future work will be needed to clarify the relation of this scale in a broader dimensional model of personality pathology that also includes the Cluster A personality disorders.

An important avenue for future research is explicit integration of the five-factor personality pathology structure presented here and the widely used measure of normative personality traits, the FFM. Although FFM data were not available in this sample to make such direct comparisons, future studies should make greater efforts to include measures of normative personality, such as the FFM, in studies that investigate personality pathology. In particular, the FFM has been proposed as one potential framework for revising Axis II in DSM–V. Widiger and Simonsen (2005) offered an integrated review of existing evidence that provides strong support for links between the existing four-factor pathology structure as captured by the DAPP–BQ and the first four factors of the FFM (e.g., Neuroticism–Emotional Dysregulation, Extraversion–Introversion, Agreeableness–Antagonism, and Conscientiousness–Compulsivity). Explicit empirical comparisons have shown strong converging evidence for connections between the DAPP–BQ scales and the first four factors of the FFM, with little systematic evidence for connections with Openness to Experience (e.g., Clark & Livesley, 2002; Schroeder et al., 2002).

The extent to which the Peculiarity factor estimated here is analogous to Openness to Experience or, alternatively, is better represented as a sixth factor within the FFM structure remains to

<table>
<thead>
<tr>
<th>Scale</th>
<th>Introversion</th>
<th>Emotional Dysregulation</th>
<th>Peculiarity</th>
<th>Antagonism</th>
<th>Compulsivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPQ Constricted Affect</td>
<td>.77</td>
<td>.33</td>
<td>.21</td>
<td>.09</td>
<td>.07</td>
</tr>
<tr>
<td>Excessive Social Anxiety</td>
<td>.43</td>
<td>.52</td>
<td>.29</td>
<td>.01</td>
<td>.13</td>
</tr>
<tr>
<td>Ideas of Reference</td>
<td>-.08</td>
<td>.17</td>
<td>.67</td>
<td>.32</td>
<td>.07</td>
</tr>
<tr>
<td>No Friends</td>
<td>.84</td>
<td>.19</td>
<td>.13</td>
<td>.08</td>
<td>.05</td>
</tr>
<tr>
<td>Odd Beliefs</td>
<td>-.03</td>
<td>.13</td>
<td>.50</td>
<td>.17</td>
<td>-.11</td>
</tr>
<tr>
<td>Odd Behavior</td>
<td>.23</td>
<td>.19</td>
<td>.56</td>
<td>.26</td>
<td>.21</td>
</tr>
<tr>
<td>Odd Speech</td>
<td>.15</td>
<td>.34</td>
<td>.56</td>
<td>.16</td>
<td>.39</td>
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<tr>
<td>Suspiciousness</td>
<td>.44</td>
<td>.25</td>
<td>.46</td>
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<td>-.22</td>
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<tr>
<td>Unusual Perceptions</td>
<td>.09</td>
<td>.14</td>
<td>.76</td>
<td>.02</td>
<td>-.10</td>
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<tr>
<td>DAPP Submissiveness</td>
<td>.24</td>
<td>.70</td>
<td>.11</td>
<td>-.08</td>
<td>.07</td>
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<tr>
<td>Cognitive Distortion</td>
<td>.26</td>
<td>.70</td>
<td>.36</td>
<td>.19</td>
<td>.01</td>
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<tr>
<td>Identity Problems</td>
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<td>.58</td>
<td>.16</td>
<td>.18</td>
<td>-.09</td>
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<tr>
<td>Affective Lability</td>
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<td>.73</td>
<td>.34</td>
<td>.22</td>
<td>-.13</td>
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<tr>
<td>Stimulus Seeking</td>
<td>-.19</td>
<td>.11</td>
<td>.13</td>
<td>.61</td>
<td>.19</td>
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<tr>
<td>Compulsivity</td>
<td>-.02</td>
<td>.04</td>
<td>.22</td>
<td>.07</td>
<td>-.57</td>
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<tr>
<td>Restricted Expression</td>
<td>.69</td>
<td>.31</td>
<td>.02</td>
<td>.08</td>
<td>-.06</td>
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<tr>
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<td>.04</td>
<td>.12</td>
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<td>.06</td>
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<td>.10</td>
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<td>.06</td>
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<td>.54</td>
<td>-.04</td>
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<td>.58</td>
<td>.26</td>
<td>.17</td>
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<td>.38</td>
<td>.28</td>
<td>.14</td>
<td>-.20</td>
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<td>.17</td>
<td>.72</td>
<td>.12</td>
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<td>.04</td>
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<td>Perceptual Aberrations</td>
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<td>.61</td>
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<td>-.15</td>
<td>.08</td>
<td>-.05</td>
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</table>

Note. Factor loadings > .40 are in bold text. SPQ = Schizotypal Personality Questionnaire; DAPP = Dimensional Assessment of Personality Pathology—Basic Questionnaire.
be empirically demonstrated. Ross, Lutz, and Bailley (2002) demonstrated that the Magical Ideation and Perceptual Aberration subscales of the Chapman scales, both of which load highly on the Peculiarity factor in the present study, showed significant positive correlations with Openness to Experience. Similarly, Camisa et al.’s (2005) factor analysis of the FFM domains and a subset of the Chapman scales found a distinct factor represented by Chapman Magical Ideation, Chapman Perceptual Aberration, and Openness to Experience. Taken together, these studies suggest that the expanded Peculiarity factor presented here may yield similar positive connections with Openness to Experience. However, in a recent study with a sample of undergraduate students, Watson, Clark, and Chmielewski (in press) found that positive schizotypy scales from the SPQ loaded with dissociation symptoms on a factor distinct from Openness to Experience. Thus, more work is needed to explicate this relationship fully.

When conducting empirical demonstrations of the relationship between Openness to Experience and Peculiarity, researchers should be cautious about how restrictions on variance imposed by the use of more normative samples might present misleading results should Peculiarity and Openness to Experience emerge as distinct factors. In future studies, efforts should be made to engage samples with the potential for increased variance in Cluster A characteristics, as we did with the sample used in the present study. Similarly, previous research has shown that manipulations of items in the Openness to Experience domain that are specifically written to capture maladaptive variants of this domain show stronger links to Cluster A symptoms (Haigler & Widiger, 2001). Thus, those researching such investigations should use broader measures of the Openness to Experience domain that may increase the potential for links with relevant personality disorder constructs.

In summary, these results provide preliminary support for inclusion of additional scales in a dimensional measure of personality pathology. The use of first-degree relatives of patients with schizophrenia, schizoaffective, or bipolar disorder strengthens our ability to identify the five-factor structure pertinent to important elements of severe psychopathology that may have been underrepresented in previous analyses of dimensional psychopathology. An alternative suggestion to the incorporation of such characteristics in a dimensional model of personality disorder is to consider them variants of schizophrenia, similar to the approach taken by the World Health Organization (First et al., 2002). We feel that these results suggest an important place for characteristics related to perceptual aberrations in the broader domain of personality pathology (Widiger & Simonsen, 2005). Future research could extend this work to specific clinical populations (e.g., individuals with schizophrenia spectrum disorders) to determine whether the fifth factor accounts for meaningful variance in individuals who are actively disordered. Further, there is a need for such a dimensional model to demonstrate clinical utility and feasibility of implementation in future work. However, this study builds on the growing consensus that a dimensional model of personality pathology may provide an empirically based alternative to the current categorical system for the next edition of the DSM.

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