

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 re-examined. When distributional properties improved, the transformation was applied. This resulted in a natural logarithmic trans-

formation 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): Introversion/Inhibition, Antagonism/Dissocial, 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, Mellinger, Venables, & Mednick, 2000). This distinction is evidenced in the present study by the differential loadings of the Chapman and SPQ scales

Table 2
Factor Loadings for Exploratory Factor Analysis With Varimax Rotation of Personality Pathology Scales

Scale	Introversion	Emotional Dysregulation	Peculiarity	Antagonism	Compulsivity
SPQ Constricted Affect	.77	.33	.21	.09	.07
Excessive Social Anxiety	.43	.52	.29	.01	.13
Ideas of Reference	-.08	.17	.67	.32	-.07
No Friends	.84	.19	.13	.08	.05
Odd Beliefs	-.03	.13	.50	.17	-.11
Odd Behavior	.23	.19	.56	.26	.21
Odd Speech	.15	.34	.56	.16	.39
Suspiciousness	.44	.25	.46	.29	-.22
Unusual Perceptions	.09	.14	.76	.02	-.10
DAPP Submissiveness	.24	.70	.11	-.08	.07
Cognitive Distortion	.26	.70	.36	.19	.01
Identity Problems	.52	.58	.16	.18	-.09
Affective Lability	.11	.73	.34	.22	-.13
Stimulus Seeking	-.19	.11	.13	.61	.19
Compulsivity	-.02	.04	.22	.07	-.57
Restricted Expression	.69	.31	.02	.08	-.06
Callousness	.37	.04	.12	.74	-.06
Passive Oppositionality	.25	.70	.12	.23	.23
Intimacy Problems	.63	.18	.03	-.04	.06
Rejection	.05	.07	.18	.68	-.21
Anxiousness	.24	.83	.18	.06	-.06
Conduct Problems	.27	.10	.24	.58	.06
Suspiciousness	.39	.36	.23	.56	-.30
Social Avoidance	.59	.67	.10	.03	.09
Narcissism	-.15	.53	.25	.54	-.04
Insecure Attachment	.04	.58	.26	.17	-.21
Self-Harm	.30	.38	.28	.14	-.20
Chapman Magical Ideation	.12	.17	.72	.12	-.14
Social Anhedonia	.78	.04	.26	.09	-.02
Perceptual Aberrations	.12	.25	.49	.09	-.09
Physical Anhedonia	.61	.05	-.15	.08	-.05

Note. Factor loadings > .40 are in bold text. SPQ = Schizotypal Personality Questionnaire; DAPP = Dimensional Assessment of Personality Pathology—Basic Questionnaire.

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 characteristics in the present study) may require a more actively disordered sample, or one larger than the sample used in this study, and represents an important area for further research.

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 related more strongly to 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 5.3. Sample Factor Loadings Table (With Rotation Method Specified)

The following table is formatted to emphasize the structure of the test batteries.

Table X

Factor Loadings for Exploratory Factor Analysis With Varimax Rotation of Personality Pathology Scales

Scale	Introversion	Emotional Dysregulation	Peculiarity
SPQ Constricted Affect	.77	.33	.21
Excessive Social Anxiety	.43	.52	.29
Ideas of Reference	-.08	.17	.67
No Friends	.84	.19	.13
Odd Beliefs	-.03	.13	.50
Odd Behavior	.23	.19	.56
Odd Speech	.15	.34	.56
Unusual Perceptions	.09	.14	.76
DAPP Submissiveness	.24	.70	.11
Cognitive Distortion	.26	.70	.36
Identity Problems	.52	.58	.16
Affective Lability	.11	.73	.34
Restricted Expression	.69	.31	.02
Passive Oppositionality	.25	.70	.12
Intimacy Problems	.63	.18	.03
Anxiousness	.24	.83	.18
Conduct Problems	.27	.10	.24
Suspiciousness	.39	.36	.23
Social Avoidance	.59	.67	.10
Insecure Attachment	.04	.58	.26
Self-Harm	.30	.38	.28
Chapman Magical Ideation	.12	.17	.72
Social Anhedonia	.78	.04	.26
Perceptual Aberrations	.12	.25	.49
Physical Anhedonia	.61	.05	-.15

Note. Factor loadings > .40 are in boldface. SPQ = Schizotypal Personality Questionnaire; DAPP = Dimensional Assessment of Personality Pathology—Basic Questionnaire.

(continued)

Table 5.3. Sample Factor Loadings Table (continued)

The following table is formatted to emphasize the structure of the factors.

Table X

Factor Loadings for Exploratory Factor Analysis With Varimax Rotation of Personality Pathology Scales

Scale	Introversion	Emotional Dysregulation	Peculiarity
SPQ No Friends	.84	.19	.13
Chapman Social Anhedonia	.78	.04	.26
SPQ Constricted Affect	.77	.33	.21
DAPP Restricted Expression	.69	.31	.02
DAPP Intimacy Problems	.63	.18	.03
Chapman Physical Anhedonia	.61	.05	-.15
DAPP Social Avoidance	.59	.67	.10
DAPP Identity Problems	.52	.58	.16
SPQ Excessive Social Anxiety	.43	.52	.29
DAPP Anxiousness	.24	.83	.18
DAPP Affective Lability	.11	.73	.34
DAPP Cognitive Distortion	.26	.70	.36
DAPP Passive Oppositionality	.25	.70	.12
DAPP Submissiveness	.24	.70	.11
DAPP Insecure Attachment	.04	.58	.26
DAPP Self-Harm	.30	.38	.28
SPQ Unusual Perceptions	.09	.14	.76
Chapman Magical Ideation	.12	.17	.72
SPQ Ideas of Reference	-.08	.17	.67
SPQ Odd Speech	.15	.34	.56
SPQ Odd Behavior	.23	.19	.56
SPQ Odd Beliefs	-.03	.13	.50
Chapman Perceptual Aberrations	.12	.25	.49
DAPP Suspiciousness	.39	.36	.23
DAPP Conduct Problems	.27	.10	.24

Note. Factor loadings > .40 are in boldface. SPQ = Schizotypal Personality Questionnaire; DAPP = Dimensional Assessment of Personality Pathology—Basic Questionnaire. Adapted from "A Dimensional Model of Personality Disorder: Incorporating DSM Cluster A Characteristics," by J. L. Tackett, A. L. Silberschmidt, R. F. Krueger, and S. R. Sponheim, 2008, *Journal of Abnormal Psychology*, 117, p. 457. Copyright 2008 by the American Psychological Association.