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DSM-IV Personality Disorders: Dimensional Ordered Categorization and Associations with Disability and Selected Axis I Disorders in a General Population Survey

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Abstract

Studies investigating associations between personality disorders (PDs) and other disabilities and mental disorders have typically used DSM categorical assessments. This approach has been criticized for using arbitrary thresholds to define categories and ignoring within-category heterogeneity. Recent studies with clinical populations, however, have questioned the utility of dimensional scoring of PD symptom criteria. To gain a better understanding of ordered threshold categories, the current study examined associations between ordered threshold categories of severity and several measures of disability and Axis I disorders for the full set of 10 PDs in the general population. Data were obtained from the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC) Waves 1 (2001–2002) and 2 (2004–2005). Respondents were categorized according to PD criteria as follows: “no symptoms” for having no positive criteria, “sub-threshold” for having at least one positive criterion but below the DSM-IV threshold, “at-threshold” for meeting the DSM-IV threshold and additionally having 1 or 2 more positive criteria, and “supra-threshold” for meeting the DSM-IV threshold plus 3 or more positive criteria. Findings from this national study support dimensional approaches to diagnostic classifications for the majority of PDs, although the usefulness of these approaches may vary by type of disability and Axis I disorder. Even among PDs with the least consistent associations for dimensional scoring (i.e., antisocial personality disorder, schizoid, and narcissistic PDs), significant associations were present. The findings from the current study indicate significant associations with disability and Axis I disorders for sub-threshold PD assessments, confirming that mild levels of severity indeed have clinical significance.

INTRODUCTION

Although categorical representations of personality disorders (PDs) dominate the current DSM-IV diagnostic system, they have been criticized for using arbitrary thresholds to define categories and ignoring within-category heterogeneity (Balsis, Lowmaster, Cooper, & Benge, 2011; Cooper, Balsis, & Zimmerman, 2010). Others have questioned whether PD symptom criteria infer specificity of distinct categories or are best viewed as indicators of continuous dimensions (Cooper et al., 2010; Krueger, Markon, Patrick, & Iacono, 2005; Widiger & Simonsen, 2005). Comparisons between categorical versus dimensional modeling favor dimensional representations of PDs because they have been found to be

more reliable, stable, and robustly associated with other disorders (Grilo et al., 2004; Heumann & Morey, 1990; Skodol et al., 2005; Widiger & Lowe, 2008; Zanarini et al., 2000). In the absence of standardized cutoffs for dimensional models and in favor of the clinical utility of categorical diagnosis (e.g., national prevalence estimates, health and treatment planning, third payment, etc.), national epidemiologic surveys of PDs and related disorders have retained the DSM-IV diagnosis (Grant, Hasin, et al., 2004; Hasin et al., 2011; Lenzenweger, Lane, Loranger, & Kessler, 2007; Pulay et al., 2009; Skodol et al., 2011).

Studies from the Rhode Island Method to Improve Assessment and Service (MIDAS) suggest that dimensional scoring based on the number of symptom criteria endorsed might be particularly important for PDs of sub-threshold severity. Asnaani, Chelminski, Young, and Zimmerman (2007) found that once the diagnostic threshold for borderline PD was reached, dimensional scoring was not informative, as the number of symptom criteria was not related to the Global Functioning Scale (GFS), the number of Axis I disorders, and current social functioning. Zimmerman, Chelminski, Young, Dalrymple, and Martinez (2012), examining whether or not milder levels of severity had clinical significance in a sample of 1,976 outpatients, found that those meeting one symptom criterion versus no criteria of borderline PD had a greater number of other disorders and suicidal ideation and attempts as well as lower GFS scores. In a study of 3,069 outpatients (Zimmerman, Chelminski, Young, Dalrymple, & Martinez, 2013), the number of criteria for those without borderline PD compared with those with borderline PD was more strongly correlated with 6 indicators of illness severity. A more recent study from the MIDAS project attempted to extend the analysis to paranoid, avoidant, and obsessive-compulsive PDs (Morgan, Chelminski, Young, Dalrymple, & Zimmerman, 2013) by testing the hypothesis that dimensional ratings were more strongly associated with morbidity indicators for patients who did not meet DSM-IV threshold criteria than those who did. The findings suggested that the hypothesis might not generalize to all PDs other than borderline PD. It is important to note that the MIDAS findings based on correlations could be affected by the well-known problem resulting from restricted ranges (Bland & Altman, 2011). When the range of one of the variables (e.g., the number of symptom criteria) is restricted, correlation may be reduced by the reduced variation. Spurious correlations may also be seen when the sample is restricted using another variable related to the ones being studied. These inconsistent findings from MIDAS merit further investigations into the full set of PDs in both clinical settings and in the general population.

The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) includes assessment of all 10 DSM-IV PDs in the general population (Grant et al., 2008; Grant, Hasin, et al., 2004; Pulay et al., 2009; Stinson et al. 2008). Confirmatory factor analysis of NESARC symptom criteria has been shown to provide an excellent fit for a single underlying latent dimension for each PD (Harford et al., 2013). The major objective in this study is to examine variations in PD sub- and supra-threshold variation with respect to disability and other mental health disorders, including alcohol use disorders (AUD), major depression, panic disorders, and bipolar I disorder. These disorders were selected to represent the broad dimensions of externalization and internalization (Kendler, Prescott, Myers, & Neale, 2003; Keyes et al., 2013; Krueger, Caspi, Moffitt, & Silva, 1998; Markon

& Krueger, 2005). Special attention is focused on the sub-threshold group of individuals who may be at risk for other disorders and impairments.

METHODS

The current study analyzed data from the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC) Waves 1 (2001–2002) and 2 (2004–2005), two national surveys of the U.S. civilian population that together assessed a full set of DSM-IV PDs. The NESARC sample was obtained from housing units, supplemented by a group quarters sampling frame, as described in detail elsewhere (Grant, Dawson, & Hasin, 2001). Face-to-face interviews were conducted with 43,093 respondents in Wave 1. The overall response rate was 81%. Blacks, Hispanics and young adults ages 18 to 24 were oversampled. Weights were provided to account for oversampling, nonresponse, and the selection of one person per household. The weighted data were representative of the civilian noninstitutionalized population of the United States in 2001–2002 based on the 2000 Decennial Census. All eligible respondents from Wave 1 who had not died, were not institutionalized, had not left the country, or had not entered the military were reinterviewed approximately 3 years later. The reinterview completion rate was 86.9%, yielding a total of 34,653 adults. Our analysis draws on the total sample of 34,653 respondents from the combined waves in the NESARC. Sample weights for Wave 2 respondents were used to ensure that the weighted Wave 2 sample represented the original baseline population of 2001–2002. Details about the NESARC sampling design and methodology are described elsewhere (Grant et al., 2009; Grant, Hasin, et al., 2004). Seven PDs were assessed in the Wave 1 NESARC (paranoid, schizoid, histrionic, antisocial, avoidant, dependent, and obsessive-compulsive PDs) (Grant, Hasin, et al., 2004). Borderline, schizotypal, and narcissistic PDs were assessed in the Wave 2 NESARC (Grant et al., 2008; Pulay et al., 2009; Stinson et al., 2008). All variables in the current study, with the exception of the seven PDs from Wave 1, were obtained from the 2004–2005 Wave 2 follow-up survey.

The assessment of PDs was based on the Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV (AUDADIS-IV) (Grant, Dawson, & Hasin, 2001; Ruan et al., 2008). The diagnosis of each PD, except antisocial personality disorder (ASPD), required an evaluation of the individual's long-term pattern of functioning (American Psychiatric Association, 1994). Respondents were asked a series of PD-symptom questions about how they felt or acted most of the time throughout their lives, regardless of the situation or whom they were with. They were instructed not to include symptoms limited to times when they were depressed, manic, drinking heavily, using medicines or drugs, or experiencing withdrawal symptoms, or during times when they were physically ill.

To receive a DSM-IV PD diagnosis, respondents needed to endorse the requisite number of DSM-IV symptom items for the particular PD, and at least one positive symptom must have caused social and/or occupational dysfunction. The following question for each PD symptom criterion was used to measure symptom dysfunction: "Did this [symptom] ever trouble you or cause problems at work or school, or with your family or other people?" The DSM-IV distress/impairment criterion does not apply to ASPD. Multiple symptom items were used to operationalize the more complex criteria associated with certain PDs.

Consistent with DSM-IV, diagnoses of ASPD required the requisite number of criteria, in addition to the specified number of criteria for conduct disorder before age 15. Reliability and validity of AUDADIS-IV PDs have been reported elsewhere (Grant et al., 2003; Ruan et al., 2008). PD criteria were categorized as follows: “no symptoms” for having no positive criteria, “sub-threshold” for having at least one positive criterion but below the DSM-IV threshold, “at-threshold” for meeting the DSM-IV threshold and additionally having 1 or 2 more positive criteria, “supra-threshold” for meeting the DSM-IV threshold plus 3 or more positive criteria. Due to the limited numbers of cases, the categories for histrionic, avoidant, and dependent PDs were limited to two categories: sub-threshold and at-threshold.

Version 2 of the Short Form as Health Survey (Ware, Kosinski, Turner-Bowler, & Gandek, 2002) assessing norm-based mental competence was used to assess level of disability associated with threshold categories. Disability assessment in the current study was focused on 3 disability scores: the mental component summary (MCS) score; the social functioning (SF) scores, which reflect limitations in social functioning due to physical or emotional problems; and the role emotional (RE) functioning score, which measures role impairment due to emotional problems. The NESARC used standard norm-based scoring techniques to transform each score to have a mean of 50 and a standard deviation of 10 in the general U.S. population, with higher scores indicating lower disability (Grant, Hasin, et al., 2004). In addition to the three disability scores, the number of social/occupational dysfunction symptoms for each PD was also assessed when comparing the PD threshold categories.

The following Wave 2 lifetime DSM-IV diagnoses were assessed: alcohol use disorder, major depression, panic disorder with or without agoraphobia, and bipolar I disorder. All mood and anxiety disorder diagnoses excluded disorders that were substance induced or due to general medical conditions. Reliability and validity of these diagnoses were good to excellent as reported elsewhere (Grant, Harford, Dawson, Chou, & Pickering, 1995; Grant, Hasin, Blanco, et al., 2005; Grant, Hasin, Stinson, et al., 2004, 2005).

Normal regression models were conducted to examine the relationships between PD threshold categories and social/occupational dysfunction in addition to the three disability scores, to determine if respondents with higher thresholds of symptoms were more impaired than those with lower or no PD symptoms. Logistic regression models were conducted to examine the relationships between PD threshold categories and the DSM-IV disorders. We did not require PD threshold categories to have at least one PD symptom criterion associated with social/occupation dysfunction for Tables 1 and 2 but did for Table 3. Analyses were conducted separately for each PD and adjusted for gender, age, race/ethnicity, and marital status using the statistical modeling program Mplus (Muthén & Muthén, 1998–2010). Logistic regression models were estimated by the maximum likelihood estimation with robust standard errors. Sampling weights and design effects of the NESARC were taken into account for parameter estimation as well as standard error and model fit calculations.

RESULTS

Table 1 presents the distributions of PD threshold categories and correlations between symptom counts and social/occupational dysfunction. The results from the linear regression

analysis of social/occupational dysfunction and disability are shown in Table 2. Across the PDs, each ordered threshold category, when compared with the category of no symptoms, indicated higher levels of social/occupational dysfunction and (with a few exceptions) conferred greater disability. Notably, the regression coefficients of the sub-threshold of schizoid PD were not statistically significant for each disability, those of the sub-threshold of obsessive-compulsive PD were not statistically significant for mental health and social functioning, and that of the sub-threshold ASPD was not statistically significant for social functioning. By inspecting whether the confidence intervals overlap or not, we noticed differences significant enough to discriminate among the ordered threshold categories for paranoid, schizotypal, and borderline PDs. For the three PDs without the supra-threshold category (histrionic, avoidant, and dependent PDs), the at-threshold category also conferred greater disability than the sub-threshold category. By contrast, discriminating among threshold categories was less clear-cut for schizoid, ASPD, narcissistic, and obsessive-compulsive PDs. Schizoid PD conferred greater disability in the at-threshold than the sub-threshold category and in the supra-threshold than the at-threshold category, except that the disability for role emotional functioning was not significantly different between the at- and supra-threshold categories. ASPD conferred greater mental health and social functioning disability in the supra-threshold than in the sub-threshold category, but the disability for role emotional functioning was not significantly different among the ordered threshold categories. Narcissistic PD conferred greater disability in the at- and supra-threshold categories than in the sub-threshold category, but the disability for mental health and social functioning was not significantly different between the at- and supra-threshold categories. Obsessive-compulsive PD conferred greater disability in the at- and supra-threshold categories than in the sub-threshold category, though differences between at- and supra-thresholds were not statistically significant for role emotional functioning.

Table 3 shows the results of the logistic regression analysis of common DSM-IV Axis I disorders. Across PDs, the ordered threshold categories conferred significantly greater risks for having an Axis I disorder compared with the category of no symptoms; this was true for each of the Axis I disorders. However, because the confidence intervals overlapped, the difference in risk of lifetime major depression was not statistically significant among the ordered threshold categories of PDs. The exception was histrionic PD, where the odds of depression were significantly higher in those with sub-threshold histrionic PD than those with at-threshold histrionic PD. Differences with respect to other Axis I disorders are described below.

AUD

The odds for an AUD were significantly higher in the at-threshold category compared with the sub-threshold category of histrionic PD and ASPD, in the supra-threshold category compared with the at-threshold category of ASPD, and in the supra-threshold category compared with the sub-threshold category of borderline PD.

Panic

The odds for panic disorders were significantly higher in the at-threshold category than in the sub-threshold category of paranoid, schizotypal, histrionic, borderline, avoidant,

dependent, and obsessive-compulsive PDs. The same was true for the supra-threshold category compared with the at-threshold category of borderline PD.

Bipolar I

The odds for bipolar I disorder were significantly higher in the at-threshold category than in the sub-threshold category of paranoid, schizotypal, histrionic, borderline, narcissistic, avoidant, dependent, and obsessive-compulsive PDs. Similarly, the odds were higher in the supra-threshold category compared with the at-threshold category of paranoid, schizoid, schizotypal, borderline and obsessive-compulsive PDs.

DISCUSSION

Drawing on a national survey of PDs, the current study examined associations between ordered threshold categories of severity (as measured by the number of symptom criteria) and several measures of disability and Axis I disorders. Overall, the level of disability increased with the levels of severity embodied in the ordered threshold categories of PDs, expanding prior categorical PD assessments by Grant, Hasin, and colleagues (2004). Except for schizoid and obsessive-compulsive PDs, sub-threshold levels were found to be significantly related to disability and social/occupational dysfunction—findings consistent with the MIDAS study for borderline, paranoid, and to some extent avoidant PDs (Asnaani et al., 2007; Morgan et al., 2013). These findings have important implications for future etiological studies in the general population, because comparisons between high-threshold PDs and controls would be compromised if the controls with sub-threshold PDs were not distinguished from controls with no symptom criteria. Even if the impact of mis-specification might be low for large epidemiological studies, including sub-threshold PDs in the same reference category as no positive criteria would also distort risk assessments and underestimate the associations between PDs and other psychiatric disorders and outcomes. More importantly, if future studies confirm that mild levels of severity indeed have clinical significance, the exclusion of sub-threshold estimates in epidemiologic surveys would jeopardize the effect of prevention and early intervention.

Findings from the current study further indicated significantly higher levels of disability at higher versus lower thresholds for the majority of the 7 PDs with supra-threshold estimates, though these differences were not statistically significant for ASPD and varied by type of disability for schizoid, narcissistic, and obsessive-compulsive PDs. In contrast with the MIDAS findings, disability levels increased across the thresholds for paranoid and borderline PDs. Comparisons between the current study and MIDAS are constrained by different sample populations (general population versus outpatients) and symptom assessments. Although both studies were based on structured interviews with trained interviewers, the NESARC was based on AUDADIS-IV, while the MIDAS project was based on the Structured Interview for DSM-IV Personality (SIDP-IV) and a modified version of the Structured Clinical Interview for DSM-IV (SCID-I). The variation in threshold categorization may also contribute to discrepancy in study findings.

Despite consistent and significant associations between each DSM-IV PD diagnosis and the Axis I disorders examined in this study, there were pronounced variations in the associations

between ordered threshold categories of PD severity and type of disorder. These variations ranged from an absence of association with depression to consistent associations with bipolar I disorder. Consistent with Cluster B PDs associations with externalizing disorders (Jahng et al., 2011), it is not surprising to find significant increases in the odds for AUD between lower and higher levels of severity for ASPD and borderline PD and between sub-threshold and at-threshold levels of histrionic PD. However, there was little evidence that the risk for major depression increased with the number of PD symptom criteria. In view of the significance of PD threshold severity in predicting other Axis I disorders, especially bipolar I disorder, reasons for the lack of greater risks associated with the PD supra-threshold severity in predicting major depression are not readily apparent. In a study of the relationship between PDs and the course of major depressive disorder, Skodol and colleagues (2011) reported that borderline PD is the only PD significantly predicting the persistence of major depressive disorder, after controlling for other confounders (odds ratio = 2.51). In the current study, borderline PD had an odds ratio of 2.45 for the sub-threshold category, 3.27 for the at-threshold category, and 2.19 for the supra-threshold category, but these differences were not statistically significant. By contrast, the risks for disability and other Axis I disorders associated with borderline PD increased monotonically with the ordered threshold categories of severity. In addition to borderline PD, Cluster C PDs exhibited clear signs of threshold severity in terms of the risk for panic disorders with and without agoraphobia. This was also true for paranoid and schizotypal PDs, whose sub-threshold category had significant lower odds ratios than at-threshold and supra-threshold categories. Consistent with the findings of Grant, Stinson, et al., (2005), for all PDs there were significant differences in threshold severity with respect to bipolar I disorder.

A number of study limitations need to be highlighted. First, our ordered threshold categories of PDs were based on the distribution of symptom criteria counts. Basing PD severity on the number of endorsed symptom criteria does not take into account the severity of individual symptom criteria and may offer only a coarse estimate of the trait severity derived from the IRT factor scores (Balsis et al., 2011; Cooper et al., 2010). Second, although the selection of Axis I disorders for assessment was guided by current research, the number of disorders chosen was limited, and results may differ with other Axis I disorders. Furthermore, though the analyses were adjusted for sociodemographic factors, they were not adjusted for the presence of other Axis I and II disorders. Third, diagnoses of disorders were based on structured interviews by lay interviewers. Although these interviews are informed by DSM-IV criteria, they are not clinical assessments. This concern is lessened by the fact that the NESARC has demonstrated fair to good reliability for all 10 DSM-IV PDs in the general population while offering extensive useful information, including PD prevalence, correlates, and comorbidity, and essential role in the incidence and persistence of other disorders (Eaton et al., 2011; Hasin et al., 2011; Skodol et al., 2011). And fourth, the PDs were assessed at different time periods. This may have introduced some bias in the associations with Axis I disorders at Wave 2, although Eaton and colleagues (2011) found no evidence for bias related to differential follow-up when they compared Wave 2 borderline PD with Wave 1 borderline-related constructs.

The findings from the current study indicate significant associations with disability and Axis I disorders for sub-threshold PD assessments, supporting one of the criticisms of DSM

categorical modeling that the choice of the minimum number of criteria for diagnosis appears to be arbitrary. Nevertheless, more studies are needed to confirm this implication that mild levels of severity indeed have clinical significance. Although varied among PDs with respect to disability and axis I disorders, the presence of significant differences between at- and supra-thresholds supports dimensional approaches to diagnostic classifications of PD. As twin studies have demonstrated genetic and environmental associations with externalizing and internalizing dimensions for common psychiatric disorders (Kendler et al., 2003, 2011), future studies also are needed to identify the potential role of these factors in PD threshold severity.

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Percentage distribution of PD threshold categories and correlations between PD symptom counts and social/occupational dysfunction

Table 1

DSM-IV PD	No symptoms	Sub-threshold	At-threshold	Supra-threshold	Correlation
Paranoid	62.33	31.72	4.61	1.34	0.69
Schizoid	32.76	53.11	11.58	2.55	0.31
Schizotypal	33.66	58.38	5.72	2.24	0.51
Histrionic*	46.28	50.54	3.18		0.49
Antisocial	95.46	0.90	1.73	1.90	
Borderline	53.16	40.15	4.40	2.28	0.78
Narcissistic	33.42	54.80	8.56	3.22	0.52
Avoidant*	75.15	21.28	3.56		0.66
Dependent*	83.97	15.48	0.55		0.66
Obsessive	29.72	55.86	12.01	2.41	0.55

* Too few cases were available for supra-threshold estimation.

Table 2Normal regression of social/occupational dysfunction and disability by PD symptom category¹

DSM-IV PD	Social/Occupational Dysfunction	Mental Health	Social Functioning	Role Emotional Functioning
	Coefficient (99% C.I.)	Coefficient (99% C.I.)	Coefficient (99% C.I.)	Coefficient (99% C.I.)
Paranoid				
No symptoms	Referent	Referent	Referent	Referent
Sub-threshold	0.38 (0.36, 0.41)	-1.96 (-2.39, -1.53)	-1.43 (-1.79, -1.06)	-1.48 (-1.84, -1.11)
At-threshold	1.89 (1.76, 2.02)	-5.94 (-6.89, -4.99)	-4.94 (-5.95, -3.93)	-4.68 (-5.79, -3.58)
Supra-threshold	3.89 (3.55, 4.23)	-9.86 (-11.7, -7.96)	-8.95 (-10.9, -7.03)	-8.03 (-9.84, -6.22)
Schizoid				
No symptoms	Referent	Referent	Referent	Referent
Sub-threshold	0.08 (0.07, 0.09)	-0.12 (-0.49, 0.25)	-0.23 (-0.54, 0.07)	-0.18 (-0.54, 0.18)
At-threshold	0.36 (0.32, 0.41)	-2.11 (-2.81, -1.41)	-2.36 (-3.01, -1.71)	-2.12 (-2.75, -1.48)
Supra-threshold	0.86 (0.67, 1.06)	-4.28 (-5.51, -3.05)	-4.47 (-5.87, -3.07)	-3.57 (-5.01, -2.13)
Schizotypal				
No symptoms	Referent	Referent	Referent	Referent
Sub-threshold	0.15 (0.14, 0.16)	-2.70 (-3.08, -2.31)	-1.68 (-2.03, -1.34)	-1.67 (-2.01, -1.33)
At-threshold	0.85 (0.76, 0.95)	-6.34 (-7.25, -5.43)	-5.51 (-6.46, -4.58)	-5.13 (-6.05, -4.21)
Supra-threshold	2.58 (2.20, 2.74)	-10.7 (-12.1, -9.34)	-10.3 (-11.9, -8.67)	-8.78 (-10.1, -7.43)
Histrionic *				
No symptoms	Referent	Referent	Referent	Referent
Sub-threshold	0.24 (0.22, 0.25)	-0.97 (-1.30, -0.65)	-0.95 (-1.24, -0.65)	-0.78 (-1.12, -0.45)
At-threshold	1.41 (1.23, 1.60)	-4.65 (-5.73, -3.58)	-4.29 (-5.38, -3.21)	-4.40 (-5.46, -3.34)
Antisocial				
No symptoms		Referent	Referent	Referent
Sub-threshold		-2.13 (-3.83, -0.43)	-1.37 (-3.04, 0.29)	-1.94 (-3.77, -0.10)
At-threshold		-2.74 (-4.06, -1.14)	-2.32 (-3.84, -0.80)	-2.42 (-3.90, -0.95)
Supra-threshold		-5.47 (-7.01, -3.93)	-5.31 (-6.82, -3.79)	-5.30 (-6.91, -3.70)
Borderline				
No symptoms	Referent	Referent	Referent	Referent
Sub-threshold	0.55 (0.52, 0.57)	-3.38 (-3.74, -3.03)	-2.40 (-2.75, -2.06)	-2.21 (-2.54, -1.87)
At-threshold	2.92 (2.76, 3.08)	-10.5 (-11.5, -9.54)	-8.87 (-9.95, -7.79)	-8.62 (-9.62, -7.62)
Supra-threshold	5.46 (5.15, 5.76)	-15.1 (-16.5, -13.7)	-14.0 (-15.6, -12.5)	-12.7 (-14.2, -11.3)
Narcissistic				
No symptoms	Referent	Referent	Referent	Referent
Sub-threshold	0.24 (0.22, 0.25)	-1.53 (-1.95, -1.10)	-1.20 (-1.56, -0.83)	-1.01 (-1.45, -0.68)
At-threshold	1.04 (0.96, 1.11)	-3.97 (-4.78, -3.16)	-3.31 (-4.03, -2.58)	-3.12 (-3.85, -2.36)
Supra-threshold	2.32 (2.09, 2.84)	-5.31 (-6.37, -4.25)	-5.02 (-6.06, -3.99)	-5.05 (-6.14, -3.97)
Avoidant *				

DSM-IV PD	Social/Occupational Dysfunction	Mental Health	Social Functioning	Role Emotional Functioning
	Coefficient (99% C.I.)	Coefficient (99% C.I.)	Coefficient (99% C.I.)	Coefficient (99% C.I.)
No symptoms	Referent	Referent	Referent	Referent
Sub-threshold	0.25 (0.23, 0.27)	-2.62 (-3.06, -2.18)	-1.87 (-2.31, -4.44)	-2.13 (-2.57, -1.71)
At-threshold	2.22 (2.02, 2.42)	-7.75 (-8.84, -6.66)	-6.69 (-7.85, -5.52)	-6.41 (-7.59, -5.22)
Dependent *				
No symptoms	Referent	Referent	Referent	Referent
Sub-threshold	0.29 (0.26, 0.32)	-3.18 (-3.64, -2.72)	-3.09 (-3.56, -2.61)	-3.30 (-3.78, -2.81)
At-threshold	3.45 (2.76, 4.15)	-12.6 (-16.3, -8.98)	-13.0 (-16.7, -9.38)	-13.3 (-16.2, -10.2)
Obsessive-compulsive				
No symptoms	Referent	Referent	Referent	Referent
Sub-threshold	0.19 (0.18, 0.20)	-0.14 (-0.56, 0.28)	0.07 (-0.32, 0.45)	0.45 (0.08, 0.82)
At-threshold	1.09 (1.02, 1.15)	-2.37 (-3.00, -1.75)	-2.08 (-2.67, -1.49)	-1.41 (-2.01, -0.82)
Supra-threshold	2.75 (2.52, 2.98)	-5.00 (-6.23, -3.78)	-4.25 (-5.60, -2.89)	-3.06 (-4.40, -1.72)

¹ Adjusted for gender, age, race/ethnicity, and marital status.

* Too few cases were available for above threshold estimation.

Table 3Logistic regression of any lifetime DSM-IV Axis I disorders by PD symptom category^{1, 2}

DSM-IV PD	AUD	Depression	Panic	Bipolar I
	OR (99% C.I.)	OR (99% C.I.)	OR (99% C.I.)	OR (99% C.I.)
Paranoid				
No symptoms	1.00	1.00	1.00	1.00
Sub-threshold	2.02 (1.77, 2.30)	2.25 (1.96, 2.58)	2.68 (2.28, 3.16)	3.66 (2.94, 4.55)
At-threshold	2.36 (1.92, 2.90)	2.32 (1.85, 2.90)	5.20 (4.05, 6.67)	9.12 (7.13, 11.7)
Supra-threshold	3.10 (2.18, 4.18)	1.56 (1.06, 2.29)	8.62 (6.07, 12.2)	18.8 (13.3, 26.6)
Schizoid				
No symptoms	1.00	1.00	1.00	1.00
Sub-threshold	2.14 (1.75, 2.65)	2.37 (1.90, 2.96)	3.31 (2.52, 4.33)	4.87 (3.69, 6.43)
At-threshold	2.22 (1.73, 2.58)	2.45 (1.87, 3.22)	5.07 (3.90, 6.60)	6.22 (4.78, 8.10)
Supra-threshold	1.90 (1.25, 2.89)	2.19 (1.44, 3.34)	5.27 (3.14, 8.86)	12.6 (8.71, 18.3)
Schizotypal				
No symptoms	1.00	1.00	1.00	1.00
Sub-threshold	1.68 (1.45, 1.95)	2.41 (2.07, 2.82)	2.52 (2.08, 3.06)	3.54 (2.80, 4.48)
At-threshold	1.96 (1.57, 2.95)	2.46 (1.89, 3.20)	5.11 (3.89, 6.70)	7.54 (5.86, 9.70)
Supra-threshold	2.28 (1.69, 3.06)	1.75 (1.26, 2.42)	8.16 (6.08, 10.9)	13.3 (9.92, 17.9)
Histrionic*				
No symptoms	1.00	1.00	1.00	1.00
Sub-threshold	2.01 (1.76, 2.29)	2.52 (2.18, 2.92)	3.23 (2.73, 3.82)	4.57 (3.82, 5.46)
At-threshold	3.61 (2.68, 4.87)	1.54 (1.10, 2.14)	5.47 (3.94, 7.59)	10.8 (8.16, 14.2)
Antisocial				
No symptoms	1.00	1.00	1.00	1.00
Sub-threshold	1.83 (1.20, 2.80)	1.86 (1.14, 3.02)	1.30 (0.73, 2.31)	2.82 (1.61, 4.92)
At-threshold	4.05 (2.85, 5.75)	1.85 (1.34, 2.56)	2.72 (1.82, 4.07)	4.38 (3.11, 6.17)
Supra-threshold	9.31 (6.39, 13.6)	1.71 (1.23, 2.37)	5.35 (3.71, 7.91)	7.44 (5.42, 10.2)
Borderline				
No symptoms	1.00	1.00	1.00	1.00
Sub-threshold	2.07 (1.86, 2.32)	2.45 (2.17, 2.77)	2.54 (2.15, 2.99)	3.47 (2.88, 4.19)
At-threshold	2.65 (2.20, 3.20)	3.27 (2.63, 4.07)	4.67 (3.67, 5.96)	9.60 (7.37, 12.5)
Supra-threshold	3.61 (2.82, 4.63)	2.19 (1.70, 2.81)	11.2 (8.66, 14.5)	28.1 (21.9, 36.1)
Narcissistic				
No symptoms	1.00	1.00	1.00	1.00
Sub-threshold	1.64 (1.45, 1.86)	2.08 (1.80, 2.41)	2.45 (2.03, 2.96)	3.01 (2.48, 3.71)
At-threshold	1.95 (1.61, 2.35)	1.73 (1.45, 2.07)	3.02 (2.41, 3.79)	5.08 (3.91, 6.69)
Supra-threshold	1.99 (1.54, 2.54)	1.48 (1.09, 2.01)	3.94 (2.79, 5.58)	8.42 (6.26, 11.3)
Avoidant*				

DSM-IV PD	AUD	Depression	Panic	Bipolar I
	OR (99% C.I.)	OR (99% C.I.)	OR (99% C.I.)	OR (99% C.I.)
No symptoms	1.00	1.00	1.00	1.00
Sub-threshold	2.09 (1.71, 2.49)	2.49 (2.05, 3.03)	3.56 (2.81, 4.52)	4.97 (3.93, 6.28)
At-threshold	1.89 (1.46, 2.45)	2.70 (2.10, 3.46)	7.21 (5.67, 9.16)	11.0 (8.33, 14.5)
Dependent *				
No symptoms	1.00	1.00	1.00	1.00
Sub-threshold	2.01 (1.60, 2.53)	2.81 (2.23, 3.54)	5.42 (4.38, 6.72)	6.39 (5.00, 8.17)
At-threshold	1.84 (1.07, 3.52)	2.05 (1.20, 3.52)	14.2 (8.01, 25.1)	21.4 (13.0, 35.3)
Obsessive-compulsive				
No symptoms	1.00	1.00	1.00	1.00
Sub-threshold	1.97 (1.71, 2.27)	2.19 (1.88, 2.54)	2.11 (1.73, 2.56)	3.43 (2.64, 4.48)
At-threshold	2.14 (1.83, 2.50)	2.23 (1.86, 2.68)	3.42 (2.83, 4.13)	5.67 (4.59, 7.00)
Supra-threshold	2.02 (1.50, 2.72)	2.30 (1.69, 3.18)	5.04 (3.66, 6.95)	10.1 (7.21, 14.2)

¹ Adjusted for gender, age, race/ethnicity, and marital status.

² Criteria are qualified for the presence of 1 or more indications of social and/or occupational dysfunction.

* Too few cases were available for supra-threshold estimation.