

PERSONALITY DISORDER NOT OTHERWISE SPECIFIED: SEARCHING FOR AN EMPIRICALLY BASED DIAGNOSTIC THRESHOLD

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The purpose of this paper is to propose a method for empirically investigating diagnostic criteria for personality disorder not otherwise specified (PDNOS). From a large, nonclinical sample of military recruits and undergraduate students who were screened for personality disorders (PDs), 572 completed the Structured Interview for DSM-IV Personality. Data from the interviewed group were used to identify a diagnostic threshold for PDNOS by comparing those who did ($n = 88$) and did not ($n = 484$) qualify for a PD diagnosis. For both groups, subjective distress increased and measures of social and occupational functioning decreased as a function of the number of PD criteria met. A classification and regression tree modeling procedure was applied using self-report scores on measures of mood, anxiety, and personality traits to arrive at probabilities for predicting the presence of a PD diagnosis based on the pattern of reported traits present. These probabilities were then used to derive an empirically based diagnostic threshold for PDNOS. In this sample, the most appropriate threshold for a PDNOS diagnosis appears to be the presence of 10 PD criteria for a person who does not qualify for a diagnosis of any other specific form of PD. This definition identified 5.5% of the young adults who were interviewed in this study.

The category of Personality Disorder Not Otherwise Specified (PDNOS) is defined for “disorders of personality functioning that do not meet the full criteria for any one personality disorder, but that together cause clinically significant distress or impairment in one or more important areas of functioning” (American Psychiatric Association [APA], 2000). Like other NOS diagnoses, there are no specific criteria for PDNOS, leaving researchers to operationalize the disorder in different ways. Most often, PDNOS refers to

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a mixed presentation of personality pathology, but the concept is further complicated by its association with PDs that are defined in the appendices of the manual (i.e., passive-aggressive PD and depressive PD). Occasionally, data are reported separately for the defined types of PDNOS, but in many cases researchers do not report what criteria they use for inclusion in the PDNOS category. Ambiguity and inconsistency in diagnostic criteria make it difficult to evaluate the prevalence and utility of this disorder.

While many investigators share the impression that PDNOS may be the most common form of PD (Clark, Livesley, & Morey, 1997; Westen & Arkowitz-Westen, 1998), only a handful of studies have reported prevalence rates for this condition. The earliest reports were based on DSM-III criteria, which included a "mixed, atypical, or other" category. The *atypical* term was used for those patients who were believed to have a PD, but the information present at the time was insufficient to make a more specific PD diagnosis (APA, 1980). Two research groups utilizing a chart review of psychiatric inpatients found rates of "mixed, atypical, or other" PD ranging from 10% to 30%, making this diagnosis the second and first most common PD diagnosis found in these studies (Koeningsberg, Kaplan, Gilmore, & Cooper, 1985; Fabrega, Ulrich, Pilkonis, & Mezzich, 1993). In a study of DSM-III PDs in families of depressed and control probands, Coryell and Zimmerman (1989) found rates ranging from 2% in relatives of never-ill probands to 5% in the relatives of patients with mood-congruent psychotic features. Subjects in this study were diagnosed with PDNOS if they fell one criterion short of meeting criteria for two or more specifically defined DSM-III PDs.

Morey (1988) compared PD prevalence rates using two versions of the diagnostic manual (DSM-III and DSM-III-R). Patients were evaluated for the presence of PDs by their own clinicians. Using DSM-III criteria for "atypical, mixed" PD, 29% of the patients were identified (second most common diagnosis). Using DSM-III-R criteria for PDNOS, 22% of the sample were identified (third most common diagnosis). The 7% drop in prevalence using DSM-III-R criteria may be due to the fact that the "atypical" subcategory was removed leaving the PDNOS category to be comprised of only the "mixed" component. Because Morey (1988) did not report cut-off scores employed to identify PDNOS, comparisons to other studies are ambiguous.

Using DSM-III-R PD criteria in a nonclinical population, Lenzenweger, Loranger, Korfine, and Neff (1997) found that among undergraduate students who completed diagnostic interviews for PDs, PDNOS was the most common diagnosis (4% of the sample). Lenzenweger et al. did establish a specific threshold for PDNOS: the presence of 10 or more criteria for any of the PDs without meeting the definition for any specific PD. Camus, de Mendonca Lima, Gaillard, Simeone, and Wertheimer (1997) used a more conservative threshold. They defined PDNOS as the presence of 15 or more PD features in a person who did not meet the diagnostic threshold for any other type of PD. In a sample of geriatric patients with major depressive

disorder, they found an 11% rate of PDNOS (making it the third most common Axis II diagnosis in their sample).

The contrast in prevalence between PDNOS and other specific forms of PD is also inconsistent in studies using DSM-IV criteria. In a sample of 434 patients being treated for an anxiety disorder, PDNOS was the second most common form of PD (Baillie & Lampe, 1998). In a sample of elderly prisoners, PDNOS was found to be the least common Axis II diagnosis (Fazel, Hope, O'Donnell, & Jacoby, 2001). Criteria employed for a diagnosis of PDNOS were not reported in either of these studies.

Important questions about the nature of personality pathology will be difficult to answer unless more specific criteria for PDNOS are established. Do the specific PD categories in DSM-IV provide adequate coverage of this domain? Are more generalized cases of personality problems also associated with significant personal distress? And do those cases actually outnumber people who happen to fall within the more traditional diagnostic categories? Resolution of these issues would provide useful information to be employed in future discussions regarding the classification of personality disorders.

What steps could be followed in order to establish an empirically based threshold for the diagnosis of PDNOS? One consideration involves the level of subjective distress or functional impairment that is experienced by people who *do* qualify for the diagnosis of a specific form of PD. The first step in searching for a threshold for PDNOS is to establish that value. The next step is to go back to the set of people who do not qualify for a specific PD diagnosis and determine how many miscellaneous PD features the prototypical person must exhibit before he or she can be expected to experience a level of distress or impairment that is commensurate with other forms of PD. That is the process that we followed in this study. We focused on subjective distress rather than functional impairment because we did not obtain an objective measure of social and occupational impairment from all participants. We measured subjective distress using the Beck Depression Inventory (BDI; Beck & Steer, 1987) and the Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988). We followed the steps outlined above in an effort to illustrate the process of exploration and to identify a preliminary threshold that might subsequently be evaluated using different samples of participants and more comprehensive measures of subjective distress and functional impairment. After the threshold level was set, we then examined social and occupational functioning data, available for only a subset of participants, to see if those identified as likely candidates for PDNOS were also demonstrating impairments in these areas.

METHODS

PARTICIPANTS

The data for these analyses were collected from 572 young men and women who completed semistructured diagnostic interviews as part of a larger study of personality disorders. Additional details about the study

and our assessment procedures have been reported elsewhere (Clifton, Turkheimer, & Oltmanns, 2004; Oltmanns & Turkheimer, in press; Thomas, Turkheimer, & Oltmanns, 2003). The study focused on two samples: One sample included 2,033 United States Air Force recruits (62% male)¹ who completed our personality screening procedure. They were identified and tested in groups that were about to complete a period of 6 weeks of basic military training. The other sample included 1,171 undergraduate students (36% male) who completed the same personality screening procedure during the spring semester of their first year at university. The students were identified and tested in groups who had lived together in a dormitory for at least 5 months.

From the first sample, we selected 411 recruits (59% male) to participate in a semistructured diagnostic interview. From the second sample, we selected 161 students (36% male) to complete the interview. Most of the people who participated in the interview were selected on the basis of evidence suggesting that they might display evidence of some type of personality disorder. In each sample, roughly one third of the participants were selected because their peers had nominated them as exhibiting pathological personality traits, one third were selected because they produced high scores on a self-report measure of personality pathology, and the final third were selected randomly from the remaining participants as a control group. Interviewers were kept blind to information regarding scores on all screening measures.

MEASURES

Schedule for Nonadaptive and Adaptive Personality (SNAP). The SNAP is a factor-analytically derived self-report inventory composed of 375 true/false items designed to assess trait dimensions in the domain of personality disorders (Clark, 1993). It also includes six validity scales, 17 trait/temperament scales,² and 10 scales corresponding to the DSM-III-R personality disorders.

Beck Depression Inventory (BDI). The BDI is a 21-item self-report measure that has been widely used to measure the severity of depressive symptoms in clinical, nonclinical, and research settings (Beck & Steer, 1987). The BDI has adequate psychometric properties and utility in a wide range of populations (Beck, Steer, & Garbin, 1988).

Beck Anxiety Inventory (BAI). The BAI is a 21-item self-report measure of the severity of anxiety symptoms with adequate psychometric properties in a wide range of ages and populations (Beck, Epstein et al., 1988; Bor-

1. Age ranged from 17 to 30 years, with a mean of 19.8 years ($SD = 2.3$). Mean IQ was 104, and 99% were high school graduates. Recruits were 65% Caucasian, 18% African American, 4% biracial, 3% Asian, .5% Native American, and 9% listed their race as "Other."

2. The 17 SNAP trait/temperament scales are Negative Temperament, Mistrust, Manipulation, Aggression, Self-Harm, Eccentric Perceptions, Dependence, Positive Temperament, Exhibition, Entitlement, Detachment, Disinhibition, Impulsivity, Proper Behavior, Hard-Working, Self-Derogatory, and Suicide Prone.

den, Peterson, & Jacobsen, 1991). Items reflect cognitive, affective, and somatic symptoms of anxiety that are rated on a 4-point scale of experiential severity.

Social Functioning Questionnaire (SFQ). Only 100 of the interviewed students completed this measure because it was added late in the data collection phase of this study (Oltmanns, Melley, & Turkheimer, 2002). The SFQ is an 8-item self-report measure of general social functioning (Tyrer, 1993). Participants rate their functioning according to how they have been feeling over the past two weeks on a scale of 1 to 4 (1 = *Most of the time*, 2 = *Quite often*, 3 = *Sometimes*, 4 = *Not at all*). This measure has adequate internal consistency (Cronbach's alpha = .64, based on our data) and has shown to be useful in detecting changes in social functioning over time (Tyrer, 1993). The eight items are: (1) I complete my tasks at work and at home satisfactorily; (2) I find my tasks at work and at home very stressful; (3) I have no money problems; (4) I have difficulties in getting and keeping close relationships; (5) I have problems in my sex life; (6) I get on well with my family and other relatives; (7) I feel lonely and isolated from other people; and (8) I enjoy my spare time.

Structured Interview for DSM-IV Personality (SIDP-IV). The SIDP-IV (Pfohl, Blum, & Zimmerman, 1997) is a semistructured interview designed to assess the diagnostic criteria for the 10 PDs listed in DSM-IV. Each criterion is rated on a scale from 0 to 3. For each PD, criterion scores were summed, and these summed scores were used as an index of PDs. All of the interviews were recorded on videotape, and each was re-rated independently by a second judge. Intraclass correlations for decisions regarding the number of criteria met for each disorder ranged from .68 (for obsessive-compulsive PD) to .90 (for avoidant PD), with a mean of .80. Kappa values for the number of criteria met for each PD ranged from .65 for schizotypal PD to .90 for avoidant PD (mean $\kappa = .77$). Discrepancies between ratings were resolved through discussion with the two raters and with a third judge. Among the Air Force recruits and students who were interviewed, 15.7% and 14.4%, respectively, met diagnostic criteria for at least one PD. The prevalence rates for each of the 10 PDs are listed in Table 1.

PROCEDURE

For the Air Force recruits, training groups were brought to a central testing center at Lackland Air Force Base. Each participant was seated at a separate computer terminal. After providing informed consent, they completed a demographic questionnaire and then computer versions of the SNAP, the BDI and BAI, and our peer nomination procedure. The battery took an average of 2 hours to complete. The procedure was essentially identical for the college sample, with the exception of the additional administration of the SFQ. Additional details regarding the peer nomination procedure are provided in Oltmanns & Turkheimer (in press). Following the initial assessment battery, we selected 20% from each flight/dorm to be interviewed using the SIDP-IV: one third were selected on the basis of elevated

TABLE 1. Prevalence Rates for the Ten DSM-IV Personality Disorders Based on SIDP-IV

	Prevalence Rates					
	Air Force Recruits		Undergraduates		Combined	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Paranoid PD	12	2.9	4	2.5	16	2.8
Schizoid PD	1	0.2	0	—	1	.2
Schizotypal PD	0	—	0	—	0	—
Antisocial PD	13	3.2	6	3.8	19	3.3
Borderline PD	12	2.9	3	1.9	12	2.1
Histrionic PD	4	1.0	1	.6	5	0.9
Narcissistic PD	8	2.0	5	3.1	13	2.3
Avoidant PD	16	3.9	1	.6	17	3.0
Dependent PD	4	1.0	0	—	4	0.7
Obsessive Compulsive PD	26	6.4	10	6.3	36	6.3

Note. For the Air Force recruits, $n = 411$, with 64 recruits meeting criteria for at least one PD. For the undergraduates, $n = 161$, with 24 students meeting criteria for at least one PD. Combined, $N = 572$, with 88 meeting criteria for at least one PD. Some participants in each group met DSM-IV criteria for more than one PD. Rates were determined using the number of participants in the interviewed samples.

SNAP scores, one third were selected on the basis of elevated MAPP-peer scores, and the last third were selected at random from the remaining people in the flight/dorm. The interviews were recorded on videotape so that they could be rated independently by a second judge. Recruits were interviewed on the same day as the initial assessment; students were interviewed within a few weeks of the initial assessment.

STATISTICAL ANALYSES

We examined the associations between criteria and levels of distress to validate this index of personality pathology and use it in the subsequent analysis. First, we divided the interviewed participants into two groups: those who met criteria for at least one of the 10 types of PD (based on the SIDP-IV) and those who did not reach the diagnostic threshold for any specific type of PD. This variable will be called “group.” Each of these groups was then further divided into subgroups of participants who exhibited a specific total number of PD criteria. This variable will be called “criteria.” Within each subgroup, we computed mean scores for subjective distress, as measured by the BDI and BAI. For both groups, BDI and BAI scores increased as the number of criteria increased (see Figure 1). We used analysis of variance (ANOVA) to predict BDI and BAI totals (separately) from the criteria and group variables in order to determine whether subjective distress increases as a function of the number of criteria that are present.

After establishing an association between criteria and our measures of distress, SNAP scales and distress data were entered into a classification and regression tree analysis (CART; Breiman, Friedman, Oshen, & Stone,

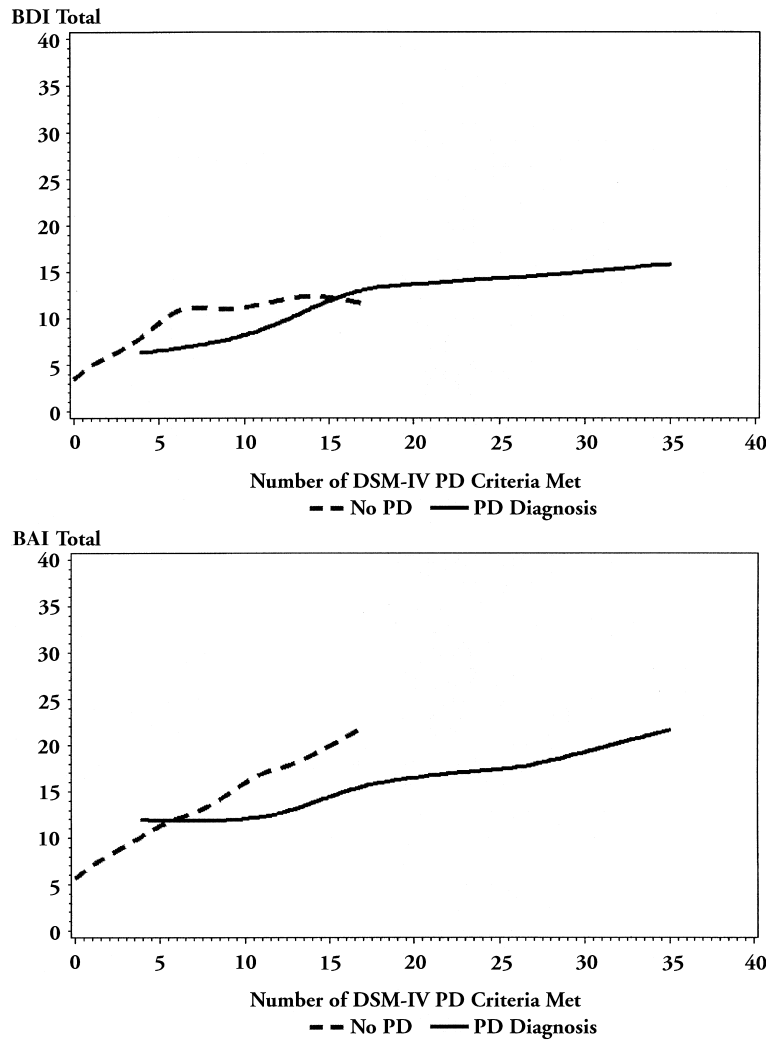


FIGURE 1. Plots of mean BDI totals (top graph) and mean BAI totals (bottom graph) as a function of total number of DSM-IV PD criteria met from SIDP interviews for those not diagnosed with a PD and for those diagnosed with at least one PD.

1984) to find the threshold on our index at which a diagnosis of PDNOS would appear to be justified. CART is a recursive method that begins by selecting the single predictor variable and cut-point that best separates participants into two distinct groups with respect to their outcome score (here, diagnostic status determined by SIDP-IV). Within each of the two newly created sets, the CART process continues, again selecting the variable that maximally separates the participants into even finer subgroups (defined with respect to the presence of a PD in this case). This method is repeated until the subgroups cannot be meaningfully subdivided further. The resulting regression tree provides a series of classification criteria,

which may be used to predict a participant's outcome (Hannöver, Richard, Hansen, Martinovich, & Kordy, 2002).

We decided upon a CART analysis because it demonstrates the multiple pathways (or branches) through the many trait scales and variables that we measured by which we can predict whether participants evidence personality pathology. Most importantly, each of these pathways carry a specific probability of being diagnosed with a PD that is then used to compare those participants who do and do not qualify for a DSM-IV PD. The latter group includes those people who might be candidates for a PD diagnosis. The minimum number of criteria chosen to indicate the presence of a PDNOS diagnosis should carry with it a similar average predicted probability as the average predicted probability of all those who did qualify for a PD diagnosis.

Lastly, we compared the 100 students who took the SFQ on self-reported social and occupational functioning. These analyses were conducted to find out whether functioning decreases as the number of criteria increase and to examine whether those students in this subsample identified as likely candidates for a PDNOS diagnosis are reporting levels of functional impairment similar to those students who meet criteria for a PD. If those students that we suspect are good candidates for a PDNOS diagnosis are functioning at similar levels as those who meet criteria for a PD, then we can be more confident in the threshold derived in the previous set of analyses.

RESULTS

Mean BDI and BAI scores for the two groups (people who qualified for at least one specific PD diagnosis and those who did not) are presented in Table 2. Within each group, we have presented scores separately as a function of the number of PD criteria exhibited by participants. Several comments should be made with regard to these distributions of scores. Among the participants who completed the SIDP-IV, 104 did not exhibit any PD features. The cells are empty in the "PD Diagnosis" group for criteria scores of zero, one, two, and three because a person must exhibit at least four criteria to qualify for one PD diagnosis. No one in our samples met more than 17 criteria without qualifying for at least one specific PD. The frequency of people in the "PD Diagnosis" group meeting various numbers of criteria remains fairly stable up into the order of 20 plus criteria. This pattern demonstrates the relatively high level of co-occurrence among specific PD diagnoses. In this sample, 36 out of 88 (41%) individuals who met criteria for at least one specific type of PD also met DSM criteria for one or more other specific PDs.

LEVELS OF DISTRESS ANALYSES

The mean number of criteria met by the 484 people who did not exhibit enough traits to qualify for a PD diagnosis was 3.5. The mean number of criteria met for the 88 people who did meet enough traits to qualify for at

TABLE 2. Frequency, Cumulative Percent, BDI, BAI, and Predicted Probability of PD Scores at Increasing Levels of DSM-IV PD Criteria for Those Without and With a PD

DSM-IV Criteria	No PD Diagnosis					PD Diagnosis				
	Freq	Cum %	BDI	BAI	Pred PD Prob(%)	Freq	Cum %	BDI	BAI	Pred PD Prob(%)
0	104	21.5	3.1	5.4	5.7	0	—	—	—	—
1	62	34.3	5.9	8.3	7.1	0	—	—	—	—
2	70	48.8	5.8	8.9	9.5	0	—	—	—	—
3	46	58.3	6.6	9.6	12.7	0	—	—	—	—
4	48	68.2	7.2	9.5	14.4	3	3.4	7.7	12.3	14.9
5	39	76.2	9.5	13.0	17.7	4	8.0	8.0	14.5	24.5
6	25	81.4	13.0	14.2	15.9	1	9.1	0.0	1.0	27.0
7	18	85.1	11.9	15.8	19.7	3	12.5	7.3	13.0	20.0
8	22	89.7	9.7	12.7	17.8	3	15.9	7.3	10.7	28.8
9	19	93.6	10.7	14.3	20.0	7	23.9	8.7	16.4	23.4
10	13	96.3	10.2	16.3	27.9	4	28.4	8.0	17.8	24.5
11	5	97.3	14.2	27.6	33.6	4	33.0	3.8	6.8	32.5
12	6	98.6	9.0	11.8	11.6	9	43.2	7.3	10.0	24.6
13	3	99.2	18.7	15.0	19.9	0	—	—	—	—
14	1	99.4	11.0	14.0	28.8	3	46.6	11.0	15.3	24.3
15	1	99.6	14.0	19.0	5.2	7	54.6	13.9	13.0	41.3
16	1	99.8	15.0	26.0	28.8	5	60.2	14.4	16.8	44.8
17	1	100.0	5.0	21.0	29.4	3	63.6	19.3	34.0	29.2
18	0	—	—	—	—	6	70.5	16.7	27.7	35.4
19	0	—	—	—	—	5	76.1	9.4	14.0	36.8
20	0	—	—	—	—	3	79.6	9.0	14.0	38.8
21	0	—	—	—	—	3	83.0	7.7	20.0	30.7
22	0	—	—	—	—	3	86.4	18.0	13.7	45.3
23	0	—	—	—	—	2	88.6	12.5	20.0	43.5
24	0	—	—	—	—	2	90.9	14.5	27.0	49.0
25	0	—	—	—	—	1	92.1	39.0	45.0	60.0
26	0	—	—	—	—	4	96.6	8.0	9.3	22.0
28	0	—	—	—	—	1	97.7	14.0	14.0	60.0
29	0	—	—	—	—	1	98.9	19.0	34.0	60.0
35	0	—	—	—	—	1	100.0	16.0	22.0	60.0
Mean:			7.1	10.0	12.3%			10.9	16.1	32.5%

Note. $N = 572$; "No PD Diagnosis" refers to those participants who did not meet DSM-IV criteria for any one PD ($n = 484$); "PD Diagnosis" refers to those participants who did meet DSM-IV criteria for at least one PD ($n = 88$); "BDI" refers to mean Beck Depression Inventory scores (possible range = 0 to 63); "BAI" refers to mean Beck Anxiety Inventory scores (possible range = 0 to 63); "Pred PD Prob (%)" refers to mean predicted probability (converted to a percentage) of a PD diagnosis based on the full CART model.

least one PD was 15.0; $t(570) = -24.65$, $p < .0001$, $d = 1.03$. The mean BDI scores for those without a PD diagnosis and for those with at least one PD diagnosis were 7.1 and 10.9, respectively; $t(570) = -4.73$, $p < .001$, $d = .20$. The mean BAI scores for those with no PD and for those with at least one PD were 10.0 and 16.1, respectively; $t(570) = -5.54$, $p < .0001$, $d = .23$.

In Figure 1, average BDI and BAI scores are graphed across increasing numbers of PD criteria met for those with and without a PD. From these graphs, it appears that the two groups differ very little on subjective distress at each number of criteria met. In fact, ANOVAs using criteria and group to account for the variance in BDI totals, $F(2, 571) = 58.6$, $p < .0001$, $R^2 = .2$, show that the criteria variable, $F(1, 571) = 91.4$, $p < .0001$,

as opposed to the group variable, $F(1, 571) = 11.1, p = .0009$, most accurately accounted for the variance in this measure. When this analysis was run to predict BAI scores, the same trends were found for the full model, $F(2, 571) = 50.8, p < .0001, R^2 = .2$, as well as for the relatively large, unique contribution of the criteria variable, $F(1, 571) = 67.3, p < .0001$, as opposed to the group variable, $F(1, 571) = 3.3, p = .07$. These results suggest that, in general, for any given number of criteria that they exhibit, participants experience approximately the same level of distress, regardless of whether or not the criteria they exhibit fall within specific PD domains or are spread across PD domains. They also indicate that the BDI and BAI are measures of subjective distress that are associated with an increased number of personality problems. Data represented in Figure 1, however, do not provide enough information to derive a threshold for diagnosing PDNOS because those with and without a PD are similar on levels of distress at all points of overlap. For these reasons, BDI and BAI levels provide useful information to be included in our subsequent CART analysis.

CLASSIFICATION AND REGRESSION TREE ANALYSIS

BDI scores, BAI scores, and the 17 SNAP trait/temperament scales were entered into a CART modeling procedure to predict the presence of a PD diagnosis (group) as measured by a semistructured interview. The purpose of the analysis was to identify a characteristic level of distress and pattern of personality traits that describe the group of people who qualified for at least one PD based on SIPD-IV interviews. Results are illustrated in Figure 2. A simple rule-of-thumb is to proceed to the left on the tree when the condition is satisfied and to the right when the condition is not. For example, the "branches" on the far right of the tree should be read as follows: For participants in our sample whose (a) Eccentric Perceptions SNAP scale score is greater than 7.5, and (b) Mistrust SNAP scale is greater than 9.5, and (c) Dependent SNAP scale is greater than 4.5, and (d) Mistrust SNAP scale is then greater than 13.5, there is a 60% probability that they will qualify for a PD diagnosis based on the structured interview (i.e., 60% of the 35 participants in this grouping actually met diagnostic criteria for a PD). This same step-by-step process can be followed down any set of branches to determine the predicted probability of a PD diagnosis for a participant meeting the conditions set forth in each level of the decision tree. Based on the model, the mean predicted probability of a PD diagnosis for participants who did not meet interview-based criteria for a PD is 12.3%, and for participants who did meet criteria in the interview, the predicted probability was 32.5%.

Table 2 shows the mean predicted probabilities of a PD diagnosis based on the CART model for each observed number of DSM criteria met in the structured interview. We can use these results to identify the number of DSM criteria that must be met among participants without a diagnosis to produce a level of distress and personality dysfunction equivalent to that

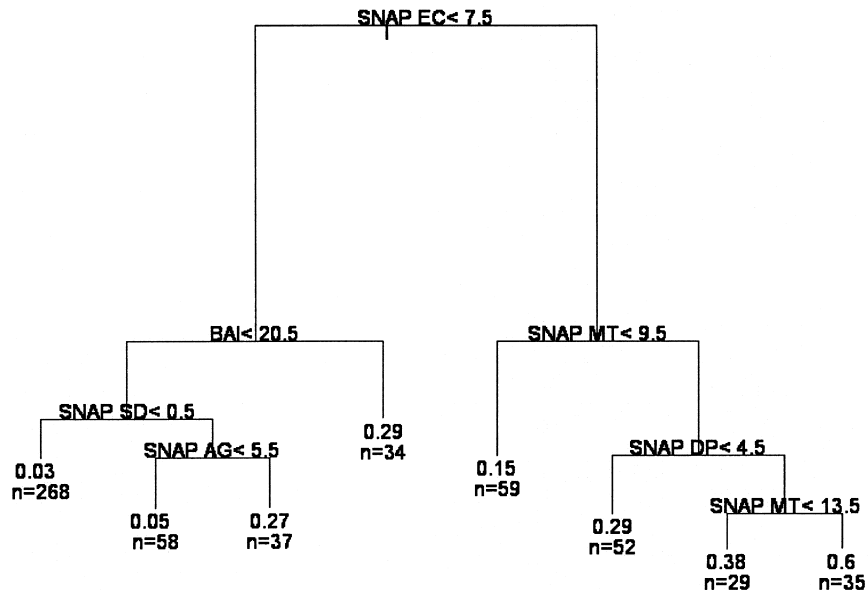


FIGURE 2. Classification and regression tree (CART) model predicting the probability of a PD diagnosis based on PDI totals, BAI totals, and 17 trait/temperamental SNAP scales.

Note. $N = 572$. SNAP EC = Eccentric Perceptions SNAP scale; BAI = BAI score; SNAP MT = Mistrust SNAP scale; SNAP SD = Self-Derogatory SNAP scale; SNAP DP = Dependent SNAP Scale; SNAP AG = Aggression SNAP Scale. The numbers in each cell indicate the predicted probability of a PD diagnosis for that cell and the number of participants meeting the necessary conditions for that cell.

displayed by the participants who do receive a diagnosis. We start with participants who did not meet any DSM criteria and move up one DSM criterion at a time, looking at the model-based probability of diagnosis in participants who exhibit one PD feature, then two PD features, and so on.

This process is illustrated in Figure 3. The plot of predicted probabilities by number of DSM criteria for those who do not have a PD shows that predicted probabilities at 10 or 11 criteria are close to the average predicted probability of those with a PD. Using 10 as a minimum number of DSM criteria identifies 31 individuals as likely candidates for a PDNOS diagnosis, resulting in a prevalence rate of 5.5% in the interviewed sample ($n = 572$) or 1.0% using the entire screened sample ($n = 3,204$). Using 11 as the minimum number of criteria for a PDNOS diagnosis, 18 participants would qualify, resulting in a prevalence rate of 3.2% in the interviewed sample or 0.6% using the entire screened sample.

SOCIAL AND OCCUPATIONAL FUNCTIONING ANALYSIS

The mean SFQ scores for those without a PD diagnosis ($n = 88$) and for those with at least one PD diagnosis ($n = 12$) were 18.8 and 17.7, respectively; $t(98) = 1.62$, $p = .11$, $d = .16$. The plot of the number of DSM-IV PD

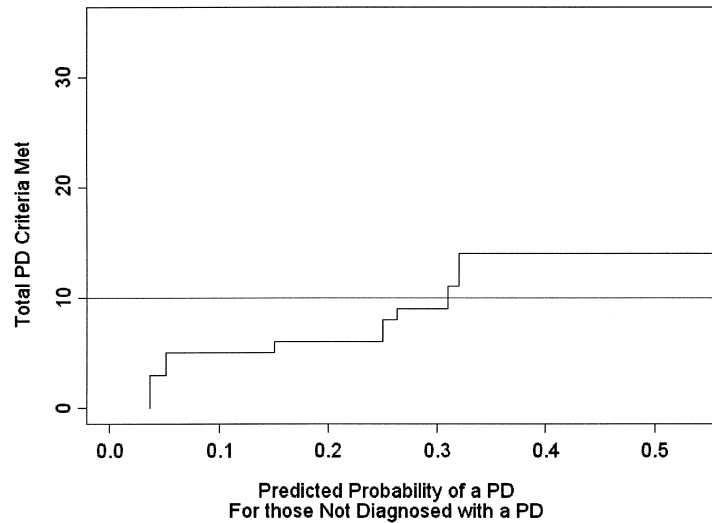


FIGURE 3. The predicted probability of a PD diagnosis for those participants not diagnosed with a PD by total number of DSM PD criteria met from SIDP interviews.

Note. Figure includes only those participants who did not meet DSM-IV criteria for any one PD ($n = 484$); Horizontal line at 10 DSM-IV PD criteria reflects our conclusion that those meeting 10 or more PD criteria have a similar predicted probability as those participants meeting at least one PD.

criteria met by average SFQ score in Figure 4 shows a steady decline in functioning as the number of criteria increases, with a more precipitous trend downward as the plot approaches 10 criteria for those not diagnosed with a PD. The average SFQ score for the five participants who met 10 or more criteria (without a PD diagnosis) was 16.0, which means that these participants were reporting, on average, slightly poorer functioning than the 12 individuals who met criteria for at least one PD.

DISCUSSION

To our knowledge, this is the first study that has attempted use an empirical method to identify a threshold for the diagnosis of PDNOS. In previous research, the criteria used for PDNOS diagnoses were not reported, vague, or arbitrary (Verheul & Widiger, 2004). Comparisons between studies are therefore difficult. By measuring “clinically significant distress” with BDI, BAI, and SNAP trait scores, we were able to identify and validate an empirical index reflecting distress that may be useful for diagnosing PDNOS. The CART model does not identify all of the people who received a diagnosis based on the diagnostic interview, and we did not expect that it would. The model was employed to identify a set of characteristics that are more likely to appear in the group of people who qualified for at least one PD than in the people who did not.

We were then able to discover at what point participants without a PD

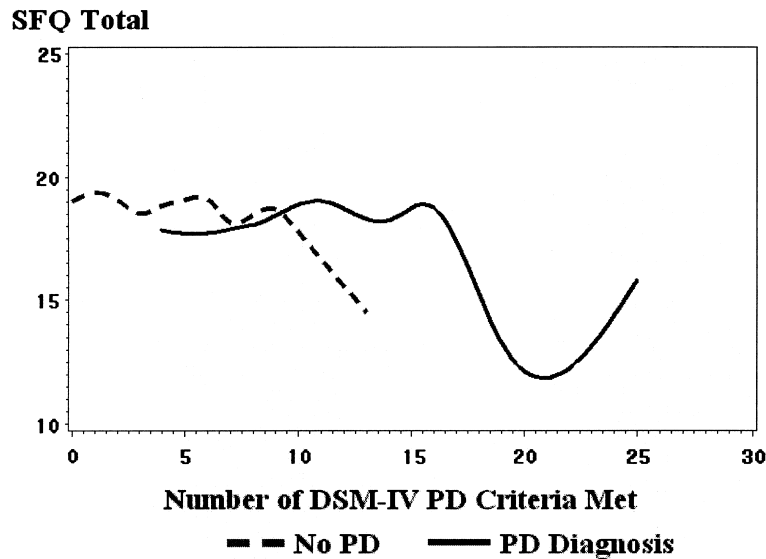


FIGURE 4. Plot of mean SFQ totals as a function of total number of DSM-IV PD criteria met from SIDP interviews for those not diagnosed with a PD and for those diagnosed with at least one PD.

Note. $n = 100$. Figure includes only the subsample of interviewed students who were given the SFQ (88 students did not receive a PD diagnosis and 12 did receive at least one PD diagnosis); SFQ = Social Functioning Questionnaire.

diagnosis resemble those who do meet criteria for at least one PD. Resemblance, in this case, was defined in terms of the predicted probability of a PD diagnosis using variables identified by the CART analysis. The average predicted probabilities of participants without a PD diagnosis but meeting a minimum of 10 or 11 criteria for PDs are similar to the average predicted probability of those meeting criteria for at least one PD. Therefore, it seems reasonable to suggest that a person who exhibits 10 or 11 PD features without meeting criteria for one specific type of PD would receive a diagnosis of PDNOS. Some investigators may want to adopt a more conservative approach. In that case, a threshold of 12 may be more appropriate. Follow-up analyses of social and occupational functioning in the small subsample of students suggests that those participants identified as likely candidates for a PDNOS diagnosis (i.e., meeting 10 or more PD criteria) are demonstrating as much or more social and occupational impairments as those who have been diagnosed with at least one PD.

The prevalence rates for PDNOS using 10 or more criteria make it the second most common PD diagnosis in our sample behind obsessive-compulsive PD (OCPD). If we use 11 or more criteria, it is the third most common diagnosis, behind OCPD and antisocial PD (see Table 1). These findings are consistent with previous studies that have reported that PDNOS diagnoses are more frequent than most other Axis II disorders (Baillie & Lampe, 1998; Fabrega et al., 1993; Koenigsberg et al., 1985; Morey, 1988).

Our results suggest that Lenzenweger et al.'s (1997) use of 10 DSM PD criteria as an "arbitrary conservative standard" (p. 348) for the diagnosis of PDNOS may not be particularly conservative, while Camus et al.'s (1997) standard of 15 criteria may be too conservative.

Although the main purpose of conducting a CART analysis was to obtain predicted probabilities, we should also mention some other findings that emerged from this modeling procedure. Referring to Figure 2, the best indicator of a PD in our sample is the tendency to perceive things oddly (SNAP Eccentric Perceptions). This feature is followed by high levels of anxiety (BAI) and a generally negative outlook (SNAP Negative Temperament). Somewhat less predictive but still important are the presence of self-derogation (SNAP Self-Derogation), moderate levels of aggression (SNAP Aggression), mistrust of others (SNAP Mistrust), and moderate levels of dependence (SNAP Dependence). When these characteristics are present—difficulties perceiving events and behaviors accurately, relating with others adaptively, and regulating emotions—the person is more likely to meet diagnostic criteria for a personality disorder.

Future investigations that attempt to identify a threshold for the diagnosis of PDNOS would benefit from the use of a more comprehensive assessment of subjective distress. Our analyses focused on the BDI and BAI. These are widely recognized measures, but they may not capture the entire range of distress or dissatisfaction experienced by people with personality disorders. It would also be useful to include objective measures of social and occupational impairment into the CART analysis because subjective distress is not the only negative consequence of personality pathology. People with personality disorders also experience impaired social functioning (Oltmanns et al., 2002; Skodol et al., 2002). Because we did not objectively assess social and occupational impairment in the Air Force sample, we were limited to using measures of distress for the CART analyses. Although this is a limitation of the present study, we do find it encouraging that SFQ data in the student sample show that self-reported functioning drops off noticeably for those without a PD diagnosis as the number of DSM-IV PD criteria met approaches 10. It will be interesting to determine whether results similar to the present pattern would be found in analyses that are able to incorporate measures of functional impairment.

Comorbid Axis I disorders were unlikely in our sample of Air Force recruits, which make up nearly three quarters of the interviewed participants. Screening for mental health problems such as substance abuse, major mood disorders, and psychosis is conducted during enlistment and again as training begins. Additionally, these recruits undergo rigorous training that would be difficult for people with severe problems to complete. Although our smaller student sample was not systematically screened for Axis I pathology, it is unlikely that the few students who may have presented with comorbid Axis I disorders would have affected results substantially. We did find evidence of personality pathology in our two nonclinical samples of young adults, based on diagnostic interviews, but

further evidence is needed from persons who are older than our participants as well as from clinical samples in which the level of personality pathology would be more marked. If future studies, using additional measures of distress and impairment in a variety of populations, do find evidence that is similar to the results of the present investigation, then it will be possible to argue that a consensus has emerged regarding a threshold for the diagnosis of PDNOS. That definition could then be employed in efforts to examine the construct validity of this particular disorder (Clark et al., 1997; Livesley, 2001; Verheul & Widiger, 2004).

Our data suggest that a reasonable threshold for PDNOS may be the presence of 10 or 11 PD features in a person who does not otherwise qualify for a specific PD diagnosis. As always, good clinical judgment is still crucial in determining whether or not a diagnosis of PDNOS is warranted, particularly with regard to the duration and extent of the personality pathology, the level of distress experienced by the person, and the impact of these problems on the person's social and occupational adjustment. As the number of PD criteria a person meets increases, their level of distress also seems to increase in a rather predictable way regardless of whether these criteria fall within DSM-IV PD domains or are spread across disorders. While this lends support for the use of PD criteria as a tool for operationalizing the diagnosis of PDNOS, it also raises questions about how we conceptualize and diagnose personality pathology. These findings are consistent with suggestions that the manner in which the DSM classifies PDs is not optimal. Some variation of a hierarchical model or a dimensional model of personality pathology may be more useful for documenting and conceptualizing the problems and characteristics of personality pathology (Blashfield & McElroy, 1995; Livesley, 2001; Westen & Shedler, 2000).

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