

Latent Class Analysis of Personality Disorders in Adults With Posttraumatic Stress Disorder: Results From the National Epidemiologic Survey on Alcohol and Related Conditions

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ABSTRACT

Objective: To characterize predominant typologies of co-occurring personality disorders among adults with posttraumatic stress disorder (PTSD) and examine their relation to Axis I comorbidities, health-related quality of life, and course and treatment of PTSD.

Method: Latent class analysis was conducted on the 10 *DSM-IV* personality disorders in a nationally representative sample of 2,463 adults with a lifetime diagnosis of PTSD from Wave 2 (2004–2005) of the National Epidemiologic Survey on Alcohol and Related Conditions.

Results: Three latent classes of personality disorders were identified: a borderline-dysregulated class (11.4%), an obsessive-paranoid class (13.1%), and a no/low personality disorders class (75.5%). The borderline-dysregulated and obsessive-paranoid classes were more likely than the no/low personality disorder class to have a broad range of comorbid Axis I diagnoses and to have ever attempted suicide (ORs = 1.50–8.01), and they reported lower mental health–related quality of life. The borderline-dysregulated class was less likely than the no/low personality disorder class to have experienced remission of their most recent episode of PTSD (OR = 0.54; 95% CI, 0.38–0.75) and was more likely to have been prescribed medication for PTSD (OR = 1.65; 95% CI, 1.20–2.28) and to have used alcohol and drugs to mitigate their PTSD symptoms (OR = 2.77; 95% CI, 1.62–4.74). The obsessive-paranoid class was more likely than the no/low personality disorders class to report sexual assault as their worst trauma (OR = 2.22; 95% CI, 1.36–3.61) and had an earlier age at onset of PTSD symptoms compared to the other 2 classes.

Conclusions: Among US adults with PTSD, the 10 *DSM-IV* personality disorders can be classified into 3 “person-based” typologies, which are differentially associated with comorbid Axis I disorders, mental health–related quality of life, and clinical and treatment characteristics of this disorder. These results suggest that comprehensive assessment of personality disorders may help inform etiologic models and treatment approaches for PTSD.

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Posttraumatic stress disorder (PTSD) is associated with high rates of comorbid Axis II psychopathology, with 45%–79% of adults with PTSD meeting criteria for at least 1 personality disorder in their lifetime.^{1–6} Comorbid personality disorders may be associated with different trauma histories and may affect the course, severity, and treatment outcomes of PTSD.^{7–11} For example, adults with comorbid PTSD and borderline personality disorder are more likely to have made a suicide attempt, score lower on measures of quality of life, and report more childhood traumas than those with either condition alone.¹² Further, the efficacy of treatment for PTSD is significantly reduced when an individual has a comorbid personality disorder.^{10,11} Thus, understanding the predominant patterns of co-occurring personality disorders among individuals with PTSD can help inform the presentation, course, and treatment of this disorder.^{13–15}

Rates of personality disorders are elevated across anxiety disorders, ranging from 35% for PTSD to 52% for obsessive-compulsive disorder.¹⁶ Two large, nationally representative surveys^{4,17} have examined rates of personality disorders among adults with PTSD. The first was a national survey¹⁷ from Australia, which found that the most common personality disorders associated with PTSD were obsessive-compulsive (22%), schizoid (20%), borderline (15%), and paranoid (13%) personality disorders. More recently, a nationally representative study⁴ of US adults found that PTSD was associated with schizotypal, narcissistic, and borderline personality disorders, with odds ratios ranging from 2.1 to 2.5. A notable limitation of these studies, however, is that they did not examine predominant patterns of multiple co-occurring personality disorders, even though it is well-known that many individuals with PTSD often have more than 1 personality disorder.²

Recent work^{18,19} has employed latent class/profile analysis to characterize personality-based latent classes of veterans with PTSD. This work has found evidence of internalizing and externalizing subtypes of PTSD, with those in the internalizing group typically exhibiting features of schizoid and avoidant personality disorders and those in the externalizing group typically exhibiting features of antisocial, borderline, histrionic, and narcissistic personality disorders. While a few studies have supported this internalizing-externalizing distinction among personality disorders in PTSD, there is variability in the predominant classes of personality disorders identified in these studies. For example, a study²⁰ of Australian combat veterans with PTSD identified a 4-class solution consisting of an externalizing class, a high and moderate internalizing class, and a simple PTSD class. Thus, there continues to be much discussion and empirical inquiry about how to best characterize latent personality profiles of individuals with PTSD and how those profiles are related to sociodemographic, trauma-related, and clinical characteristics of

- The 10 *DSM-IV* personality disorders can be classified into 3 predominant typologies among US adults with posttraumatic stress disorder.
- US adults with posttraumatic stress disorder and comorbid personality disorders had elevated rates of comorbid Axis I disorder and poorer mental health and were more likely to have ever attempted suicide than those with no comorbid personality disorders.
- Assessment of personality disorders among adults with posttraumatic stress disorder may inform etiologic models and treatment approaches for posttraumatic stress disorder.

this disorder. An additional limitation of extant research in this area is that studies have focused on combat veterans. Thus, it is not clear whether these studies may apply to general population samples of adults with PTSD that are more demographically heterogeneous and often have more varied trauma histories.

Personality disorders in the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition (*DSM-IV*)²¹ are assessed for certain characteristics that commonly overlap, such as emotion dysregulation, which is common to borderline, narcissistic, and schizotypal personality disorders. Consequently, there is an inherent potential for a high rate of co-occurring personality disorders that may be more reflective of overlapping clinical phenomenology as opposed to distinct personality syndromes.²² The recently published *DSM-5* has retained all 10 personality disorders, although it remains controversial and debatable as to how personality disorders should be best assessed and conceptualized.^{23,24} Thus, there is a need to better understand the latent organization of personality disorders, particularly among clinical populations such as PTSD, which have elevated rates of several personality disorders^{1-6,16} and in which personality disorders have important clinical and prognostic significance.⁷⁻¹² Characterization of homogeneous patterns of co-occurring personality disorders among individuals with PTSD may help inform the development of more individualized treatment of PTSD as well as a greater appreciation of how patterns of comorbid personality disorders can inform the presentation, course, and treatment of this disorder.^{7-9,12}

In the present study, we examined the latent classes and demographic and clinical correlates of the 10 *DSM-IV* personality disorders in a large, nationally representative sample of adults with lifetime diagnoses of PTSD. We used data from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), one of the largest psychiatric epidemiology studies ever conducted.

METHOD

Sample

The 2004–2005 Wave 2 NESARC²⁵ is the follow-up of the Wave 1 NESARC that was conducted in 2001–2002.²⁶ The Wave 1 NESARC surveyed a representative sample of

the noninstitutionalized US population aged 18 years and older residing in households and group quarters. Face-to-face interviews were conducted with 43,093 respondents in Wave 1, and attempts were made in Wave 2 to reinterview all Wave 1 respondents with a response rate of 86.7%, reflecting 34,653 completed interviews.

As in Wave 1, Wave 2 NESARC data were weighted to reflect design characteristics of the survey and account for oversampling. Adjustment for nonresponse across sociodemographic characteristics and the presence of any lifetime Wave 1 psychiatric disorder was performed at the household and person levels to ensure that the sample represented the US population on sociodemographic variables based on the 2000 Decennial Census.²⁵ The entire protocol, including consent procedures, received full review and approval from the US Office of Management and Budget and the US Census Bureau.

Assessments

Posttraumatic stress disorder. Lifetime PTSD was assessed in Wave 2 of the NESARC using the PTSD section of the Alcohol Use Disorder and Associated Disabilities Interview Schedule–*DSM-IV* Version (AUDADIS-IV),²⁷ a computerized, fully structured instrument designed for experienced lay interviewers. Test-retest reliability was good ($\kappa = 0.64$)²⁸ according to widely accepted standards ($\kappa < .40$ as poor, 0.40 – 0.75 as fair to good, and > 0.75 as excellent).²⁹

Clinical and treatment characteristics of PTSD. Respondents with PTSD were asked about the age at onset of their PTSD symptoms, duration of their longest episode, and age when their only or most recent episode of PTSD symptoms remitted. In relation to their only or most recent episode of PTSD, respondents were also asked whether they had ever received treatment, were hospitalized overnight, were prescribed medication, drank alcohol to mitigate their symptoms, or used drugs/medicine to mitigate their symptoms. The 12-item Short Form Health Survey, version 2 (SF-12v2),³⁰ was used to assess mental and physical health–related quality of life.

Personality disorders. All 10 of the *DSM-IV* personality disorders were diagnosed.^{31,32} Paranoid, schizoid, histrionic, avoidant, dependent, and obsessive-compulsive personality disorders were assessed in Wave 1³³; antisocial personality disorder was assessed at both waves³⁴; and schizotypal, narcissistic, and borderline personality disorders were assessed in Wave 2.^{31,32} Reliability of AUDADIS-IV personality disorder diagnoses was fair to good ($\kappa = 0.40$ – 0.71)³⁵ according to widely accepted standards.²⁹

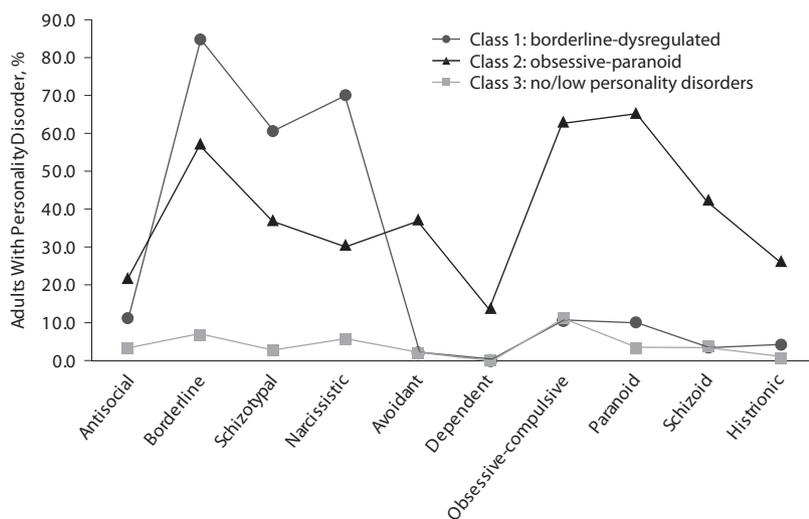
Mood, anxiety, and substance use disorders. Wave 2 AUDADIS-IV²⁷ assessments of mood, anxiety, and substance use disorders were identical to those conducted in Wave 1 except for time frames. Wave 2 lifetime diagnoses reflect disorders occurring at any time in respondents' lives as assessed over the 2 waves. Reliability and validity of AUDADIS-IV mood and anxiety diagnoses have been found to be fair to good ($\kappa = 0.40$ – 0.77) in both general population and clinical samples.^{28,36–38}

Table 1. Fit Statistics for Latent Class Models of Personality Disorders Among Adults With a Lifetime Diagnosis of Posttraumatic Disorder (N = 2,463)^a

	Log-Likelihood	G ²	Akaike Information Criterion	Bayesian Information Criterion	Adjusted Bayesian Information Criterion	Entropy	Lo-Mendell-Rubin Test
1 class	-8,424.59	5,081.09	16,869.18	16,927.27	16,895.50	1.00	NA
2 class	-7,528.86	1,757.50	15,099.71	15,221.71	15,154.98	0.76	P < .001
3 class	-7,316.88	2,048.53	14,697.75	14,883.64	14,781.97	0.82	P < .001
4 class	-7,251.40	1,754.14	14,588.80	14,838.60	14,701.97	0.74	P = .09
5 class	-7,224.99	1,303.61	14,557.98	14,871.67	14,700.10	0.82	P = .60
6 class	-7,198.22	1,022.09	14,526.44	14,904.03	14,697.51	0.81	P = .50
7 class	-7,177.98	827.55	14,507.95	14,949.45	14,707.98	0.83	P = .60

^aBold numbers indicate the optimal solution identified. Abbreviation: NA = not applicable.

Figure 1. Latent Classes of Personality Disorders Among Adults With Posttraumatic Stress Disorder (n = 2,463)



The AUDADIS-IV also assessed alcohol and drug abuse and dependence and nicotine dependence. The reliability and validity of AUDADIS-IV alcohol and drug use disorder diagnoses have been found to have good to excellent reliability in both general population and clinical samples ($\kappa = 0.70-0.91$).³⁹⁻⁴²

Data Analysis

The analytic sample consisted of all Wave 2 NESARC respondents with a lifetime diagnosis of PTSD (N = 2,463). Latent class analysis implemented in Mplus version 7.0⁴³ was used to identify predominant classes of personality disorders among respondents with PTSD. We compared 1- to 7-class unconditional latent class analyses and assessed their relative fit using the Bayesian information criterion, sample size-adjusted Bayesian information criterion, Akaike information criterion, entropy, and the Lo-Mendell-Rubin test.⁴⁴ Design variables, including poststratification weights, were incorporated into these analyses. The best-fitting model was assessed on the basis of smaller Bayesian information criterion, sample size-adjusted Bayesian information criterion, and Akaike information criterion values; higher entropy values; and on results of Lo-Mendell-Rubin tests. In addition to these statistics, we considered theory, parsimony, interpretability, and average latent class probabilities of the solutions^{45,46};

we also aimed to select a final model that contained at least 5% of the total sample in the smallest class in order to facilitate generalizability. Respondents were assigned to the personality disorder class having the greatest posterior probability.

Once the optimal solution was identified, we compared the classes with respect to sociodemographics, comorbid Axis I diagnoses, lifetime suicide attempt, health-related quality of life, and clinical characteristics of PTSD using χ^2 statistics, multiple regression, and multinomial logistic regression analyses with SUDAAN software,⁴⁷ which incorporates population-based weights. We then examined associations of comorbid mood, anxiety, and substance use disorders by personality

disorder class using multinomial logistic regression analyses that adjusted for sociodemographics and other psychiatric disorders. For example, when examining the relation between personality disorder classes and comorbid mood disorders, we adjusted for sociodemographics and any lifetime comorbid anxiety or substance use disorder. Finally, we compared the personality disorder classes on trauma and other clinical characteristics, adjusting for sociodemographics.

RESULTS

Among respondents with a lifetime diagnosis of PTSD, 1,242 (50.0%) had at least 1 personality disorder, 785 (30.5%) had 2 or more personality disorders, and 487 (19.0%) had 3 or more personality disorders.

On the basis of latent class analysis fit statistics (Table 1), along with theory, parsimony, interpretability, and a minimal 5% of the total sample in each class, we determined that a 3-class model of personality disorders was optimal (Figure 1). When we divided the total sample into 2 random subsamples (n = 1,231 and n = 1,232) and conducted separate latent class analyses for each subsample, we obtained similar results in both subsamples (available upon request from the author), so results of the total sample were used.

Respondents in the first class (n = 323; 11.4%), labeled “borderline-dysregulated,” were characterized by high

Table 2. Sociodemographic Characteristics of Adults With Lifetime Posttraumatic Stress Disorder by Latent Class of Personality Disorders

Characteristic	Class 1: Borderline-Dysregulated (n = 323), Raw n (weighted %)	Class 2: Obsessive-Paranoid (n = 333), Raw n (weighted %)	Class 3: No/Low Personality Disorders ^a (n = 1,807), Raw n (weighted %)			Class 1 vs Class 3, Adjusted Odds Ratio (95% CI) ^a	Class 2 vs Class 3, Adjusted Odds Ratio (95% CI) ^a
				χ^2	P		
Age, y				8.18	<.001		
20–29	58 (20.1)	64 (23.0)	183 (12.5)			4.28 (1.91–9.61)	6.97 (3.38–14.38)
30–44	128 (41.4)	119 (34.2)	558 (29.9)			4.13 (2.00–8.53)	5.01 (2.58–9.75)
45–64	116 (32.8)	135 (38.3)	558 (43.1)			2.23 (1.11–4.49)	3.97 (2.04–7.74)
≥ 65	21 (5.7)	15 (4.5)	280 (14.5)			1.00	1.00
Sex				5.46	.006		
Male	115 (43.1)	90 (29.4)	469 (29.0)			2.15 (1.51–3.06)	1.05 (0.73–1.51)
Female	208 (56.9)	243 (70.6)	1,338 (71.0)			1.00	1.00
Race/ethnicity				6.18	<.001		
White	123 (50.9)	181 (70.1)	1,069 (72.3)			1.00	1.00
Black	118 (24.5)	71 (13.4)	366 (12.0)			2.24 (1.53–3.30)	0.83 (0.55–1.23)
Other	15 (8.4)	24 (7.8)	69 (4.5)			2.26 (1.20–4.23)	1.38 (0.81–2.35)
Hispanic	67 (16.2)	57 (8.7)	303 (11.2)			1.79 (1.13–2.82)	0.66 (0.39–1.11)
Education				3.35	.015		
Less than high school	78 (21.4)	67 (18.3)	302 (15.1)			1.23 (0.79–1.90)	0.86 (0.55–1.36)
High school	83 (24.2)	101 (33.6)	462 (25.1)			1.00	1.00
Postsecondary	162 (54.4)	165 (48.0)	1,043 (59.8)			1.13 (0.75–1.69)	0.69 (0.49–0.98)
Marital status				4.63	.002		
Married/cohabiting	122 (47.5)	138 (52.9)	884 (59.3)			1.00	1.00
Widowed/separated/ divorced	110 (29.6)	116 (26.1)	651 (28.0)			1.27 (0.82–1.95)	0.90 (0.62–1.30)
Never married	91 (22.9)	79 (21.0)	272 (12.7)			1.19 (0.77–1.83)	1.10 (0.68–1.80)
Household income				5.93	<.001		
\$0–\$19,999	142 (36.3)	133 (38.7)	501 (23.4)			2.42 (1.32–4.42)	3.81 (2.08–7.00)
\$20,000–\$34,999	71 (23.5)	83 (22.2)	405 (21.1)			1.80 (0.95–3.41)	2.34 (1.34–4.09)
\$35,000–\$69,999	71 (24.7)	82 (26.7)	502 (29.4)			1.31 (0.73–2.35)	1.90 (1.14–3.16)
≥ \$70,000	39 (15.6)	35 (12.4)	399 (26.1)			1.00	1.00

^aAdjusted odds ratios were derived from a single logistic regression model into which all sociodemographic variables were entered simultaneously.

probability for a triad of personality disorders, including borderline, schizotypal, and narcissistic personality disorders; respondents in the second class (n = 333; 13.1%), labeled “obsessive-paranoid,” had high probabilities of obsessive-compulsive and paranoid personality disorders; and respondents in the third class (n = 1,807; 75.5%), labeled “no/low personality disorders,” had 0 or low probabilities of all personality disorders.

Compared to the no/low personality disorders class, the borderline-dysregulated and obsessive-paranoid classes were significantly younger and had lower household income (Table 2). Compared to the no/low personality disorders class, the borderline-dysregulated class was significantly more likely to be male and a racial/ethnic minority, and the obsessive-paranoid class was less likely to have completed postsecondary education. The borderline-dysregulated class was significantly more likely to be black or Hispanic than the obsessive-paranoid class.

Lifetime Axis I and II disorders by personality disorder class are shown in Table 3. After we controlled for sociodemographics and other Axis I psychiatric comorbidity, the borderline-dysregulated and obsessive-paranoid classes were more likely than the no/low personality disorder class to have any comorbid mood and/or other anxiety disorder and more likely to have ever made a suicide attempt. Both of these classes were also more likely to be diagnosed with a substance use disorder. The obsessive-paranoid class was more likely than the borderline-dysregulated class to have dysthymic and panic disorders and specific phobia.

After we controlled for sociodemographics and Axis I diagnoses, the borderline-dysregulated and obsessive-paranoid classes were more likely than the no/low personality disorder class to have most of the 10 personality disorders, but avoidant, obsessive-compulsive, and schizoid personality disorders did not differ between the borderline-dysregulated and no/low personality disorder classes. The borderline-dysregulated class was more likely than the obsessive-paranoid class to have borderline, schizotypal, and narcissistic personality disorders, while the obsessive-paranoid class was more likely to have avoidant, obsessive-compulsive, schizoid, paranoid, and histrionic personality disorders.

Table 4 shows trauma-related variables by personality disorder latent class. After we controlled for sociodemographics, the obsessive-paranoid class had an earlier age at onset of PTSD than the no/low personality disorder class and was more likely to report sexual assault and less likely to report a serious illness or injury to someone close as their worst traumatic event. The borderline-dysregulated class was less likely to report military combat as their worst event than the no/low personality disorder class, although few respondents reported military combat as their worst event. The borderline-dysregulated and obsessive-paranoid classes had significantly lower SF-12v2 mental component summary scores than the no/low personality disorder class.

Regarding treatment characteristics, the borderline-dysregulated class was more likely than the no/low personality disorder class to have ever received PTSD treatment, to have ever been prescribed medication for PTSD, and to have

Table 3. Lifetime DSM-IV Psychiatric Comorbidity Among Adults With Lifetime PTSD by Latent Class of Personality Disorders

Variable	Class 1: Borderline- Dysregulated (n = 323), Raw n (weighted %)	Class 2: Obsessive- Paranoid (n = 333), Raw n (weighted %)	Class 3: No/ Low Personality Disorders (n = 1,807), Raw n (weighted %)	χ^2 or <i>F</i>	<i>P</i> Value	Class 1 vs Class 3, Adjusted Odds Ratio (95% CI) ^a	Class 2 vs Class 3, Adjusted Odds Ratio (95% CI) ^a
Axis I							
Any mood disorder	261 (80.9)	305 (88.9)	980 (53.8)	37.1	<.001	3.80 (2.60–5.54)	6.40 (3.63–11.29)
Major depressive disorder	226 (70.3)	268 (79.1)	890 (49.3)	26.9	<.001	2.71 (1.93–3.81)	3.85 (2.52–5.90)
Dysthymic disorder	69 (20.6)	138 (42.2)	253 (13.6)	23.1	<.001	1.81 (1.20–2.74)	4.66 (3.34–6.51)
Mania	127 (42.0)	163 (51.7)	176 (10.0)	47.6	<.001	5.58 (4.03–7.71)	8.01 (5.77–11.13)
Hypomania	44 (10.9)	52 (15.1)	108 (5.4)	9.7	<.001	1.63 (0.98–2.70)	2.45 (1.54–3.91)
Any anxiety disorder except PTSD	230 (70.5)	289 (83.9)	934 (52.9)	33.1	<.001	2.31 (1.70–3.14)	4.48 (2.97–6.74)
Generalized anxiety disorder	128 (43.7)	172 (50.9)	384 (21.5)	30.6	<.001	3.34 (2.49–4.49)	4.00 (2.90–5.53)
Panic disorder with or without agoraphobia	99 (26.1)	165 (47.3)	323 (19.9)	20.7	<.001	1.50 (1.05–2.16)	3.53 (2.54–4.89)
Agoraphobia without panic disorder	5 (1.9)	4 (0.9)	7 (0.5)	1.5	.224	5.52 (1.56–19.54)	2.04 (0.54–7.74)
Social phobia	104 (35.6)	156 (45.5)	218 (12.4)	33.5	<.001	4.38 (3.10–6.20)	5.71 (4.09–7.96)
Specific phobia	143 (45.5)	208 (63.4)	544 (31.6)	28.8	<.001	1.79 (1.30–2.49)	3.45 (2.57–4.63)
Any alcohol or drug use disorder	186 (63.9)	207 (62.3)	713 (41.1)	18.1	<.001	2.38 (1.71–3.30)	2.26 (1.61–3.16)
Alcohol abuse/dependence	159 (56.6)	192 (57.5)	648 (36.9)	16.0	<.001	2.06 (1.49–2.86)	2.33 (1.68–3.24)
Drug abuse/dependence	109 (38.3)	130 (41.6)	271 (16.5)	24.8	<.001	2.69 (1.83–3.95)	3.09 (2.24–4.26)
Nicotine dependence ^b	123 (41.0)	119 (40.0)	362 (21.5)	20.6	<.001	2.21 (1.53–3.18)	1.80 (1.26–2.59)
Lifetime suicide attempt	77 (25.7)	109 (31.6)	174 (9.0)	28.2	<.001	3.31 (2.26–4.85)	3.87 (2.60–5.76)
Axis II personality disorder							
Antisocial	33 (11.8)	84 (24.8)	60 (3.9)	22.8	<.001	2.48 (1.51–4.10)	7.31 (4.68–11.41)
Borderline	292 (91.4)	200 (61.3)	151 (7.8)	68.4	<.001	131.28 (75.77–227.47)	16.57 (11.39–24.09)
Schizotypal	236 (70.3)	136 (39.1)	53 (2.7)	61.4	<.001	84.48 (53.48–133.44)	23.71 (15.75–35.71)
Narcissistic	251 (80.6)	125 (31.4)	108 (5.7)	54.3	<.001	66.04 (42.55–102.48)	8.31 (5.67–12.20)
Avoidant	5 (1.4)	133 (40.6)	35 (2.0)	31.1	<.001	0.64 (0.22–1.88)	31.00 (18.28–52.58)
Dependent	0 (0.0)	48 (15.4)	0 (0.0)	17.0	<.001	NA ^c	NA ^c
Obsessive-compulsive	28 (10.5)	214 (63.6)	174 (12.0)	47.3	<.001	1.01 (0.61–1.69)	16.04 (10.86–23.70)
Paranoid	28 (8.6)	261 (73.0)	61 (3.4)	52.3	<.001	2.25 (1.20–4.22)	80.33 (48.46–133.16)
Schizoid	9 (3.3)	155 (46.6)	62 (3.8)	37.9	<.001	0.76 (0.36–1.60)	22.04 (14.35–33.84)
Histrionic	9 (3.9)	94 (29.5)	11 (0.7)	26.2	<.001	4.04 (1.43–11.44)	50.44 (24.42–104.21)

^aOdds ratios are adjusted for sociodemographic variables and other psychiatric disorders.

^bNicotine dependence was not based on lifetime, but past year.

^cOdds ratios were not generated because a value of 0 was present in at least 1 of the cells.
Abbreviation: NA = not applicable.

ever drunk alcohol to mitigate PTSD symptoms. Both the borderline-dysregulated and the obsessive-paranoid classes were more likely than the no/low personality disorder class to have used drugs/medicines to mitigate PTSD symptoms. The borderline-dysregulated class was less likely than the no/low personality disorders class to have reported remission of their most recent episode of PTSD.

DISCUSSION

This study is the first of which we are aware to evaluate the nature and correlates of latent classes of all 10 DSM-IV personality disorders in a population-based, nationally representative sample of individuals with PTSD. The organization of personality disorders in the borderline-dysregulated and obsessive-paranoid classes is largely consistent with theoretical models that assert that certain personality disorders share associated symptoms.⁴⁸ Specifically, our results suggest that adults with PTSD who have difficulty regulating their thoughts and emotions, such as those with borderline, schizotypal, and/or narcissistic personality disorders, are similarly grouped, while those who are hypervigilant and distrusting may develop obsessive-

compulsive and paranoid personality disorders, which are characterized by rigid rules and structure and generalized mistrust of others. For the latter group, there are several studies that have demonstrated a unique relation between trauma, PTSD, and obsessive-compulsive behaviors.^{49–51}

Compared to previous studies of personality characteristics or personality disorders among adults with PTSD,^{17–19} our findings are more variable in that we did not specifically find classes indicative of distinct “internalizing” and “externalizing” personality disorders,^{18,19} although the borderline-dysregulated class is conceptually similar to an externalizing class. This difference may be due to prior studies measuring personality *traits* on a dimensional spectrum rather than dichotomous personality disorders; also, these samples were drawn from clinical settings (eg, treatment-seeking combat veterans) rather than from the general population. However, it is worth noting that the prevalence of personality disorders found among those with PTSD in this sample is comparable to that found in other smaller studies.^{1–6}

Results of the current study accord with a well-known alternative personality disorder classification to the one

Table 4. Worst Trauma Exposures and Clinical Characteristics Among Adults With Lifetime PTSD by Latent Class of Personality Disorders

Variable	Class 1: Borderline- Dysregulated (n = 323), Raw n (weighted %)	Class 2: Obsessive- Paranoid (n = 333), Raw n (weighted %)	Class 3: No/Low Personality Disorders (n = 1,807), Raw n (weighted %)	χ^2 or F	P	Class 1 vs Class 3, Adjusted Odds Ratio (95% CI) ^a	Class 2 vs Class 3, Adjusted Odds Ratio (95% CI) ^a
Worst stressful event ever experienced				2.42	.005		
Unexpected death of someone close	78 (24.6)	72 (22.1)	432 (25.4)			1.00 (0.69–1.44)	0.84 (0.57–1.23)
Serious illness or injury to someone close	40 (14.0)	40 (10.7)	293 (17.5)			0.96 (0.62–1.49)	0.63 (0.41–0.98)
Sexual assault	32 (9.4)	53 (18.2)	148 (8.0)			1.22 (0.70–2.13)	2.22 (1.36–3.61)
Seeing someone badly injured or dead	25 (9.4)	19 (6.8)	98 (5.3)			1.33 (0.75–2.34)	1.13 (0.62–2.08)
Military combat	6 (1.9)	11 (2.8)	88 (6.1)			0.28 (0.10–0.78)	0.62 (0.26–1.47)
Being beaten up by intimate partner	19 (3.5)	28 (6.8)	106 (5.5)			0.63 (0.35–1.14)	1.07 (0.59–1.96)
Indirect experience of 9/11 (eg, television or radio broadcast)	16 (4.5)	11 (2.3)	99 (4.7)			0.93 (0.45–1.94)	0.54 (0.24–1.22)
Own serious or life-threatening accident	13 (4.4)	18 (5.3)	55 (3.2)			1.07 (0.51–2.28)	1.39 (0.69–2.79)
Other trauma to self	70 (23.0)	71 (22.7)	374 (21.4)			1.06 (0.73–1.55)	1.10 (0.73–1.68)
Other trauma to someone close	14 (5.4)	6 (2.3)	59 (3.2)			1.62 (0.85–3.09)	0.72 (0.23–2.30)
Clinical characteristics							
Age at onset of first episode of PTSD symptoms, y	26.1 (1.1) ^b	23.4 (1.0) ^b	30.0 (0.5) ^b	44.6	<.001	0.99 (0.98–1.01)	0.98 (0.97–0.99)
Duration of longest or only episode, y	11.8 (0.9) ^b	12.2 (0.9) ^b	11.0 (0.4) ^b	2.11	.348	1.01 (1.00–1.03)	1.01 (1.00–1.02)
Ever received treatment for PTSD	148 (47.8)	162 (49.6)	737 (42.8)	2.04	.138	1.49 (1.10–2.01)	1.32 (0.94–1.87)
Ever hospitalized overnight because of PTSD	41 (11.4)	42 (11.3)	141 (7.5)	3.05	.054	1.50 (0.98–2.29)	1.35 (0.83–2.19)
Ever prescribed medication for PTSD	104 (33.4)	108 (31.4)	492 (27.7)	1.72	.188	1.65 (1.20–2.28)	1.26 (0.88–1.82)
Ever drank alcohol to mitigate PTSD symptoms	86 (28.3)	84 (23.0)	271 (15.9)	6.69	.002	1.98 (1.35–2.91)	1.52 (1.00–2.33)
Ever used drugs/medicines to mitigate PTSD symptoms	39 (14.0)	32 (9.7)	69 (4.7)	9.80	<.001	2.77 (1.62–4.74)	1.80 (1.10–2.94)
Most recent episode of PTSD remitted	110 (34.1)	131 (43.2)	902 (50.0)	8.00	.001	0.54 (0.38–0.75)	0.85 (0.61–1.19)
Health-related quality of life (past month)							
SF-12v2 Mental component summary score	39.8 (0.9) ^b	39.0 (0.9) ^b	46.5 (0.3) ^b	101.24	<.001	0.96 (0.95–0.97)	0.96 (0.95–0.97)
SF-12v2 Physical component summary score	46.9 (0.7) ^b	44.4 (1.0) ^b	46.5 (0.4) ^b	4.53	.104	1.00 (0.99–1.01)	0.99 (0.97–1.00)

^aOdds ratios are adjusted for sociodemographic variables.

^bValues represent mean (SE).

Abbreviations: PTSD = posttraumatic stress disorder; SE = standard error; SF-12v2 = 12-item Short Form Health Survey, version 2.

specified in the *DSM-IV*.^{22,52} This classification organized personality disorder traits under 4 superordinate dimensions consisting of an internalizing spectrum, an externalizing spectrum, a borderline-dysregulated spectrum, and a neurotic style.^{22,52} Consistent with the borderline-dysregulated spectrum, a borderline-dysregulated class was identified in our sample of adults with PTSD, which was composed of individuals with high probabilities of borderline, schizotypal, and narcissistic personality disorders. We also identified an obsessive-paranoid group, similar to the neurotic style, which is characterized by obsessional and hysteric-histrionic traits. Our results also accord with the results of Livesley and colleagues,⁵³ who found that personality disorder traits were represented by 4 unique components—emotional dysregulation, dissociation, inhibition, and compulsivity—in both general population and clinical samples. Specifically, our borderline-dysregulated class closely resembles traits in Livesley and colleagues' emotional dysregulation component,⁵³ while our obsessive-paranoid group captures many of the traits in Livesley and colleagues' compulsive component,⁵³ suggesting there is some precedent for the latent classes found in our study. Taken together, our findings along with those of other researchers^{53–55} support efforts to aggregate personality disorders in a more unitary and meaningful manner that reflects common as opposed to nonoverlapping personality pathology.

Adults with PTSD in the borderline-dysregulated and obsessive-paranoid classes were more likely than the no/low personality disorder class to have other Axis I psychiatric disorders, prior suicide attempt, and lower mental health-related quality of life, thereby confirming and extending prior work documenting the association between Axis I and II psychopathology.^{13–15} Specifically, we found that more than 50% of the borderline-dysregulated and obsessive-paranoid classes had comorbid mood, other anxiety, and substance use disorders. While the temporal sequence in which personality disorders and these other disorders developed cannot be reliably ascertained on the basis of cross-sectional data, PTSD is known to co-occur with other Axis I disorders,^{56,57} and these data suggest that when personality disorders are taken into consideration, one can further differentiate risk of additional Axis I comorbidity. Notably, the obsessive-paranoid class was significantly more likely than the borderline-dysregulated class to have dysthymic and panic disorders and specific phobia, which suggests a unique Axis I comorbidity profile of this class. This pattern of PTSD-personality disorder comorbidity with a variety of Axis I and II disorders also accords with findings from Zanarini et al,^{58,59} who described this pattern as “complex comorbidity,” and underscores the importance of assessing for patterns of personality disorders in individuals with PTSD.

Clinical differences between personality disorder classes were also observed, further highlighting the importance of assessing and understanding the nature of Axis II psychopathology in individuals with PTSD. For example, the obsessive-paranoid class was more likely to report sexual assault as their worst event than the no/low personality disorder class and also had an earlier age at onset of PTSD. While the temporal sequence of the onset of personality disorders and exposure to traumatic events could not be determined due to the cross-sectional design of the study, sexual assault may be more strongly associated with personality disorders characterized by obsessive-compulsive (ie, organized around cleanliness; needing to be in control) and paranoid (ie, overly concerned with safety) features, as prior work has found that sexual assault may engender pervasive obsessive worries and paranoia.⁶⁰⁻⁶²

The personality disorder classes also differed with respect to treatment characteristics for PTSD. Specifically, the borderline-dysregulated class reported using significantly more services and resources for PTSD than the no/low personality disorder class. The extant literature on borderline personality disorder has similarly demonstrated that adults with borderline personality disorder often require ongoing, intensive treatment,^{63,64} which also seems to affect the intensity of treatment and services needed for PTSD symptoms.⁶⁵ Collectively, these results suggest that Axis II psychopathology can inform patterns of co-occurring Axis I disorders, as well as clinical characteristics and treatment utilization among individuals with PTSD in the general US adult population.

Limitations of this study are worth noting. First, this was a cross-sectional study, and disorders were assessed on a lifetime basis, which consequently precludes any causal or temporal conclusions. Additional research is needed to evaluate whether personality disorders precede PTSD, are caused or exacerbated by PTSD, or originate from a common process. Second, the precision with which personality disorders were assessed in NESARC may be variable, as a recent study⁶⁶ found that antisocial, schizoid, and schizotypal personality disorders had high measurement precision compared to other personality disorders, and the reliability of personality disorders in NESARC has been considered acceptable, albeit imperfect, but is the best that is currently available.⁶⁷ The NESARC found a higher prevalence of obsessive-compulsive personality disorders than reported in previous studies,⁶⁸ which may have also influenced the results. Additionally, some personality disorders were assessed only in Wave 1 of the NESARC, while others were assessed only in Wave 2; consequently, it cannot be ruled out that a “wave effect” may, at least in part, account for the latent classification of personality disorders. Third, although we adhered to recommended practices in selecting an optimal model on the basis of latent class analysis,^{45,46} decisions regarding model selection may differ across studies, with more parsimonious or more refined solutions offering different perspectives regarding the latent classification of disorders. Lastly, we focused on classifying individuals rather

than items or traits, as in Livesley and colleagues’ model,⁵³ so further replication of our approach using dimensional models of personality traits/personality disorders, including the 5-factor model, will be useful in further evaluating latent profiles of personality disorders.

Notwithstanding these limitations, notable strengths of the current study include face-to-face structured diagnostic assessments of a large, representative sample of US adults with PTSD; use of a novel statistical procedure to examine “person-based” typologies of personality disorder comorbidity; and inclusion of a broad range of relevant covariates. The utilization of a large representative sample is a particular strength, as sampling and selection issues can influence rates of comorbidity and impede clear interpretation.^{69,70}

In conclusion, results of this study suggest that the 10 DSM-IV personality disorders can be classified into 3 predominant classes in a general population sample of adults with PTSD. Importantly, these 3 classes were differentially associated with Axis I disorders, suicide attempt, mental health–related quality of life, and clinical characteristics of PTSD, as well as treatment and resource utilization. Collectively, these results underscore the importance of comprehensive evaluation of personality disorders in the assessment, monitoring, and treatment of PTSD.

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