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Antisocial Behavioral Syndromes and Additional Psychiatric Comorbidity in Posttraumatic Stress Disorder Among U.S. Adults: Results from Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions

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Abstract

Background—Despite the relatively high prevalence of antisocial personality disorder (ASPD) in individuals with posttraumatic stress disorder (PTSD), associations of ASPD with clinical presentation of PTSD, including additional comorbidity, have not been investigated.

Objective—To present nationally representative findings on associations of *DSM-IV* ASPD versus syndromal adult antisocial behavior without conduct disorder before age 15 with additional psychiatric disorders among U.S. adults with PTSD.

Method—Face-to-face interviews using the Alcohol Use Disorder and Associated Disabilities Interview Schedule-*DSM-IV* version in the Wave 2 National Epidemiologic Survey on Alcohol and Related Conditions (n=34,653).

Results—After adjustment for sociodemographics and additional comorbidity, both antisocial syndromes were significantly associated with bipolar I, attention-deficit/hyperactivity, substance use, and paranoid, schizoid, histrionic, and obsessive-compulsive personality disorders among respondents with PTSD. Odds of major depressive and generalized anxiety disorders were significantly reduced among men with ASPD.

Conclusions—Interventions targeting PTSD may require attention to co-occurring antisociality and additional comorbidity.

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Keywords

Posttraumatic stress disorder; antisocial personality disorder; epidemiology; comorbidity

Antisocial personality disorder (ASPD) affects 3% to 5% of adults in the general United States population (Compton, Conway, Stinson, Colliver, & Grant, 2005; Goodwin & Hamilton, 2003; Robins, Tipp, & Przybeck, 1991), but 8% to 21% of respondents with posttraumatic stress disorder (PTSD) in epidemiologic samples including the National Comorbidity Survey, the National Vietnam Veterans Readjustment Study (NVVRS), and the Vietnam Experience Study (Barrett et al., 1996; Goodwin & Hamilton, 2003; Jordan et al., 1991). Among patients with PTSD in clinical settings other than addiction treatment, prevalences of ASPD range from 7% to 15% (Bollinger, Riggs, Blake, & Ruzek, 2000; Dunn et al., 2004; Orsillo et al., 1996; Zlotnick, Zimmerman, Wolfsdorf, & Mattia, 2001). Among respondents ascertained for substance use disorders who were also diagnosed with PTSD, ASPD was diagnosed in 41% to 52% (Cottler, Nishith, & Compton, 2001; Wasserman, Havassy, & Boles, 1997).

According to the criteria of the *Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition (DSM-IV*; American Psychiatric Association, 1994), the diagnosis of ASPD requires both conduct disorder (CD) with onset before, and syndromal antisocial behavior since, age 15 years. Significant associations of CD and conduct problems with PTSD have been documented in epidemiologic samples, both prospectively (Gregory et al., 2007) and in cross-sectional studies of adults from the general population and the military (Helzer, Robins, & McEvoy, 1987; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; O'Toole, Marshall, Schureck, & Dobson, 1998). Significant relationships have been demonstrated between CD or conduct problems with onset before age 15 years and subsequent exposure to traumatic events (Breslau, Lucia, & Alvarado, 2006; Helzer et al., 1987). Associations of CD behaviors with PTSD given previous trauma exposure, while generally of similar magnitude, have less consistently achieved statistical significance (Breslau, Davis, Andreski, & Peterson, 1991; Helzer et al., 1987; Koenen et al., 2005; Koenen, Moffitt, Poulton, Martin, & Caspi, 2007; Storr, Ialongo, Anthony, & Breslau, 2007), possibly due in part to the smaller sizes of trauma-exposed subsamples.

Both PTSD and ASPD are associated with substantial burden on affected individuals, their families and social networks, and society as a whole, both in their own rights and because of their high comorbidity with chronic medical illnesses (Goldstein et al., 2008; Sareen et al., 2007; Sledjeski, Speisman, & Dierker, 2008) as well as Axis I and Axis II psychiatric disorders (Compton et al., 2005; Grant, Stinson, Dawson, Chou, & Ruan, 2005; Grant, Hasin, Stinson, Dawson, Chou, et al., 2005; Kessler et al., 1995; Robins et al., 1991; Sareen, Stein, Cox, & Hassard, 2004). Personality disorder (PD) comorbidity has been associated with more severe clinical presentations and poorer outcomes in mood, anxiety, and cluster B personality disorders (Chiesa & Fonagy, 2007; Malta, Blanchard, Taylor, Hickling, & Friedenberg, 2002; Mennin & Heimberg, 2000; Reich, 2003). ASPD in particular is associated with more severe symptomatic presentation, higher rates of additional psychiatric comorbidity, and poorer treatment outcomes of substance use disorders (Basu, Ball, Feinn, Gelernter, & Kranzler, 2004; Compton, Cottler, Jacobs, Ben Abdallah, & Spitznagel., 2003; Darke, Williamson, Ross, Teesson, & Lynskey, 2004; Galen, Brower, Gillespie, & Zucker, 2000; Goldstein, Dawson, et al., 2007; Goldstein, Compton, et al., 2007; McKay, Alterman, Cacciola, Mulvaney, & O'Brien, 2000; Westermeyer & Thuras, 2005). However, despite the relatively high prevalence of ASPD in individuals with trauma exposure and PTSD, the question of whether ASPD is associated with severity of clinical presentation in PTSD, including rates and patterns of additional psychiatric comorbidity, has not been investigated.

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As has been documented in both clinical (Black & Braun, 1998; Brooner, Schmidt, Felch, & Bigelow, 1992; Cacciola, Rutherford, Alterman, & Snider, 1994; Cottler, Price, Compton, & Mager, 1995; Goldstein et al., 1998) and epidemiologic (Compton et al., 2005; Galbaud du Fort, Boothroyd, Bland, Newman, & Kakuma, 2002; Marmorstein, 2006; Tweed, George, Blazer, Swartz, & MacMillan, 1994) samples, individuals with syndromal antisocial behavior in adulthood often report too few symptomatic behaviors to meet criteria for CD before age 15 (adult antisocial behavioral syndrome or AABS, not a codable *DSM-IV* disorder). Individuals with AABS differ little from those with ASPD on antisocial symptomatology in adulthood and psychiatric comorbidity (Black & Braun, 1998; Cottler et al., 1995; Goldstein et al., 1998; Marmorstein, 2006; Tweed et al., 1994), suggesting that regarding individuals with AABS as "without ASPD" may obscure potentially important differences in clinical presentation and treatment outcomes of PTSD, between individuals with ASPD and individuals with no adult antisocial syndrome (Black & Braun, 1998; Cottler et al., 1995). The options for coding affected individuals' antisociality in *DSM-IV*, under either the V-code of "adult antisocial behavior" (Langbehn & Cadoret, 2001) or the diagnosis of "Personality Disorder Not Otherwise Specified" (Black & Braun, 1998), are also unsatisfactory. The former implies antisocial behavior that lacks the persistence, inflexibility, and maladaptive and impairing qualities seen in ASPD, whereas both options may hinder recognition of behaviors that would, absent the requirement of CD before age 15, meet criteria for ASPD (Black & Braun, 1998). To our knowledge, however, only one study (Cottler et al., 2001) has examined associations of AABS with either trauma exposure or PTSD, showing that AABS was associated with potentially traumatic exposures but not PTSD among street-recruited current drug users. Associations of AABS with the clinical presentation of PTSD, including additional comorbidity, have not been examined.

Because comparative data concerning associations of *DSM-IV* ASPD and AABS with psychiatric comorbidity in PTSD are not available from nationally representative epidemiologic samples, it remains unclear whether antisocial syndromes in adulthood that have onsets at different developmental phases bear differential associations with comorbid disorders among adults with PTSD. Rates or patterns of comorbidity that differ by antisocial syndrome in PTSD could signal a need to tailor prevention, treatment, and clinical care approaches to the co-occurrences among specific antisocial syndromes, trauma exposure, PTSD, and additional disorders. In addition, the impulsivity, risk-taking, and disregard for externally imposed norms and rules that are hallmarks of antisocial syndromes more generally may pose noteworthy challenges to prevention and treatment strategies for trauma exposure, PTSD, and many other disorders that focus on self-regulation, including cognitive-behavioral approaches that constitute the mainstay of psychotherapy for PTSD (Bisson & Andrew, 2007).

Males are overrepresented among individuals with antisocial behavioral syndromes (Compton et al., 2005; Nock, Kazdin, Hiripi, & Kessler, 2006). Conversely, for reasons that remain unclear, females are overrepresented among adults with PTSD, both overall and among those exposed to traumatic events (see review by Breslau, 2009). Although the observed sex differentials in antisocial syndromes could reflect genuine male-female differences, the diagnostic validity of CD and ASPD among women has been controversial (Cale & Lilienfeld, 2002; Ohan & Johnston, 2005). DSM criteria for these conditions emphasize overtly aggressive behaviors that are disproportionately prevalent in males, giving limited attention to covert acts such as truancy, lying, and relational aggression that may be more typical manifestations of antisociality in females (Cale & Lilienfeld, 2002; Ohan & Johnston, 2005). If the diagnostic criteria for CD and ASPD demonstrate sex biases, then associations of antisocial syndromes as currently defined with PTSD and patterns of comorbidity, and the implications of these associations for preventive and therapeutic interventions targeting traumatic exposures and PTSD, may also differ importantly by sex.

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Accordingly, this report examines associations of antisocial syndromes in adulthood with lifetime psychiatric comorbidity on both Axis I and Axis II among respondents with lifetime *DSM-IV* PTSD in Wave 2, conducted in 2004-2005, of the NESARC (Grant, Moore, Shepard, & Kaplan, 2003; Grant, Kaplan, & Stinson, 2005). The NESARC's large, nationally representative sample, including 2,463 respondents with lifetime PTSD, allows precise estimates of the prevalences of antisocial syndromes, comorbid psychiatric disorders, and relevant sociodemographic correlates by antisocial syndrome. In addition, the subsamples of respondents with PTSD, with and without antisocial syndromes, are large enough to allow examination of whether patterns of association between antisocial syndromes and additional psychiatric comorbidity in PTSD vary by sex.

Methods

Sample

The 2004-2005 Wave 2 NESARC (Grant, Kaplan, et al., 2005) is the second wave follow-up of the Wave 1 NESARC that was conducted in 2001-2002 and described in detail elsewhere (Grant, Moore, et al., 2003). The Wave 1 NESARC surveyed a representative sample of the civilian, noninstitutionalized population of the United States aged 18 years and older and residing in households and group quarters. Face-to-face interviews were conducted with 43,093 respondents, with oversampling of Black and Hispanic individuals as well as those 18 to 24 years old. The overall response rate was 81.0%.

In Wave 2, attempts were made to conduct face-to-face reinterviews with all 43,093 Wave 1 respondents. Excluding those ineligible for reinterview because they were deceased, mentally or physically incapacitated, deported, or on military deployment for the entire follow-up period, the Wave 2 response rate was 86.7% (n=34,653 completed interviews). The cumulative response rate at Wave 2, the product of the Wave 1 and Wave 2 response rates, was 70.2%. As in Wave 1, the 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 substance use disorder or psychiatric disorder was performed at the household and person levels to ensure that the sample approximated the target population, i.e., the original sample minus attrition between Waves 1 and 2 due to death, incapacitation or institutionalization, deportation or permanent departure from the United States, and military service for the whole Wave 2 interviewing period. Weighted Wave 2 data were then adjusted to represent the civilian population on socioeconomic variables including region, age, race-ethnicity, and sex, based on the 2000 Decennial Census.

All potential NESARC respondents received written information about the nature of the survey, the statistical uses of the survey data, the voluntary aspect of their participation, and the Federal laws that rigorously provide for the strict confidentiality of identifiable survey information. Respondents consenting to participate after receiving this information were interviewed. The entire research protocol, including informed consent procedures, received full ethical review and approval from the U.S. Office of Management and Budget and the U.S. Census Bureau.

Posttraumatic Stress Disorder (PTSD)

The diagnostic interview used in the NESARC was the NIAAA Alcohol Use Disorder and Associated Disabilities Interview Schedule-*DSM-IV* Version (AUDADIS-IV), for Wave 1(Grant, Dawson, & Hasin, 2001) and Wave 2 (Grant, Dawson, & Hasin, 2004). The Wave 1 and Wave 2 Versions of the AUDADIS-IV are computerized, fully structured instruments designed for experienced nonclinician interviewers. PTSD was assessed on a lifetime basis

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at Wave 2. The PTSD section begins with an enumeration of 27 types of potentially traumatic events operationalizing the *DSM-IV* (American Psychiatric Association, 1994) definition of traumatic exposure.

PTSD was diagnosed when respondents endorsed at least 1 symptom within Criterion B (persistent reexperiencing), at least 3 within Criterion C (persistent avoidance and numbing), and at least 2 within D (persistent hyperarousal), lasting at least 1 month (Criterion E), subsequent to the worst event they experienced that met both aspects of Criterion A (intense fear, helplessness, or horror; and actual or threatened death, serious injury, or threat to their or someone else's physical integrity). Diagnoses of PTSD additionally required that the *DSM-IV* clinical significance criterion of impairment or distress be met. Reliability of the lifetime PTSD diagnosis was good (κ=0.64; Ruan et al., 2008).

Antisocial Behavioral Syndromes

Antisocial behavioral syndromes were diagnosed on a lifetime basis at Wave 1, with a follow-up assessment at Wave 2 of adult ASPD symptoms occurring since the Wave 1 interview. Thus, respondents who had not yet met sufficient criteria since age 15 years to be diagnosable with ASPD or AABS at Wave 1 could become eligible for the respective classifications as of Wave 2. An AUDADIS-IV diagnosis of ASPD required the specified numbers of *DSM-IV* CD symptoms with onset before, and adult antisocial behaviors since, age 15 years. AABS was operationalized as meeting all criteria for ASPD except CD before age 15. Test-retest reliability of the AUDADIS-IV ASPD diagnosis was good (κ=0.67) and convergent validity of ASPD was good to excellent (Compton et al., 2005; Grant, Hasin, et al., 2004).

Other Psychiatric Disorders

Wave 2 AUDADIS-IV assessments of substance use (alcohol and drug-specific abuse and dependence and nicotine dependence), mood (primary major depressive disorder, dysthymic disorder, and bipolar I and bipolar II disorders), and anxiety (primary panic disorder with and without agoraphobia, social and specific phobias, and generalized anxiety) disorders other than PTSD were identical to those utilized in Wave 1 except for time frames. AUDADIS-IV methods to diagnose these disorders are described in detail elsewhere (Grant, Hasin, Blanco, et al., 2005; Grant, Hasin, Stinson, Dawson, Ruan, et al., 2005; Grant, Stinson, Dawson, Chou, Dufour, et al., 2004; Grant, Stinson, Hasin, et al., 2005; Grant et al., 2006; Hasin, Goodwin, Stinson, & Grant, 2005; Stinson et al., 2007). Consistent with *DSM-IV*, "primary" AUDADIS-IV diagnoses excluded disorders that were substance induced or due to general medical conditions. Diagnoses of MDD additionally ruled out bereavement. Lifetime diagnoses of attention-deficit/hyperactivity disorder (ADHD) were also assessed in Wave 2.

Personality disorders other than ASPD that were assessed at Wave 1 and described in detail elsewhere (Grant, Hasin, et al., 2004), included avoidant, dependent, obsessive-compulsive, paranoid, schizoid, and histrionic PDs. Borderline, schizotypal, and narcissistic PDs were measured at Wave 2 (Grant et al., 2008). All PD diagnoses were assessed on a lifetime basis. Test-retest reliabilities for AUDADIS-IV mood, anxiety, personality disorder, and ADHD diagnoses in the general population and clinical settings were fair to good (κ=0.40-0.77; Ruan et al., 2008; Grant, Dawson, et al., 2003; Canino et al., 1999). Test-retest reliabilities of AUDADIS-IV PD diagnoses compare favorably with those obtained in patient samples using semistructured personality interviews (Zimmerman, 1994). Convergent validity was good to excellent for all affective, anxiety, and personality disorder diagnoses (Grant, Hasin, et al., 2004; Grant, Hasin, Blanco, et al., 2005; Grant, Hasin, Stinson, Dawson, Ruan, et al., 2005; Grant, Stinson, Dawson, Chou, Dufour, et al., 2004; Grant, Stinson, Hasin, et al.,

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2005; Grant et al., 2006; Hasin et al., 2005; Stinson et al., 2007) and selected diagnoses showed good agreement (κ=0.64-0.68) with psychiatrist reappraisals (Canino et al., 1999).

The good to excellent (κ=0.70-0.91) test-retest reliability of AUDADIS-IV substance use disorder diagnoses is documented in clinical and general population samples (Canino et al., 1999; Chatterji et al., 1997; Grant, Dawson, et al., 2003; Grant, Harford, Dawson, Chou, & Pickering, 1995; Hasin, Carpenter, McCloud, Smith, & Grant, 1997). Convergent, discriminant, and construct validity of AUDADIS-IV substance use disorder criteria and diagnoses were good to excellent (Hasin & Paykin, 1999; Hasin et al., 2003; Hasin, Grant, & Endicott, 1990; Hasin, Muthén, Wisnicki, & Grant, 1994; Hasin, Van Rossem, & Endicott, 1997) including in the World Health Organization/National Institutes of Health International Study on Reliability and Validity (Cottler et al., 1997; Hasin, Grant, et al., 1997; Nelson, Rehm, Üstün, Grant, & Chatterji, 1999; Pull et al., 1997; Üstün et al., 1997; Vrasti et al., 1998), where clinical reappraisals documented good validity of *DSM-IV* alcohol and drug use disorder diagnoses (κ=0.54-0.76; Canino et al., 1999; Cottler et al., 1997).

Statistical Analysis—The analysis sample for this report consists of the 2,442 Wave 2 NESARC respondents with PTSD and ASPD (n= 177, 7.5% of those with PTSD), AABS (n= 629, 26.2% of those with PTSD), or no antisocial syndrome (n=1,636, 65.4% of those with PTSD) in adulthood. Twenty-one (0.8%) respondents with PTSD who were diagnosed at Wave 1 with CD but did not progress to ASPD over follow-up were excluded from the present study because their small numbers precluded meaningful statistical comparisons.

Standard contingency table approaches and chi-square statistics were employed, both in the total sample and in analyses stratified by sex, to compare (1) sociodemographics, (2) family histories of psychopathology, and (3) lifetime prevalences of comorbid psychiatric disorders by antisocial syndrome (Agresti, 1990). Associations of antisocial syndromes with other psychiatric disorders were examined using 2 sets of logistic regression analyses (Hosmer & Lemeshow, 2000). The first controlled for sociodemographic characteristics. The second additionally controlled for all other Axis I and Axis II psychiatric disorders, addressing the fact that control only for sociodemographic characteristics does not yield information on the unique relationships of antisocial syndromes to other disorders that themselves have considerable comorbidity. Control for other psychiatric disorders is necessary as these conditions may confound pairwise relationships between antisocial syndromes and each target diagnosis (Hasin, Stinson, Ogburn, & Grant, 2007; Compton, Thomas, Stinson, & Grant, 2007). Odds ratios (ORs) were considered statistically significant at the 0.05 level when their associated 95% confidence intervals excluded the null value of 1.00. To assess whether comorbid associations of ASPD and AABS with other psychiatric disorders varied between men and women, sex by antisocial syndrome interaction terms were tested for statistical significance in all logistic regression models, with an alpha to stay of 0.05. Where statistically significant sex by antisocial syndrome interactions were identified, sex-specific adjusted ORs were computed; otherwise, ORs were computed for the entire sample, controlling for sex and other covariates. All standard errors and 95% confidence intervals were estimated using SUDAAN (Research Triangle Institute, 2006), which uses Taylor series linearization to adjust for design characteristics of complex surveys like the NESARC.

Results

Sociodemographic Characteristics of Respondents with PTSD by Antisocial Syndrome

Sociodemographic characteristics of respondents with PTSD are shown by antisocial syndrome in Table 1. Respondents with ASPD and AABS were strikingly more likely to be male and younger than those without any antisocial syndrome. In addition, those with AABS were most likely to self-identify as non-Hispanic white or non-Hispanic black and

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respondents in both antisocial groups were least likely to self-identify as Asian or Pacific Islander. Respondents with AABS were least likely to be currently married or cohabiting and most likely never to have been married; those with ASPD were least likely to have attained high school or postsecondary education. Statistically significant ($p < 0.05$) sex by antisocial syndrome interactions were observed for age and race or ethnicity. Associations of antisocial syndromes with younger age were more striking in women than in men. No women with ASPD self-reported Asian or Pacific Islander race or ethnicity; additionally, among men, those with ASPD were least likely to self-identify as non-Hispanic white and most likely to self-identify as Hispanic, whereas among women, those with no antisocial syndrome exhibited these characteristics. While there was no association of antisocial syndromes with income overall, a statistically significant sex by antisocial syndrome interaction was observed, with women in all 3 groups, especially those with an antisocial syndrome, reporting the lowest incomes.

Family Psychiatric History and Comorbid Lifetime Psychiatric Disorders

Prevalences of family psychiatric histories and comorbid lifetime disorders among respondents with PTSD are given by antisocial syndrome in Table 2. Highly significant associations were observed between antisocial syndromes and all family psychopathology, with the highest rates observed among respondents with ASPD and the lowest among nonantisocial respondents. No statistically significant sex by antisocial syndrome interactions were observed for any family history variable.

Prevalences of all comorbid lifetime disorders were extremely high, with the majority of all respondents meeting criteria for at least one mood disorder and at least one additional anxiety disorder. In addition, the majority of antisocial respondents met criteria for at least one alcohol or drug use disorder, nicotine dependence, and at least one additional PD. All disorders except dysthymia were highly significantly associated with antisocial syndrome. Except for MDD, social phobia, and generalized anxiety disorder (GAD), the highest rates were observed among respondents with ASPD and the lowest in respondents with no antisocial syndrome. Statistically significant sex by antisocial syndrome interactions were observed for MDD, bipolar II disorder, GAD, and dependent PD. Rates of MDD were lowest among men with ASPD and highest in men with AABS; among women, rates were lowest in those with ASPD and highest in the nonantisocial group. Rates of bipolar II disorder were highest in men with ASPD and lowest in men with AABS; among women, rates were highest in those with ASPD and lowest in the nonantisocial group. Rates of GAD were highest among men with AABS and similar between the groups with ASPD and no antisocial syndrome; among women, rates were highest in those with ASPD and lowest in the nonantisocial group. In both sexes, rates of dependent PD were highest among those with ASPD and lowest among nonantisocial respondents, but the pattern was much more striking in men.

The mean±SE number of additional lifetime Axis I diagnoses ranged from 5.7±0.28 among respondents with ASPD to 2.3±0.07 among respondents without any antisocial syndrome. Parallel figures for additional Axis II diagnoses ranged from 2.5±0.21 among respondents with ASPD to 0.7±0.04 among nonantisocial respondents; for total Axis I and Axis II diagnoses, from 8.2±0.38 among respondents with ASPD to 3.0±0.09 in those with no antisocial syndrome. No sex by antisocial syndrome interactions were observed for any of these associations.

Adjusted associations of antisocial syndromes with comorbid psychiatric disorders are shown in Table 3. With control only for sociodemographic characteristics, ASPD was most strongly associated in the total sample with histrionic PD, drug abuse or dependence, alcohol abuse or dependence, paranoid and schizoid PDs, and bipolar I disorder (ORs=5.8-16.4).

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ORs for AABS were generally smaller than those for ASPD; however, similar to what was observed for ASPD, AABS bore the strongest associations in the total sample with histrionic PD, drug abuse or dependence, alcohol abuse or dependence, paranoid PD, and bipolar I disorder. The only disorder-specific ORs that differed significantly between the two antisocial groups, as indicated by nonoverlapping 95% confidence intervals, were for drug abuse or dependence (ASPD: OR=12.2, 95% CI=7.66-19.53; AABS: OR=5.1, 95% CI=3.70-6.91). As in the unadjusted analyses, significant sex by antisocial syndrome interactions were observed for MDD (OR for men with ASPD=0.4, OR for women with ASPD=0.8, OR for men with AABS=1.4, OR for women with AABS=0.8), GAD (OR for men with ASPD=1.0, OR for women with ASPD=2.9, OR for men with AABS=2.1, OR for women with AABS=1.7), and dependent PD (OR for men with ASPD=122.1, OR for women with ASPD=15.1, OR for men with AABS=65.6, OR for women with AABS=2.8). ORs for increasing numbers of lifetime Axis I and total (Axis I plus Axis II) diagnoses escalated steeply in both antisocial groups. For counts of Axis II diagnoses, ORs escalated sharply among respondents with ASPD but peaked at 4 or 5 disorders and then declined modestly for more than 5 diagnoses in the group with AABS.

After further adjustment for additional psychiatric diagnoses, patterns of specific comorbid associations remained largely similar, though their magnitudes were reduced. Disorders most strongly associated with ASPD in the total sample included histrionic PD, drug abuse or dependence, ADHD, alcohol abuse or dependence, and paranoid and schizoid PDs (ORs=3.2-6.3). Disorders most strongly associated with AABS in the total sample included alcohol abuse or dependence, drug abuse or dependence, histrionic and paranoid PDs, ADHD, and bipolar I disorder (ORs=2.1-3.3). No disorder-specific ORs differed significantly between the two antisocial groups. The sex by antisocial syndrome interaction for dependent PD was no longer significant (OR for ASPD=7.7, OR for AABS=2.4). Interactions remained for MDD (OR for men with ASPD=0.4, OR for women with ASPD=1.0, OR for men with AABS=1.5, OR for women with AABS=0.9) and GAD (OR for men with ASPD=0.4, OR for women with ASPD=1.1, OR for men with AABS=1.1, OR for women with AABS=0.9).

Discussion

Comorbid Associations with Antisocial Syndromes in PTSD

To our knowledge, this study is the first to investigate rates and types of additional psychiatric disorders among respondents with PTSD plus ASPD, AABS, or no antisocial behavioral syndrome in adulthood. Extremely high rates of additional lifetime disorders were observed. In almost all cases, respondents with ASPD had the highest and nonantisocial respondents had the lowest rates of comorbid disorders. After adjustment for potentially confounding sociodemographic characteristics and additional psychiatric comorbidity, statistically significant, unique associations remained between both antisocial syndromes and bipolar I disorder, alcohol abuse or dependence, drug abuse or dependence, nicotine dependence, ADHD, and paranoid, schizoid, histrionic, and obsessive-compulsive PDs. In addition, ASPD remained associated with avoidant and dependent PDs. The magnitudes of comorbid associations with ASPD did not differ significantly from those with AABS, though the ORs for AABS were numerically more modest. The present findings provide additional evidence that AABS is clinically important and contribute further support for modification of current diagnostic nomenclature either to eliminate the requirement of evidence of CD before age 15 from the diagnostic criteria for ASPD, or to include a separate category for AABS.

Sex by antisocial syndrome interactions were observed in the fully adjusted models for MDD and GAD, indicating that men with ASPD, but not other antisocial respondents,

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exhibited significantly lower odds of both comorbid disorders. These interactions were unexpected and call for further study. Both disorders are significantly more prevalent among women than among men in the general population (Hasin et al., 2005; Grant, Hasin, Stinson, Dawson, Ruan, et al., 2005). In addition, each exhibits substantial comorbidity with both ASPD (e.g., Black et al., 1996; Grant, Hasin, Stinson, Dawson, Chou, et al., 2005; Marmorstein, 2006; Robins et al., 1991; Sareen et al., 2004) and PTSD (Breslau et al., 1991; Kessler et al., 1995; Orsillo et al., 1996). The available sex-specific data (e.g., Kessler et al., 1995) suggest that these comorbid associations occur in both sexes. Moreover, both clinical and epidemiologic data suggest that ASPD and AABS do not differ strikingly in most aspects of clinical presentation, including patterns of psychiatric comorbidity (e.g., Cottler et al., 1995; Goldstein et al., 1998; Black & Braun, 1998; Marmorstein, 2006; Tweed et al., 1994). Therefore, it is unclear why men with ASPD, but not other antisocial respondents, should exhibit reduced odds of MDD and GAD.

Apart from these unexpected interactions, the comorbid associations with antisociality were broadly compatible with previous findings in epidemiologic samples (e.g., Compton et al., 2005; Glantz et al., 2009; Goodwin & Hamilton, 2003; Grant, Hasin, Stinson, Dawson, Chou, et al., 2005; Grant, Stinson, Dawson, et al., 2005; Kessler et al., 1997; Robins et al., 1991). Thus, some proportion of the additional comorbidity among antisocial individuals with PTSD could reflect the co-occurrence of these disorders with antisocial syndromes in the population as a whole. In particular, conduct problems, whether or not they rise to the level of CD or progress to ASPD, constitute a well-documented risk factor for a range of substance use, mood, and anxiety disorders (e.g., Fergusson, Horwood, & Ridder, 2007; Moffitt et al., 2007; Nock et al., 2006; Robins & Price, 1991)

Associations of ASPD with avoidant and dependent PDs among respondents with PTSD may reflect difficulties in obtaining adequate social support. Inadequate social support appears to be a risk factor for both onset and persistence of PTSD (see reviews by Guay, Billette, & Marchand, 2006, and Charuvastra & Cloitre, 2008). The social inhibition, feelings of inadequacy, and hypersensitivity to indications of rejection that are characteristic of avoidant PD may make reaching out to potential sources of support a daunting challenge. In addition, while antisociality, particularly overt aggression, may be used as a mechanisms for coping with social anxiety by individuals with avoidant PD (e.g., Sareen et al., 2004), the behaviors characteristic of ASPD and AABS may alienate spouses or partners, family members, and other potentially important support people (e.g., Black, Baumgard, & Bell, 1996; Robins, 1966). Conversely, the behaviors symptomatic of dependent PD among antisocial individuals with PTSD may partly reflect PTSD-or antisociality-associated role impairments. Recognition by these multiply affected individuals of the propensity of their antisocial behaviors to alienate important others, combined with the need for emotional or adaptive (e.g., monetary) supports that may be increased by work impairments related to PTSD, antisociality, or both, may lead to seemingly exaggerated care-eliciting behaviors.

The comorbid associations of antisocial syndromes with substance use disorders, bipolar I, ADHD, and perhaps histrionic PD, specifically among individuals with PTSD, could involve deficits in self-regulation, particularly emotion processing and executive function, that are prominent both in antisocial syndromes and as either essential or associated features of each of these comorbid disorders (Koenen, 2006), as well as risk factors for PTSD. Individuals with both an antisocial syndrome and another condition involving impaired self-regulation may be at particular risk for exposure to traumatic stressors as a reflection of increased propensities toward impulsive, risk-taking, and attention-seeking behaviors. In addition, the combination of antisociality with other disorders that impair self-regulation may render affected individuals especially vulnerable to PTSD given a traumatic event

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because of multiply determined impediments to the affect tolerance, particularly anger modulation, needed to process traumatic exposures adaptively (Koenen, 2006).

Comorbidity with antisocial syndromes may also reflect, in part, overlapping diagnostic criteria among antisocial syndromes, PTSD, and comorbid disorders. For example, the subcriterion of irritable mood for mania in bipolar I disorder partly overlaps with criterion A4 (irritability and aggressiveness) for ASPD and AABS, and Criterion D for PTSD. Features of paranoid PD, such as suspiciousness and a bias toward hostile attributions, are associated with the development of persistent antisociality (e.g., Dodge & Pettit, 2003), and partly overlap with hypervigilance, subsumed under Criterion D, for PTSD. Associations of paranoid traits with PTSD appear to be particularly pronounced among combat-exposed veterans (Bollinger et al., 2000). Similarly, features of schizoid PD, including emotional coldness, detachment, or flattened affectivity, and indifference to praise or criticism from others, overlap in part with Criterion C (avoidance and numbing) for PTSD. These features are also broadly compatible with a “callous/unemotional” subtype of CD that is associated with larger numbers and greater varieties of antisocial behavior (Frick, Cornell, Barry, Bodin, & Dane, 2003) and occurs primarily among cases with onset before age 10 years (Frick et al., 2003; McCabe, Hough, Wood, & Yeh, 2001). To our knowledge, however, the relationship of the callous/unemotional CD subtype to ASPD in adulthood, and the prevalence and implications of callous/unemotional traits among adults with AABS, have not been characterized.

The associations we observed between antisocial syndromes and obsessive-compulsive PD are compatible with previous work identifying associations of obsessive-compulsive PD with aggression (e.g., Burt & Donellan, 2008; Stein et al., 1996; Hopwood et al., 2009). Among antisocial respondents with PTSD, obsessive-compulsive personality symptomatology may also have developed in part as one strategy for gaining control over posttraumatic symptoms or other consequences of traumatic exposures or antisocial acts (e.g., Southwick, Yehuda, & Giller, 1993).

Importantly, because antisociality was associated with significantly elevated levels of comorbidity in PTSD, as well as with trauma exposure (Breslau et al., 2006; Helzer et al., 1987), it was necessary to consider whether level of trauma exposure could have mediated the associations of antisocial syndromes with additional disorders. The numbers of potentially traumatic event types endorsed by NESARC respondents with ASPD (mean ±SE=8.2±0.31), AABS (mean±SE=7.0±0.16), and no antisocial syndrome (mean ±SE=5.2±0.08) differed significantly and strikingly (F =93.00, df=2,65, $p < 0.0001$). Similar patterns were observed when events that happened directly to respondents (e.g., living through a natural disaster, intimate partner violence, mugging), and “indirect” exposures (e.g., seeing the attacks of September 11, 2001, on television; unexpected death of someone close; serious illness or injury to someone close), were considered separately. When we refit the logistic models for each comorbid disorder, including total number of potentially traumatic event types as an additional covariate, ORs associated with antisocial syndromes changed for the most part modestly. For example, in the case of drug abuse or dependence, the OR for ASPD decreased from 6.1 to 5.2, and that for AABS went from 2.8 to 2.5, adjusted for sociodemographics plus additional psychiatric disorders. Larger reductions were observed for associations of ASPD with ADHD (from 3.7 to 2.9) in the fully adjusted model, and for total numbers of comorbid disorders adjusted for sociodemographic variables. Nevertheless, the overall patterns remained the same and all ORs that were statistically significant in the original analyses remained so except for the association of panic disorder with AABS adjusted only for sociodemographic characteristics. Therefore, mediation of the antisociality-comorbidity associations by level of trauma exposure could not explain our findings.

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Limitations

Limitations of the study include its reliance on self-reported data and its cross-sectional design. Optimal clinical assessment of PDs and their comorbidity would ideally involve longitudinal evaluations of data both from the respondent and from collaterals (L. A. Clark, 2007; Zimmerman, 1994). However, in large epidemiologic surveys, the resources required to implement such assessments are prohibitive. As noted previously, test-retest reliability of AUDADIS-IV PD diagnoses was fair to good and convergent validity was good to excellent. Nevertheless, some PD symptomatology identified in the NESARC might not demonstrate the life course persistence conceptualized in DSM-IV as characteristic of PDs. For example, in our recent longitudinal follow-up of NESARC respondents with ASPD or AABS at Wave 1 (Goldstein & Grant, 2009), over half reported no antisocial acts over the 3 years between Waves 1 and 2. A more general limitation of the study design involves the need for longitudinal studies to test causal inferences concerning comorbid associations with antisociality in PTSD, and to identify underlying mechanisms. A further consideration is that the NESARC was designed to examine the epidemiology of PTSD, antisocial syndromes, and other mental disorders in the general, noninstitutionalized adult population. Therefore, it excluded individuals from clinical or correctional settings.

Clinical and Research Implications

Slightly fewer than half of the comorbid disorders assessed in this study were uniquely associated with antisocial syndromes among respondents with PTSD. Nevertheless, the prevalences of most co-occurring mood, substance use, and additional anxiety and personality disorders among antisocial respondents far exceeded those in nonantisocial individuals with PTSD and rates among both antisocial and nonantisocial respondents substantially exceeded those observed in the population as a whole. These extraordinarily high rates of a wide variety of disorders, particularly among respondents with both PTSD and an antisocial syndrome, indicate the need for comprehensive assessment of adults with PTSD, regardless of their chief complaints and the settings (e.g., mental health or addiction treatment) to which they present. Antisocial syndromes are poorly responsive to existing treatments (Reid & Gacono, 2000). As noted previously, they are also adverse prognostic factors in substance use disorder treatment (Basu et al., 2004; Compton et al., 2003; Galen et al., 2000; Westermeyer & Thuras, 2005), whereas PD comorbidity more generally portends less successful treatment outcomes in mood, anxiety, and substance use disorders, as well as cluster B PDs (Chiesa & Fonagy, 2007; Malta et al., 2002; Mennin & Heimberg, 2000; Reich, 2003). Therefore, more work is urgently needed to develop effective prevention and treatment programs that target antisociality over the life course and over the range of disorders that co-occur with antisocial syndromes. Nevertheless, evidence-based pharmacologic and psychosocial therapies are presently available for PTSD and most comorbid disorders examined herein and appropriate treatments should be offered for all identified disorders. Further research is needed to assess the extent to which these treatments are effective, with or without modification, among antisocial respondents with PTSD.

Implications of the present study's findings for psychiatric nursing practice in both inpatient and outpatient settings involve the exceptional clinical complexity likely to be posed by the comorbidity of PTSD, antisociality, and numerous other mental disorders. Nurses in a wide range of practice settings may need to advocate for, and implement, multiple evidence-based intervention modalities, either simultaneously or sequentially, to address a wide range of conditions (e.g., Pasacreta, Minarik, Cataldo, Muller, & Scahill, 1999). Because of the close, ongoing relationships and whole-person perspective on patients that are integral to the nursing role (e.g., E. H. Clark, 2004), nurses are also uniquely positioned to monitor patients' clinical status, identify potentially adverse reactions to or interactions among indicated interventions, and pursue appropriate therapeutic course corrections. A related

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consideration involves the challenges posed by disregard for norms and rules, a hallmark of both ASPD and AABS, to the uptake of appropriate treatments by these patients, particularly when their treatment entry is voluntary but potentially even in settings such as legally coerced addiction treatment, during the course of which PTSD and antisocial syndromes may be identified as additional diagnoses, or commitment to inpatient psychiatric hospitalization. Participation by nurses in coerced interventions may be unavoidable for both clinical and legal reasons; nevertheless, even under these circumstances, nurses should strive to build therapeutic alliances that will facilitate concordance between patient and staff concerning clinical goals and voluntary patient adherence to recommended treatments (Vuckovich, 2010). Research focusing on the identification of strategies to optimize partnerships between antisocial patients and nurses, perhaps by allowing them to "work around" the adverse impacts of antisociality, may also be of value. Approaches warranting investigation might include a focus on ways for antisocial patients to maximize near-term gratification through outcomes valued by them that also promote improvements in clinical status, including PTSD symptomatology and comorbidity.

Both PTSD and antisocial syndromes, as well as bipolar I, substance use disorders, and ADHD, with which we identified some of the strongest comorbid associations, may increase risks that patients will engage in self-destructive acts as well as aggression toward others. The use of physical or pharmacologic restraints, even if perceived by staff as unavoidable, is also likely to be regarded as nontherapeutic and traumagenic by patients (Delaney & Johnson, 2008; Finfgeld-Connett, 209; Mohr, 2010; Nelstrop et al., 2006); this may be of particular concern in patients with PTSD. Research on alternative interventions to manage aggression, specifically focusing on patients with PTSD and antisocial syndromes, is therefore urgently needed.

In addition to the implications of our findings for clinical practice and treatment research, the identification of unique comorbid associations of both antisocial syndromes with lifetime bipolar I disorder, substance use disorders, ADHD, and paranoid, schizoid, histrionic, and obsessive-compulsive PDs, and of ASPD with avoidant and dependent PDs, among adults with lifetime PTSD indicates the need for further prospective etiologic research to characterize the nature of and mechanisms underlying these relationships, as well as the sex specificity of the associations with MDD and GAD. Findings from these investigations may contribute to the identification of etiologically relevant subtypes of both PTSD and antisocial syndromes, thereby allowing the development of tailored prevention and treatment strategies to reduce the personal and public health burdens attributable to PTSD, antisociality, and their co-occurrences.

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Table 1

Sociodemographic Characteristics of NESARC Respondents with Lifetime DSM-IV Posttraumatic Stress Disorder by Antisocial Behavioral Syndrome

Characteristic, % (SE)	Men (n=670)			Women (n=1772)			Total (n=2442)			χ^2, Total Sample (d.f.)	*p*-value
	ASPD[a] (n=89)	AABS[b] (n=227)	No Antisocial Behavioral Syndrome (n=354)	ASPD[a] (n=88)	AABS[b] (n=402)	No Antisocial Behavioral Syndrome (n=1282)	ASPD[a] (n=177)	AABS[b] (n=629)	No Antisocial Behavioral Syndrome (n=1636)		
Male							56.8 (4.75)	42.1 (2.30)	23.2 (1.36)	51.02 (2)	<0.0001
Age, years[c]										83.88 (6)	<0.0001
20-29	21.9 (4.70)	22.7 (3.79)	8.7 (1.75)	30.3 (6.29)	21.0 (2.68)	11.3 (1.18)	25.5 (3.70)	21.7 (2.18)	10.7 (0.97)		
30-44	28.5 (5.34)	26.8 (3.47)	28.8 (2.87)	38.4 (6.24)	46.1 (3.15)	29.4 (1.42)	32.8 (4.14)	38.0 (2.25)	29.3 (1.20)		
45-64	44.8 (6.51)	45.0 (4.07)	45.4 (3.09)	31.3 (5.43)	30.2 (2.96)	42.7 (1.80)	38.9 (4.46)	36.5 (2.30)	43.4 (1.45)		
≥ 65	4.9 (2.66)	5.5 (1.58)	17.1 (2.31)	0.0 (0.00)	2.7 (0.87)	16.5 (1.31)	2.8 (1.51)	3.9 (0.84)	16.7 (1.14)		
Race or ethnicity[d]										19.23 (8)	0.0137
White, non-Hispanic	60.8 (6.07)	74.9 (3.16)	71.1 (2.93)	70.6 (6.35)	70.8 (3.03)	68.2 (1.92)	65.0 (4.67)	72.5 (2.35)	68.9 (1.76)		
Black, non-Hispanic	11.7 (4.33)	13.4 (2.52)	12.4 (1.71)	14.7 (5.09)	14.6 (2.06)	13.8 (1.06)	13.0 (3.35)	14.1 (1.76)	13.4 (0.96)		
Native American	7.1 (3.25)	3.3 (1.28)	0.5 (0.53)	6.2 (2.87)	5.0 (1.38)	2.9 (0.71)	6.7 (2.20)	4.3 (0.91)	2.4 (0.58)		
Asian or Pacific Islander	2.3 (1.63)	0.9 (0.86)	3.2 (1.00)	0.0 (0.00)	1.3 (0.63)	2.6 (0.64)	1.3 (0.94)	1.1 (0.50)	2.7 (0.58)		
Hispanic	18.1 (6.16)	7.5 (1.79)	12.8 (2.24)	8.5 (2.81)	8.2 (1.54)	12.5 (1.66)	13.9 (3.81)	7.9 (1.27)	12.6 (1.49)		
Marital status										29.53 (4)	<0.0001
Married or cohabiting	69.0 (5.63)	54.3 (4.04)	64.9 (3.06)	48.8 (6.47)	44.4 (3.00)	58.6 (1.61)	60.3 (4.62)	48.6 (2.30)	60.1 (1.42)		
Separated, divorced or widowed	13.8 (3.56)	20.0 (3.19)	20.0 (2.24)	31.4 (6.38)	34.4 (2.89)	31.2 (1.42)	21.4 (3.66)	28.3 (2.06)	28.6 (1.20)		
Never married	17.2 (4.48)	25.7 (3.49)	15.1 (2.18)	19.9 (4.79)	21.3 (2.66)	10.2 (0.87)	18.3 (3.23)	23.1 (2.06)	11.4 (0.85)		
Education										13.17 (4)	0.0105
Less than high school	23.9 (5.73)	18.4 (2.89)	11.4 (1.91)	25.1 (4.93)	12.5 (1.90)	16.9 (1.39)	24.4 (3.60)	14.9 (1.52)	15.6 (1.18)		
High school diploma	32.6 (6.35)	29.5 (3.80)	27.4 (2.81)	27.3 (6.45)	29.7 (2.96)	23.4 (1.54)	30.3 (4.44)	29.6 (2.59)	24.3 (1.41)		
Postsecondary	43.6 (7.19)	52.1 (3.80)	61.2 (3.07)	47.6 (6.51)	57.8 (3.25)	59.7 (1.79)	45.3 (4.73)	55.4 (2.74)	60.0 (1.58)		
Past-year personal income[e]										6.19 (6)	0.4020
≤$19,999	42.6 (6.47)	40.7 (4.07)	38.5 (3.08)	72.6 (5.76)	67.5 (2.94)	55.9 (1.88)	55.6 (5.18)	56.2 (2.39)	51.9 (1.75)		
$20,000-34,999	19.3 (4.69)	23.2 (3.47)	17.9 (2.25)	22.2 (5.48)	17.5 (2.26)	22.3 (1.55)	20.5 (3.72)	19.9 (1.89)	21.3 (1.33)		
$35,000-69,999	31.7 (5.49)	28.6 (3.46)	26.3 (2.63)	3.2 (1.65)	13.6 (1.83)	17.0 (1.25)	19.4 (3.81)	19.9 (1.84)	19.1 (1.16)		
≥ $70,000	6.4 (5.24)	7.6 (2.42)	17.3 (3.04)	2.0 (1.39)	1.4 (0.64)	4.9 (0.86)	4.5 (3.08)	4.0 (1.14)	7.8 (1.12)		

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Characteristic, % (SE)	Men (n=670)			Women (n=1772)			Total (n=2442)			χ^2, Total Sample (d.f.)	*p*-value
	ASPD[a] (n=89)	AABS[b] (n=227)	No Antisocial Behavioral Syndrome (n=354)	ASPD[a] (n=88)	AABS[b] (n=402)	No Antisocial Behavioral Syndrome (n=1282)	ASPD[a] (n=177)	AABS[b] (n=629)	No Antisocial Behavioral Syndrome (n=1636)		
Region of residence										6.81 (6)	0.3386
Northeast	20.5 (5.26)	29.0 (3.81)	18.2 (2.73)	14.6 (3.82)	16.4 (2.30)	16.9 (1.70)	18.0 (3.51)	21.7 (2.27)	17.2 (1.70)		
Midwest	18.2 (5.64)	14.2 (2.60)	20.9 (2.65)	13.7 (4.00)	17.6 (2.25)	21.1 (2.12)	16.2 (3.75)	16.2 (1.71)	21.1 (1.83)		
South	34.0 (6.06)	35.7 (3.83)	37.6 (3.37)	47.0 (6.31)	37.8 (3.04)	36.4 (2.40)	39.6 (4.56)	36.9 (2.53)	36.7 (2.17)		
West	27.3 (5.39)	21.1 (3.49)	23.4 (2.76)	24.7 (5.62)	28.2 (2.77)	25.6 (1.69)	26.2 (4.08)	25.2 (2.26)	25.1 (1.57)		
Urban (vs. rural) residence	91.5 (2.91)	86.2 (2.90)	84.2 (2.30)	79.1 (5.10)	83.7 (2.65)	83.4 (1.60)	86.1 (2.97)	84.8 (1.94)	83.6 (1.37)	0.69 (2)	0.7069

[a] ASPD: antisocial personality disorder.

[b] AABS: syndromal adult antisocial behavior without conduct disorder before age 15 years.

[c] Sex by antisocial syndrome interaction: χ^2=224.41, df=6, $p < 0.0001$.

[d] Sex by antisocial syndrome interaction: χ^2=308.12, df=8, $p < 0.0001$.

[e] Sex by antisocial syndrome interaction: χ^2=15.19, df=6, $p = 0.0188$.

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Table 2

Family History and Lifetime Psychiatric Comorbidity among NESARC Respondents with Lifetime DSM-IV Posttraumatic Stress Disorder by Antisocial Behavioral Syndrome

Characteristic, % or mean (SE)	Men (n=670)			Women (n=1772)			Total (n=2442)			χ^2 or *F*, Total Sample (d.f.)	*p*-value
	ASPD[a] (n=89)	AABS[b] (n=227)	No Antisocial Behavioral Syndrome (n=354)	ASPD[a] (n=88)	AABS[b] (n=402)	No Antisocial Behavioral Syndrome (n=1282)	ASPD[a] (n=177)	AABS[b] (n=629)	No Antisocial Behavioral Syndrome (n=1636)		
Family history											
Antisocial behavior	70.7 (5.87)	44.5 (4.02)	19.6 (2.53)	73.7 (5.30)	61.0 (2.98)	31.0 (1.84)	72.0 (3.99)	54.0 (2.51)	28.4 (1.60)	70.64 (2)	<0.0001
Alcohol problems	92.1 (2.98)	77.0 (3.48)	53.5 (3.45)	92.6 (3.44)	81.8 (2.28)	60.9 (2.05)	92.4 (2.35)	79.8 (1.96)	59.2 (1.94)	58.27 (2)	<0.0001
Drug problems	64.1 (6.33)	43.8 (3.71)	20.6 (2.47)	68.1 (5.64)	47.7 (3.10)	26.5 (1.52)	65.8 (4.63)	46.0 (2.34)	25.2 (1.27)	68.93 (2)	<0.0001
Depression	69.9 (5.68)	54.5 (3.90)	37.3 (3.57)	78.1 (5.01)	71.3 (2.66)	52.3 (2.09)	73.5 (3.94)	64.2 (2.36)	48.8 (2.04)	28.33 (2)	<0.0001
Lifetime psychiatric comorbidity											
Any mood disorder	67.9 (6.42)	67.7 (4.04)	39.6 (3.26)	94.7 (2.56)	82.1 (2.54)	57.7 (1.77)	79.5 (3.98)	76.1 (2.29)	53.5 (1.64)	55.78 (2)	<0.0001
Major depressive disorder[c]	9.7 (3.01)	30.6 (3.71)	25.6 (2.73)	34.5 (6.49)	37.4 (2.83)	40.7 (1.80)	20.4 (3.45)	34.5 (2.36)	37.2 (1.55)	15.12 (2)	0.0005
Dysthymia	3.8 (1.92)	8.0 (2.11)	4.3 (1.36)	19.8 (6.24)	12.7 (1.90)	11.3 (1.09)	10.7 (2.96)	10.7 (1.36)	9.7 (0.88)	0.50 (2)	0.7772
Bipolar I disorder	46.7 (6.07)	29.4 (3.95)	8.5 (1.64)	43.1 (5.84)	34.6 (2.80)	11.4 (1.08)	45.1 (4.44)	32.4 (2.31)	10.7 (0.90)	70.98 (2)	<0.0001
Bipolar II disorder[d]	4.3 (2.41)	2.8 (0.95)	3.6 (1.08)	13.3 (4.38)	8.0 (1.46)	3.2 (0.63)	8.2 (2.43)	5.8 (0.92)	3.3 (0.55)	8.82 (2)	0.0122
Any additional anxiety disorder	63.6 (6.70)	58.9 (3.62)	43.1 (3.34)	84.1 (4.75)	73.2 (2.60)	57.5 (1.88)	72.5 (4.16)	67.2 (2.18)	54.1 (1.76)	25.81 (2)	<0.0001
Panic disorder with or without agoraphobia	36.3 (7.27)	21.4 (3.25)	14.5 (2.32)	45.8 (6.24)	31.5 (2.67)	23.1 (1.75)	40.4 (4.67)	27.2 (1.98)	21.1 (1.47)	17.14 (2)	0.0002
Social phobia	20.2 (4.79)	25.0 (3.37)	9.3 (1.62)	36.7 (5.77)	30.5 (2.70)	16.6 (1.28)	27.4 (3.91)	28.2 (2.05)	14.9 (1.09)	34.40 (2)	<0.0001
Specific phobia	36.9 (6.52)	37.9 (3.88)	25.2 (2.99)	69.8 (5.34)	54.3 (3.08)	33.6 (1.57)	51.1 (4.32)	47.4 (2.38)	31.7 (1.49)	34.89 (2)	<0.0001
Generalized anxiety disorder[e]	18.5 (4.63)	33.0 (3.82)	18.2 (2.61)	50.9 (5.51)	38.3 (2.83)	25.6 (1.56)	32.5 (4.01)	36.1 (2.19)	23.8 (1.44)	19.40 (2)	0.0001
Any alcohol or drug use disorder	91.0 (3.34)	83.9 (2.55)	47.3 (3.27)	77.4 (6.09)	68.0 (2.79)	25.6 (1.57)	85.1 (3.51)	74.7 (1.95)	30.6 (1.48)	125.44 (2)	<0.0001
Alcohol abuse or dependence	84.2 (4.82)	79.7 (2.96)	42.9 (3.35)	71.0 (6.50)	61.2 (2.88)	21.8 (1.46)	78.5 (4.08)	69.0 (2.07)	26.7 (1.42)	123.79 (2)	<0.0001
Drug abuse or dependence	66.7 (6.15)	49.4 (3.88)	13.6 (1.98)	60.6 (6.74)	36.4 (3.02)	8.4 (0.96)	64.0 (4.71)	41.9 (2.37)	9.6 (0.91)	92.01 (2)	<0.0001
Nicotine dependence	65.1 (6.80)	63.3 (3.59)	28.5 (3.02)	70.7 (6.47)	52.9 (3.19)	26.3 (1.57)	67.5 (4.67)	57.3 (2.32)	26.8 (1.33)	96.36 (2)	<0.0001
Attention-deficit/hyperactivity disorder	23.3 (5.16)	17.4 (2.94)	3.7 (1.02)	21.4 (5.57)	12.9 (2.05)	4.7 (0.69)	22.5 (3.74)	14.8 (1.69)	4.5 (0.60)	40.05 (2)	<0.0001
Any additional personality disorder	73.9 (5.80)	64.6 (3.96)	36.4 (3.17)	87.5 (4.15)	71.6 (2.70)	36.5 (1.76)	79.8 (4.01)	68.6 (2.28)	36.5 (1.68)	88.88 (2)	<0.0001
Paranoid	26.9 (5.67)	14.8 (3.03)	4.3 (1.14)	38.6 (6.23)	28.9 (2.88)	7.9 (1.00)	31.9 (4.40)	23.0 (2.31)	7.0 (0.82)	57.12 (2)	<0.0001
Schizoid	19.8 (5.15)	14.6 (2.80)	4.9 (1.73)	33.4 (5.71)	15.4 (2.23)	5.2 (0.81)	25.7 (4.22)	15.1 (1.67)	5.1 (0.72)	41.62 (2)	<0.0001

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	ASPD[a] (n=89)	AABS[b] (n=227)	No Antisocial Behavioral Syndrome (n=354)	ASPD[a] (n=88)	AABS[b] (n=402)	No Antisocial Behavioral Syndrome (n=1282)	ASPD[a] (n=177)	AABS[b] (n=629)	No Antisocial Behavioral Syndrome (n=1636)		
Schizotypal	31.3 (5.90)	26.6 (3.55)	8.3 (1.47)	28.5 (5.22)	22.9 (2.45)	10.3 (1.02)	30.1 (4.02)	24.5 (1.99)	9.9 (0.85)	47.55 (2)	<0.0001
Histrionic	19.1 (4.54)	8.7 (2.74)	0.8 (0.44)	23.7 (5.59)	9.6 (2.01)	1.4 (0.37)	21.1 (3.56)	9.2 (1.53)	1.3 (0.30)	41.75 (2)	<0.0001
Narcissistic	36.9 (6.10)	31.7 (3.82)	17.7 (2.53)	27.2 (5.74)	20.8 (2.35)	11.1 (1.12)	32.7 (4.25)	25.4 (2.18)	12.6 (1.07)	37.44 (2)	<0.0001
Borderline	42.0 (6.79)	36.8 (4.02)	15.7 (2.18)	49.2 (5.81)	41.4 (3.01)	15.7 (1.20)	45.1 (4.67)	39.5 (2.38)	15.7 (1.11)	65.83 (2)	<0.0001
Avoidant	12.8 (3.95)	5.1 (1.78)	2.6 (0.87)	22.4 (5.75)	15.5 (2.22)	4.7 (0.77)	16.9 (3.38)	11.1 (1.47)	4.2 (0.60)	26.48 (2)	<0.0001
Dependent[f]	5.1 (2.47)	2.9 (1.54)	0.1 (0.03)	15.8 (5.12)	3.3 (0.91)	0.9 (0.29)	9.7 (2.72)	3.2 (0.81)	0.7 (0.22)	17.72 (2)	0.0001
Obsessive-compulsive	28.3 (5.14)	21.4 (3.04)	11.3 (2.18)	36.9 (5.77)	30.4 (2.92)	14.4 (1.43)	32.0 (4.09)	26.6 (2.19)	13.7 (1.19)	36.15 (2)	<0.0001
Total number of additional lifetime Axis I diagnoses										125.19 (6)	<0.0001
None or one	13.1 (5.35)	8.4 (2.26)	44.1 (3.32)	7.4 (3.33)	9.0 (1.62)	39.5 (1.78)	10.6 (3.33)	8.8 (1.31)	40.6 (1.68)		
2 or 3	15.3 (4.67)	25.5 (3.37)	34.7 (2.79)	10.6 (3.67)	23.2 (2.51)	33.6 (1.70)	13.2 (3.25)	24.2 (1.99)	33.8 (1.49)		
4 or 5	21.0 (4.37)	27.0 (3.65)	14.0 (2.20)	14.4 (4.43)	36.4 (2.79)	20.1 (1.33)	18.1 (3.23)	32.5 (2.31)	18.7 (1.16)		
> 5	50.6 (7.18)	39.1 (3.93)	7.2 (1.74)	67.7 (6.63)	31.3 (2.75)	6.8 (0.92)	58.0 (5.09)	34.6 (2.36)	6.9 (0.83)		
Total additional lifetime Axis I diagnoses, mean	5.2 (0.37)	4.7 (0.19)	2.1 (0.13)	6.4 (0.38)	4.6 (0.14)	2.4 (0.07)	5.7 (0.28)	4.7 (0.11)	2.3 (0.07)	192.96 (2,65)	<0.0001
Total number of additional Axis II diagnoses										88.46 (6)	<0.0001
None or one	43.1 (7.26)	56.4 (3.91)	83.3 (2.30)	33.1 (5.52)	51.9 (3.32)	80.7 (1.44)	38.8 (5.02)	53.8 (2.44)	81.3 (1.29)		
2 or 3	31.1 (6.18)	30.9 (3.40)	13.9 (2.20)	32.9 (5.46)	31.3 (3.00)	15.6 (1.27)	31.9 (4.41)	31.2 (2.31)	15.2 (1.16)		
4 or 5	18.7 (4.64)	9.6 (2.36)	2.1 (0.81)	23.9 (5.09)	12.5 (2.14)	2.8 (0.60)	21.0 (3.64)	11.3 (1.53)	2.6 (0.49)		
> 5	7.0 (2.58)	3.0 (1.28)	0.7 (0.36)	10.2 (4.30)	4.3 (1.29)	1.0 (0.32)	8.4 (2.43)	3.8 (0.91)	0.9 (0.26)		
Total additional Axis II diagnoses, mean	2.2 (0.26)	1.6 (0.14)	0.7 (0.07)	2.8 (0.29)	1.9 (0.12)	0.7 (0.04)	2.5 (0.21)	1.8 (0.08)	0.7 (0.04)	91.33 (2,65)	<0.0001
Total number of additional lifetime diagnoses (Axis I and Axis II)										130.56 (6)	<0.0001
None or one	6.1 (3.99)	5.2 (1.97)	36.2 (3.15)	0.4 (0.39)	5.4 (1.34)	33.0 (1.77)	3.7 (2.29)	5.3 (1.13)	33.7 (1.64)		
2 or 3	9.0 (4.21)	19.9 (2.73)	30.4 (2.81)	5.7 (2.80)	12.8 (1.90)	31.5 (1.62)	7.6 (2.79)	15.8 (1.66)	31.3 (1.41)		
4 or 5	21.3 (5.40)	16.0 (2.84)	19.7 (3.03)	11.1 (4.18)	22.8 (2.73)	18.7 (1.28)	16.9 (3.58)	19.9 (1.94)	19.0 (1.26)		
> 5	63.5 (6.84)	58.8 (3.91)	13.7 (2.11)	82.8 (4.92)	59.0 (3.13)	16.8 (1.35)	71.9 (4.47)	58.9 (2.42)	16.0 (1.19)		
Total additional lifetime diagnoses (Axis I and Axis II), mean.	7.4 (0.51)	6.4 (0.28)	2.8 (0.16)	9.1 (0.48)	6.5 (0.22)	3.1 (0.10)	8.2 (0.38)	6.5 (0.17)	3.0 (0.09)	201.58 (2,65)	<0.0001

[a] ASPD: antisocial personality disorder.

[b] AABS: syndromal adult antisocial behavior without conduct disorder before age 15 years.

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[c] Sex by antisocial syndrome interaction: χ^2=7.33, df=2, $p < 0.0256$.

[d] Sex by antisocial syndrome interaction: χ^2=6.41, df=2, $p < 0.0406$.

[e] Sex by antisocial syndrome interaction: χ^2=8.68, df=2, $p < 0.0131$.

[f] Sex by antisocial syndrome interaction: χ^2=6.72, df=2, $p < 0.0348$.

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Table 3

Adjusted Odds Ratios (95% Confidence Intervals) for Comorbid Lifetime Mental Disorders by Antisocial Syndrome among NESARC Respondents with Lifetime Posttraumatic Stress Disorder

Comorbid Disorder	Controlling for Sociodemographics Only				Controlling for Sociodemographics Plus Additional Psychiatric Disorders			
	ASPD[a] vs. No Antisocial Syndrome		AABS[b] vs. No Antisocial Syndrome		ASPD[a] vs. No Antisocial Syndrome		AABS[b] vs. No Antisocial Syndrome	
Any mood disorder	4.1 (2.47-6.91)		2.9 (2.10-3.94)		2.1 (1.21-3.68)		1.8 (1.27-2.53)	
Major depressive disorder	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*
	0.4 (0.17-0.73)	0.8 (0.46-1.35)	1.4 (0.84-2.18)	0.8 (0.64-1.11)	0.4 (0.21-0.94)	1.0 (0.54-1.75)	1.5 (0.92-2.47)	0.9 (0.66-1.23)
Dysthymia	1.6 (0.84-3.13)		1.4 (0.97-2.00)		1.1 (0.54-2.34)		1.0 (0.70-1.55)	
Bipolar I disorder	5.8 (3.73-8.97)		3.5 (2.69-4.59)		2.5 (1.48-4.31)		2.1 (1.52-2.79)	
Bipolar II disorder	2.6 (1.20-5.45)		1.6 (0.92-2.67)		1.8 (0.83-3.99)		1.2 (0.70-2.14)	
Any additional anxiety disorder	2.7 (1.61-4.40)		1.8 (1.42-2.38)		1.1 (0.62-1.80)		0.9 (0.70-1.25)	
Panic disorder	2.7 (1.75-4.24)		1.4 (1.06-1.92)		1.4 (0.86-2.37)		0.9 (0.63-1.25)	
Social phobia	2.2 (1.40-3.51)		2.2 (1.71-2.82)		0.8 (0.46-1.33)		1.1 (0.81-1.47)	
Specific phobia	2.5 (1.61-3.84)		2.0 (1.54-2.58)		1.3 (0.82-2.07)		1.2 (0.93-1.67)	
Generalized anxiety disorder	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*
	1.0 (0.52-1.93)	2.9 (1.76-4.89)	2.1 (1.26-3.50)	1.7 (1.25-2.31)	0.4 (0.19-0.84)	1.1 (0.65-1.94)	1.1 (0.61-1.90)	0.9 (0.63-1.32)
Any alcohol or drug use disorder	9.8 (5.61-17.26)		5.4 (4.10-7.14)		6.8 (3.92-11.79)		4.2 (3.17-5.70)	
Alcohol abuse or dependence	8.1 (4.87-13.34)		5.1 (3.95-6.71)		3.5 (2.04-6.02)		3.3 (2.43-4.37)	
Drug abuse or dependence	12.2 (7.66-19.53)		5.1 (3.70-6.91)		6.1 (3.70-10.22)		2.8 (2.00-3.91)	
Nicotine dependence	4.4 (2.72-7.21)		2.8 (2.23-3.57)		2.0 (1.24-3.35)		1.7 (1.23-2.26)	
Attention-deficit/hyperactivity disorder	4.8 (2.84-8.08)		3.1 (2.10-4.69)		3.7 (1.98-6.91)		2.6 (1.64-4.19)	
Any additional personality disorder	6.1 (3.62-10.39)		3.5 (2.68-4.55)		3.9 (2.14-7.22)		2.5 (1.87-3.41)	
Paranoid personality disorder	6.6 (4.17-10.48)		4.1 (2.94-5.62)		3.4 (1.96-5.74)		2.6 (1.74-3.96)	
Schizoid personality disorder	6.3 (3.49-11.39)		3.2 (2.11-4.85)		3.2 (1.53-6.51)		2.0 (1.24-3.22)	
Schizotypal personality disorder	3.3 (2.17-5.11)		2.5 (1.89-3.32)		1.3 (0.75-2.16)		1.3 (0.97-1.83)	
Histrionic personality disorder	16.4 (9.04-29.67)		6.0 (3.29-10.84)		6.3 (2.90-13.65)		2.8 (1.41-5.63)	
Narcissistic personality disorder	2.5 (1.60-3.92)		1.9 (1.44-2.64)		1.2 (0.74-2.00)		1.2 (0.79-1.72)	
Borderline personality disorder	3.5 (2.35-5.24)		2.8 (2.16-3.58)		1.0 (0.60-1.80)		1.3 (0.95-1.68)	
Avoidant personality disorder	4.5 (2.50-8.06)		2.4 (1.60-3.65)		2.1 (1.07-3.97)		1.3 (0.84-2.15)	

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Comorbid Disorder	Controlling for Sociodemographics Only				Controlling for Sociodemographics Plus Additional Psychiatric Disorders	
	ASPD[a] vs. No Antisocial Syndrome		AABS[b] vs. No Antisocial Syndrome		ASPD[a] vs. No Antisocial Syndrome	AABS[b] vs. No Antisocial Syndrome
Dependent personality disorder	*Men*	*Women*	*Men*	*Women*	7.7 (2.42-24.55)	2.4 (0.99-5.91)
	122.1 (13.19-1129.96)	15.1 (5.63-40.45)	65.6 (7.50-572.99)	2.8 (1.18-6.85)		
Obsessive-compulsive personality disorder	3.6 (2.29-5.65)		2.5 (1.89-3.42)		1.9 (1.15-3.20)	1.5 (1.07-2.10)
Total number of additional lifetime Axis I diagnoses						
None or one (referent)	1.00		1.00		n/a[c]	n/a[c]
2 or 3	1.6 (0.65-3.85)		3.2 (2.15-4.70)		n/a[c]	n/a[c]
4 or 5	4.1 (1.79-9.33)		7.7 (5.17-11.40)		n/a[c]	n/a[c]
> 5	30.1 (12.70-71.44)		18.8 (12.16-28.99)		n/a[c]	n/a[c]
Total number of additional Axis II diagnoses						
None or one (referent)	1.00		1.00		n/a[c]	n/a[c]
2 or 3	4.0 (2.48-6.46)		2.8 (2.11-3.80)		n/a[c]	n/a[c]
4 or 5	14.0 (7.48-26.33)		5.4 (3.32-8.89)		n/a[c]	n/a[c]
> 5	17.9 (7.30-43.64)		5.1 (2.59-10.11)		n/a[c]	n/a[c]
Total number of additional lifetime diagnoses (Axis I and Axis II)						
None or one (referent)	1.00		1.00		n/a[c]	n/a[c]
2 or 3	2.2 (0.47-10.56)		3.1 (1.88-5.05)		n/a[c]	n/a[c]
4 or 5	8.1 (1.95-34.03)		6.2 (3.70-10.54)		n/a[c]	n/a[c]
> 5	40.5 (10.43-156.98)		20.1 (12.61-32.16)		n/a[c]	n/a[c]

[a] ASPD: antisocial personality disorder.

[b] AABS: syndromal adult antisocial behavior without conduct disorder before age 15 years.

[c] N/a: not applicable.