Sex Differences in Prevalence and Comorbidity of Alcohol and Drug Use Disorders: Results From Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions

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ABSTRACT. Objective: The present study examined sex differences in lifetime Axis I and II psychiatric comorbidity of DSM-IV alcohol use disorders (AUDs) and drug use disorders (DUDs) among general population U.S. adults. **Method:** Using data from Waves 1 and 2 of the National Epidemiologic Survey on Alcohol and Related Conditions, Wave 2 lifetime prevalences of each disorder comorbid with alcohol abuse, alcohol dependence, drug abuse, and drug dependence were compared between men and women. Sex-specific associations of alcohol, any drug, and cannabis- and cocaine-specific abuse and dependence with each comorbid disorder were examined using logistic regression, first with adjustment for sociodemographic variables and then with additional adjustment for all other psychiatric disorders. **Results:** Prevalences of most comorbid disorders differed significantly by sex among respondents with each AUD and DUD. However, after adjustment for sociodemographic characteristics and additional co-occurring psychiatric diagnoses, there were few sex differences in unique comorbid associations of specific AUDs and DUDs with specific psychiatric disorders. **Conclusions:** Rates of psychiatric disorders comorbid with AUDs and DUDs indicate large burdens of morbidity in both sexes, highlighting the need for careful assessment and appropriate treatment of both substance use and mental health disorders. The unique comorbid associations with AUDs and DUDs identified in this study further indicate the need for prospective etiological research to characterize these associations, their underlying mechanisms, and the possible sex specificity of those mechanisms. (*J. Stud. Alcohol Drugs, 73,* 938–950, 2012)

LIFETIME AND CURRENT POPULATION prevalences of alcohol use disorders (AUDs) and drug use disorders (DUDs) are consistently higher in men than in women (Compton et al., 2007; Hasin et al., 2007; Kessler et al., 1994, 2005; Seedat et al., 2009; Teesson et al., 2006). Adding to the substantial burden of these disorders, lifetime and current rates of psychiatric comorbidity are high in both sexes among clinical and epidemiological samples (e.g., Abbott et al., 1994; Compton et al., 2000; De Wilde et al., 2007; Kessler et al., 1997; Magura et al., 1998; McCance-Katz et al., 1999). Regardless of sample ascertainment and time frame, prevalences of specific comorbid disorders differ between men and women in ways that largely resemble patterns in the total population unselected for substance use disorders (SUDs). For example, women are more likely to meet criteria for mood and anxiety disorders, whereas men are more likely to carry diagnoses of antisocial personality disorder (PD), attention-deficit/hyperactivity disorder (ADHD), and additional SUDs (Abbott et al., 1994; Brooner et al., 1997; Compton et al., 2000; Conway et al., 2006; De Wilde et al., 2007; Helzer et al., 1991; Kessler et al., 1997; Magura et al., 1998; McCance-Katz et al., 1999; Najavits and Lester, 2008; Shand et al., 2011).

In contrast to the well-documented sex differences in prevalences of specific disorders, few sex-specific data are available on comorbid associations, typically measured as odds ratios (ORs), of AUDs and DUDs with other psychiatric disorders in the general population. Kessler et al. (1997) reported significantly larger ORs among women in the National Comorbidity Survey for lifetime *Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised* (DSM-III-R; American Psychiatric Association,

Received: February 21, 2012. Revision: July 20, 2012.

The National Epidemiologic Survey on Alcohol and Related Conditions is funded by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) with supplemental support from the National Institute on Drug Abuse. This research was supported in part by the Intramural Program of the National Institutes of Health, NIAAA. A preliminary version of parts of this article was presented at the Joint Research Society on Alcoholism/International Society for Biomedical Research on Alcoholism Scientific Conference, June 2008, Washington, DC. The views and opinions expressed in this report are those of the authors and should not be construed to represent the views of sponsoring organizations, agencies, or the U.S. government.

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1987), alcohol abuse with most lifetime mood, anxiety, and additional SUDs, as well as any of the following: conduct disorder, antisocial PD, or syndromal adulthood antisocial behavior without conduct disorder. Conway et al. (2006) reported larger ORs among men in Wave 1 of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) for lifetime DSM-IV (American Psychiatric Association, 2000) sedative dependence with lifetime panic disorder without agoraphobia but larger ORs among women for tranquilizer abuse with social and specific phobias. Grant et al. (2004e) reported larger ORs among women in Wave 1 of the NESARC for past-year DSM-IV alcohol dependence and any drug abuse with obsessive–compulsive (OC), histrionic, and antisocial PDs, and for any past-year drug abuse with schizoid PD, but larger ORs among men for past-year drug dependence with dependent PD.

Previously reported sex-specific comorbid associations were unadjusted. However, recent research considering men and women together (Compton et al., 2007; Hasin et al., 2007) has shown much of the comorbidity of SUDs with other specific disorders to reflect high rates of co-occurrence among other diagnoses. After adjustment for both sociodemographic variables and additional co-occurring disorders, the unique pairwise associations of AUDs and DUDs with many specific comorbid conditions are more modest than unadjusted or sociodemographic-adjusted findings.

Sex-specific prevalences of comorbid psychiatric disorders importantly inform case finding and treatment approaches tailored to the needs of male and female clients for both SUDs and comorbid conditions. With growing evidence for sex differences in clinical presentation and course of SUDs (Brady and Randall, 1999; Wetherington, 2007), data on unique, sex-specific adjusted pairwise associations between SUDs and other disorders are also critically needed. Sex differences may yield clues to the etiology of the index disorder (e.g., alcohol dependence), the comorbid disorder (e.g., major depressive disorder [MDD]), or their co-occurrence (e.g., Prescott et al., 2000). In addition, although the evidence is limited and inconsistent, some studies suggest sex-specific implications of particular disorders comorbid with AUDs or DUDs with respect to clinical presentation or course of SUDs (e.g., Dawson et al., 2010; Pettinati et al., 2000; Shand et al., 2011), SUD treatment utilization (e.g., Green et al., 2002; Grella et al., 2003), and treatment outcomes (e.g., Compton et al., 2003; Greenfield et al., 2007; Grella, 2003; Grella et al., 2003). Nevertheless, sex-specific prevalence data on some comorbid disorders—notably Axis II diagnoses other than antisocial PD—among individuals with SUDs are limited, and similarities or differences in unique, fully adjusted associations of SUDs with specific comorbid disorders between men and women in nationally representative samples have not been reported.

The present report addresses these important knowledge gaps by describing lifetime psychiatric comorbidity of AUDs and DUDs among men and women in the United States based on Wave 2 of the NESARC (Grant et al., 2003b, 2007). With the largest nationally representative sample to date and rigorous assessment of SUDs and other lifetime DSM-IV disorders—including posttraumatic stress disorder (PTSD), ADHD, and all 10 PDs—Wave 2 NESARC data allow precise estimates of the prevalences of comorbid disorders. Furthermore, the large, comprehensively assessed NESARC sample enables analyses of comorbid associations that adjust for both sociodemographic characteristics and other co-occurring conditions, thus allowing the determination of unique, sex-specific relationships between SUDs and other psychiatric disorders.

Method

Sample

The research protocol, including informed consent procedures, received full approval from the institutional review board of the United States Census Bureau and the Office of Management and Budget. The 2004–2005 Wave 2 NESARC is the longitudinal follow-up of the 2001–2002 Wave 1 NESARC sample (Grant et al., 2003b, 2007). With an overall response rate of 81.0% (n = 43,093), the Wave 1 NESARC was nationally representative of residents age 18 years and older of households and selected group quarters. Respondents were interviewed face to face; individuals age 18–24 years, Blacks, and Hispanics were oversampled. Face-to-face re-interviews of all Wave 1 respondents were attempted in Wave 2. Among those alive and not deported, incapacitated, or on active military duty throughout the follow-up period, the Wave 2 response rate was 86.7% (n = 34,653), thus yielding a cumulative response rate of 70.2% across the two waves (Grant et al., 2003a, 2007). Wave 2 respondents did not differ from the target population comprising Wave 2 respondents plus eligible nonrespondents on age, race or ethnicity, sex, socioeconomic status, or the presence of any lifetime substance use, mood, anxiety, or PD (each examined separately; Grant et al., 2009).

Assessments

Among Wave 2 NESARC respondents, Wave 2 lifetime SUDs and other psychiatric disorders were assessed on the basis of Wave 1 and Wave 2 data, using the Alcohol Use Disorders and Associated Disabilities Interview Schedule–DSM-IV version (AUDADIS-IV; Grant et al., 2001, 2004a).

Substance use disorders. Extensive questions operationalized DSM-IV criteria for alcohol and drug-specific abuse and dependence for 10 drug categories (Compton et al., 2007; Hasin et al., 2007). Wave 2 lifetime abuse diagnoses required at least one of four abuse criteria, and dependence diagnoses required at least three of seven dependence crite-

ria, to be met in the same 12-month period for alcohol or the same drug class at any time in respondents' lives. Nicotine dependence was diagnosed similarly (Grant et al., 2004b). The good to excellent reliability of AUDADIS-IV AUD (κ = .70–.84), DUD (κ = .53–.79), and nicotine dependence (κ = .60–.63), and their validity, are extensively documented in the general population and clinical samples (Compton et al., 2007; Grant et al., 2003a, 2004b; Hasin et al., 2007).

Other psychiatric disorders. Wave 2 assessments of mood (primary MDD, dysthymia, and bipolar I and II) and anxiety (primary panic with and without agoraphobia, social and specific phobias, and generalized anxiety) disorder diagnoses were identical to those in Wave 1 (Grant et al., 2005a, 2005b) except for time frames. Consistent with DSM-IV, primary mood and anxiety disorder diagnoses excluded cases attributable to general medical conditions as well as substance-induced cases. The latter were defined as disorders in which all episodes began after alcohol or other drug intoxication or withdrawal and did not persist for more than 1 month following cessation of intoxication or withdrawal. Primary or independent mood or anxiety disorder diagnoses reflected that none or only some of respondents' episodes were substance induced (Grant et al., 2004d). MDD diagnoses additionally excluded bereavement. Lifetime diagnoses of PTSD and ADHD were assessed solely at Wave 2 (Ruan et al., 2008).

PDs assessed at Wave 1 included avoidant, dependent, OC, paranoid, schizoid, and histrionic PDs (Grant et al., 2004c). Antisocial PD was queried at Wave 1, with an assessment at Wave 2 of antisocial symptomatology occurring over follow-up (Goldstein and Grant, 2009). Borderline, schizotypal, and narcissistic PDs were measured at Wave 2 (Grant et al., 2008). All PDs were assessed on a lifetime basis. Test–retest reliabilities of AUDADIS-IV mood and anxiety (κ = .42–.65), PD (κ = .40–.71), and ADHD (κ = .71) diagnoses were fair to good (Grant et al., 2003a, 2004c, 2004d, 2005a, 2005b; Ruan et al., 2008). Convergent validity of mood, anxiety, and PD diagnoses was good to excellent (Grant et al., 2004c, 2004d, 2005a, 2005b).

Statistical analysis. Wave 2 lifetime prevalences of each comorbid disorder were compared by sex using standard contingency table approaches. Two sets of sex-specific multivariable logistic regressions were fit to estimate adjusted associations of AUDs, any drug abuse, any drug dependence, and cannabis- and cocaine-specific use disorders with other psychiatric disorders. The first set included only sociodemographic covariates (age, race or ethnicity, marital status, past-year personal income, and education). These covariates were selected both because they were associated ($p < .10$) with AUDs and DUDs in both sexes and because of subject-matter considerations (Hosmer and Lemeshow, 2000), importantly including methodological comparability with numerous previous studies that adjusted for sociodemographic variables. The second set additionally adjusted for all other Axis I and II disorders. For example, the fully adjusted model examining comorbidity of AUDs with panic disorder adjusted for sociodemographic variables plus any mood disorder, any anxiety disorder except panic disorder, any DUD, nicotine dependence, ADHD, and any PD. Adjustment for diagnostic covariates reflects both the highly significant ($p \leq .01$) bivariate associations of all examined comorbid disorders with AUDs and DUDs in each sex and the fact that adjustment only for sociodemographic characteristics does not identify unique relationships of AUDs and DUDs to other specific disorders that themselves have considerable comorbidity (Compton et al., 2007; Hasin et al., 2007; Hosmer and Lemeshow, 2000). Adjustment for additional comorbidity tests the hypothesis that a particular AUD or DUD is associated with the pure (noncomorbid) form of another specific disorder. In addition to ORs, 95% confidence intervals (CIs) were estimated. ORs were considered significant when their 95% CIs excluded 1.00. The statistical significance of sex differences in ORs was assessed in models for each comorbid disorder that examined Sex × AUD or Sex × DUD interactions, as appropriate, in the total sample, with α-to-stay = .05. No adjustments were made for multiple comparisons.

Because lifetime abstainers are by definition at no risk for SUDs and may differ systematically on other factors relevant to risks for psychopathology from lifetime drinkers (Liang et al., 2010; Skogen et al., 2011) or other drug users (Di Forti et al., 2007; Macleod et al., 2004), it was necessary to determine whether inclusion of abstainers in the comparison groups without the respective SUDs affected the sex-specific comorbid associations. Therefore, the logistic models for AUDs were refit with lifetime abstainers (7.5% of men and 17.2% of women) excluded, and models for DUDs were refit with those reporting no lifetime illicit drug use (68.8% of men, 77.8% of women) excluded. When cannabis- and cocaine-specific use disorders were considered, the models were refit with respondents reporting no lifetime use of the respective target drugs excluded. All analyses used SUDAAN (Research Triangle Institute, 2008), which adjusts for the NESARC's complex design using Taylor series linearization.

Results

Alcohol use disorders

Lifetime prevalences (*SE*) of alcohol abuse were 26.7% (0.69) and 12.5% (0.45) among men and women, respectively, $\chi^2(1) = 169.28$, $p < .0001$ (unadjusted OR, men vs. women = 3.2, 95% CI [2.95, 3.41]), and lifetime prevalences of alcohol dependence were 21.0% (0.54) and 9.9% (0.37) among men and women, respectively, $\chi^2(1) = 140.02$, $p < .0001$ (OR = 3.1, 95% CI [2.89, 3.42]). Table 1 shows sex-specific prevalences and unadjusted ORs (men vs. women)

TABLE 1. Lifetime prevalences, % (*SE*), and unadjusted odds ratios (ORs) of comorbid DSM-IV Axis I and II disorders among Wave 2 NESARC respondents with lifetime alcohol use disorders by sex

	Abuse, no dependence			Dependence with or without abuse		
Comorbid disorder	Men (n = 3,956)	Women (n = 2,433)	OR [95% CI][a,b]	Men (n = 2,988)	Women (n = 1,926)	OR [95% CI][a,b]
Any mood disorder	17.6 (0.75)	38.0 (1.23)	**0.4 [0.30, 0.40]**	38.1 (1.05)	61.6 (1.33)	**0.4 [0.33, 0.44]**
Major depressive disorder	10.9 (0.61)	27.9 (1.08)	**0.3 [0.27, 0.37]**	18.4 (0.84)	35.3 (1.31)	**0.4 [0.35, 0.48]**
Dysthymia	1.9 (0.27)	5.1 (0.54)	**0.4 [0.24, 0.52]**	4.0 (0.41)	9.6 (0.78)	**0.4 [0.29, 0.52]**
Bipolar I disorder	3.2 (0.33)	6.2 (0.66)	**0.5 [0.37, 0.66]**	11.9 (0.71)	17.6 (1.07)	**0.6 [0.53, 0.76]**
Bipolar II disorder	1.3 (0.21)	2.0 (0.31)	**0.6 [0.39, 0.96]**	3.4 (0.40)	5.1 (0.58)	**0.7 [0.46, 0.92]**
Any anxiety disorder	21.9 (0.73)	43.8 (1.28)	**0.4 [0.33, 0.43]**	36.9 (1.05)	62.5 (1.36)	**0.4 [0.32, 0.42]**
Panic disorder with or without agoraphobia	4.0 (0.37)	11.8 (0.80)	**0.3 [0.24, 0.40]**	10.4 (0.67)	21.6 (1.05)	**0.4 [0.35, 0.51]**
Social phobia	5.6 (0.41)	10.3 (0.78)	**0.5 [0.41, 0.65]**	11.7 (0.72)	19.6 (1.11)	**0.5 [0.45, 0.66]**
Specific phobia	10.2 (0.51)	24.0 (1.06)	**0.4 [0.30, 0.42]**	17.4 (0.82)	35.0 (1.48)	**0.4 [0.33, 0.46]**
Generalized anxiety disorder	4.7 (0.46)	12.7 (0.86)	**0.3 [0.26, 0.44]**	9.8 (0.64)	22.3 (1.14)	**0.4 [0.31, 0.46]**
Posttraumatic stress disorder	4.0 (0.38)	9.1 (0.65)	**0.4 [0.32, 0.52]**	7.1 (0.54)	16.9 (1.04)	**0.4 [0.30, 0.47]**
Any drug use disorder	18.1 (0.80)	18.5 (0.94)	1.0 [0.83, 1.14]	42.0 (1.17)	37.8 (1.34)	**1.2 [1.03, 1.39]**
Any drug abuse	16.9 (0.77)	16.0 (0.85)	1.0 [0.87, 1.22]	35.2 (1.06)	29.2 (1.29)	**1.3 [1.07, 1.52]**
Any drug dependence	2.6 (0.28)	3.5 (0.51)	0.7 [0.50, 1.06]	15.4 (0.87)	15.4 (0.95)	1.1 [0.88, 1.31]
Nicotine dependence	29.9 (1.07)	32.7 (1.15)	0.9 [0.76, 1.01]	51.7 (1.20)	52.6 (1.46)	1.0 [0.84, 1.11]
Attention-deficit/hyperactivity disorder	2.3 (0.29)	2.4 (0.39)	1.0 [0.66, 1.46]	6.6 (0.55)	5.9 (0.67)	1.1 [0.84, 1.50]
Any personality disorder	23.3 (0.84)	24.1 (1.06)	1.0 [0.83, 1.10]	42.7 (1.14)	44.6 (1.43)	0.9 [0.81, 1.06]
Paranoid	2.9 (0.30)	4.8 (0.49)	**0.6 [0.44, 0.80]**	8.7 (0.64)	13.9 (0.92)	**0.6 [0.48, 0.73]**
Schizoid	2.9 (0.35)	3.5 (0.50)	0.8 [0.56, 1.17]	6.3 (0.54)	6.9 (0.67)	0.9 [0.69, 1.20]
Schizotypal	3.5 (0.35)	4.0 (0.46)	0.9 [0.64, 1.16]	8.4 (0.63)	10.0 (0.84)	0.8 [0.65, 1.05]
Histrionic	1.3 (0.20)	2.5 (0.38)	**0.5 [0.32, 0.81]**	4.9 (0.46)	7.1 (0.69)	**0.7 [0.51, 0.89]**
Narcissistic	7.4 (0.50)	5.0 (0.45)	**1.5 [1.20, 1.93]**	13.6 (0.73)	10.1 (0.84)	**1.4 [1.14, 1.75]**
Antisocial	6.1 (0.47)	4.1 (0.48)	**1.5 [1.14, 2.00]**	15.6 (0.81)	8.3 (0.76)	**2.0 [1.60, 2.57]**
Borderline	4.0 (0.37)	6.4 (0.56)	**0.6 [0.47, 0.78]**	13.9 (0.81)	20.3 (1.20)	**0.6 [0.52, 0.77]**
Avoidant	1.2 (0.21)	2.4 (0.38)	**0.5 [0.28, 0.76]**	4.1 (0.46)	8.1 (0.75)	**0.5 [0.36, 0.66]**
Dependent	0.1 (0.06)	0.6 (0.21)	**0.2 [0.05, 0.62]**	0.9 (0.22)	1.3 (0.28)	0.7 [0.37, 1.39]
Obsessive–compulsive	8.7 (0.50)	10.4 (0.73)	0.8 [0.68, 1.00]	13.4 (0.75)	17.3 (0.95)	**0.7 [0.61, 0.88]**

Notes: DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition;* NESARC = National Epidemiologic Survey on Alcohol and Related Conditions; CI = confidence interval. [a]Men versus women; [b]sex differences that are statistically significant ($p < .05$) are displayed in **bold.**

of comorbid disorders among respondents with lifetime AUDs. Across the diagnoses of abuse and dependence, women had significantly higher rates of all mood and anxiety disorders and paranoid, histrionic, borderline, and avoidant PDs. Men had higher rates of narcissistic and antisocial PDs. Among respondents with abuse, dependent PD was significantly more prevalent in women; among those with dependence, drug abuse was more prevalent in men.

Comorbid associations of AUDs with other psychiatric disorders are shown in Table 2. In sociodemographic-adjusted models, alcohol abuse was significantly and positively associated among both sexes with MDD; social and specific phobias; generalized anxiety disorder; drug abuse; drug dependence; nicotine dependence; and paranoid, schizoid, narcissistic, antisocial, borderline, and OC PDs. However, a significant Sex × Alcohol Abuse interaction was observed only in MDD, with a modestly larger OR for women than for men. Alcohol abuse was significantly and positively associated with bipolar II disorder among men and associated with dysthymia, bipolar I, panic, and schizotypal and histrionic PDs in women. However, ORs for these disorders did not differ significantly by sex. After further adjustment for additional comorbidity, alcohol abuse remained significantly and positively associated in both sexes with drug abuse, drug dependence, nicotine dependence, and antisocial PD; in men with bipolar II and OC PD; and in women with MDD, social and specific phobias, and histrionic PD. Additionally, significant negative associations were observed among men with dysthymia and avoidant PD. Only in MDD, however, was there a significant Sex × Alcohol Abuse interaction (men: OR = 1.0; women: OR = 1.3).

After adjustment for sociodemographic characteristics, alcohol dependence was significantly and positively associated with all examined disorders in both sexes; however, no ORs for specific comorbid disorders differed significantly between men and women. After further adjustment for additional diagnoses, significant positive associations remained in both sexes with MDD, bipolar I, social and specific phobias, drug abuse and dependence, nicotine dependence, and paranoid, histrionic, antisocial, and borderline PDs; in men with bipolar II; and in women with OC PD. Again, no significant sex differences were observed for any comorbid disorder.

In light of the high prevalence of lifetime drinking (92.5% for men, 82.8% for women), exclusion of lifetime abstainers from the group without any lifetime AUD yielded virtually no changes to comorbid associations of AUDs with mood, anxiety, ADHD, PD, and, in the case of alcohol abuse, nicotine dependence diagnoses (data not shown), although the

TABLE 2. Odds ratios [95% confidence intervals] for Wave 2 lifetime DSM-IV alcohol use disorders and other psychiatric disorders among NESARC respondents (n = 34,653) by sex[a,b]

	Adjusted for sociodemographic characteristics				Adjusted for sociodemographic characteristics plus other psychiatric disorders			
	Alcohol abuse, no dependence, vs. neither abuse nor dependence		Alcohol dependence, with or without abuse, vs. neither abuse nor dependence		Alcohol abuse, no dependence, vs. neither abuse nor dependence		Alcohol dependence, with or without abuse, vs. neither abuse nor dependence	
Comorbid disorder	Men	Women	Men	Women	Men	Women	Men	Women
Any mood disorder	***1.2 [1.08, 1.39]***	***1.6 [1.38, 1.76]***	***3.0 [2.63-3.43]***	***3.9 [3.47, 4.40]***	*0.9 [0.79, 1.06]*	***1.2 [1.05, 1.40]***	***1.5 [1.28, 1.78]***	***2.1 [1.78, 2.37]***
Major depressive disorder	***1.2 [1.01, 1.38]***	***1.5 [1.32, 1.70]***	**2.1 [1.75, 2.45]**	**2.2 [1.91, 2.48]**	*1.0 [0.84, 1.16]*	***1.3 [1.15, 1.52]***	**1.3 [1.07, 1.61]**	**1.5 [1.32, 1.79]**
Dysthymia	0.9 [0.61, 1.27]	**1.4 [1.07, 1.77]**	**1.9 [1.32, 2.62]**	**2.8 [2.22, 3.56]**	**0.7 [0.46, 0.96]**	1.0 [0.77, 1.31]	0.7 [0.49, 1.13]	1.2 [0.94, 1.57]
Bipolar I disorder	1.2 [0.88, 1.54]	**1.6 [1.23, 1.99]**	**3.7 [2.97, 4.71]**	**4.3 [3.59, 5.12]**	0.8 [0.58, 1.07]	1.1 [0.82, 1.40]	**1.4 [1.10, 1.87]**	**1.6 [1.29, 2.10]**
Bipolar II disorder	**1.9 [1.18, 2.89]**	1.1 [0.81, 1.59]	**3.5 [2.28, 5.39]**	**2.4 [1.76, 3.21]**	**1.7 [1.08, 2.58]**	0.9 [0.60, 1.21]	**2.3 [1.41, 3.71]**	1.2 [0.85, 1.63]
Any anxiety disorder	**1.4 [1.28, 1.60]**	**1.5 [1.31, 1.66]**	**2.8 [2.50, 3.20]**	**3.1 [2.73, 3.51]**	**1.2 [1.05, 1.35]**	**1.2 [1.01, 1.31]**	**1.5 [1.29, 1.73]**	**1.5 [1.30, 1.76]**
Panic disorder with or without agoraphobia	1.3 [0.99, 1.62]	**1.5 [1.27, 1.81]**	**3.3 [2.64, 4.14]**	**3.0 [2.61, 3.49]**	0.9 [0.69, 1.21]	1.0 [0.83, 1.21]	1.3 [0.96, 1.70]	1.1 [0.89, 1.32]
Social phobia	**1.4 [1.14, 1.77]**	**1.6 [1.33, 1.93]**	**2.9 [2.35, 3.51]**	**3.2 [2.70, 3.83]**	1.2 [0.93, 1.47]	**1.3 [1.05, 1.55]**	**1.5 [1.14, 1.83]**	**1.5 [1.21, 1.80]**
Specific phobia	**1.4 [1.16, 1.58]**	**1.5 [1.26, 1.69]**	**2.3 [1.98, 2.72]**	**2.4 [2.07, 2.82]**	1.1 [0.96, 1.33]	**1.2 [1.01, 1.38]**	**1.2 [1.03, 1.50]**	**1.2 [1.02, 1.51]**
Generalized anxiety disorder	**1.4 [1.07, 1.80]**	**1.5 [1.22, 1.74]**	**2.8 [2.21, 3.43]**	**3.0 [2.53, 3.44]**	1.1 [0.82, 1.48]	1.1 [0.91, 1.35]	1.1 [0.81, 1.43]	1.2 [0.98, 1.46]
Posttraumatic stress disorder	1.3 [1.00, 1.68]	1.2 [0.97, 1.38]	**2.3 [1.82, 2.97]**	**2.3 [1.93, 2.72]**	1.0 [0.72, 1.30]	0.9 [0.72, 1.05]	0.9 [0.70, 1.27]	1.0 [0.84, 1.23]
Any drug use disorder	**4.7 [3.89, 5.60]**	**6.1 [5.09, 7.31]**	**12.5 [10.73, 14.64]**	**14.4 [12.09, 17.10]**	**4.0 [3.34, 4.87]**	**4.9 [4.10, 5.89]**	**8.0 [6.74, 9.52]**	**8.1 [6.68, 9.76]**
Any drug abuse vs. neither abuse nor dependence	**4.8 [3.96, 5.82]**	**6.1 [5.09, 7.41]**	**9.9 [8.30, 11.73]**	**10.8 [8.88, 13.24]**	**4.2 [3.48, 5.17]**	**5.2 [4.28, 6.28]**	**7.1 [5.88, 8.51]**	**7.1 [5.66, 8.90]**
Any drug dependence vs. neither abuse nor dependence	**3.8 [2.40, 5.96]**	**5.8 [3.82, 8.69]**	**24.1 [16.39, 35.34]**	**27.8 [19.94, 38.66]**	**3.0 [1.90, 4.83]**	**4.0 [2.65, 5.97]**	**11.8 [7.97, 17.52]**	**11.0 [7.87, 15.47]**
Nicotine dependence	**2.4 [2.16, 2.76]**	**2.7 [2.37, 3.07]**	**5.8 [5.03, 6.61]**	**6.0 [5.27, 6.91]**	**2.1 [1.86, 2.42]**	**2.2 [1.92, 2.51]**	**3.9 [3.32, 4.52]**	**3.6 [3.07, 4.16]**
Attention-deficit/ hyperactivity disorder	1.1 [0.78, 1.54]	1.4 [0.91, 2.06]	**2.5 [1.88, 3.31]**	**3.1 [2.25, 4.22]**	0.9 [0.60, 1.24]	1.0 [0.68, 1.58]	1.2 [0.84, 1.65]	1.3 [0.93, 1.79]
Any personality disorder	**1.7 [1.52, 1.92]**	**1.6 [1.41, 1.84]**	**3.6 [3.22, 4.04]**	**3.7 [3.21, 4.19]**	***1.5 [1.28, 1.65]***	***1.2 [1.02, 1.37]***	**2.0 [1.70, 2.22]**	**1.6 [1.39, 1.91]**
Paranoid	**1.5 [1.16, 2.05]**	**1.4 [1.06, 1.75]**	**3.8 [2.92, 4.86]**	**3.6 [2.94, 4.44]**	1.1 [0.83, 1.55]	0.9 [0.68, 1.18]	**1.6 [1.18, 2.12]**	**1.3 [1.05, 1.72]**
Schizoid	**1.6 [1.15, 2.08]**	**1.5 [1.06, 2.02]**	**3.1 [2.35, 4.15]**	**2.6 [1.97, 3.34]**	1.2 [0.84, 1.61]	1.0 [0.70, 1.34]	1.3 [0.88, 1.92]	0.9 [0.64, 1.15]
Schizotypal	1.2 [0.93, 1.52]	**1.5 [1.19, 1.97]**	**2.3 [1.84, 2.94]**	**3.5 [2.74, 4.38]**	0.9 [0.65, 1.11]	1.0 [0.77, 1.40]	0.8 [0.63, 1.12]	1.2 [0.88, 1.55]
Histrionic	1.5 [0.94, 2.30]	**2.5 [1.70, 3.65]**	**4.2 [2.91, 6.05]**	**6.3 [4.64, 8.51]**	1.1 [0.70, 1.87]	**1.8 [1.23, 2.61]**	**1.8 [1.10, 2.86]**	**2.5 [1.78, 3.63]**
Narcissistic	**1.5 [1.22, 1.77]**	**1.4 [1.11, 1.65]**	**2.5 [2.06, 2.96]**	**2.5 [2.01, 3.08]**	1.2 [0.94, 1.43]	1.0 [0.79, 1.25]	1.2 [0.94, 1.47]	1.1 [0.85, 1.50]
Antisocial	**3.3 [2.54, 4.29]**	**5.5 [3.70, 8.14]**	**7.7 [5.96, 9.82]**	**8.9 [6.33, 12.54]**	**2.4 [1.78, 3.11]**	**3.2 [2.14, 4.77]**	**3.1 [2.28, 4.08]**	**2.4 [1.60, 3.49]**
Borderline	**1.4 [1.05, 1.73]**	**1.4 [1.13, 1.72]**	**4.2 [3.37, 5.18]**	**4.5 [3.74, 5.36]**	1.0 [0.76, 1.31]	0.8 [0.66, 1.06]	**1.6 [1.25, 2.11]**	**1.4 [1.11, 1.82]**
Avoidant	0.9 [0.53, 1.39]	1.1 [0.73, 1.52]	**2.4 [1.66, 3.51]**	**3.2 [2.46, 4.21]**	**0.6 [0.34, 0.98]**	0.7 [0.51, 1.07]	0.9 [0.51, 1.44]	1.1 [0.83, 1.47]
Dependent	0.7 [0.15, 3.26]	1.5 [0.73, 3.15]	**3.6 [1.33, 9.77]**	**2.6 [1.49, 4.50]**	0.3 [0.05, 2.16]	0.9 [0.46, 1.85]	0.6 [0.17, 2.46]	0.7 [0.39, 1.22]
Obsessive–compulsive	**1.5 [1.24, 1.80]**	**1.5 [1.25, 1.84]**	**2.4 [2.00, 2.81]**	**2.8 [2.32, 3.30]**	**1.2 [1.02, 1.52]**	1.2 [1.00, 1.52]	1.2 [0.97, 1.50]	**1.3 [1.06, 1.57]**

Notes: DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition;* NESARC = National Epidemiologic Survey on Alcohol and Related Conditions. [a]Odds ratios significantly ($p < .05$) different from 1.0 are presented in **bold;** [b]odds ratios in *italics* are significantly ($p < .05$) different between women and men.

Sex × Alcohol Abuse interaction for MDD was no longer significant. ORs for any DUD comorbid with alcohol abuse decreased from 4.0 and 4.9 in men and women, respectively, in the total sample to 3.7 and 4.5 among lifetime drinkers. ORs for any DUD comorbid with alcohol dependence decreased from 8.0 and 8.1 among men and women in the total sample to 7.3 and 7.4 among lifetime drinkers; for nicotine dependence, from 3.9 and 3.6 in the total sample to 3.6 and 3.2 among lifetime drinkers. The ORs for dysthymia comorbid with alcohol dependence went from 0.7 and 1.2 among men and women in the total sample to 0.7 and 1.3 among lifetime drinkers; although neither sex-specific OR was itself statistically significant, a significant Sex × Alcohol Dependence interaction for dysthymia not seen in the total sample emerged among lifetime drinkers.

Drug use disorders

Lifetime prevalences (*SE*) of any drug abuse were 13.9% (0.44) and 6.7% (0.30) among men and women, respectively, $\chi^2(1) = 108.21$, $p < .0001$ (unadjusted OR = 2.2, 95% CI [1.95, 2.40]), and lifetime prevalences of any drug dependence were 4.4% (0.27) and 2.5% (0.15) among men and women, respectively, $\chi^2(1) = 37.56$, $p < .0001$ (OR = 1.9, 95% CI [1.65, 2.28]). Table 3 shows sex-specific prevalences and unadjusted ORs (men vs. women) of comorbid disorders among respondents with any lifetime DUDs. Among respondents with any drug abuse, women had significantly higher rates of most mood and anxiety disorders and paranoid, borderline, and avoidant PDs, whereas men had higher rates of alcohol abuse and dependence and narcissistic and antisocial PDs. Among respondents with any drug dependence, women had higher rates of nonbipolar mood disorders, anxiety disorders, and paranoid and avoidant PDs, whereas men had higher rates of alcohol dependence and narcissistic and antisocial PDs.

Comorbid associations of any drug abuse and any drug dependence with other psychiatric disorders are shown in Table 4. In sociodemographic-adjusted models, abuse was significantly and positively associated among both sexes with all examined disorders except bipolar II (only in women) and dependent PD (only in men). ORs for alcohol abuse and nicotine dependence were significantly larger in women than in men. After further adjustment for additional comorbidity, drug abuse remained significantly and positively associated in both sexes with bipolar I, alcohol abuse and dependence, nicotine dependence, and antisocial PD; in men with MDD and ADHD; and in women with borderline PD. ORs for bipolar I disorder and alcohol abuse were significantly larger among women than men.

TABLE 3. Lifetime prevalences, % (*SE*), and unadjusted odds ratios (ORs) of comorbid DSM-IV Axis I and II disorders among Wave 2 NESARC respondents with lifetime drug use disorders by sex

	Any drug abuse, no dependence			Any drug dependence with or without abuse		
Comorbid disorder	Men (n = 1,649)	Women (n = 1,148)	OR [95% CI][a,b]	Men (n = 633)	Women (n = 482)	OR [95% CI][a,b]
Any mood disorder	32.9 (1.62)	53.2 (1.82)	**0.4 [0.35, 0.52]**	60.7 (2.23)	77.8 (2.47)	**0.4 [0.32, 0.60]**
Major depressive disorder	17.7 (1.30)	29.8 (1.79)	**0.5 [0.39, 0.66]**	23.8 (1.91)	37.0 (2.91)	**0.5 [0.38, 0.75]**
Dysthymia	3.8 (0.58)	7.2 (0.86)	**0.5 [0.33, 0.76]**	7.5 (1.33)	13.5 (2.12)	**0.5 [0.31, 0.89]**
Bipolar I disorder	9.0 (0.84)	15.5 (1.27)	**0.5 [0.41, 0.71]**	24.9 (2.12)	30.8 (2.52)	0.8 [0.55, 1.01]
Bipolar II disorder	2.3 (0.41)	3.6 (0.58)	0.6 [0.39, 1.04]	5.4 (1.05)	7.6 (1.44)	0.7 [0.39, 1.23]
Any anxiety disorder	30.1 (1.34)	51.6 (1.91)	**0.4 [0.33, 0.49]**	55.7 (2.19)	73.6 (2.32)	**0.5 [0.34, 0.59]**
Panic disorder with or without agoraphobia	6.9 (0.73)	18.6 (1.49)	**0.3 [0.25, 0.43]**	23.4 (2.06)	35.8 (2.80)	**0.6 [0.39, 0.76]**
Social phobia	8.9 (0.81)	13.8 (1.16)	**0.6 [0.46, 0.81]**	22.0 (2.15)	28.6 (2.30)	**0.7 [0.51, 0.97]**
Specific phobia	15.0 (1.14)	29.4 (1.65)	**0.4 [0.34, 0.53]**	26.9 (2.39)	47.1 (3.19)	**0.4 [0.29, 0.59]**
Generalized anxiety disorder	8.1 (0.75)	16.8 (1.26)	**0.4 [0.34, 0.57]**	18.4 (1.88)	33.5 (2.61)	**0.5 [0.31, 0.64]**
Posttraumatic stress disorder	6.1 (0.64)	13.6 (1.33)	**0.4 [0.30, 0.58]**	15.7 (1.70)	27.0 (2.50)	**0.5 [0.35, 0.73]**
Any alcohol use disorder	83.8 (1.14)	69.8 (1.69)	**2.2 [1.79, 2.80]**	89.9 (1.72)	80.2 (2.33)	**2.2 [1.35, 3.60]**
Alcohol abuse	35.7 (1.52)	31.9 (1.63)	**2.1 [1.61, 2.70]**	15.7 (1.61)	17.9 (2.22)	1.7 [0.95, 3.16]
Alcohol dependence	48.1 (1.46)	37.9 (1.83)	**2.4 [1.85, 3.01]**	74.2 (1.99)	62.3 (2.75)	**2.3 [1.43, 3.84]**
Nicotine dependence	49.4 (1.43)	48.9 (1.78)	1.0 [0.85, 1.22]	67.8 (2.56)	71.2 (2.61)	0.9 [0.60, 1.21]
Attention-deficit/hyperactivity disorder	6.6 (0.71)	4.9 (0.69)	1.4 [0.94, 1.98]	12.0 (1.49)	10.1 (1.94)	1.2 [0.72, 2.07]
Any personality disorder	40.2 (1.58)	36.1 (1.69)	1.2 [1.00, 1.42]	66.2 (2.14)	69.8 (2.83)	0.9 [0.63, 1.14]
Paranoid	5.7 (0.63)	9.6 (1.03)	**0.6 [0.41, 0.78]**	17.7 (1.92)	24.3 (2.51)	**0.7 [0.47, 0.96]**
Schizoid	5.1 (0.66)	5.4 (0.81)	0.9 [0.63, 1.38]	12.1 (1.65)	15.3 (2.13)	0.8 [0.48, 1.21]
Schizotypal	6.9 (0.75)	7.3 (0.86)	0.9 [0.67, 1.32]	18.3 (2.08)	21.2 (2.52)	0.8 [0.55, 1.27]
Histrionic	2.7 (0.45)	3.9 (0.62)	0.7 [0.42, 1.10]	11.3 (1.96)	11.7 (1.89)	1.0 [0.56, 1.64]
Narcissistic	11.6 (0.90)	8.2 (1.11)	**1.5 [1.04, 2.08]**	26.4 (2.14)	14.7 (1.95)	**2.1 [1.44, 3.00]**
Antisocial	15.3 (1.11)	6.6 (0.85)	**2.6 [1.90, 3.42]**	33.7 (2.18)	25.0 (2.50)	**1.5 [1.08, 2.15]**
Borderline	10.5 (0.88)	16.6 (1.34)	**0.6 [0.45, 0.77]**	28.2 (2.32)	35.3 (3.05)	0.7 [0.51, 1.02]
Avoidant	3.3 (0.52)	5.6 (0.80)	**0.6 [0.37, 0.90]**	9.6 (1.58)	16.0 (2.28)	**0.6 [0.34, 0.92]**
Dependent	0.4 (0.19)	0.5 (0.25)	0.8 [0.23, 2.91]	3.9 (1.37)	4.8 (1.07)	0.8 [0.33, 1.90]
Obsessive–compulsive	11.5 (0.92)	13.0 (1.07)	0.9 [0.67, 1.13]	22.3 (2.03)	23.0 (2.45)	1.0 [0.68, 1.36]

Notes: DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition;* NESARC = National Epidemiologic Survey on Alcohol and Related Conditions. [a]Men versus women; [b]sex differences that are statistically significant ($p < .05$) are displayed in **bold.**

TABLE 4. Odds ratios [95% confidence intervals] for Wave 2 lifetime DSM-IV drug use disorders and other psychiatric disorders among NESARC respondents (n = 34,653) by sex[a,b]

	Adjusted for sociodemographic characteristics				Adjusted for sociodemographic characteristics plus other psychiatric disorders			
	Any drug abuse, no dependence, vs. neither abuse nor dependence		Any drug dependence, with or without abuse, vs. neither abuse nor dependence		Any drug abuse, no dependence, vs. neither abuse nor dependence		Any drug dependence, with or without abuse, vs. neither abuse nor dependence	
Comorbid disorder	Men	Women	Men	Women	Men	Women	Men	Women
Any mood disorder	**2.1 [1.75, 2.46]**	**2.4 [2.04, 2.81]**	**6.1 [4.87, 7.51]**	**7.0 [5.28, 9.39]**	**1.3 [1.09, 1.61]**	**1.4 [1.20, 1.73]**	**2.3 [1.76, 3.04]**	**2.4 [1.81, 3.28]**
Major depressive disorder	**1.7 [1.42, 2.13]**	**1.5 [1.20, 1.75]**	**2.5 [1.92, 3.11]**	**2.0 [1.55, 2.62]**	**1.3 [1.06, 1.66]**	1.0 [0.82, 1.24]	1.3 [0.97, 1.70]	1.0 [0.75, 1.31]
Dysthymia	**1.9 [1.29, 2.70]**	**1.8 [1.38, 2.47]**	**3.9 [2.42, 6.13]**	**3.5 [2.38, 5.24]**	1.3 [0.89, 2.01]	1.1 [0.76, 1.46]	1.6 [0.91, 2.62]	1.2 [0.79, 1.85]
Bipolar I disorder	**2.4 [1.89, 3.10]**	**3.4 [2.71, 4.16]**	**7.2 [5.52, 9.31]**	**7.0 [5.46, 9.06]**	***1.3 [1.02, 1.70]***	***2.0 [1.56, 2.63]***	**2.1 [1.56, 2.92]**	**2.2 [1.56, 3.08]**
Bipolar II disorder	1.6 [0.99, 2.46]	**1.5 [1.03, 2.22]**	**3.2 [2.01, 4.95]**	**2.9 [1.82, 4.59]**	0.9 [0.54, 1.43]	0.9 [0.62, 1.42]	1.1 [0.65, 1.80]	1.0 [0.64, 1.67]
Any anxiety disorder	**1.8 [1.52, 2.04]**	**1.9 [1.65, 2.23]**	**5.1 [4.22, 6.24]**	**4.9 [3.82, 6.20]**	1.0 [0.86, 1.20]	1.1 [0.88, 1.27]	**1.8 [1.42, 2.29]**	**1.4 [1.06, 1.89]**
Panic disorder with or without agoraphobia	**1.8 [1.37, 2.35]**	**2.2 [1.86, 2.82]**	**7.3 [5.48, 9.61]**	**5.2 [4.06, 6.70]**	1.0 [0.73, 1.29]	1.2 [0.97, 1.56]	**2.2 [1.59, 3.02]**	**1.6 [1.17, 2.14]**
Social phobia	**1.7 [1.37, 2.17]**	**1.8 [1.41, 2.18]**	**4.8 [3.67, 6.27]**	**4.1 [3.20, 5.29]**	1.0 [0.77, 1.30]	0.9 [0.72, 1.19]	**1.5 [1.10, 2.10]**	1.1 [0.82, 1.41]
Specific phobia	**1.6 [1.33, 1.98]**	**1.7 [1.42, 1.96]**	**3.3 [2.51, 4.22]**	**3.4 [2.67, 4.41]**	1.0 [0.84, 1.25]	1.0 [0.83, 1.19]	1.1 [0.82, 1.54]	1.2 [0.91, 1.56]
Generalized anxiety disorder	**1.9 [1.48, 2.37]**	**1.8 [1.48, 2.20]**	**4.7 [3.50, 6.18]**	**4.4 [3.44, 5.68]**	1.0 [0.74, 1.35]	1.0 [0.76, 1.24]	1.2 [0.85, 1.63]	1.2 [0.89, 1.61]
Posttraumatic stress disorder	**1.9 [1.41, 2.45]**	**1.7 [1.33, 2.15]**	**5.3 [3.97, 7.16]**	**3.7 [2.80, 4.85]**	1.2 [0.87, 1.63]	1.1 [0.80, 1.38]	**1.9 [1.36, 2.75]**	1.4 [0.99, 1.89]
Any alcohol use disorder	***6.8 [5.79, 8.06]***	***8.0 [6.80, 9.50]***	**12.6 [8.56, 18.51]**	**15.0 [10.92, 20.57]**	**5.3 [4.44, 6.30]**	**5.9 [4.93, 7.06]**	**6.8 [4.59, 10.12]**	**7.2 [5.19, 10.12]**
Alcohol abuse vs. neither abuse nor dependence	***4.8 [3.96, 5.81]***	***6.1 [5.08, 7.40]***	**3.8 [2.40, 5.87]**	**5.7 [3.81, 8.62]**	***4.2 [3.41, 5.06]***	***5.0 [4.13, 6.09]***	**2.7 [1.72, 4.32]**	**3.7 [2.41, 5.88]**
Alcohol dependence vs. neither abuse nor dependence	**9.9 [8.30, 11.72]**	**10.9 [8.92, 13.28]**	**24.1 [16.41, 35.02]**	**27.8 [20.04, 38.67]**	**7.0 [5.78, 8.41]**	**7.2 [5.69, 8.98]**	**10.6 [7.13, 15.64]**	**10.5 [7.36, 15.04]**
Nicotine dependence	***3.2 [2.79, 3.68]***	***3.9 [3.36, 4.58]***	***6.8 [5.27, 8.69]***	***9.6 [7.30, 12.61]***	**2.1 [1.76, 2.39]**	**2.3 [1.91, 2.70]**	**3.3 [2.52, 4.26]**	**4.0 [3.01, 5.43]**
Attention-deficit/ hyperactivity disorder	**2.4 [1.81, 3.17]**	**2.3 [1.59, 3.18]**	**4.1 [2.95, 5.74]**	**4.4 [2.69, 7.04]**	**1.6 [1.16, 2.16]**	1.3 [0.88, 1.99]	**1.6 [1.12, 2.41]**	1.4 [0.83, 2.32]
Any personality disorder	**2.5 [2.24, 2.97]**	**2.3 [1.96, 2.66]**	**7.0 [5.71, 8.50]**	**8.6 [6.57, 11.15]**	***1.7 [1.44, 1.97]***	***1.3 [1.09, 1.52]***	**2.7 [2.16, 3.42]**	**3.2 [2.46, 4.21]**
Paranoid	**1.8 [1.34, 2.33]**	**2.1 [1.66, 2.70]**	**5.4 [3.94, 7.34]**	**5.4 [4.02, 7.26]**	0.8 [0.59, 1.11]	1.0 [0.76, 1.36]	1.3 [0.90, 1.81]	1.2 [0.85, 1.78]
Schizoid	**2.0 [1.46, 2.85]**	**2.0 [1.39, 2.74]**	**4.8 [3.33, 6.96]**	**5.4 [3.76, 7.62]**	1.1 [0.73, 1.58]	1.1 [0.72, 1.54]	1.3 [0.87, 1.99]	**1.5 [1.04, 2.16]**
Schizotypal	**1.8 [1.38, 2.38]**	**2.4 [1.79, 3.17]**	**4.8 [3.52, 6.49]**	**6.9 [4.93, 9.59]**	1.0 [0.72, 1.34]	1.2 [0.89, 1.74]	1.3 [0.90, 1.95]	**1.9 [1.26, 2.76]**
Histrionic	**1.7 [1.13, 2.95]**	**2.2 [1.49, 3.28]**	**6.7 [4.45, 10.14]**	**6.7 [4.38, 10.13]**	0.8 [0.49, 1.19]	0.9 [0.59, 1.38]	**1.6 [1.02, 2.48]**	1.2 [0.75, 1.98]
Narcissistic	**1.8 [1.48, 2.19]**	**1.9 [1.38, 2.57]**	**4.6 [3.65, 5.76]**	**3.2 [2.33, 4.40]**	1.1 [0.85, 1.33]	1.1 [0.78, 1.54]	***1.7 [1.26, 2.20]***	*1.0 [0.68, 1.42]*
Antisocial	**4.7 [3.69, 5.87]**	**5.1 [3.51, 7.26]**	***12.0 [9.14, 15.71]***	***20.5 [14.41, 29.29]***	**2.5 [1.95, 3.25]**	**2.0 [1.36, 3.06]**	**4.0 [2.94, 5.53]**	**4.9 [3.17, 7.46]**
Borderline	**2.5 [1.96, 3.13]**	**3.2 [2.58, 3.98]**	**7.2 [5.43, 9.52]**	**7.4 [5.54, 9.84]**	1.3 [0.95, 1.63]	**1.7 [1.34, 2.26]**	**1.7 [1.21, 2.48]**	**1.8 [1.23, 2.56]**
Avoidant	**2.1 [1.44, 3.13]**	**2.1 [1.54, 2.96]**	**5.5 [3.69, 8.12]**	**6.0 [4.03, 8.95]**	1.3 [0.83, 2.02]	1.2 [0.79, 1.68]	**1.6 [1.02, 2.47]**	**1.6 [1.02, 2.42]**
Dependent	**3.0 [1.09, 8.35]**	1.1 [0.40, 3.01]	***20.7 [9.24, 46.27]***	***8.7 [5.03, 14.97]***	1.6 [0.58, 4.58]	0.5 [0.19, 1.46]	***5.6 [1.79, 17.29]***	***2.2 [1.15, 4.15]***
Obsessive–compulsive	**1.6 [1.34, 2.01]**	**1.7 [1.38, 2.09]**	**3.7 [2.84, 4.78]**	**3.4 [2.58, 4.58]**	0.9 [0.73, 1.20]	0.9 [0.72, 1.16]	1.2 [0.88, 1.57]	0.9 [0.64, 1.24]

Notes: DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition;* NESARC = National Epidemiologic Survey on Alcohol and Related Conditions. [a]Odds ratios significantly ($p < .05$) different from 1.0 are presented in **bold;** [b]odds ratios in *italics* are significantly ($p < .05$) different between women and men.

TABLE 5. Odds ratios [95% confidence intervals] adjusted for sociodemographic characteristics and additional Axis I and II comorbidity of Wave 2 lifetime DSM-IV cannabis and cocaine use disorders and other psychiatric disorders among NESARC respondents(n = 34,653) by sex[a,b]

	Cannabis use disorders				Cocaine use disorders			
	Abuse, no dependence, vs. neither abuse nor dependence		Dependence, with or without abuse, vs. neither abuse nor dependence		Abuse, no dependence, vs. neither abuse nor dependence		Dependence, with or without abuse, vs. neither abuse nor dependence	
Comorbid disorder	Men	Women	Men	Women	Men	Women	Men	Women
Any mood disorder	1.1 [0.91, 1.37]	1.2 [1.00, 1.48]	**1.6 [1.10, 2.44]**	**2.0 [1.28, 3.07]**	1.4 [0.95, 1.91]	0.7 [0.45, 1.04]	**1.7 [1.07, 2.64]**	**2.0 [1.21, 3.18]**
Major depressive disorder	1.2 [0.89, 1.47]	1.0 [0.77, 1.18]	1.0 [0.65, 1.42]	1.0 [0.68, 1.49]	*1.5 [1.00, 2.18]*	***0.6 [0.42, 0.92]***	1.2 [0.70, 1.89]	0.9 [0.51, 1.41]
Dysthymia	1.1 [0.70, 1.72]	1.1 [0.77, 1.48]	1.5 [0.72, 2.97]	1.1 [0.58, 2.12]	1.4 [0.81, 2.49]	0.7 [0.34, 1.46]	1.4 [0.69, 2.92]	1.1 [0.59, 1.92]
Bipolar I disorder	1.2 [0.96, 1.60]	**1.8 [1.32, 2.40]**	**1.8 [1.15, 2.83]**	**1.7 [1.05, 2.74]**	1.3 [0.81, 1.96]	0.9 [0.56, 1.53]	1.7 [0.97, 3.00]	1.1 [0.59, 1.96]
Bipolar II disorder	0.8 [0.50, 1.27]	0.9 [0.57, 1.43]	1.0 [0.48, 2.04]	0.8 [0.41, 1.70]	0.7 [0.36, 1.52]	1.0 [0.39, 2.48]	1.4 [0.63, 2.92]	1.6 [0.79, 3.28]
Any anxiety disorder	1.0 [0.80, 1.16]	1.0 [0.82, 1.25]	**1.6 [1.11, 2.30]**	1.3 [0.84, 2.00]	**0.7 [0.51, 0.94]**	0.7 [0.48, 1.00]	1.3 [0.90, 2.00]	1.1 [0.70, 1.60]
Panic disorder with or without agoraphobia	**0.7 [0.53, 0.97]**	1.0 [0.80, 1.34]	1.2 [0.80, 1.92]	1.2 [0.79, 1.95]	1.3 [0.81, 1.95]	1.1 [0.72, 1.81]	**1.6 [1.03, 2.52]**	1.4 [0.87, 2.29]
Social phobia	1.1 [0.79, 1.41]	1.1 [0.87, 1.46]	**1.8 [1.14, 2.83]**	1.1 [0.72, 1.70]	0.8 [0.49, 1.16]	0.7 [0.42, 1.20]	1.1 [0.67, 1.85]	1.0 [0.66, 1.48]
Specific phobia	1.1 [0.84, 1.30]	0.9 [0.77, 1.12]	1.1 [0.71, 1.71]	1.3 [0.81, 1.97]	**0.6 [0.40, 0.94]**	0.7 [0.48, 1.02]	1.1 [0.73, 1.73]	0.9 [0.55, 1.34]
Generalized anxiety disorder	1.0 [0.74, 1.38]	1.1 [0.88, 1.48]	1.6 [0.98, 2.49]	**1.7 [1.12, 2.48]**	0.8 [0.51, 1.18]	0.9 [0.60, 1.43]	0.9 [0.52, 1.61]	0.7 [0.46, 1.12]
Posttraumatic stress disorder	1.2 [0.86, 1.72]	0.9 [0.68, 1.22]	**1.9 [1.25, 3.01]**	1.1 [0.71, 1.81]	0.9 [0.54, 1.41]	1.0 [0.58, 1.73]	1.4 [0.84, 2.47]	1.0 [0.55, 1.66]
Any alcohol use disorder	***4.5 [3.66, 5.47]***	***5.5 [4.35, 6.88]***	**3.5 [1.99, 6.25]**	**6.1 [3.89, 9.60]**	**5.1 [3.15, 8.19]**	**6.1 [3.60, 10.31]**	**6.3 [2.98, 13.16]**	**4.9 [2.59, 9.40]**
Alcohol abuse vs. neither abuse nor dependence	***3.9 [3.13, 4.88]***	***5.1 [3.93, 6.50]***	1.7 [0.87, 3.23]	**3.4 [1.79, 6.32]**	**4.3 [2.60, 7.01]**	**5.9 [3.52, 9.91]**	**3.0 [1.28, 6.87]**	**2.5 [1.11, 5.61]**
Alcohol dependence vs. neither abuse nor dependence	**5.3 [4.26, 6.50]**	**6.0 [4.64, 7.85]**	**4.6 [2.59, 8.19]**	**7.9 [4.94, 12.53]**	**6.1 [3.69, 10.08]**	**6.6 [3.54, 12.10]**	**8.8 [4.07, 18.93]**	**6.7 [3.44, 13.02]**
Any additional drug use disorder[c]	**10.3 [8.30, 12.67]**	**7.8 [6.18, 9.87]**	**12.8 [9.12, 17.99]**	**10.8 [7.40, 15.87]**	**19.5 [13.73, 27.69]**	**13.3 [9.30, 19.04]**	**13.2 [7.89, 22.00]**	**7.5 [4.65, 12.00]**
Nicotine dependence	***1.8 [1.54, 2.17]***	***2.3 [1.87, 2.75]***	**3.0 [1.99, 4.58]**	**2.5 [1.64, 3.91]**	1.2 [0.89, 1.50]	1.4 [0.99, 1.98]	**2.1 [1.41, 3.26]**	**2.7 [1.60, 4.42]**
Attention-deficit/ hyperactivity disorder	1.4 [0.96, 2.00]	1.4 [0.91, 2.01]	1.5 [0.89, 2.36]	1.4 [0.75, 2.74]	1.2 [0.78, 1.85]	1.8 [0.93, 3.50]	1.6 [0.89, 3.02]	1.2 [0.63, 2.42]
Any personality disorder	***1.4 [1.20, 1.70]***	*0.9 [0.77, 1.15]*	**2.4 [1.79, 3.32]**	**2.1 [1.44, 2.97]**	1.2 [0.90, 1.56]	1.4 [0.97, 1.97]	**1.8 [1.21, 2.57]**	**3.3 [2.13, 5.23]**
Paranoid	0.9 [0.65, 1.28]	0.9 [0.67, 1.25]	1.5 [0.96, 2.37]	0.9 [0.57, 1.55]	0.9 [0.47, 1.60]	0.8 [0.45, 1.38]	1.3 [0.76, 2.14]	0.9 [0.51, 1.49]
Schizoid	0.8 [0.51, 1.22]	0.9 [0.57, 1.28]	1.0 [0.59, 1.66]	0.7 [0.36, 1.17]	0.7 [0.38, 1.31]	1.2 [0.58, 2.30]	1.3 [0.70, 2.34]	**1.8 [1.10, 3.08]**
Schizotypal	0.8 [0.61, 1.12]	1.1 [0.79, 1.62]	1.1 [0.70, 1.67]	1.3 [0.75, 2.21]	0.9 [0.51, 1.53]	1.3 [0.78, 2.18]	1.6 [0.96, 2.60]	1.2 [0.77, 1.97]
Histrionic	1.0 [0.70, 1.52]	1.0 [0.63, 1.47]	1.3 [0.73, 2.30]	1.0 [0.50, 1.82]	1.2 [0.67, 2.25]	1.0 [0.49, 2.11]	1.6 [0.91, 2.97]	1.1 [0.54, 2.28]
Narcissistic	1.2 [0.94, 1.49]	1.1 [0.76, 1.63]	**1.8 [1.21, 2.64]**	1.2 [0.73, 2.04]	1.1 [0.73, 1.50]	1.0 [0.56, 1.69]	1.4 [0.90, 2.29]	0.6 [0.36, 1.12]
Antisocial	**1.9 [1.42, 2.44]**	**1.6 [1.03, 2.34]**	**2.8 [1.84, 4.18]**	**3.6 [2.08, 6.13]**	**1.7 [1.21, 2.26]**	**2.0 [1.15, 3.51]**	**1.6 [1.06, 2.48]**	**2.1 [1.02, 4.34]**
Borderline	1.2 [0.91, 1.63]	1.3 [0.97, 1.80]	1.1 [0.73, 1.78]	0.9 [0.57, 1.44]	1.2 [0.82, 1.71]	1.3 [0.79, 2.09]	**1.6 [1.02, 2.45]**	**1.8 [1.01, 3.33]**
Avoidant	1.2 [0.73, 1.92]	0.8 [0.53, 1.27]	1.6 [0.83, 3.11]	0.8 [0.45, 1.57]	1.0 [0.52, 1.81]	0.6 [0.30, 1.12]	1.8 [0.97, 3.37]	0.9 [0.45, 1.60]
Dependent	2.0 [0.74, 5.15]	0.8 [0.31, 2.11]	***5.6 [1.49, 20.77]***	*2.2 [0.93, 4.96]*	2.1 [0.61, 7.30]	1.0 [0.34, 2.79]	2.3 [0.50, 10.75]	1.8 [0.63, 4.98]
Obsessive–compulsive	1.0 [0.73, 1.24]	0.8 [0.59, 1.08]	**1.5 [1.02, 2.13]**	1.2 [0.80, 1.92]	1.1 [0.76, 1.53]	1.3 [0.81, 2.02]	1.0 [0.59, 1.60]	0.9 [0.60, 1.36]

Notes: DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition;* NESARC = National Epidemiologic Survey on Alcohol and Related Conditions. [a]Odds ratios significantly ($p < .05$) different from 1.0 are presented in **bold;** [b]odds ratios in *italics* are significantly ($p < .05$) different between women and men; [c]for comorbidity with cannabis use disorders, any use disorder associated with any drug other than cannabis; for comorbidity with cocaine use disorders, any use disorder associated with any drug other than cocaine.

With adjustment only for sociodemographic characteristics, drug dependence was significantly and positively associated with all examined disorders in both sexes. ORs for nicotine dependence and antisocial PD were significantly larger in women, whereas the OR for dependent PD was significantly larger in men. After further adjustment for additional comorbidity, significant positive associations remained in both sexes with bipolar I and panic disorders; alcohol abuse and dependence; nicotine dependence; and antisocial, borderline, avoidant, and dependent PDs. Significant positive associations also remained in men with social phobia, PTSD, ADHD, and histrionic and narcissistic PDs and in women with schizoid and schizotypal PDs. ORs for narcissistic and dependent PDs were significantly larger in men than in women.

Drug-specific, fully adjusted sex-specific comorbid associations of cannabis and cocaine use disorders with other psychiatric disorders are shown in Table 5. Cannabis abuse was significantly and positively associated among both sexes with AUDs, any DUD other than cannabis, nicotine dependence, and antisocial PD, and among women with bipolar I disorder, but negatively associated among men with panic disorder. Significant Sex × Cannabis Abuse interactions were observed in alcohol abuse and nicotine dependence, with ORs larger in women than in men. Cannabis dependence was significantly and positively associated with bipolar I disorder, alcohol dependence, any additional DUD, nicotine dependence, and antisocial PD in both sexes; social phobia, PTSD, and narcissistic, dependent, and OC PDs in men; and generalized anxiety disorder and alcohol abuse in women. The OR for dependent PD was significantly larger in men than in women.

Cocaine abuse was significantly and positively associated among both sexes with AUDs, any DUD other than cocaine, and antisocial PD. Among men, it was significantly and negatively associated with specific phobia; among women, with MDD. The Sex × Cocaine Abuse interaction was significant for MDD. Cocaine dependence was significantly and positively associated with AUDs, any additional DUD, nicotine dependence, and antisocial and borderline PDs in both sexes; with panic disorder in men; and with schizoid PD in women. No disorder-specific ORs differed significantly by sex.

TABLE 6. Odds ratios [95% confidence intervals] adjusted for sociodemographic characteristics and additional Axis I and II comorbidity of Wave 2 lifetime DSM-IV drug use disorders and other psychiatric disorders among lifetime users of the target drugs by sex[a]

	Abuse, no dependence, vs. neither abuse nor dependence		Dependence, with or without abuse, vs. neither abuse nor dependence	
Comorbid disorder by drug class	Men	Women	Men	Women
Any drug[b]				
Any mood disorder	**1.3 [1.06, 1.64]**	**1.3 [1.03, 1.53]**	**2.4 [1.82, 3.19]**	**2.1 [1.54, 2.95]**
Any anxiety disorder	1.1 [0.88, 1.26]	1.0 [0.83, 1.23]	**2.0 [1.55, 2.59]**	**1.5 [1.09, 2.00]**
Any alcohol use disorder	**2.4 [1.99, 2.98]**	**2.3 [1.89, 2.71]**	**3.7 [2.44, 5.70]**	**3.4 [2.44, 4.78]**
Nicotine dependence	**1.6 [1.29, 1.85]**	**1.7 [1.41, 1.98]**	**2.5 [1.88, 3.25]**	**3.1 [2.31, 4.11]**
Attention-deficit/ hyperactivity disorder	**1.6 [1.11, 2.30]**	1.1 [0.71, 1.72]	**1.9 [1.19, 2.89]**	1.2 [0.69, 2.00]
Any personality disorder	**1.4 [1.19, 1.74]**	1.2 [0.99, 1.41]	**2.4 [1.84, 3.04]**	**3.0 [2.26, 3.97]**
Cannabis[c]				
Any mood disorder	1.1 [0.89, 1.37]	1.2 [0.99, 1.50]	**1.7 [1.18, 2.56]**	**2.0 [1.31, 3.13]**
Any anxiety disorder	1.1 [0.86, 1.28]	1.0 [0.79, 1.24]	**1.9 [1.30, 2.68]**	1.4 [0.91, 2.14]
Any alcohol use disorder	**2.0 [1.59, 2.51]**	**2.1 [1.65, 2.57]**	**1.9 [1.05, 3.28]**	**2.9 [1.84, 4.69]**
Any additional drug use disorder[d]	**4.2 [3.33, 5.24]**	**3.8 [3.00, 4.70]**	**5.9 [4.20, 8.37]**	**5.8 [3.88, 8.59]**
Nicotine dependence	**1.4 [1.14, 1.68]**	**1.6 [1.32, 2.01]**	**2.2 [1.42, 3.31]**	**1.9 [1.24, 2.92]**
Attention-deficit/ hyperactivity disorder	1.5 [0.99, 2.24]	1.1 [0.71, 1.69]	**1.8 [1.02, 3.03]**	1.2 [0.61, 2.26]
Any personality disorder	**1.3 [1.06, 1.63]**	0.9 [0.71, 1.09]	**2.3 [1.63, 3.18]**	**1.9 [1.32, 2.81]**
Cocaine[e]				
Any mood disorder	1.1 [0.77, 1.63]	0.8 [0.50, 1.37]	1.5 [0.93, 2.41]	**2.0 [1.14, 3.43]**
Any anxiety disorder	0.7 [0.51, 1.05]	0.7 [0.48, 1.13]	1.4 [0.90, 2.23]	1.3 [0.76, 2.07]
Any alcohol use disorder	**2.5 [1.46, 4.25]**	**1.8 [1.02, 3.09]**	**3.7 [1.70, 8.09]**	**2.3 [1.07, 4.69]**
Any additional drug use disorder[d]	**3.7 [2.55, 5.41]**	**3.5 [2.26, 5.30]**	**3.2 [1.86, 5.54]**	**2.5 [1.47, 4.29]**
Nicotine dependence	1.1 [0.78, 1.46]	1.3 [0.84, 1.99]	**2.0 [1.24, 3.05]**	**2.1 [1.22, 3.63]**
Attention, deficit/ hyperactivity disorder	**2.0 [1.08, 3.81]**	2.0 [0.95, 4.39]	**2.6 [1.20, 5.45]**	1.4 [0.58, 3.37]
Any personality disorder	1.1 [0.79, 1.54]	1.2 [0.77, 1.91]	**1.7 [1.11, 2.53]**	**3.0 [1.80, 5.06]**

Notes: DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition.* [a]Odds ratios significantly ($p < .05$] different from 1.0 are presented in **bold;** [b]lifetime users of any drug: $n = 8,863$ (men: $n = 4,489$; women: $n = 4,374$); [c]lifetime cannabis users: $n = 7,433$ (men: $n = 3,934$; women: $n = 3,499$); [d]for comorbidity with cannabis use disorders, any use disorder associated with any drug other than cannabis; for comorbidity with cocaine use disorders, any use disorder associated with any drug other than cocaine; [e]lifetime cocaine users: $n = 2,283$ (men: $n = 1,317$; women: $n = 966$).

When lifetime comorbidities for any drug, cannabis, and cocaine use disorders were examined among lifetime users of the respective substances (Table 6), most associations from Tables 4 and 5 retained their magnitudes and statistical significance. The largest changes in ORs were observed for other SUDs, especially cannabis and cocaine with other DUDs, in which comorbid associations were markedly weaker when the samples were restricted to lifetime users. ORs for any mood disorder, any anxiety disorder, ADHD, any PD, and specific disorders within aggregated categories (not shown) generally changed little. The notable exception was comorbid ADHD in index cocaine use disorders, for which the ORs increased from 1.2 to 2.0 for abuse and 1.6 to 2.6 for dependence among men but only from 1.8 to 2.0 for abuse and 1.2 to 1.4 for dependence among women.

Sex × DUD interactions for specific comorbid disorders in the total respondent sample generally did not hold in analyses restricted to lifetime users. The exception was Sex × Cocaine Abuse, which was observed for comorbid MDD in both samples (men: ORs = 1.5 in the total sample and 1.2 among lifetime users; women: ORs = 0.6 in both samples), although neither sex-specific OR was itself significant among the subgroup of lifetime users. The lower confidence limit on the OR for men in the total sample was 1.00. Conversely, Sex × DUD interactions were observed among lifetime users but not in the total sample for PTSD in any drug dependence (men: OR = 2.8; women: OR = 1.4) and cannabis abuse (men: OR = 1.5; women: OR = 0.9) and dependence (men: OR = 2.5; women: OR = 1.2), and narcissistic PD in cocaine dependence (men: OR = 2.1; women: OR = 0.7). However, the ORs for women were not statistically significant in any of these instances.

Discussion

To our knowledge, this is the first study to compare adjusted associations of AUDs and DUDs, including cannabis- and cocaine-specific use disorders, with other psychiatric disorders by sex in the general population. Fully adjusted ORs were modest to moderate (<5.0), except for comorbid DUDs with index alcohol dependence in both sexes; comorbid drug abuse with index alcohol abuse in women; comorbid alcohol abuse with any index drug abuse, cocaine abuse, and cannabis abuse in women; comorbid alcohol dependence with all index DUDs in both sexes, except cannabis dependence in men; any additional DUD in cannabis and cocaine use disorders; and comorbid dependent PD with any index drug dependence and cannabis dependence in men. Few adjusted ORs differed significantly between men and women. Our findings thus contrast with stronger unadjusted associations in women for most disorders with lifetime DSM-III-R alcohol abuse reported by Kessler et al. (1997). They also contrast with stronger unadjusted ORs reported by Grant et al. (2004e) among women of past-year DSM-IV alcohol dependence and any drug abuse with OC, histrionic, and antisocial PDs, and past-year drug abuse with schizoid PD. However, they are consistent with the larger OR in men, also reported by Grant et al. (2004e), for any past-year drug dependence with dependent PD. The present results therefore extend findings previously reported by Compton et al. (2007) and Hasin et al. (2007) by indicating that, for both sexes, much of the comorbidity between SUDs and other psychiatric disorders reflects factors common to additional co-occurring conditions. However, differences with respect to past-year disorders may also be at least partly explained by the different time frames.

The observed Sex × SUD interactions varied by substance and between the total sample and lifetime users of the respective substances. Those in the total sample for comorbid MDD in alcohol abuse, bipolar I and alcohol abuse in any drug abuse, and alcohol abuse and nicotine dependence in cannabis abuse indicated modestly to moderately larger ORs for women than men. Conversely, those for narcissistic and dependent PDs in any drug dependence and dependent PD in cannabis dependence indicated ORs larger for men, considerably so in the case of dependent PD despite the lack of significant sex difference in prevalence. None of these interactions was observed in lifetime users of the target substances, although sample size considerations precluded estimation of adjusted ORs for dependent PD among lifetime drug users. The sex-specific ORs for alcohol abuse diminished markedly from the total sample to lifetime users of any drug and cannabis. Those for nicotine dependence diminished more modestly from the total sample to lifetime cannabis users. As such, the interactions in the total sample may reflect gendered differences in exposure to the target drugs, including larger proportions of lifetime abstainers from alcohol, any drug, and cannabis, respectively, among women. However, the sex-specific ORs for MDD in alcohol abuse (men: 1.0; women: 1.3) and bipolar I in any drug (men: 1.4; women: 2.0) and cannabis abuse (men: 1.3; women: 1.8) among users were almost identical to those in the total sample, suggesting that loss of these interactions may at least in part reflect reduction in sizes of the comparison groups and consequent loss of power.

Stronger comorbid associations of MDD with alcohol abuse and bipolar I with any drug abuse among women are compatible with sex differences in the prevalences of these disorders among NESARC respondents with the respective SUDs. They are consistent with numerous published reports indicating that comorbid mood disorders are more prominent among women than men presenting for SUD treatment (see review by Pettinati and Plebani, 2009). To our knowledge, stronger comorbid associations of any drug dependence with narcissistic PD among men have not previously been reported except in the NESARC sample (Stinson et al., 2008), and this sex difference has not been reported at all for cannabis dependence, although Preuss et al. (2009) reported

a significantly higher prevalence of narcissistic PD among male than among female patients with alcohol dependence.

We are also unaware of previous studies replicating our finding of positive comorbid associations among men and negative ones among women between index cocaine abuse and comorbid MDD. They appear inconsistent with higher prevalences of mood disorders among women in both the general population (see reviews by Goldstein, 2009, and Greenfield et al., 2010) and SUD treatment. They also contrast with greater depression severity among female than male SUD treatment clients (Pettinati and Plebani, 2009), including those seeking help specifically for cocaine use disorders (Griffin et al., 1989; McCance-Katz et al., 1999). These findings should be interpreted cautiously because ORs were not significant for either sex among lifetime users and fell just short of significance for men in the total sample. Nevertheless, one possible interpretation is that, with additional co-occurring disorders accounted for, women vulnerable to depression may be less likely than their male counterparts to become problematically involved with cocaine. However, the comorbidity of cocaine abuse plus depression may differentially, or more rapidly, select women into treatment (Pettinati and Plebani, 2009).

The present study similarly, and unexpectedly, appears to be the first to identify stronger associations among men than women of comorbid PTSD with any index drug dependence and cannabis use disorders among lifetime users, although not in the total sample. Stronger associations among male users contrast with considerably higher prevalences of PTSD in women than men with any drug dependence (27.0% vs. 15.7%), cannabis abuse (13.9% vs. 7.2%), and cannabis dependence (27.2% vs. 16.3%). They also appear at variance with previous findings of much higher prevalences of PTSD among women in SUD treatment (Greenfield et al., 2010; Hien, 2009), although these sex differentials have not, to our knowledge, been examined specifically in cannabis use disorder treatment. PTSD among women in the general population (Grant and Goldstein, 2012, unpublished data), and even more so among those in SUD treatment, reflects very high rates of sexual and physical assaults in childhood and subsequently, along with multiple other traumatic exposures. In SUD treatment, the comorbid condition is associated with a more severe clinical profile than either PTSD or SUDs by themselves (Hien, 2009) and may differentially or more rapidly select women with both PTSD and SUDs into treatment. Among NESARC respondents with lifetime PTSD who ever used cannabis, men reported lifetime exposure to more categories of potentially traumatic events (*M* [*SE*] = 7.4 [0.26]) than women (6.8 [0.17]). However, additional adjustment for the number of potentially traumatic event types did not change sex-specific ORs for cannabis use disorders and PTSD among lifetime users; adjustment only slightly reduced the ORs for any drug dependence among lifetime users (2.8 to 2.4 in men, 1.4 to 1.2 in women) and left all significant Sex × DUD interactions intact.

This study's limitations include its cross-sectional design, which renders infeasible the identification of causal mechanisms, including possible sex specificity, that underlie the observed comorbidities. Another potential concern reflects the fact that we examined sex-specific comorbid associations with cannabis and cocaine use disorders, the most prevalent specific DUDs in the NESARC (Compton et al., 2005), whereas findings reported by Compton et al. (2005) and Conway et al. (2006) also suggest the possibility of sex- and drug-specific associations with other DUDs; however, prevalences in the NESARC of other specific DUDs are low (<3.0%), particularly among women (Compton et al., 2005), precluding fully adjusted analyses. Some caution is also warranted because the veracity of respondents' self-reports of stigmatized behavior, including symptoms of SUDs and other psychopathology, may be questioned (Tourangeau and Yan, 2007). However, we can identify no obvious disincentives to veracity, particularly given the NESARC's rigorous guarantees of confidentiality.

Taken together, our findings suggest few sex differences in epidemiologically assessed comorbid associations of SUDs with other psychiatric disorders, whether among lifetime users or among the total population. However, although the unique comorbid associations were generally not large, the high prevalences of AUDs, DUDs, and co-occurring psychiatric disorders among both sexes emphasize the multifaceted burden of morbidity among individuals with SUDs. These findings indicate the need for careful assessment of both mental health disorders and SUDs, regardless of presenting complaints and the settings (primary care, mental health, or SUD treatment) in which patients are seen. Thorough assessment in primary care and mental health settings may be particularly crucial for women because they present with SUD-related problems more frequently than men to settings other than SUD treatment (Chander and McCaul, 2003; Greenfield et al., 2007; Mojtabai, 2005). Appropriate, evidence-based therapies should be offered for all active disorders identified in clients with SUDs.

As emphasized previously by Huang et al. (2006), based on variations by race or ethnicity between patterns of prevalences and those of comorbid associations of other disorders with AUDs and DUDs, the risk and protective factors that contribute to prevalences of psychiatric disorders in men and women may differ importantly from those related to the strength of sex-specific comorbid associations. Future prospective studies, including consideration of a range of genetic, epigenetic, and environmental factors, are needed to characterize the underlying mechanisms and their possible sex specificity.

For example, SUDs did not predict any incident mood or anxiety disorders in the NESARC, but baseline bipolar I predicted incident drug abuse, and baseline panic disorder predicted incident drug dependence (Grant et al., 2009).

Further analyses are planned to investigate whether these relationships hold for both sexes and, if so, whether the factors driving them are sex specific. Future research should also characterize the common factors underlying the co-occurrences among other comorbid disorders, including their sex specificity. These findings will inform prevention research, including the possible need for sex- and comorbidity-specific tailoring, thereby more effectively reducing the burdens of AUDs, DUDs, and other psychiatric disorders in both women and men.

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