Lifetime Comorbidity of DSM-IV Mood and Anxiety Disorders and Specific Drug Use Disorders: Results From the National Epidemiologic Survey on Alcohol and Related Conditions

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Objective: To present nationally representative data on the lifetime prevalence and comorbidity of 8 specific drug use disorders, separately for abuse and dependence, and mood and anxiety disorders.

Method: Data come from a representative sample (N = 43,093) of the United States civilian, noninstitutional population 18 years and older. Diagnoses of mood, anxiety, and drug use disorders were based upon face-to-face personal interviews using the Alcohol Use Disorder and Associated Disabilities Interview Schedule–DSM-IV Version (AUDADIS-IV).

Results: Associations between specific mood and anxiety disorders and specific drug use disorders were virtually all positive and statistically significant ($p < .05$). In general, associations were greater for dependence than abuse, greater for mood than anxiety disorders, and in some instances stronger among women than men ($p < .05$). Large odds ratios also were observed for individuals with comorbid mood and anxiety disorders.

Conclusion: The comorbidity between specific mood and anxiety disorders and specific drug use disorders is pervasive in the U.S. population. Findings suggest that comorbid psychiatric disorders may increase the risk of greater involvement in more serious illicit drug use disorders and that the greater comorbidity between mood and anxiety and drug use disorders among women may reflect greater deviance and psychopathology among drug-using women than men. Findings also suggest that drug abuse prevention and intervention efforts should address other psychiatric conditions. Further, definitions of drug use disorder phenotypes should give careful consideration to other psychiatric conditions as meaningful characteristics of case heterogeneity.

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The comorbidity of mood and anxiety disorders with drug use disorders has been investigated in several large epidemiologic studies conducted over the past 2 decades. Findings from the Epidemiologic Catchment Area (ECA) survey,[1] the National Comorbidity Survey (NCS),[2] the International Consortium in Psychiatric Epidemiology (ICPE),[3,4] and the National Longitudinal Alcohol Epidemiologic Survey (NLAES)[5] show substantial comorbidity of mood and anxiety disorders with drug use disorders. These surveys also have consistently shown that mood and anxiety disorders are more strongly associated with drug dependence than drug abuse. Further, a number of these surveys have shown particularly strong associations between drug use disorders and specific mood and anxiety disorders, including mania and panic disorder.[2,3,5]

Although these surveys have demonstrated that drug use disorders, in the aggregate, are highly associated with mood and anxiety disorders, much less research has been conducted on the psychiatric comorbidity of specific drug use disorders. Data from the ECA[1] indicated that the

associations between any mood disorder and any anxiety disorder and drug-specific use disorders were greatest for barbiturate abuse and/or dependence and weakest for marijuana abuse and/or dependence. Focusing on lifetime major depression, Grant[5] reported NLAES data separately for abuse and dependence on 7 specific classes of drugs. For dependence, the strongest association was found for depression and amphetamine dependence, while the weakest was reported for depression and cocaine dependence. With respect to drug abuse, the strongest association was found between depression and hallucinogen abuse and the weakest relationship was reported for depression and cannabis abuse. Interestingly, this pattern of results suggests that the magnitude of comorbid associations between mood and anxiety disorders and drug use disorders may be inversely related to the prevalence of the specific drug use disorders.

Despite the considerable interest in drug use disorder and other psychiatric disorder comorbidity in the literature, no large-scale survey of the general population has examined the associations between specific drug use disorders and a broad array of specific mood and anxiety disorders. Our empirical knowledge in this area has been limited by the small sample sizes and the lack of specificity of analyses of prior epidemiologic surveys. Although the ECA study reported associations between specific drug use disorders and any mood and any anxiety disorder, abuse and dependence diagnoses were combined for each specific drug use disorder examined. The NCS reported associations between specific mood and anxiety disorders and drug use disorders, but only according to the broad categories of any drug abuse and any drug dependence. Reports from the ICPE surveys were also very general, as associations among drug, mood, and anxiety disorders were presented in the aggregate categories of any drug abuse, any drug dependence, any mood disorder, and any anxiety disorder. Although the NLAES examined the association between 7 drug use disorders, separately for abuse and dependence, and major depression, no other mood or anxiety disorders were measured in that survey. The absence of data on the associations between specific drug use disorders and specific mood and anxiety disorders thus represents a gap in our understanding of the extent of the comorbidity between these major Axis I psychiatric disorders. The present study was designed, in part, to provide information to fill this gap in the literature.

Accordingly, this report presents nationally representative data on the lifetime prevalence and comorbidity of 8 specific drugs, separately for abuse and dependence, and 9 mood and anxiety disorders as defined in the *Diagnostic and Statistical Manual of Mental Disorders*-Fourth Edition (DSM-IV)[6] and as assessed in the 2001–2002 National Institute on Alcohol Abuse and Alcoholism's (NIAAA) National Epidemiologic Survey on Alcohol and Related Conditions (NESARC).[7,8] The large sample size of the NESARC (N = 43,093) also allows for the examination of associations between specific drug use disorders and specific mood disorders by gender. Further, because mood and anxiety disorders are often comorbid with each other, the impact of comorbid mood and anxiety disorders on the observed associations with specific drug use disorders is examined as well.

METHOD

NESARC Sample

The 2001–2002 NESARC is a representative sample of the United States sponsored by the NIAAA that has been described in detail elsewhere.[7,8] The target population of the NESARC was the civilian, noninstitutional population of the United States residing in households as well as in group quarters, 18 years and older. The overall survey response rate was 81%. Blacks, Hispanics, and young adults (aged 18 to 24 years) were oversampled in the NESARC.

The data were weighted to reflect the design characteristics of the NESARC survey and to account for oversampling. Adjustment for nonresponse across numerous variables, including age, race, ethnicity, sex, region, and place of residence was performed at the household level and person level. The weighted data were then adjusted to be representative of the civilian population of the United States based on the 2000 Decennial Census.

Interviewer Training Field Quality Control

Approximately 1800 professional interviewers from the Census Bureau administered the NESARC using laptop computer–assisted software that included built-in skip, logic, and consistency checks. On average, the interviewers had 5 years' experience working on Census and other health-related national surveys. Training was standardized through centralized sessions under the direction of NIAAA and Census Headquarters Staff.

Regional supervisors recontacted a random 10% of all survey respondents for quality control purposes and to verify the accuracy of the interviewer's performance. In addition, 2657 respondents were randomly selected to participate in a reinterview study after completion of their NESARC interview. Each respondent was readministered 1 to 3 complete sections of the NESARC survey interview. These interviews not only served as a check on survey data quality, but formed the basis of an additional test-retest reliability study of Wave 1 NESARC measures.[9]

DSM-IV Drug Use Disorder Assessment

The Alcohol Use Disorder and Associated Disabilities Interview Schedule–DSM-IV Version (AUDADIS-IV)[22] included an extensive list of symptom questions that separately operationalized DSM-IV criteria for abuse and

dependence for 8 classes of drugs, including sedatives, tranquilizers, opiates (other than heroin or methadone), stimulants, hallucinogens, cannabis, cocaine (including crack cocaine), and inhalants/solvents. Consistent with the DSM-IV, lifetime diagnoses of abuse required a survey respondent to meet at least 1 of the 4 criteria defined for abuse either in the 12-month period preceding the interview or before. AUDADIS-IV dependence diagnoses required the respondent to satisfy at least 3 of the 7 DSM-IV criteria for dependence either during the past year or before. Diagnoses of dependence prior to the past year were required to satisfy the time-clustering criteria defined in the DSM-IV; that is, in order to meet criteria for the prior-to-the-past-year time period, at least 3 dependence symptoms must have occurred within the same 1-year period.

The good-to-excellent reliability and validity of the AUDADIS-IV substance use diagnoses are well documented in numerous psychometric studies conducted in clinical and general population samples.[9–14] The psychometric properties of the substance use disorders modules of the AUDADIS-IV also were examined and found to be excellent in several countries as part of the World Health Organization/National Institutes of Health's International Study on Reliability and Validity.[15–21]

DSM-IV Mood and Anxiety Disorder Assessment

The NESARC diagnostic interview used to generate diagnoses presented in this report is the NIAAA's AUDADIS-IV, a state-of-the-art structured diagnostic interview designed for use by lay interviewers.[22]

The DSM-IV mood and anxiety diagnoses included in the AUDADIS-IV were major depression, dysthymia, mania, hypomania, panic disorder with and without agoraphobia, social phobia, specific phobia, and generalized anxiety disorder.

Lifetime mood and anxiety diagnoses presented in this report are defined in the DSM-IV as "primary" or independent diagnoses. In the DSM-IV, the term *primary* is used as shorthand to indicate those mental disorders that are not substance-induced and that are not due to a general medical condition.[6(p192)] Survey respondents classified with disorders that only were substance-induced and/or due to a general medical condition were not included in the analyses presented here. Depressive episodes entirely accounted for by bereavement also were excluded.

The reliability of AUDADIS-IV measures of DSM-IV mood and anxiety disorders is documented in test-retest studies among several general population and clinical samples.[9–11] In these test-retest studies, the reliability values of mood and anxiety disorders were fair to good, ranging from a kappa of 0.42 for specific phobia to a kappa of 0.64 for major depression.

The validity of AUDADIS-IV mood and anxiety disorders was assessed in a series of linear regression analyses, using the NESARC data that examined the association between each mood and anxiety disorder and 4 Short Form-12v2[23] mental disability scores, controlling for age, alcohol and drug use disorders, and all other mood and anxiety disorders. The Short Form-12v2 is a reliable and valid measure of disability used in large population surveys. Each mood and anxiety disorder assessed in the NESARC was shown to be a highly significant ($p < .01$–$p < .0001$) predictor of the mental component summary, social functioning, role emotional, and mental health scales. Respondents with these mood and anxiety disorders had significantly greater disability and social/occupational dysfunction than respondents who did not have the particular mood or anxiety disorder.

Statistical Methods

Cross-tabulations were used to calculate lifetime prevalence estimates for drug use, mood, and anxiety disorders. The strength of association between drug use disorders and mood and anxiety disorders was assessed by the odds ratio (OR) derived from logistic regression analyses. Associations between ORs and the prevalences of any mood and anxiety disorder were assessed by correlation analysis. All standard errors of the prevalence estimates and confidence intervals (CIs) of the ORs were generated using SUDAAN,[24] a software program that uses Taylor series linearization to make adjustments for the NESARC's sample design characteristics. All models were estimated separately for men and women, and the significance of gender differences was evaluated in pooled models. The significance level for all tests was set at $p < .05$.

RESULTS

Prevalence of Mood, Anxiety, and Drug Use Disorders

Table 1 shows DSM-IV lifetime prevalence estimates of mood, anxiety, and drug use disorders. Nearly 1 (19.5%) in 5 had a mood disorder, 1 (16.2%) in 6 had an anxiety disorder, and 1 (10.3%) in 10 had at least 1 drug use disorder. Having a mood without an anxiety disorder was more common (11.2%) than having either a mood with an anxiety disorder (8.4%) or an anxiety without a mood disorder (8.8%). Among the mood disorders, major depression was the most prevalent (16.5%), followed by dysthymia (4.3%), mania (3.3%), and hypomania (2.3%). Among the anxiety disorders, specific phobia was the most prevalent (9.4%). Less common were social phobia, panic disorder without agoraphobia, generalized anxiety disorder, and panic with agoraphobia (1.1%–5.0%). Marijuana use disorders were the most prevalent (8.5%) drug use disorders in this general population survey, while rates of the cocaine, amphetamine, hallucinogen, sedative, opioid, and inhalant/solvent use disorders were much lower (0.3%–2.8%). For each specific drug, the rates of

Table 1. Prevalence of DSM-IV Lifetime Mood, Anxiety, and Drug Use Disorders

	Men		Women		Total	
Disorder	%	SE	%	SE	%	SE
Any mood disorder	15.2	0.35	23.5	0.54	19.54	0.38
Major depression	11.8	0.31	20.9	0.52	16.54	0.36
Dysthymia	3.0	0.16	5.5	0.20	4.30	0.14
Mania	3.2	0.16	3.4	0.18	3.31	0.13
Hypomania	2.5	0.14	2.2	0.12	2.33	0.09
Any anxiety disorder	11.7	0.39	20.3	0.55	16.16	0.42
Panic with agoraphobia	0.7	0.08	1.4	0.10	1.07	0.07
Panic without agoraphobia	2.6	0.15	5.3	0.21	4.00	0.13
Social phobia	4.2	0.22	5.7	0.25	4.97	0.20
Specific phobia	6.2	0.28	13.3	0.41	9.39	0.30
Generalized anxiety	2.8	0.18	5.3	0.23	4.14	0.17
Any drug use disorder	13.8	0.46	7.1	0.29	10.33	0.32
Any drug abuse	10.6	0.36	5.1	0.24	7.74	0.24
Any drug dependence	3.3	0.19	2.0	0.12	2.59	0.13
Sedative use disorder	1.6	0.12	0.6	0.06	1.07	0.07
Sedative abuse	1.3	0.11	0.4	0.05	0.82	0.06
Sedative dependence	0.3	0.05	0.2	0.03	0.25	0.03
Tranquilizer use disorder	1.4	0.12	0.6	0.06	0.98	0.07
Tranquilizer abuse	1.2	0.11	0.4	0.05	0.76	0.06
Tranquilizer dependence	0.3	0.05	0.2	0.03	0.22	0.03
Opioid use disorder	2.0	0.16	0.9	0.09	1.42	0.10
Opioid abuse	1.6	0.13	0.6	0.08	1.08	0.08
Opioid dependence	0.4	0.07	0.3	0.04	0.34	0.04
Amphetamine use disorder	2.5	0.18	1.5	0.13	2.00	0.13
Amphetamine abuse	1.9	0.15	0.9	0.09	1.40	0.10
Amphetamine dependence	0.6	0.08	0.6	0.07	0.60	0.06
Hallucinogen use disorder	2.5	0.17	1.0	0.09	1.70	0.10
Hallucinogen abuse	2.1	0.14	0.9	0.08	1.45	0.09
Hallucinogen dependence	0.4	0.07	0.1	0.03	0.24	0.03
Marijuana use disorder	11.8	0.40	5.4	0.25	8.45	0.27
Marijuana abuse	10.0	0.34	4.5	0.22	7.16	0.23
Marijuana dependence	1.7	0.14	0.9	0.08	1.30	0.08
Cocaine use disorder	3.9	0.20	1.8	0.11	2.81	0.12
Cocaine abuse	2.7	0.17	1.0	0.08	1.83	0.10
Cocaine dependence	1.2	0.10	0.7	0.07	0.98	0.06
Inhalant/solvent abuse[a]	0.5	0.07	0.1	0.03	0.30	0.04
Mood and anxiety disorder	5.53	0.24	10.97	0.37	8.36	0.26
Mood without anxiety disorder	9.67	0.27	12.56	0.33	11.18	0.23
Anxiety without mood disorder	7.03	0.29	10.40	0.31	8.78	0.26

[a]The base rate of inhalant/solvent dependence was virtually 0.0% in the sample.

abuse exceeded those of dependence. With the exception of hypomania, the prevalences of all mood and anxiety disorders were greater among women than men. The opposite was the case for drug use disorders.

Prevalence of Mood and Anxiety Disorders Among Respondents With Drug Use Disorders

The prevalences of any lifetime mood and anxiety disorders among survey respondents with any drug use disorder were 40.9% and 29.9%, respectively (Table 2). The prevalence of any mood disorder also exceeded the prevalence of any anxiety disorder across the specific drug use disorders. Major depression was the most prevalent (29.2%–59.8%) mood disorder among those with specific drug use disorders, followed by mania (8.9%–33.4%) or dysthymia (9.3%–29.1%). Hypomania was the rarest mood disorder among respondents with specific drug use disorders (3.7%–13.4%). Regarding the anxiety disorders, specific phobia was the most prevalent (11.8%–35.7%) whereas panic with agoraphobia was the least prevalent (2.2%–14.1%) among respondents with specific drug use disorders. Falling within this range of prevalences were social phobia (8.5%–21.9%), generalized anxiety disorder (7.0%–28.3%), and panic disorder without agoraphobia (7.4%–23.7%). Further, for each specific drug disorder, the prevalences of each mood and anxiety disorder were consistently much greater among respondents with dependence than for those with abuse.

Prevalence of Drug Use Disorders Among Respondents With Mood and Anxiety Disorders

The prevalences of any lifetime drug use disorder among survey respondents with any mood disorder and any anxiety disorder were 21.6% and 19.1%, respectively. (Table 3). The prevalences of specific drug use disorders among respondents with any mood disorder (0.8%–17.1%) were marginally higher than the corresponding prevalences among respondents with any anxiety disorder (0.6%–15.1%). Marijuana use disorders were the most common drug use disorders among respondents with any mood disorder (17.1%) or any anxiety disorder (15.1%), followed by cocaine use disorders (6.5% and 5.4%, respectively), amphetamine use disorders (5.2% and 4.8%), hallucinogen use disorders (4.5% and 3.7%), opioid use disorders (4.0% and 3.2%), sedative use disorders (3.0% and 2.6%), tranquilizer use disorders (2.7% and 2.5%), and inhalant/solvent abuse (0.8% and 0.6%). Similar prevalences of specific drug use disorders were found among respondents with specific mood and anxiety disorders.

Associations Between Mood and Drug Use Disorders in the Total Sample and by Gender

Associations between mood disorders and specific drug use disorders are shown in Table 4 for the total sample and by gender. For the total sample, 98% of the disorder-specific ORs were greater than 1 and statistically significant. The association between any mood disorder and any drug dependence (OR = 7.1) was much greater than the corresponding association for any drug abuse (OR = 2.3). This pattern was remarkably consistent for each of the specific drug use disorders. Major depression (ORs = 2.1–7.6), dysthymia (ORs = 2.4–9.3), and mania (ORs = 3.0–15.2) were more strongly related to each specific drug use disorder than was hypomania (ORs = 1.6–6.6). Some of the strongest associations were observed between mania and opioid (OR = 15.2), hallucinogen (OR = 13.1), and cocaine (OR = 10.6) dependence. Further, the magnitude of the associations between any mood disorder and specific drug use disorders was inversely related to the overall prevalence of the specific

Table 2. Prevalence of DSM-IV Lifetime Mood and Anxiety Disorders Among Respondents With Drug Use Disorders

	Any Mood Disorder		Any Anxiety Disorder		Depression		Dysthymia		Mania		Hypomania		Panic With Agoraphobia		Panic Without Agoraphobia		Social Phobia		Specific Phobia		Generalized Anxiety	
Drug Use Disorder	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Any drug use disorder	40.9	1.0	29.9	1.0	33.2	1.0	11.4	0.6	12.0	0.7	5.7	0.4	3.6	0.4	9.0	0.5	10.7	0.6	17.1	0.8	9.2	0.6
Any drug abuse	34.0	1.1	24.1	1.0	28.0	1.1	8.0	0.6	8.3	0.6	4.5	0.4	2.0	0.3	6.8	0.5	8.0	0.6	13.9	0.8	6.4	0.5
Any drug dependence	61.7	1.9	47.2	2.0	49.0	2.0	21.4	1.7	23.1	1.7	9.2	1.1	8.1	1.2	15.4	1.3	18.8	1.6	26.7	1.9	17.7	1.5
Sedative use disorder	54.2	3.1	39.0	2.9	47.7	3.1	20.0	2.4	18.8	2.5	6.9	1.4	6.0	1.4	14.2	2.0	12.5	1.8	20.4	2.6	14.0	2.0
Sedative abuse	49.8	3.7	33.1	3.4	44.0	3.8	17.4	2.6	15.8	2.7	6.0	1.7	5.4	1.5	12.4	2.4	11.4	2.0	17.5	2.8	11.6	2.2
Sedative dependence	68.4	6.1	58.4	5.1	59.8	6.0	28.7	5.7	28.8	5.0	9.7	3.3	8.1	3.0	20.1	4.9	15.8	3.9	30.0	5.7	21.8	4.3
Tranquilizer use disorder	54.9	3.1	41.9	3.0	45.3	3.2	18.0	2.2	18.8	2.5	7.1	1.5	7.8	1.9	13.4	1.9	14.9	2.1	23.4	2.7	15.7	2.2
Tranquilizer abuse	49.8	3.6	36.6	3.4	41.7	3.8	14.6	2.4	15.9	2.6	6.3	1.7	6.0	1.6	12.0	2.1	13.8	2.2	19.7	2.8	12.0	2.3
Tranquilizer dependence	72.1	5.9	59.9	5.7	57.4	6.2	29.1	5.4	28.5	6.1	9.9	3.4	14.1	5.5	18.3	4.4	18.6	5.6	35.7	6.5	28.3	5.0
Opioid use disorder	54.2	3.0	36.3	2.7	45.6	2.9	15.4	1.7	17.4	2.0	9.0	1.5	4.7	1.2	13.7	1.6	12.7	2.0	18.5	2.2	10.7	1.4
Opioid abuse	48.3	3.3	28.6	2.9	41.1	3.1	11.5	1.7	12.4	1.8	8.5	1.8	2.2	0.9	10.6	1.8	10.1	2.1	13.9	2.1	7.1	1.3
Opioid dependence	72.9	5.2	60.9	5.0	59.7	5.6	27.9	4.5	33.4	5.6	10.4	3.1	12.6	4.0	23.7	4.2	21.0	4.8	33.0	5.4	21.9	3.9
Amphetamine use disorder	51.2	2.5	39.0	2.4	41.6	2.2	17.9	1.7	16.5	1.6	6.8	1.2	5.0	1.0	11.6	1.4	13.8	1.6	23.1	2.1	12.8	1.4
Amphetamine abuse	45.5	2.8	34.2	2.8	37.5	2.6	15.4	1.9	13.1	1.8	5.6	1.2	4.1	1.1	10.6	1.6	10.7	1.6	19.2	2.3	9.2	1.5
Amphetamine dependence	64.3	4.1	50.3	4.1	51.1	4.5	23.5	3.8	24.2	3.0	9.7	2.2	7.1	2.1	14.0	2.6	20.8	3.5	32.0	3.5	21.2	3.1
Hallucinogen use disorder	52.0	2.4	35.4	2.1	41.8	2.2	16.4	1.8	17.6	1.9	7.9	1.2	5.1	1.2	10.0	1.3	12.0	1.6	21.8	1.9	11.2	1.5
Hallucinogen abuse	48.4	2.5	32.0	2.2	40.4	2.5	16.6	2.0	15.5	2.0	7.0	1.3	4.6	1.2	9.4	1.4	10.4	1.6	19.8	1.9	9.4	1.4
Hallucinogen dependence	73.6	6.4	55.5	5.9	50.6	6.1	15.5	4.2	30.6	5.4	13.4	3.9	8.3	3.0	13.7	4.1	21.9	6.2	33.4	6.1	21.7	6.6
Marijuana use disorder	39.6	1.1	28.8	1.0	31.9	1.0	11.0	0.7	11.8	0.7	5.7	0.5	3.3	0.4	8.4	0.6	10.5	0.7	16.5	0.9	9.1	0.7
Marijuana abuse	35.8	1.2	25.3	1.1	29.2	1.1	9.3	0.7	9.7	0.7	4.9	0.5	2.2	0.4	7.4	0.6	8.5	0.7	14.6	0.9	7.0	0.6
Marijuana dependence	60.5	2.8	48.5	2.7	47.0	2.6	20.3	2.4	23.6	2.5	10.2	1.7	8.8	2.0	13.7	1.6	21.3	2.3	27.2	2.9	20.8	2.6
Cocaine use disorder	44.9	1.9	31.2	1.7	35.7	1.9	14.2	1.4	14.6	1.4	6.2	0.8	4.4	0.8	10.8	1.2	11.1	1.1	15.9	1.3	10.4	1.0
Cocaine abuse	35.5	2.3	23.7	1.9	29.3	2.2	9.5	1.3	8.9	1.3	4.6	0.9	3.3	1.0	7.5	1.2	8.6	1.3	11.8	1.4	8.1	1.0
Cocaine dependence	62.5	3.1	45.0	2.8	47.6	3.1	23.0	2.5	25.3	2.9	9.3	1.6	6.5	1.5	17.1	2.3	15.6	2.2	23.4	2.6	14.7	2.2
Inhalant/solvent abuse	49.6	5.3	33.6	5.1	42.2	5.2	24.6	4.3	15.5	4.1	3.7	1.9	3.0	1.6	14.5	3.9	12.3	3.7	15.9	3.9	10.0	3.5

drug use disorder (r = –0.67), a pattern generally observed across specific mood and drug use disorders.

Similar to the results observed in the total sample, associations between specific mood disorders and specific drug use disorders among men and women were overwhelmingly (98%) positive and significant. There were few gender differences in the magnitude of the comorbid associations. The association between dysthymia and opioid dependence was significantly greater among women than men as were the associations between mania and any drug abuse, tranquilizer abuse, and any opioid use disorder. The associations between hypomania and any drug abuse, any sedative use disorder, opioid abuse, and any cocaine use disorder also were significantly greater among women than men. In addition, major depression was more strongly associated with marijuana dependence among women than men.

Associations Between Anxiety and Drug Use Disorders in the Total Sample and by Gender

Similar to the results for mood disorders in the total sample, associations between specific anxiety disorders and specific drug use disorders were almost entirely (99%) greater than 1 and statistically significant (Table 5). Like the mood disorders, the association between any anxiety disorder and any drug dependence (OR = 4.9) was much greater than the corresponding association for abuse (OR = 1.7). Again, this pattern was consistent across specific anxiety and specific drug use disorders. Panic disorder with agoraphobia (ORs = 2.0–15.6) was more strongly related to each specific drug use disorder than was panic disorder without agoraphobia (ORs = 2.0–7.6), social phobia (ORs = 1.8–5.4), specific phobia (ORs = 1.3–5.4), and generalized anxiety disorder (ORs = 1.8–9.3). Particularly strong associations were observed between panic disorder with agoraphobia and tranquilizer (OR = 15.6), opioid (OR = 13.8), and marijuana (OR = 9.8) dependence and between generalized anxiety disorder and tranquilizer dependence (OR = 9.3). In addition, the magnitude of the associations between any anxiety disorder and specific drug use disorders was found to be inversely related to the overall prevalence of the specific drug use disorder (r = –0.51). This pattern was gener-

Table 3. Prevalence of DSM-IV Lifetime Drug Use Disorders Among Respondents With Mood and Anxiety Disorders

Drug Use Disorder	Any Mood Disorder		Any Anxiety Disorder		Depression		Dysthymia		Mania		Hypomania		Panic With Agoraphobia		Panic Without Agoraphobia		Social Phobia		Specific Phobia		Generalized Anxiety	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Any drug use disorder	21.6	0.7	19.1	0.7	20.7	0.7	27.3	1.3	37.5	1.7	25.2	1.7	34.2	3.1	23.1	1.3	22.3	1.3	18.8	0.9	23.0	1.4
Any drug abuse	13.5	0.5	11.6	0.5	13.1	0.6	14.4	1.1	19.4	1.4	14.9	1.4	14.7	1.9	13.2	1.0	12.5	0.9	11.4	0.6	11.9	0.9
Any drug dependence	8.2	0.4	7.6	0.5	7.7	0.4	12.9	1.1	18.1	1.4	10.2	1.2	19.5	2.9	9.9	0.9	9.8	0.9	7.3	0.6	11.1	1.1
Sedative use disorder	3.0	0.3	2.6	0.2	3.1	0.3	5.0	0.7	6.1	0.8	3.2	0.7	6.0	1.3	3.8	0.6	2.7	0.4	2.3	0.3	3.6	0.5
Sedative abuse	2.1	0.2	1.7	0.2	2.2	0.2	3.3	0.5	3.9	0.7	2.1	0.6	4.1	1.1	2.6	0.5	1.9	0.3	1.5	0.3	2.3	0.5
Sedative dependence	0.9	0.1	0.9	0.1	0.9	0.1	1.7	0.4	2.2	0.4	1.0	0.4	1.9	0.7	1.3	0.3	0.8	0.2	0.8	0.2	1.3	0.3
Tranquilizer use disorder	2.7	0.3	2.5	0.2	2.7	0.3	4.1	0.5	5.6	0.8	3.0	0.7	7.1	1.7	3.3	0.5	2.9	0.4	2.4	0.3	3.7	0.5
Tranquilizer abuse	1.9	0.2	1.7	0.2	1.9	0.2	2.6	0.4	3.6	0.6	2.0	0.6	4.2	1.2	2.3	0.4	2.1	0.4	1.6	0.2	2.2	0.4
Tranquilizer dependence	0.8	0.1	0.8	0.1	0.8	0.1	1.5	0.3	1.9	0.5	0.9	0.4	2.9	1.3	1.0	0.3	0.8	0.3	0.9	0.2	1.5	0.3
Opioid use disorder	4.0	0.4	3.2	0.3	3.9	0.4	5.1	0.6	7.5	1.0	5.5	1.0	6.2	1.6	4.9	0.6	3.6	0.6	2.8	0.4	3.7	0.5
Opioid abuse	2.7	0.3	1.9	0.2	2.7	0.3	2.9	0.5	4.1	0.7	4.0	0.9	2.2	0.9	2.9	0.5	2.2	0.5	1.6	0.3	1.9	0.4
Opioid dependence	1.3	0.2	1.3	0.2	1.2	0.2	2.2	0.4	3.4	0.7	1.5	0.5	4.0	1.4	2.0	0.4	1.4	0.4	1.2	0.2	1.8	0.4
Amphetamine use disorder	5.2	0.4	4.8	0.4	5.0	0.4	8.3	0.8	10.0	1.0	5.9	1.1	9.2	1.9	5.8	0.7	5.5	0.7	4.9	0.5	6.2	0.7
Amphetamine abuse	3.3	0.3	3.0	0.3	3.2	0.3	5.0	0.6	5.5	0.8	3.4	0.8	5.3	1.4	3.7	0.6	3.0	0.5	2.9	0.4	3.1	0.5
Amphetamine dependence	2.0	0.2	1.9	0.2	1.9	0.2	3.3	0.5	4.4	0.7	2.5	0.6	4.0	1.1	2.1	0.4	2.5	0.5	2.1	0.3	3.1	0.5
Hallucinogen use disorder	4.5	0.3	3.7	0.3	4.3	0.3	6.5	0.8	9.1	1.0	5.8	0.9	8.1	1.8	4.3	0.6	4.1	0.6	3.9	0.4	4.6	0.7
Hallucinogen abuse	3.6	0.3	2.9	0.3	3.5	0.3	5.6	0.7	6.8	0.8	4.4	0.8	6.2	1.5	3.4	0.6	3.0	0.5	3.1	0.3	3.3	0.5
Hallucinogen dependence	0.9	0.1	0.8	0.2	0.7	0.1	0.9	0.2	2.2	0.5	1.4	0.4	1.9	0.7	0.8	0.3	1.1	0.3	0.9	0.2	1.3	0.5
Marijuana use disorder	17.1	0.6	15.1	0.6	16.3	0.6	21.7	1.2	30.2	1.6	20.6	1.7	25.6	3.1	17.7	1.2	17.8	1.1	14.9	0.8	18.5	1.3
Marijuana abuse	13.1	0.5	11.2	0.5	12.6	0.5	15.6	1.1	21.0	1.4	14.9	1.4	15.0	2.3	13.3	1.1	12.3	0.9	11.1	0.7	12.0	0.9
Marijuana dependence	4.0	0.3	3.9	0.3	3.7	0.3	6.1	0.8	9.3	1.1	5.7	1.0	10.6	2.5	4.4	0.6	5.6	0.7	3.8	0.5	6.5	0.9
Cocaine use disorder	6.5	0.4	5.4	0.3	6.1	0.4	9.3	0.9	12.4	1.2	7.5	1.0	11.5	2.0	7.6	0.9	6.3	0.7	4.8	0.4	7.1	0.7
Cocaine abuse	3.3	0.3	2.7	0.2	3.2	0.3	4.1	0.6	4.9	0.7	3.6	0.7	5.6	1.7	3.4	0.6	3.2	0.5	2.3	0.3	3.6	0.5
Cocaine dependence	3.1	0.2	2.7	0.3	2.8	0.2	5.3	0.7	7.5	1.0	3.9	0.7	5.9	1.3	4.2	0.7	3.1	0.4	2.4	0.3	3.5	0.6
Inhalant/solvent abuse	0.8	0.1	0.6	0.1	0.8	0.1	1.7	0.4	1.4	0.4	0.5	0.2	0.8	0.4	1.1	0.3	0.7	0.2	0.5	0.1	0.7	0.3

ally consistent across specific anxiety and drug use disorders.

Among men and women, the associations between specific anxiety disorders and drug use disorders were nearly all (98%) positive and statistically significant, and few gender differences were observed. However, the association between any anxiety disorder and tranquilizer use disorder and tranquilizer abuse were significantly greater among women compared to men, as were the associations between social phobia and tranquilizer abuse and any opioid use disorder and between specific phobia and tranquilizer abuse. In contrast, the associations between panic disorder without agoraphobia and sedative and tranquilizer dependence and between panic disorder with agoraphobia and cocaine dependence were greater for men than for women.

Comorbid and Pure Mood and Anxiety Disorders Among Respondents With Drug Use Disorders

The impact of comorbid mood and anxiety disorders on the observed associations with specific drug use disorders is examined in Table 6. The associations between comorbid mood and anxiety disorder and mood disorder without an anxiety disorder (i.e., pure mood disorder) and specific drug use disorders were all greater than 1 and statistically significant. This was not the case for anxiety disorder without a mood disorder (i.e., pure anxiety disorder) for which only 25% of the drug use disorder–specific ORs were significant. Within each of the specific drug use disorders, the size of the ORs followed a linear pattern; associations between comorbid mood and anxiety disorders were greater than the corresponding associations for pure mood disorders, which, in turn, were greater than those observed for pure anxiety disorders (in those instances for which the latter associations were significant). Moreover, the magnitude of the associations between the overall prevalence of the specific drug use disorder was inversely correlated with comorbid mood and anxiety disorder ($r = –0.51$) and pure mood disorder ($r = –0.35$). Conversely, the magnitude of the associations between the overall prevalence of the specific drug use disorder was positively correlated with pure anxiety disorder ($r = +0.31$).

Table 4. Odds Ratios[a] of DSM-IV Lifetime Mood and Drug Use Disorders in the Total Sample and Among Men and Women[b]

	Any Mood Disorder			Major Depression			Dysthymia			Mania			Hypomania		
Drug Use Disorder	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total
Any drug use disorder	3.8	4.1	3.4	3.4	3.6	2.9	4.1	4.2	3.6	5.6	6.7	5.8	2.7	3.6	3.0
Any drug abuse	2.4	3.0	2.3	2.3	2.6	2.1	2.3	2.5	2.1	2.6	**4.0**	3.0	1.7	**2.9**	2.1
Any drug dependence	8.0	8.1	7.1	5.6	6.5	5.2	6.9	8.2	6.8	10.8	10.7	10.5	4.7	4.4	4.6
Sedative use disorder	5.5	7.1	5.0	5.8	6.1	4.7	7.0	7.0	5.8	6.0	11.0	7.2	2.1	**6.0**	3.2
Sedative abuse	5.0	4.8	4.2	5.3	4.5	4.0	6.2	5.3	4.8	4.9	9.1	5.7	2.0	4.8	2.7
Sedative dependence	7.3	18.1	9.0	7.2	11.0	7.6	9.3	10.5	9.1	10.6	14.3	12.0	2.2	8.3	4.5
Tranquilizer use disorder	5.6	7.1	5.1	5.3	5.0	4.3	5.6	6.6	5.0	5.8	11.0	7.1	2.6	4.9	3.3
Tranquilizer abuse	4.8	5.4	4.1	4.5	4.7	3.7	5.0	4.3	3.9	4.4	**10.5**	5.7	2.2	4.8	2.9
Tranquilizer dependence	11.0	12.8	10.7	9.9	5.3	6.9	7.8	12.6	9.3	12.3	11.5	11.9	4.3	5.0	4.6
Opioid use disorder	5.2	7.5	5.0	4.9	6.0	4.4	4.4	5.5	4.2	5.5	**9.5**	6.6	3.5	5.9	4.3
Opioid abuse	4.3	5.5	3.9	4.3	4.8	3.6	4.1	2.6	2.9	3.8	5.7	4.3	2.8	**7.1**	4.0
Opioid dependence	10.5	17.0	11.2	7.6	10.3	7.6	5.3	**15.5**	8.8	12.4	19.8	15.2	6.1	3.2	4.9
Amphetamine use disorder	4.6	5.6	4.5	4.1	4.5	3.7	5.4	6.2	5.2	6.0	7.0	6.3	2.8	3.8	3.2
Amphetamine abuse	3.9	4.1	3.5	3.8	3.4	3.1	5.1	4.5	4.2	4.8	4.5	4.6	2.3	3.0	2.5
Amphetamine dependence	6.9	9.1	7.5	4.5	6.9	5.3	5.3	8.7	7.0	8.5	11.0	9.7	4.3	4.9	4.6
Hallucinogen use disorder	5.0	6.5	4.6	4.4	5.0	3.7	5.1	6.1	4.6	6.8	7.5	6.8	3.2	4.8	3.8
Hallucinogen abuse	4.2	5.6	4.0	4.0	4.6	3.5	5.2	5.7	4.6	5.1	7.4	5.7	2.7	4.3	3.3
Hallucinogen dependence	12.4	24.6	11.6	5.9	9.0	5.2	3.5	8.1	4.1	16.4	7.3	13.1	5.9	8.0	6.6
Marijuana use disorder	3.5	3.8	3.1	3.1	3.3	2.6	3.8	3.9	3.2	5.0	6.1	5.2	2.6	3.5	2.9
Marijuana abuse	2.7	3.2	2.5	2.7	2.7	2.2	2.8	3.2	2.5	3.3	4.7	3.7	1.9	3.1	2.3
Marijuana dependence	7.2	8.1	6.5	4.6	**7.2**	4.6	6.9	6.8	6.0	9.9	10.5	9.9	5.0	4.8	5.0
Cocaine use disorder	4.0	4.2	3.5	2.9	3.2	2.9	4.5	4.8	4.0	5.5	6.2	5.6	2.1	**4.6**	2.9
Cocaine abuse	2.8	2.4	2.3	3.0	1.9	2.1	3.2	2.4	2.4	2.8	3.5	3.0	1.5	3.4	2.1
Cocaine dependence	7.0	9.7	7.1	4.8	6.1	4.7	6.7	8.8	7.0	11.4	10.0	10.6	3.4	6.1	4.4
Inhalant/solvent abuse	5.1	4.4	4.1	4.7	4.8	3.7	9.7	8.2	7.4	4.7	8.8	5.4	2.0	1.2	1.6

[a]All odds ratios are statistically significant ($p < .05$) except associations between hypomania and inhalant/solvent abuse (in total sample and among men and women) and between hypomania and cocaine abuse, any sedative use disorder, and sedative abuse (among men).
[b]Bold underline indicates significant ($p < .05$) gender difference.

DISCUSSION

The lifetime prevalences of any drug use disorder, any mood disorder, and any anxiety disorder were 10.3%, 19.5%, and 16.2% in this general population sample. These rates are similar to the corresponding rates found in the NCS (11.9%, 19.3%, and 23.2%)[2] and the 2001–2002 NCS Replication (10.9%, 20.8%, and 28.8%),[25] but higher than those observed in the earlier ECA survey (6.1%, 8.3%, and 14.6%).[1] Lower rates observed in the ECA survey may be attributable to use of an earlier diagnostic classification system (the *Diagnostic and Statistical Manual of Mental Disorders*, Third Edition)[26] and diagnostic interview schedule or the aggregation of 5 U.S. geographic areas to yield national estimates as opposed to a nationally representative sampling base. In addition, the prevalences of any drug use, mood, or anxiety disorder may have increased in this survey and in the NCS and NCS Replication merely as a function of the passage of time. Future research is needed to understand the complex methodological and other factors that have contributed to these changing rates over time.

Although a number of studies have been conducted in clinical populations, these studies' findings varied widely depending on the nature of the clinical population (persons with mood, anxiety, and most often drug use disorders), type of treatment facility (inpatient, outpatient, Veterans Administration, private facility), and referral patterns. Moreover, in most of those samples, only single drug use disorders, e.g., marijuana use disorders, were examined, or drug use disorders were aggregated to yield a category of any drug use disorder. An additional consideration for some of these studies is that specific mood and/or anxiety disorders were aggregated to produce measures of any mood and/or any anxiety disorder. More importantly, the wide variation found in comorbidity rates using treated samples can be attributed to the patients, who do not represent the psychiatric characteristics of those in the general population.

Consequently, this is the first study to show that the comorbidity between specific DSM-IV mood and anxiety disorders and specific drug use disorders is pervasive in the U.S. population. Among individuals with any lifetime drug use disorder, 41% and 30% had at least 1 mood or anxiety disorder, respectively. Among individuals with a lifetime mood or anxiety disorder, the prevalence of lifetime drug use disorders was 22% and 19%, respectively. Associations between specific mood and anxiety disorder and specific drug use disorders were overwhelmingly positive and significant and strong in the total sample. Further, these associations remained strong when examined separately by gender.

Consistent with prior epidemiologic research,[1–5] the risk of mood and anxiety disorders was greater for individuals with drug dependence than abuse. This pattern was observed across nearly all drug classes, though it was

Table 5. Odds Ratios[a] of DSM-IV Lifetime Anxiety and Drug Use Disorders in the Total Sample and Among Men and Women[b]

	Any Anxiety Disorder			Panic With Agoraphobia			Panic Without Agoraphobia			Social Phobia			Specific Phobia			Generalized Anxiety		
Drug Use Disorder	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total
Any drug use disorder	3.0	2.9	2.5	6.8	4.9	4.6	3.3	3.3	2.8	2.9	2.9	2.7	2.7	2.5	2.2	3.3	3.1	2.7
Any drug abuse	1.9	2.2	1.7	2.0	2.8	2.1	1.9	2.5	1.9	1.9	1.9	1.8	1.9	1.9	1.6	1.9	1.9	1.7
Any drug dependence	6.1	5.0	4.9	15.5	8.5	9.8	6.2	4.6	4.7	5.1	5.0	4.8	4.5	4.0	3.7	6.3	6.0	5.5
Sedative use disorder	4.1	4.2	3.4	9.5	5.5	6.2	5.7	4.2	4.1	2.5	4.2	2.8	3.1	3.1	2.5	4.7	4.6	3.9
Sedative abuse	3.0	3.7	2.6	7.8	5.4	5.4	4.2	4.8	3.5	2.4	3.7	2.5	2.6	2.7	2.1	3.8	3.7	3.1
Sedative dependence	11.4	5.1	7.4	14.1	5.5	8.2	**12.3**	3.0	6.1	2.7	4.9	3.6	5.5	3.9	4.2	8.2	6.2	6.5
Tranquilizer use disorder	3.8	**6.8**	3.8	10.4	10.0	8.4	4.5	4.8	3.8	2.9	5.3	3.4	3.0	5.0	3.0	4.7	6.4	4.4
Tranquilizer abuse	2.8	**7.7**	3.0	7.9	7.2	6.1	3.3	5.9	3.3	2.4	**6.1**	3.1	2.1	**5.5**	2.4	3.4	4.8	3.2
Tranquilizer dependence	12.4	5.3	7.8	19.3	15.2	15.6	**10.5**	2.9	5.4	5.2	3.9	4.4	8.2	4.2	5.4	10.5	9.8	9.3
Opioid use disorder	3.3	4.2	3.0	6.2	5.0	4.7	5.2	4.1	4.0	2.3	**4.4**	2.8	2.3	3.2	2.2	2.7	4.0	2.8
Opioid abuse	2.2	3.1	2.1	3.1	1.7	2.0	3.4	3.7	2.9	2.1	2.9	2.2	1.5	2.6	1.6	2.2	2.0	1.8
Opioid dependence	10.2	7.8	8.2	18.3	12.8	13.8	13.2	4.9	7.6	3.3	8.1	5.1	6.1	4.7	4.8	4.8	9.8	6.6
Amphetamine use disorder	3.7	4.1	3.4	6.6	5.2	5.2	4.2	3.2	3.3	3.4	3.2	3.2	3.2	3.6	3.0	3.9	4.0	3.6
Amphetamine abuse	2.9	3.6	2.7	5.8	3.7	4.1	3.6	3.1	2.9	3.1	1.7	2.3	2.6	3.0	2.3	3.0	2.4	2.4
Amphetamine dependence	6.4	4.9	5.3	7.5	7.3	7.2	5.5	3.3	4.0	4.2	6.0	5.1	5.4	4.4	4.6	6.2	6.9	6.4
Hallucinogen use disorder	3.2	4.0	2.9	8.4	4.6	5.3	3.0	3.7	2.8	2.5	3.6	2.7	3.0	3.9	2.8	3.7	3.4	3.0
Hallucinogen abuse	2.5	3.8	2.5	7.7	3.5	4.7	2.6	3.6	2.6	1.9	3.4	2.2	2.5	3.5	2.4	2.6	3.2	2.5
Hallucinogen dependence	8.9	6.0	6.5	9.2	12.6	8.5	4.8	4.6	3.8	6.4	4.9	5.4	5.9	7.2	4.9	9.9	4.8	6.5
Marijuana use disorder	2.8	2.7	2.3	5.3	4.2	3.8	2.8	3.1	2.5	2.8	2.7	2.5	2.6	2.3	2.1	3.2	3.0	2.6
Marijuana abuse	2.1	2.3	1.9	2.4	3.1	2.3	2.2	2.7	2.1	1.9	2.2	1.9	2.2	2.0	1.7	2.1	2.2	1.8
Marijuana dependence	6.7	4.7	5.0	15.2	8.4	9.8	4.8	4.3	3.9	6.5	4.8	5.4	4.9	3.7	3.7	7.9	6.9	6.4
Cocaine use disorder	3.0	2.7	2.4	7.6	3.9	4.6	3.7	3.6	3.1	2.6	2.7	2.5	2.3	2.1	1.9	3.6	3.0	2.8
Cocaine abuse	2.0	1.7	1.6	5.8	2.0	3.2	2.6	2.2	2.0	2.0	1.9	1.8	1.7	1.5	1.3	2.8	2.0	2.1
Cocaine dependence	5.0	4.8	4.3	**8.7**	6.5	6.7	5.7	5.8	5.4	3.7	3.8	3.6	3.6	3.2	3.0	4.6	4.4	4.1
Inhalant/solvent abuse	2.6	6.5	2.6	3.4	4.0	2.8	3.6	9.9	4.1	2.9	3.3	2.7	2.0	3.3	1.8	3.1	3.6	2.6

[a]All odds ratios are statistically significant ($p < .05$) except associations between panic disorder with agoraphobia and opioid abuse (in the total sample and among men and women) and cocaine abuse (among women) and between specific phobia and cocaine abuse (in the total sample and among women), opioid abuse (among men), and amphetamine abuse (among women).
[b]Bold underline indicates significant ($p < .05$) gender difference.

particularly elevated for opioid use disorders for which the differential was 3-fold for any mood disorder and 4-fold for any anxiety disorder. This robust relationship across specific drug classes is consistent with the finding that mood and anxiety disorder comorbidity is associated with the progression from abuse to dependence, as well as heavier use patterns of marijuana[27] and nicotine.[28] Whether the direct increase in the magnitude of these associations reflects a meaningful continuum of severity from abuse to dependence is an important area for future research.

Mood disorders were found to be more highly associated with drug use disorders than were anxiety disorders. This finding is consistent with that of the ECA in which the OR of any mood disorder and any drug use disorder was 4.7 and the corresponding OR for any anxiety disorder was 2.5. In contrast, the results from the NCS[2] reported associations between drug dependence and any mood disorder that were similar to those for any anxiety disorder, although the actual size of the OR varies across reports. Moreover, and similar to the ECA findings, the present study was able to document that this mood-to-anxiety disorder differential generalized across specific drug classes. This was also borne out in the analyses that examined the impact of comorbid mood and anxiety disorder, which found the highest associations between each of the specific drug use disorders and comorbid mood and anxiety disorder, followed by pure mood disorder, and then pure anxiety disorder. These findings suggest that mood disorders may be more easily assuaged by self-medication by specific classes of drugs than anxiety disorders, a potential explanation requiring further detailed analyses. In addition, alternative definitions of anxiety disorders (e.g., dimensional measures, endophenotypes hypothesized to underlie anxiety) may reveal meaningful etiologic links that are obscured by DSM categorizations and should be investigated.

Marijuana use disorder was by far the most prevalent drug use disorder, followed by any cocaine use disorder, yet

Table 6. Prevalence and Odds Ratios of DSM-IV Lifetime Comorbid and Pure Mood and Anxiety Disorders and Drug Use Disorders

	Mood and Anxiety Disorder				Mood Without Anxiety Disorder				Anxiety Without Mood Disorder			
Drug Use Disorder	%	SE	OR	(95% CI)	%	SE	OR	(95% CI)	%	SE	OR	(95% CI)
Any drug use disorder	20.2	0.8	3.4	(3.0 to 3.8)	20.7	0.8	2.3	(2.1 to 2.6)	11.2	0.6	1.4	(1.2 to 1.5)
Sedative use disorder	31.2	2.7	5.1	(4.0 to 6.6)	23.0	3.0	2.4	(1.7 to 3.4)	10.2	1.8	1.2	(0.8 to 1.7)
Tranquilizer use disorder	34.4	2.7	5.9	(4.7 to 7.6)	20.5	2.8	2.1	(1.5 to 2.9)	10.2	1.7	1.2	(0.8 to 1.7)
Opioid use disorder	28.9	2.3	4.6	(3.7 to 5.7)	25.3	2.8	2.8	(2.1 to 3.7)	8.6	1.6	1.0	(0.7 to 1.5)
Amphetamine use disorder	28.5	2.1	4.6	(3.7 to 5.7)	22.7	2.0	2.4	(1.9 to 3.0)	12.4	1.6	1.5	(1.1 to 2.0)
Hallucinogen use disorder	27.1	2.0	4.2	(3.5 to 5.2)	24.9	2.0	2.7	(2.2 to 3.4)	9.9	1.5	1.1	(0.8 to 1.6)
Marijuana use disorder	19.1	0.9	3.0	(2.6 to 3.3)	20.6	0.8	2.2	(2.0 to 2.5)	11.4	0.7	1.4	(1.2 to 1.6)
Cocaine use disorder	22.8	1.5	3.4	(2.9 to 4.1)	22.1	1.5	2.3	(1.9 to 2.8)	10.4	1.1	1.2	(1.0 to 1.5)
Inhalant/solvent abuse	23.4	4.6	3.4	(2.0 to 5.6)	26.2	4.3	2.8	(1.8 to 4.4)	11.3	3.3	1.3	(0.7 to 2.5)

these drug use disorders generally showed the weakest association with mood and anxiety disorders. Conversely, low-prevalence drug use disorders (i.e., sedative, opioid, and tranquilizer) were most strongly associated with mood and anxiety disorders. Although similar findings were presented in the ECA report,[1] a unique finding from this NESARC report is that comorbid mood and anxiety disorder, relative to either pure mood disorder or pure anxiety disorder, was most strongly associated with these low-prevalence drug use disorders. One interpretation is that patients with comorbid mood and anxiety disorders are more likely to be prescribed sedatives, tranquilizers, and opioids and consequently are more likely to develop problems with their use. Conversely, marijuana use is highly prevalent in the U.S. population, and many individuals who use marijuana without psychiatric illness would be expected to develop abuse and dependence on this drug. Thus, marijuana use disorders would be more weakly associated with mood and anxiety disorders than with the aforementioned prescription use disorders. An alternative interpretation is that having a mood disorder confers risk for greater involvement with serious illicit drugs, particularly when the mood disorder co-occurs with an anxiety disorder. This elevated risk for greater involvement with serious illicit drugs may be attributable to a mechanism specific to mood-anxiety comorbidity or other factors associated with having multiple psychiatric disorders, such as greater disorder severity or individual differences in factors underlying vulnerability to mood-anxiety comorbidity and drug involvement. This latter interpretation is consistent with NCS and ICPE findings that showed that the number of psychiatric diagnoses was positively associated with the risk of progression to heavy smoking,[28] nicotine dependence,[29] and drug dependence.[4]

Although virtually all specific mood and anxiety disorders and specific drug use disorders were positively and significantly associated with one another, mania and panic disorder with and without agoraphobia were more strongly related to specific drug use disorders, particularly sedative, tranquilizer, and opioid use disorder, than other mood and anxiety disorders. These findings are consistent with, and advance upon, those of the NCS that found especially strong associations between any drug use disorder and mania and panic disorder.[2,3] Moreover, 14 of the 17 significant gender differences observed in this study found stronger associations between specific mood and anxiety disorders and specific drug use disorders among women compared to men. In most of these instances, women were more highly comorbid for specific mood and anxiety disorders and tranquilizer, sedative, and opioid use disorders. Similarly, men with panic disorder without agoraphobia were more highly comorbid for sedative and tranquilizer dependence. Although it is tempting to interpret these results as support for the self-medication hypothesis, particularly among women, this issue would best be examined in a longitudinal context. Finally, these findings do suggest that comorbidity is stronger among women with drug use disorders despite much lower prevalences of drug use disorders. In fact, it has been proposed that drug use disorders in women may be particularly related to deviance or psychiatric impairment.[3,28] Clearly, these findings prompt further research on gender differences in mechanisms of comorbidity, and perhaps particularly those that help explain the elevated associations between mania and panic and the rarer drug use disorders, sedative, tranquilizer, and opioid use disorders.

The findings of this study have a number of treatment and research implications. The associations between mood and anxiety disorders and drug use disorders are substantial, particularly among individuals dependent on serious and less-common drugs who, in turn, tend to be more likely to suffer from both anxiety and mood disorders. This issue undoubtedly poses significant challenges to clinicians given that comorbidity complicates treatment prognosis and course of drug use disorders[30–33] and increases service utilization and health care costs.[2,34] Further, the extensive comorbidity of mood and anxiety disorders among individuals with drug disorders, as well as the elevated rates of drug use disorders among individuals with mood or anxiety disorders, reiterates an appeal for comprehensive prevention and interventions that assess and address both substance use and psychiatric disorders.[1,3,35] Given that mood disorders are among the most

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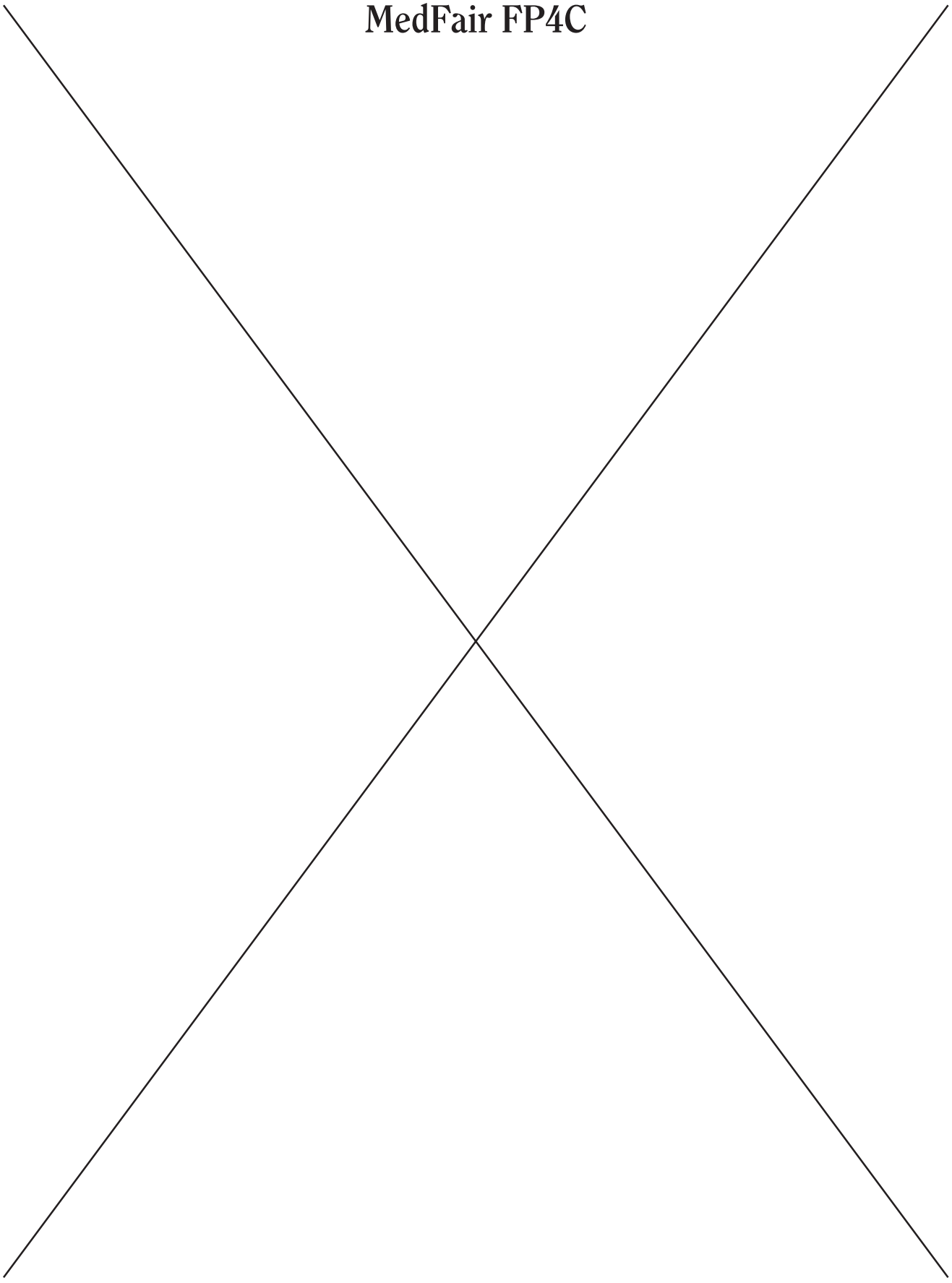

prevalent psychiatric disorders, and are more strongly associated with drug use disorders than anxiety disorders, insight into mechanisms of mood comorbidity with drug use disorders has the potential of yielding beneficial help to many individuals.

Our findings should be evaluated in the context of several limitations. First, the interpretation of the associations between mood, anxiety, and specific drug use disorders is complicated by 2 important and related issues that were not addressed in this report—namely, alcohol and drug use disorder comorbidities, and order of onset of comorbid conditions. Insofar as alcohol use disorders are often comorbid with drug use disorders,[1,35] we fully acknowledge the importance of addressing these issues in order to fully inform mechanisms of comorbidity. However, we decided that these important analyses would be more appropriately and comprehensively addressed in a follow-up report. Order-of-onset data for mood, anxiety, and specific drug use disorders were also not included in this report. Although the NESARC does contain data to inform these issues, these analyses would best be conducted with the Wave 2 longitudinal data.

The identification of consistent patterns of association between mood and anxiety disorders and specific drug use disorders provides the much-needed starting point for more detailed examinations of specific mechanisms of comorbidity in this large nationally representative sample. The extensive comorbidity among mood, anxiety, and drug use disorders would have particular relevance for research on the genetic underpinnings of addiction. To the extent that comorbidity indicates greater risk of or vulnerability to drug use disorder, definitions of phenotypes of drug use disorders in genetically informative research should give careful consideration to psychiatric conditions as meaningful characteristics of case heterogeneity, particularly for the relatively rare drug use disorders. Definitions of cases that fail to account for such heterogeneity run the risk of drawing misinformed conclusions based upon overly gross distinctions between cases and controls, and overlooking potentiality important subgroups of cases. Given the relatively low prevalence of certain types of drugs and drug-psychiatric disorder comorbidities, large prospective genetically informative studies drawn from community sources as well as studies that combine samples across sites would be especially promising avenues of research into mechanisms of comorbidity given their ability to maximize statistical power and generalizability.

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