

Race/ethnic differences in the prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions

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ABSTRACT

Background. Very few large national epidemiologic surveys have examined the prevalence of psychiatric disorders among Asians and Native Americans due to small sample sizes. Very little is also known about the co-occurrences between substance use disorders and mood and anxiety disorders among these two minority groups and how their rates compare to Whites, Blacks, and Hispanics.

Method. Analyses were based on a large ($n=43\,093$) nationally representative survey of the adult (18+ years), U.S. population supplemented by a group quarters sampling frame. Prevalences and associations of major DSM-IV mood, anxiety and substance use disorders were examined among all major race/ethnic subgroups of the population.

Results. Twelve-month rates of most mood, anxiety and substance use disorders were generally greatest among Native Americans and lowest among Asians. For most race/ethnic subgroups, alcohol and drug dependence, but not abuse, were significantly associated with mood disorders. With few exceptions, there were no significant associations between alcohol and drug abuse and anxiety disorders. In contrast, alcohol dependence was associated with most anxiety disorders among Whites, Blacks and Asians, but not among Native Americans.

Conclusions. The 12-month prevalence of substance use, mood, and anxiety disorders varied greatly across the five major race/ethnic subgroups of the population. Twelve-month co-occurrence of substance use disorders and mood and anxiety disorders was pervasive among all race/ethnic subgroups. Future research is also needed to understand race/ethnic differentials in prevalence and co-occurrence of these disorders with a particular focus on factors that may give rise to them.

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INTRODUCTION

Earlier epidemiologic surveys conducted in the United States have consistently shown that substance use, mood and anxiety disorders are highly prevalent in the U.S. population and that substance use disorders are particularly common among individuals with mood and

anxiety disorders. According to data from the 1980–1984 Epidemiologic Catchment Area (ECA) study, 13.4% and 19.4% of individuals with alcohol use disorders had a lifetime mood or anxiety disorder, respectively (Regier *et al.* 1990). Corresponding rates for mood and anxiety disorders among individuals with drug use disorders were 26.4% and 28.3%. Consistent with the ECA findings, the 1990–1992 National Comorbidity Survey (NCS; Kessler *et al.* 1996) reported that among individuals with a lifetime alcohol or drug use disorder, 12.3% and 29.1% had a mood or anxiety disorder at some time in their lives. Recent data from the 2001–2002 National Institute on Alcohol Abuse and Alcoholism's National Epidemiologic Survey on Alcohol and Related Conditions (NESARC; Grant *et al.* 2003*a*, 2004*b*) confirm the results of earlier surveys on 12-month, as opposed to lifetime, comorbidity of these disorders. The NESARC found that 18.9% and 17.1% of individuals with 12-month alcohol use disorders had a co-occurring mood or anxiety disorder. Among individuals with drug use disorders, 31.8% and 25.4% had a co-occurring mood and anxiety disorder.

Although all of these epidemiologic surveys have provided important information concerning the prevalence and co-morbidity of substance use disorders and major mood and anxiety disorders, very little is known about how current rates and co-occurrence of these disorders differ for all important race/ethnic subgroups of the population. To date, none of these surveys have examined 12-month prevalence and co-morbidity among Native Americans and other race/ethnic groups. Only the ECA data (Zhang & Snowden, 1999) has been used to examine rates among a small subsample ($n=242$) of Asians relative to other race/ethnic groups. Although race/ethnic differences in the prevalences of mood and anxiety disorders have been studied across White, Black, and Hispanic subgroups of the U.S. population, the related ECA study was not a national survey and the number of Hispanics in the NCS was small (Ortega *et al.* 2000) and non-English-speaking respondents were excluded from the survey (Kessler *et al.* 2005*a, b*).

The small sample sizes of Hispanics and Asians in the ECA and NCS also precluded

analyses of current (12-month) prevalences and co-morbidity of specific substance use disorders and specific mood and anxiety disorders among all major race/ethnic subgroups of the population. Similar to these other national surveys, recent analyses of the NCS-R (Breslau *et al.* 2005*a, b*) were confined to lifetime estimates, and in only one instance were 12-month prevalences presented for Whites, Blacks, and Hispanics across broad categories of any substance use, any mood or any anxiety disorder, again due to small sample sizes of these minority subgroups. Lifetime estimates, unlike current 12-month estimates, are prone to imprecision largely as the result of recall bias. With respect to co-morbidity, examining 12-month rates that describe the co-occurrence of disorders during the specific time period of the past year is more meaningful than examining lifetime co-morbidity for co-morbid disorders that could have occurred many years apart. In addition, in both the ECA and NCS-R studies, Whites were used as the referent category for which minority group prevalence rates were compared, obscuring potentially important differences between minority groups. Further, in all of these studies on race/ethnic differences, alcohol and drug abuse and dependence were aggregated into any alcohol or any drug use disorder, again obscuring race/ethnic differences that may exist between abuse and dependence.

The purpose of this study was to fill this gap in our knowledge about race/ethnic differences by providing information on the 12-month prevalence and co-occurrence between DSM-IV (APA, 1994) alcohol and drug use disorders and mood and anxiety disorders, using a large ($n=43\,093$) nationally representative survey of the general population, the National Institute on Alcohol Abuse and Alcoholism's 2001–2002 NESARC (Grant *et al.* 2003*a*, 2004*b*). The sample size and geographic coverage of the NESARC allow, for the first time, reliable 12-month estimates of the prevalence and co-occurrence of alcohol and drug abuse and dependence and specific mood and anxiety disorders for all five major race/ethnic groups of the U.S. population: Whites, Blacks, Hispanics, Asians, and Native Americans/Alaska Natives. We also determine differences in the prevalence of these specific disorders between each race/ethnic group for the purpose

of understanding important variations between minority subgroups as opposed to differences between Whites and each minority group.

METHOD

NESARC sample

The NESARC is a nationally representative general population survey conducted by the National Institute on Alcohol Abuse and Alcoholism (NIAAA). A detailed description of the methods has been published elsewhere (Grant *et al.* 2003a, 2004a). The NESARC is representative of the civilian, non-institutionalized population of adults, 18 years and older, living in households and group quarters in the United States, including the District of Columbia, Alaska, and Hawaii. The NESARC was a face-to-face survey with a response rate of 81%, yielding a sample size of 43093. Blacks, Hispanics, and young adults (18–24 years) were oversampled.

The sample included persons living in households, on tribal reservations, the military living off base and the following group quarters: boarding houses; rooming houses; non-transient hotels and motels; shelters; facilities for housing workers; college quarters and group homes. The sampling frame of housing units for the NESARC is the Census Supplementary Survey (C2SS), which included 2000 primary sampling units (PSUs) consisting of all 3142 counties and county equivalents in the United States. The C2SS sample consisted of 655 PSUs. For the NESARC a sample was drawn from each of the C2SS's 655 PSUs in addition to a group quarters sampling frame selected from the Census 2000 Group Quarters Inventory. Group quarter units were converted to housing unit equivalents and sampled together with other NESARC housing units. To prevent potential respondent disclosure, small PSUs were collapsed so that the final NESARC data file shows 435 PSUs. After the data were weighted, they were adjusted to be representative of the U.S. population on several demographic variables, including region, age, sex, and race/ethnicity based on the 2000 Census.

Measurement of race/ethnicity

Race/ethnic group membership was determined by responses to questions about Hispanic or

Latino origin and race. Approximately seventy-one percent of the weighted sample was White ($n=24\,507$), 11.1% Black ($n=8245$), 2.1% Native American (including Alaska Natives) ($n=701$), 4.4% Asian (including Pacific Islanders) ($n=1332$), and 11.6% Hispanic ($n=8308$). All race/ethnic groups comprising the entire NESARC sample ($n=43\,093$) were included in the analyses.

DSM-IV alcohol and drug use disorders

The psychiatric diagnostic interview used in the NESARC was the NIAAA Alcohol Use Disorder and Associated Disabilities Interview Schedule – DSM-IV Version (AUDADIS-IV) designed for use by highly trained lay interviewers (Grant *et al.* 2001). The AUDADIS-IV contained a comprehensive list of questions designed to operationalize the DSM-IV criteria for alcohol use disorders and drug use disorders for 10 different classes of drugs: sedatives, tranquilizers, opiates (other than heroin or methadone), stimulants, hallucinogens, cannabis, cocaine (including crack cocaine), inhalants/solvents, heroin, and other drugs. In accordance with DSM-IV, a diagnosis of 12-month alcohol dependence required that the respondent satisfy at least three of the seven DSM-IV criteria for dependence in the 12 months preceding the interview. Consistent with the DSM-IV, an AUDADIS-IV diagnosis of alcohol abuse required that the respondent satisfy at least one of the four abuse criteria in the past 12 months. Diagnoses of drug-specific abuse and dependence (which used the same algorithms as alcohol) were aggregated across the 10 drug classes to generate variables for any drug use disorder, drug abuse, and drug dependence.

The good to excellent reliability and validity of the AUDADIS-IV substance use disorder diagnoses are well documented in numerous psychometric studies, including clinical reappraisals conducted by psychiatrists, in clinical and general population samples (Grant *et al.* 1995, 2003b; Hasin *et al.* 1997a, 2003; Hasin & Paykin, 1999; Canino *et al.* 1999) and several countries as part of the World Health Organization/National Institutes of Health's International Study on Reliability and Validity (Chatterji *et al.* 1997; Cottler *et al.* 1997; Hasin *et al.* 1997b; Ustun *et al.* 1997; Vrsti *et al.* 1997; Nelson *et al.* 1999).

DSM-IV mood and anxiety disorders

Individuals were classified as having a 12-month mood disorder if they met the DSM-IV criteria for 12-month major depression, dysthymia or mania. They were classified with a 12-month anxiety disorder if they met the DSM-IV criteria for 12-month panic disorder with or without agoraphobia, social phobia, specific phobia, or generalized anxiety disorder. All mood and anxiety disorders satisfied the clinical significance criteria of the DSM-IV and all diagnoses ruled out substance-induced disorders and those due to a general medical condition. Diagnoses of major depression also ruled out bereavement, following the DSM-IV. As described in detail elsewhere, the reliability and validity of AUDADIS-IV mood and anxiety disorders were fair to good as assessed in both clinical and general population samples (Grant *et al.* 1995, 2003*b*, 2004*b, c*; Canino *et al.* 1999; Hasin *et al.* 2005).

Interviewer training

Approximately 1800 lay interviewers from the U.S. Census Bureau administered the NESARC, using laptop computers with software that included built-in skip, logic, and consistency checks. Interviewers completed 10 days of training, standardized by central training sessions under the direction of NIAAA and Census staff, and had an average of 5 years' experience working on Census and other health-related surveys.

Statistical analyses

Cross-tabulations were used to derive prevalences of sociodemographic factors and alcohol and drug use disorders and mood, and anxiety disorders by race/ethnic group. Two-sided tests were used to assess differences in prevalence between all pairs of race/ethnic groups using a significance level of $\alpha < 0.05$ for rejecting the null hypothesis of equivalent proportions. Statistical tests regarding differences between two proportions parallel those for differences between means. We use the equation (Neter *et al.* 1992):

$$z = \frac{\bar{p}_1 - \bar{p}_2}{\sqrt{\bar{p}(1-\bar{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

where \bar{p}_1 and \bar{p}_2 are the two proportions to be compared, \bar{p} is simply the weighted average of \bar{p}_1 and \bar{p}_2 , and the denominator in its entirety is the standard error of \bar{p} . In fact, the sampling distribution of the square of the z test statistic shown above is a χ^2 distribution with 1 degree of freedom. Thus, a two-sided z test is equivalent to a classic χ^2 test (Fleiss, 1981), and the p values yielded by the χ^2 and z test statistics are identical when appropriate degrees of freedom are used for each test. The only difference in using the z statistic, as we have used, and the equivalent χ^2 test for homogeneity of proportions is that the χ^2 test has the advantage of generalizing to tests of the equality of more than two proportions, which was not of interest in our analyses. When we compared the results of our analyses with the more typically used χ^2 equivalent, our inferences were not altered and the results remained the same.

Logistic regression models were used to estimate odds ratios (ORs) reflecting the associations of 12-month alcohol and drug use disorders with 12-month mood and anxiety disorders, within race/ethnic groups controlling for age, sex, marital status, and family income. All analyses were conducted using SUDAAN version 9.0 (Research Triangle Institute, 2004), a software package that uses Taylor series linearization to adjust variance estimates for the effects of complex survey designs.

RESULTS

Differences in the distribution of demographic variables between race/ethnic groups

Table 1 presents the distribution of demographic variables between race/ethnic groups. In general, Blacks had the lowest proportion of males and people who were married, compared to the other race/ethnic groups. In general, Hispanics tend to be younger and Whites older than other race/ethnic groups.

Differences in the prevalence of alcohol and drug use disorders and mood and anxiety disorders between race/ethnic groups

Table 2 presents the prevalence of DSM-IV 12-month alcohol and drug use disorders and mood and anxiety disorders. In general, rates for all of these disorders were greatest for Native Americans and lowest among Asians. Blacks

Table 1. Distribution of demographic variables by race or ethnic group

	White % (S.E.)	Black % (S.E.)	Native American % (S.E.)	Asian % (S.E.)	Hispanic % (S.E.)
Sex					
Male	48.07 (0.38)	43.75 (0.72) ^a	47.66 (2.06) ^b	48.26 (1.85)	50.88 (0.72) ^{ab}
Age (yr)					
18–29	18.84 (0.36)	25.85 (0.68) ^a	19.50 (1.78) ^b	27.81 (1.78) ^{a,c}	34.22 (1.09) ^{abcd}
30–44	29.38 (0.37)	33.30 (0.66) ^a	32.79 (2.28)	34.45 (1.85) ^a	36.17 (0.78) ^{ab}
45–64	32.95 (0.35)	29.11 (0.65) ^a	34.06 (2.23) ^b	28.00 (1.51) ^{ac}	21.95 (0.75) ^{abcd}
65+	18.82 (0.33)	11.74 (0.47) ^a	13.66 (1.30) ^a	9.74 (1.83) ^a	7.66 (0.63) ^{abc}
Married					
Yes	64.16 (0.44)	42.18 (0.80) ^a	62.76 (2.09) ^b	66.68 (1.55) ^b	62.55 (1.11) ^{bd}
Family income					
\$1000–19999	20.00 (0.44)	34.38 (0.91) ^a	32.86 (2.38) ^a	20.99 (1.31) ^{bc}	34.24 (1.08) ^{acd}
\$20000–34999	19.10 (0.38)	22.24 (0.65) ^a	20.12 (1.76)	18.30 (1.28) ^b	25.60 (0.59) ^{abcd}
\$35000–69999	33.30 (0.40)	30.20 (0.76) ^a	32.49 (2.47)	29.99 (2.10)	27.59 (0.80) ^{ab}
\$70000+	27.60 (0.81)	13.18 (0.72) ^a	14.54 (1.63) ^a	30.72 (1.93) ^{bc}	12.57 (0.74) ^{ad}

^a Significantly different from estimate for Whites.

^b Significantly different from estimate for Blacks.

^c Significantly different from estimate for Native Americans.

^d Significantly different from estimate for Asians.

Table 2. Twelve-month prevalence of substance use disorders, mood disorders, and anxiety disorders by race or ethnic group

Disorder	White (W) % (S.E.)	Black (B) % (S.E.)	Native American (NA) % (S.E.)	Asian (A) % (S.E.)	Hispanic (H) % (S.E.)
Any alcohol use disorder	8.93 (0.27)	6.86 (0.40) ^a	12.09 (1.60) ^{ab}	4.54 (0.62) ^{abc}	7.92 (0.58) ^{bcd}
Alcohol abuse	5.10 (0.21)	3.29 (0.30) ^a	5.75 (1.02) ^b	2.13 (0.46) ^{abc}	3.97 (0.30) ^{abcd}
Alcohol dependence	3.83 (0.16)	3.57 (0.29)	6.35 (1.17) ^{ab}	2.41 (0.38) ^{abc}	3.95 (0.44) ^{abcd}
Any drug use disorder	1.93 (0.12)	2.39 (0.24) ^a	4.91 (0.98) ^{ab}	1.39 (0.43) ^{bc}	1.74 (0.21) ^{bc}
Any drug abuse	1.38 (0.10)	1.63 (0.18)	2.29 (0.65) ^b	0.99 (0.38) ^{bc}	1.06 (0.14) ^{abc}
Any drug dependence	0.55 (0.06)	0.77 (0.12)	2.62 (0.70) ^{ab}	0.40 (0.17) ^{bc}	0.68 (0.17) ^{cd}
Any mood disorder	9.41 (0.24)	8.80 (0.44)	15.35 (1.53) ^b	7.36 (1.06) ^{ac}	7.97 (0.63) ^{ac}
Major depression	7.38 (0.21)	6.36 (0.38) ^a	12.38 (1.40) ^{ab}	4.78 (0.76) ^{abc}	5.67 (0.49) ^{ac}
Dysthymia	1.88 (0.11)	1.86 (0.19)	2.99 (0.58) ^{ab}	1.20 (0.41) ^c	1.56 (0.21) ^c
Mania	1.66 (0.10)	1.87 (0.21)	2.54 (0.68)	0.95 (0.29) ^{abc}	1.54 (0.19)
Any anxiety disorder	11.68 (0.32)	10.43 (0.58) ^a	15.28 (1.59) ^{ab}	6.87 (0.86) ^{abc}	8.80 (0.61) ^{abcd}
Panic with agoraphobia	0.65 (0.06)	0.36 (0.08) ^a	1.19 (0.45) ^b	0.05 (0.06) ^{abc}	0.33 (0.09) ^{abcd}
Panic without agoraphobia	1.66 (0.09)	1.12 (0.15) ^a	3.45 (0.83) ^{ab}	0.67 (0.23) ^{ac}	1.27 (0.14) ^{acd}
Social phobia	3.01 (0.15)	2.00 (0.23) ^a	3.56 (0.85) ^b	2.13 (0.39) ^{ac}	1.98 (0.20) ^{ac}
Specific phobia	7.51 (0.26)	7.23 (0.46)	8.18 (1.14)	4.13 (0.58) ^{abc}	5.65 (0.52) ^{abcd}
Generalized anxiety	2.19 (0.12)	1.88 (0.22)	2.64 (0.63)	1.13 (0.29) ^{abc}	1.68 (0.24) ^a

^a Significantly different from estimate for Whites.

^b Significantly different from estimate for Blacks.

^c Significantly different from estimate for Native Americans.

^d Significantly different from estimate for Asians.

had significantly lower rates of alcohol abuse, major depression, panic disorder with and without agoraphobia and social phobia but significantly greater rates of any drug use disorder compared with Whites. Prevalences of alcohol dependence, drug dependence, major depression, dysthymia and panic disorder without agoraphobia were significantly greater among Native Americans relative to Whites and

Blacks while rates of alcohol abuse, drug abuse, panic with agoraphobia and social phobia among Native Americans exceeded those among Blacks.

Among Asians, the 12-month prevalences of alcohol abuse and dependence, major depression, mania, panic disorder with agoraphobia, specific phobia and generalized anxiety disorder were all significantly lower than the

Table 3. Twelve-month adjusted odds ratios (OR) of DSM-IV alcohol and drug use disorders and mood and anxiety disorders by race/ethnicity

Co-morbid disorder	Alcohol			Any drug		
	Disorder OR (95% CI)	Abuse OR (95% CI)	Dependence OR (95% CI)	Disorder OR (95% CI)	Abuse OR (95% CI)	Dependence OR (95% CI)
White						
Any mood disorder	2.0 (1.7–2.4)*	1.1 (0.9–1.4)	3.1 (2.4–3.8)*	2.9 (2.3–3.8)*	1.7 (1.2–2.4)*	7.4 (4.7–11.5)*
Major depression	2.0 (1.7–2.4)*	1.1 (0.8–1.4)	3.1 (2.4–4.0)*	3.0 (2.3–3.9)*	1.9 (1.3–2.7)*	6.5 (4.1–10.1)*
Dysthymia	1.4 (0.9–2.1)	0.8 (0.5–1.5)	2.1 (1.3–3.6)*	4.2 (2.6–6.8)*	2.3 (1.3–4.2)*	8.5 (4.5–16.1)*
Mania	2.2 (1.6–2.9)*	0.9 (0.6–1.4)	3.5 (2.4–5.0)*	3.9 (2.5–6.0)*	2.1 (1.2–3.8)*	8.0 (4.4–14.6)*
Any anxiety disorder	1.9 (1.6–2.2)*	1.2 (0.9–1.4)	2.8 (2.3–3.4)*	2.8 (2.1–3.7)*	1.7 (1.2–2.3)*	6.6 (4.1–10.6)*
Panic with agoraphobia	2.7 (1.7–4.4)*	1.4 (0.7–2.9)	4.0 (2.2–7.5)*	6.7 (4.1–11.1)*	4.0 (2.0–8.1)*	11.3 (5.0–25.5)*
Panic without agoraphobia	2.1 (1.5–2.9)*	0.8 (0.5–1.4)	3.8 (2.6–5.7)*	2.6 (1.6–4.3)*	1.4 (0.7–3.0)	5.9 (2.9–11.9)*
Social phobia	1.6 (1.2–2.1)*	1.0 (0.7–1.5)	2.2 (1.5–3.2)*	2.4 (1.6–3.6)*	1.7 (1.0–2.8)*	3.9 (2.2–6.9)*
Specific phobia	1.8 (1.5–2.1)*	1.2 (0.9–1.5)	2.5 (1.9–3.1)*	2.4 (1.7–3.3)*	1.6 (1.1–2.3)*	4.7 (2.6–8.3)*
Generalized anxiety	1.9 (1.4–2.7)*	1.0 (0.6–1.7)	3.0 (2.0–4.4)*	4.6 (2.9–7.4)*	2.3 (1.2–4.1)*	10.7 (5.0–22.7)*
Black						
Any mood disorder	3.5 (2.5–4.8)*	1.7 (1.0–2.8)	4.8 (3.3–7.0)*	6.2 (3.9–10.1)*	2.8 (1.5–5.2)*	20.7 (10.8–39.7)*
Major depression	2.9 (2.0–4.2)*	1.2 (0.6–2.3)	4.2 (2.8–6.5)*	5.1 (3.1–8.4)*	2.7 (1.3–5.6)*	10.8 (5.3–22.0)*
Dysthymia	3.6 (1.9–6.6)*	1.7 (0.4–6.7)	4.6 (2.3–9.2)*	7.4 (3.6–15.1)*	4.1 (1.4–12.4)*	11.7 (4.5–30.9)*
Mania	5.8 (3.1–10.9)*	2.1 (0.6–7.1)	7.3 (3.6–14.7)*	10.8 (5.1–22.7)*	4.6 (2.1–10.3)*	20.8 (9.7–44.6)*
Any anxiety disorder	2.1 (1.5–3.0)*	0.9 (0.5–1.6)	3.2 (2.1–4.8)*	3.3 (2.1–5.4)*	2.0 (1.0–3.9)	6.6 (3.4–12.9)*
Panic with agoraphobia	3.5 (1.2–10.1)*	4.2 (1.2–15.0)*	2.7 (0.5–15.6)	7.7 (1.6–36.4)*	—	20.1 (4.1–97.8)*
Panic without agoraphobia	4.2 (2.2–8.0)*	—	7.6 (3.8–15.1)*	9.8 (4.1–23.4)*	3.8 (0.7–19.6)	19.1 (6.5–56.2)*
Social phobia	2.4 (1.1–5.1)*	1.0 (0.3–3.6)	3.4 (1.4–7.9)*	3.6 (1.4–9.3)*	2.6 (0.8–8.5)	4.9 (1.5–15.7)*
Specific phobia	1.5 (0.9–2.3)	0.8 (0.4–1.7)	1.9 (1.0–3.6)*	1.9 (1.0–3.7)	1.6 (0.7–3.7)	2.4 (0.8–7.4)
Generalized anxiety	3.3 (1.7–6.4)*	0.7 (0.2–2.3)	5.1 (2.6–10.1)*	9.3 (4.7–18.6)*	2.2 (0.7–7.5)	24.5 (10.2–58.8)*
Native American						
Any mood disorder	1.7 (1.0–3.0)*	1.0 (0.4–2.4)	2.3 (1.1–4.7)*	7.8 (2.8–21.3)*	3.5 (1.0–12.3)	13.2 (2.1–83.4)*
Major depression	1.3 (0.7–2.4)	0.8 (0.3–2.1)	1.7 (0.8–4.0)	5.0 (2.0–12.4)*	2.2 (0.6–8.0)	7.8 (1.8–33.0)*
Dysthymia	2.4 (0.9–6.3)	1.0 (0.1–7.8)	3.0 (1.0–9.0)	7.1 (1.7–29.9)*	4.0 (0.5–34.3)	7.3 (1.5–35.1)*
Mania	3.4 (1.4–8.5)*	1.9 (0.5–7.5)	3.0 (1.0–8.8)*	6.1 (2.2–16.9)*	0.9 (0.1–9.5)	10.5 (3.0–36.1)*
Any anxiety disorder	2.3 (1.1–4.9)*	1.5 (0.5–4.4)	3.2 (1.4–7.2)*	5.4 (2.4–11.8)*	2.3 (0.8–6.8)	8.9 (3.0–26.7)*
Panic with agoraphobia	3.6 (0.8–15.6)	3.6 (0.5–28.8)	2.7 (0.2–42.3)	—	—	—
Panic without agoraphobia	1.4 (0.4–5.3)	0.9 (0.1–8.4)	1.8 (0.5–6.5)	5.6 (1.7–17.7)*	1.0 (0.1–10.1)	10.4 (2.4–45.4)*
Social phobia	2.0 (0.6–6.7)	0.5 (0.1–4.0)	3.6 (0.9–14.1)	8.0 (2.5–25.4)*	1.0 (0.1–8.8)	15.7 (4.6–53.5)*
Specific phobia	2.8 (1.1–6.8)*	1.8 (0.5–6.4)	3.4 (1.2–9.3)*	2.5 (0.9–6.5)*	3.9 (1.2–12.8)*	1.2 (0.2–6.2)
Generalized anxiety	1.1 (0.3–3.7)	1.2 (0.2–5.8)	1.1 (0.2–5.5)	1.3 (0.3–6.9)	1.4 (0.1–13.6)	1.2 (0.1–11.4)
Asian						
Any mood disorder	3.9 (1.6–9.9)*	1.7 (0.6–4.7)	5.8 (1.8–18.3)*	3.8 (1.2–12.4)*	0.8 (0.1–7.3)	14.8 (3.3–67.1)*
Major depression	3.7 (1.2–11.7)*	1.1 (0.3–3.7)	6.1 (1.6–23.6)*	2.0 (0.5–8.3)	1.3 (0.1–11.9)	3.5 (0.5–22.3)
Dysthymia	14.1 (3.9–50.0)*	—	35.5 (9.1–137.9)*	42.8 (6.3–289.8)*	—	123.0 (15.4–980.0)*
Mania	8.9 (1.8–43.7)*	3.2 (0.3–36.7)	9.7 (1.5–63.0)*	1.8 (0.2–20.4)	—	7.4 (0.7–78.5)

Any anxiety disorder	4.4 (1.8–10.5)*	2.1 (0.7–7.0)	5.8 (1.9–17.9)*	1.6 (0.3–7.9)	8.6 (1.2–60.2)*
Panic with agoraphobia	6.3 (0.7–56.6)	—	—	—	—
Panic without agoraphobia	2.9 (0.7–12.5)	—	14.5 (1.4–150.5)*	27.3 (2.7–271.3)*	77.1 (5.7–1048.2)*
Social phobia	1.8 (0.6–5.5)	—	6.4 (1.4–29.0)*	1.7 (0.2–12.4)	9.9 (1.6–60.2)*
Specific phobia	25.3 (6.1–105.1)*	4.5 (1.4–14.0)*	—	—	—
Generalized anxiety	—	2.8 (0.4–20.3)	49.1 (9.3–259.8)*	7.2 (0.6–80.0)	42.5 (2.9–623.9)*
Hispanic					
Any mood disorder	3.1 (2.3–4.3)*	2.1 (1.5–3.1)*	3.5 (2.3–5.2)*	5.1 (3.0–8.6)*	9.7 (4.3–21.6)*
Major depression	2.9 (2.0–4.3)*	2.2 (1.4–3.4)*	3.0 (1.8–5.1)*	4.3 (2.1–8.8)*	9.0 (3.2–25.6)*
Dysthymia	2.5 (1.3–4.7)	0.8 (0.3–2.0)	4.0 (1.9–8.2)*	9.7 (4.5–20.8)*	21.3 (8.4–54.0)*
Mania	3.6 (2.1–6.4)*	1.7 (0.7–4.3)	4.6 (2.3–9.5)*	4.6 (1.9–11.5)*	2.2 (0.7–6.9)
Any anxiety disorder	1.9 (1.3–2.8)*	1.3 (0.7–2.3)	2.4 (1.5–3.9)*	2.8 (1.6–4.9)*	4.8 (1.9–12.7)*
Panic with agoraphobia	2.8 (0.8–9.6)	0.7 (0.1–5.7)	4.9 (1.3–19.0)*	15.3 (3.4–69.3)*	33.9 (6.5–175.6)*
Panic w/o agoraphobia	2.0 (1.0–4.0)	2.1 (0.8–5.7)	1.6 (0.6–4.5)	2.0 (0.5–8.0)	1.5 (0.3–7.1)
Social phobia	1.3 (0.7–2.4)	0.8 (0.3–2.0)	1.8 (0.9–3.9)	3.8 (1.6–9.0)*	8.2 (2.3–28.7)*
Specific phobia	2.1 (1.3–3.2)*	1.1 (0.6–2.1)	2.9 (1.7–5.0)*	3.5 (1.8–6.7)*	6.4 (2.2–18.3)*
Generalized anxiety	1.8 (0.9–3.7)	0.7 (0.1–3.4)	2.9 (1.4–6.2)*	4.3 (1.7–11.4)*	9.2 (2.6–32.2)*

Odds ratios adjusted for age, sex, family income, and marital status.

* $p < 0.05$.

— No cases in cell.

corresponding rates among Whites, Blacks and Native Americans. Rates of dysthymia, panic disorder without agoraphobia and social phobia were significantly lower among Asians relative to Native Americans and Whites.

Hispanics consistently had lower rates than Whites for all specific disorders except drug dependence, dysthymia and mania. Rates of alcohol abuse and dependence were significantly greater among Hispanics than Blacks whereas rates of drug abuse, panic disorder with agoraphobia and specific phobia were significantly lower among Hispanics compared with Blacks. Twelve-month prevalences of alcohol abuse and dependence, drug abuse and dependence, major depression, dysthymia, panic disorder with and without agoraphobia, and social and specific phobias were significantly lower among Hispanics compared with Native Americans. Hispanics also had significantly higher rates than Asians for alcohol abuse, alcohol dependence, drug dependence, panic disorder with and without agoraphobia, and specific phobia.

Associations between alcohol and drug use disorders and mood and anxiety disorders within race/ethnic groups

Table 3 presents associations expressed in terms of ORs between 12-month DSM-IV alcohol and drug use disorders and 12-month mood and anxiety disorders. The results presented in Table 3 for some cells may be relatively less reliable than others due to small sample sizes and/or prevalences. For most race/ethnic groups, alcohol dependence and drug dependence, but not alcohol and drug abuse, were positively and significantly related to specific mood disorders. In contrast, alcohol dependence and specific mood disorders were not significantly associated among Native Americans, drug dependence was not significantly related to most mood disorders among Asians, and drug abuse was significantly associated with specific mood disorders among Whites and Blacks.

Unlike mood disorders, there was much greater variability by race/ethnicity for associations between alcohol and drug use disorders and anxiety disorders. There were no significant associations between alcohol abuse and specific anxiety disorders across race/ethnic groups with the exception of specific phobia among Asians

and panic disorder with agoraphobia among Blacks. With few exceptions, 12-month associations between drug abuse and specific anxiety disorders were significant only among Whites. Only specific phobia was significantly associated with drug abuse among Native Americans.

Alcohol dependence was significantly associated with most specific anxiety disorders among Whites, Blacks, and Asians, but not Native Americans. Significant associations were also noted between alcohol dependence and specific phobia and generalized anxiety disorder among Hispanics. Further, drug abuse was significantly related to most anxiety disorders among Whites. Drug abuse was only significantly associated with specific phobia among Native Americans and with mania among Hispanics.

With the exception of specific phobia among Blacks and panic disorder without agoraphobia among Hispanics, there were significant associations between drug dependence and specific anxiety disorders among Whites, Blacks, Asians and Hispanics. For Native Americans, drug dependence was only significantly associated with panic disorder without agoraphobia and social phobia.

DISCUSSION

The results of this study add to our existing knowledge of differences in the prevalences of substance use disorders and mood and anxiety disorders among Blacks, Asians, and Hispanics compared with Whites derived from other national surveys that examined lifetime as opposed to 12-month rates of disorder. Although caution should be exercised in comparing lifetime rates from other studies and this study's 12-month rates, our results are consistent with the NCS-R (Breslau *et al.* 2005*a*), that found rates of major depression and panic disorder significantly lower among Blacks than Whites, and the ECA (Zhang & Snowden, 1999) that found lower rates of major depression. Blacks were also observed to have lower rates of alcohol abuse relative to Whites, a result that refines the ECA and NCS-R findings of lower rates among Blacks for substance use disorders and alcohol and drug abuse/dependence in the aggregate. Further, Asians and Blacks were found to have lower rates of alcohol use disorders, major depression and most anxiety disorders compared

with Whites. The ECA and NCS-R found far fewer differences in rates of these disorders between Asians and Hispanics compared with Whites. Consistent with the results of this study, the ECA found lower rates of panic disorder among Hispanics, but at variance with the study's results were the lower rates of drug abuse/dependence and mania among Hispanics relative to Whites observed in the ECA. The NCS-R findings of lower rates of major depression, social phobia and generalized anxiety disorder among Hispanics were replicated in this survey, but the lower rate of dysthymia among Hispanics relative to Whites observed in the NCS-R was not.

There are numerous reasons for the disparate race/ethnic results emerging from these three large surveys of the U.S. population. Findings from the ECA are over 20 years old and were based on the earlier DSM-III-R criteria (APA, 1980). Survey methodology and assessment instruments were also not common across surveys. Foremost was the sample size differential entering into the race/ethnic analyses among minority subgroups of the population: Whites (NESARC, $n=24\,507$; NCS-R, $n=4180$; ECA, $n=12\,176$); Blacks (NESARC, $n=8245$; NCS-R, $n=717$; ECA, $n=4301$); Asians (NESARC, $n=1332$; ECA, $n=242$); Hispanics (NESARC, $n=8308$; NCS-R, $n=527$; ECA, $n=1433$).

The NESARC was the first survey of the U.S. population to have adequate sample sizes sufficient for comparisons of the prevalence of psychopathology among Native Americans ($n=701$) and Asians ($n=1332$) relative to Whites and additionally to other minority subgroups of the population. Although basic prevalence estimates for rates of psychiatric disorders across race/ethnic groups presented here appear in previous NESARC publications (Grant *et al.* 2004*a*, 2005*a, b*; Hasin *et al.* 2005), none of these prior studies statistically compared each race/ethnic group with the other. Rather, in all of these prior publications, rates among race/ethnic groups for specific disorders were only compared with Whites.

Twelve-month rates of alcohol and drug dependence, major depression, dysthymia and panic disorder without agoraphobia were significantly higher among Native Americans compared with Whites. Further, prevalences of most, if not all current substance use, mood, and

anxiety disorders were significantly greater among Native Americans relative to Blacks, Asians, and Hispanics. Hispanics also demonstrated significantly greater rates than Asians for alcohol abuse, alcohol dependence, drug dependence, panic disorder with and without agoraphobia, and specific phobia. Information on psychiatric disorders among Native Americans is scarce and special attention to the mental health needs of this group appears warranted. In contrast, prevalences of alcohol abuse and dependence, major depression, mania, and each specific anxiety disorder among Asians were generally lower than the corresponding rates among Whites, Blacks, Native Americans, and Hispanics. The lower observed rates of psychiatric disorders among Asians relative to all other race/ethnic groups are consistent with international studies among Asian samples. Analyses are needed to understand the risk and protective factors in these two minority groups and whether disparities in treatment for psychiatric disorders among Asians exist despite lower rates. The reasons for differential rates of specific psychiatric disorders across race/ethnic groups are unclear. Further in-depth analyses of the NESARC and other datasets promise to increase our understanding of the variability of these observed rates. Research will also critically be needed to ascertain the degree to which language bias, differential response patterns and other cultural factors influenced the observed rates of psychiatric disorders among subgroups of the population defined in terms of race/ethnicity (Rogler, 1999; Rogler *et al.* 2001).

Information on the co-occurrence of substance use disorders and mood and anxiety disorders within race/ethnic groups was not previously available and is highly relevant to understanding the race/ethnic differential in psychiatric disorders. Associated analyses revealed three major trends. With respect to mood disorders, alcohol and drug dependence, but not alcohol and drug abuse, were highly associated with specific mood disorders among most race/ethnic groups. Interesting exceptions to this trend included the absence of associations between: (1) drug abuse and dependence and specific mood disorders among Asians; (2) alcohol dependence and mood disorders among Native Americans; and (3) drug abuse and

mood disorders among Native Americans and Hispanics. Second, alcohol dependence, but not alcohol abuse, was significantly associated with most specific anxiety disorders among each race/ethnic subgroup except Native Americans. Third, although drug dependence was generally associated with most specific anxiety disorders among each race/ethnic group, drug abuse was associated with specific anxiety disorders only among Whites. Failure to differentiate alcohol and drug abuse and dependence in prior studies served to obscure these relationships between specific substance use disorders and specific mood and anxiety disorders that relate to one another in important but different ways. Determining the reasons for these variations in patterns of co-morbidity is important. The information in this report can provide a strong starting point for such investigation.

The findings of this study have several implications. With regard to public health, this study has determined the magnitude of psychiatric disorders confronting the nation and identified important race/ethnic subgroups of the population at risk for the disorder, especially Native Americans. This information is critical to the planning of local and national mental health services and the design of prevention and intervention programs targeted at high-risk subgroups. With regard to clinical implications, substance use disorders were found to be highly co-morbid with mood and anxiety disorders across race/ethnic subgroups. Comprehensive evaluation of all patients presenting with these disorders should also include a systematic assessment of other co-morbid disorders.

Why certain race/ethnic groups of the population were found to have differential risk of psychiatric disorders in this study raises questions concerning the influence of cultural experiences on psychopathology. Given that culture is so intertwined with interpersonal expectations, styles of communication, coping mechanisms and self-concept (Diener & Suh, 1999; Kirmayer, 2001), the dearth of methodological work on cultural validity of psychiatric diagnoses is striking. Future epidemiologic research focusing on race/ethnic differences in the prevalences and co-morbidity of substance use disorders and mood, anxiety and other psychiatric disorders should focus on methodological issues surrounding the validity of the

measurement of these disorders across race/ethnic subgroups of the population including differential response and language bias. Whether culturally oriented life experiences protect against or increase vulnerability for the development of psychopathology or whether the DSM-IV defined categories are culturally uninformed are important research questions for future epidemiologic surveys of the general population.

Future work is also needed to assess the occurrence and co-morbidity of substance use disorders and other psychiatric disorders among sub-ethnic subgroups of the population (e.g. differentiating Chinese and Koreans and Native Americans by tribal affiliation), given the diversity that exists within major race/ethnic subgroups of the population examined here (Alegria *et al.* 2006). The need to more fully understand sub-ethnic differences in psychopathology is highlighted in two recent large epidemiological studies, one conducted among two Native American tribes, the American Indian Service Utilization, Psychiatric Risk and Protective Factors Project (AI-SUPERPFP; Beals *et al.* 2005), and one conducted among Chinese Americans living in Los Angeles, the Chinese American Psychiatric Epidemiological Study (CAPES; Takeuchi *et al.* 1998). In the AI-SUPERPFP survey, the Southwest Tribe and the Northern Plains Tribe differed significantly with regard to 12-month prevalences of mood and anxiety disorders, but not alcohol and drug use disorders. In the CAPES, the reported rates of 12-month major depression (3.4%) and dysthymia (0.9%) were slightly lower than the corresponding rates (4.8% and 1.2%) observed in the present study. Understanding sub-ethnic differences in psychopathology will require larger national samples than have been used to date, supplemented by smaller epidemiologic surveys conducted in special populations defined by sub-ethnicity.

Future research is also needed to understand the reasons for the race/ethnic differentials in prevalences and co-morbidity observed in this study with particular focus on other factors that may affect mental health status, including discrimination, acculturation, religious affiliation, social stress and mobility, employment status, adverse childhood events, and race/ethnic orientation (Schaefer, 2001; Nazroo,

2003; Grant *et al.* 2004b). The second recently completed wave of the NESARC assesses all of these factors and others that may importantly elucidate reasons for the race/ethnic differentials in psychiatric disorders observed in this study.

In sum, this study provides the most comprehensive information on the epidemiology of substance use, mood and anxiety disorders among major race/ethnic subgroups of the U.S. population to date. Our findings provide new insights into the prevalence and co-morbidity of substance use disorders and mood and anxiety disorders among race/ethnic groups and how this compares with other surveys. The variation in co-morbidity of these specific disorders among race/ethnic groups, which was unavailable before, highlights the importance of detailed race/ethnic information provided by large-scale population surveys that might help guide future research on etiology and the development of culturally sensitive prevention and treatment programs. Longitudinal epidemiologic surveys that attempt to elucidate the temporal relationships between onsets of alcohol and drug use disorder and mood and anxiety disorders also promise to increase our understanding of differential co-morbid etiology across race/ethnic groups and to examine similar differentials that may exist in the persistence and course of these disorders. The second wave of the NESARC, will allow the use of the wave 1 race/ethnic results as a platform for investigation of these important prospective questions.

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DECLARATION OF INTEREST

None.

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