Are Overweight, Obesity, and Extreme Obesity Associated With Psychopathology? Results From the National Epidemiologic Survey on Alcohol and Related Conditions

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Objective: This study examined associations of overweight, obesity, and extreme obesity with sociodemographic characteristics and specific DSM-IV Axis I and II disorders among men and women.

Method: Face-to-face interviews were conducted in a large national survey of the adult U.S. population conducted from 2001 to 2002.

Results: In general, black men; black, Hispanic, and Native American women; women who were not married/cohabiting; and those residing in the South and Midwest and in rural areas were at greatest risk of overweight, obesity, and extreme obesity. Women with obesity and extreme obesity were more likely to have atypical major depressive episodes in their bipolar illness. Panic disorder was associated (odds ratio [OR] = 1.5) with overweight among men, and specific phobia was associated with overweight (OR = 1.2) and obesity (OR = 1.3) among women. Antisocial personality disorder was also associated with overweight (OR = 1.5) and extreme obesity (OR = 1.9) among women, and avoidant personality disorder was associated (OR = 1.7) with extreme obesity among women.

Conclusion: Obesity among women appears to be related to episodes of major depression with atypical features occurring in established bipolar I disorder. Due to symptom overlap, panic disorder among overweight men may signal the presence of an undiagnosed illness such as cardiovascular disease or diabetes mellitus, type 2. More frequent exposure/vulnerability to stress may predispose overweight/obese women to specific phobia. Treatment guidelines for psychiatric disorders need to address the management of comorbid overweight and obesity, and treatment guidelines for obesity need to address the management of comorbid psychopathology.

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Over the past 20 years, prevalences of overweight and obesity have markedly increased[1–2] among U.S. adults. Although overweight and obesity are associated with a host of physical diseases and all-cause mortality,[3] little is known about their associations with psychiatric disorders in the U.S. general population.

To date, clinical and epidemiologic studies have largely focused on the relationship between overweight and obesity and major depression. Clinical research has demonstrated a positive relationship between obesity and major depressive disorder and bipolar disorder in men and women.[4] Results from the 6 cross-sectional[5–7] and prospective[8–10] epidemiologic surveys that have measured major depression using diagnostic assessment instruments also found positive relationships between obesity and major depression, but in the one study that presented data by sex, these findings were restricted to women.[5] Three

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TAKE-HOME POINTS

- Increased vigilance is needed in detecting and treating bipolar I disorder among obese and extremely obese women, especially if there is a history of atypical depressive episodes.
- Overweight men should be assessed (and treated) for panic disorder, and overweight and obese women should be assessed (and treated) for specific phobia.
- Obese, and especially extremely obese, women are more likely to have antisocial and avoidant personality disorders, which if present, must be treated.

epidemiologic surveys focused on psychopathology other than major depression. One cross-sectional study found an inverse relationship between alcohol use disorders and overweight and a positive association between nicotine dependence and obesity among men; no significant relationships were observed between depressive or anxiety disorders defined in the aggregate and obesity.[11] Another study found no associations between obesity and anxiety, mood, or substance use disorders,[12] while another study found a positive relationship between obesity and current bipolar I disorder and any anxiety and any substance use disorder defined in the aggregate.[13] One prospective survey[8,14] found an inverse relationship between obesity and generalized anxiety disorder among men and positive associations between the atypical depressive subtype and hypomanic symptoms among adolescents and obesity among adult men and women. Another prospective study[15] found conduct disorder in adolescence to be predictive of overweight and obesity in early adulthood.

The disparate results of these studies have been attributed to a variety of limitations: restricted age ranges, low response rates due to attrition, failure to exclude pregnant women, failure to analyze data by sex, use of aggregate measures of psychopathology, restricted geography, and failure to control for a broad array of critical correlates, especially psychiatric comorbidity. Psychiatric disorders are highly comorbid, necessitating the control of other psychopathology when examining specific psychiatric disorder–obesity relationships. Most prior research also failed to differentiate major depressive disorder (MDD), which excludes individuals with histories of manic episodes, from bipolar I disorder, in which major depressive episodes occur within the context of a history of manic episodes. Lastly, some surveys examined current body mass index (BMI) status with lifetime psychiatric disorders.[13] These results are difficult to interpret because BMI status cannot be directly related to the age at which the disorders occurred, a problem arising from sample sizes too small to examine current BMI status and current psychopathology.

The lack of information on the relationship between overweight and obesity and specific psychiatric disorders in the U.S. adult population represents a gap in knowledge in terms of prevention, treatment, and economic costs. To fill this gap, the present study examines associations between overweight, obesity, and extreme obesity and current (12-month) *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition (DSM-IV)[16] specific substance use, mood, anxiety, and personality disorders (PDs), using a large representative national survey of the U.S. adult population. Associations are examined separately by sex, controlling for current and past psychopathology and a broader array of sociodemographic and other covariates than in any other study to date. This is the first epidemiologic survey in obesity research to differentiate between MDD and bipolar I disorder while at the same time simultaneously controlling for a variety of relevant correlates. Based on the inadequate control of covariates and modest associations (odds ratios [ORs] = 1.1–1.9) found between obesity and MDD in past research, it was hypothesized that there would be no relationship between BMI and MDD once relevant covariates were controlled. It was also hypothesized that obesity and extreme obesity would be associated with bipolar I disorder once MDD had been differentiated from bipolar I disorder. The absence of a conceptual framework and empirical data linking obesity with other psychiatric disorders precluded hypotheses related to these disorders. As a preliminary to comorbidity analyses, detailed information is presented on the associations between BMI status and sex and important sociodemographic subgroups of the U.S. population.

METHOD

Sample

The 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) is a representative sample of the United States, described in detail elsewhere.[17,18] The NESARC target population was the adult (18 years and older) civilian population residing in households and group quarters. Face-to-face interviews were conducted with 43,093 respondents. Response rate was 81%. Blacks, Hispanics, and young adults (aged 18–24 years) were oversampled. Data were adjusted for oversampling and household- and person-level nonresponse and weighted to be representative of the U.S. civilian population based on the 2000 Census.

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The research protocols, including informed consent procedures, received full ethical review and approval from the U.S. Census Bureau and U.S. Office of Management and Budget.

Diagnostic Assessment

The diagnostic interview used to generate diagnoses was the Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV version (AUDADIS-IV),[18] designed for highly trained lay interviewers as described elsewhere.[19]

Anxiety (panic disorder, social phobia, specific phobia, and generalized anxiety disorder) and mood (major depressive disorder, dysthymia, bipolar I disorder, and bipolar II disorder) diagnoses in this report are primary diagnoses. In DSM-IV, the term *primary* excludes mental disorders that are substance-induced or due to medical conditions.[16(pp192–194)] All mood and anxiety disorders satisfied the DSM-IV clinical significance criterion (requirement for distress or impairment).[16(p7)]

AUDADIS-IV assessed DSM-IV criteria for alcohol use disorders, nicotine dependence, and drug-specific abuse and dependence for 10 drug classes (aggregated in this report) and 7 DSM-IV PDs, including avoidant, dependent, obsessive-compulsive, paranoid, schizoid, histrionic, and antisocial PDs. Following DSM-IV, all PD diagnoses required evidence of distress and/or social/occupational dysfunction.[17,18]

As described in detail elsewhere, test-retest reliability and validity of diagnoses (and algorithms used to derive diagnoses) assessed in the NESARC, including clinical reappraisals by psychiatrists, were fair to excellent in U.S. clinical and general population studies[19–29] and in several other countries as part of the World Health Organization/National Institutes of Health Reliability and Validity Study.[30–33]

Body Mass Index

BMI was defined[3] using standards developed by the National Heart, Lung, and Blood Institute: healthy weight, BMI = 18.5 to 24.9 kg/m^2; overweight, BMI = 25.0 to 29.9 kg/m^2; obesity, BMI = 30.0 to 39.9 kg/m^2; extreme obesity, BMI ≥ 40.0 kg/m^2. Similar to previous research in this area, height and weight were self-reported in the NESARC. Self-reported weight correlates highly with measured weight ($r = 0.86$) and is largely independent of height ($r \approx -0.03$).[34] Recent validation studies suggest that any bias in the measure of self-reported BMI is unlikely to affect conclusions about associations in epidemiologic studies.[35–38] We additionally derived correlation coefficients that measured the association between NESARC BMI data and comparable data from the combined 1999–2002 National Health and Nutrition Examination Survey[439] that measured actual height and weight, by sex, 5 racial-ethnic groups, and 6 age groups. Correlations of BMI were 0.76 for healthy weight, 0.75 for overweight, 0.84 for obesity, and 0.72 for extreme obesity.

Covariates

In addition to controlling for current (12-month) and past (prior to the past 12 months) psychiatric comorbidity when examining 12-month associations between BMI and specific 12-month psychiatric disorders, we controlled for a broad array of sociodemographic variables, including age, race-ethnicity, marital status, personal income and education, region of the country, and urbanicity. Other covariates included the sums of 11 past-year physical conditions (those diagnosed by a physician or other health professional), and 12 past-year stressful life events (see Table 1). Past-month physical disability/impairment was measured with the physical component scale of the SF-12-v2, a reliable and valid measure of physical impairment used in general population surveys.[40]

Lifetime nicotine abstainers were compared separately with current users (i.e., respondents who used, in the past 12 months, at least 100 cigarettes, 50 cigars, a pipe 50 times, or chewing tobacco or snuff on at least 20 occasions) and with former users (i.e., respondents who used prior to the past year). Current and former illicit drug users were compared with never-users. For alcohol consumption variables, respondents who had never exceeded the recommended ethanol volume limits (> 1.2 and > 0.6 oz of ethanol per day for men and women, respectively) during the past 12 months were compared with those who had, and with past-year abstainers. Similar comparisons were made for exceeding the limits during respondents' heaviest lifetime consumption. Analyses involving substance use disorders yielded the same results whether conducted with or without the associated consumption covariates.

Statistical Analysis

Weighted percentages and cross-tabulations were used to derive prevalences of sociodemographic characteristics across BMI status and sex. ORs, derived from logistic regression analyses, were used to examine the associations between sociodemographic characteristics and BMI status separately by sex. Multinomial logistic regression analyses were used to examine associations between each 12-month psychiatric disorder and BMI status, controlling for current and past psychiatric comorbidity and all other covariates. Covariates were independent variables, and BMI status formed one categorical dependent variable, with healthy weight as the referent category. Analyses were conducted separately for men and women. Women pregnant at the time of the interview (N = 453) and respondents classified as underweight (N = 829) or with missing BMI data (N = 1423) were excluded from the analyses. Standard errors and 95% confidence

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Table 1. Sociodemographic Characteristics by Body Mass Index Status[a] and Sex

Sociodemographic Characteristic	Healthy Weight			Overweight			Obese			Extremely Obese		
	Men, % (SE)	Women, % (SE)	Total, % (SE)	Men, % (SE)	Women, % (SE)	Total, % (SE)	Men, % (SE)	Women, % (SE)	Total, % (SE)	Men, % (SE)	Women, % (SE)	Total, % (SE)
Race-ethnicity												
White	69.7 (1.98)	75.2 (1.65)	72.9 (1.74)	72.9 (1.59)	68.5 (1.85)	71.1 (1.66)	70.9 (1.74)	64.4 (1.71)	67.7 (1.64)	71.0 (3.23)	64.9 (2.54)	67.1 (2.24)
Black	9.8 (0.76)	7.5 (0.56)	8.4 (0.60)	9.2 (0.58)	13.4 (0.92)	10.9 (0.68)	11.9 (0.89)	19.0 (1.12)	15.4 (0.91)	14.5 (1.94)	22.1 (1.78)	19.4 (1.47)
Native American	1.9 (0.26)	1.9 (0.23)	1.9 (0.19)	2.0 (0.21)	2.0 (0.26)	2.0 (0.18)	2.8 (0.40)	2.8 (0.38)	2.8 (0.29)	1.2 (0.71)	2.9 (0.80)	2.3 (0.62)
Asian	7.3 (1.14)	5.9 (0.75)	6.5 (0.87)	3.4 (0.45)	3.1 (0.47)	3.3 (0.40)	1.9 (0.35)	2.0 (0.38)	2.0 (0.31)	0.9 (0.68)	0.2 (0.10)	0.4 (0.24)
Hispanic	11.4 (1.14)	9.5 (1.02)	10.3 (1.03)	12.6 (1.41)	13.2 (1.67)	12.8 (1.49)	12.4 (1.56)	11.8 (1.32)	12.1 (1.41)	12.5 (2.72)	9.9 (1.81)	10.8 (1.88)
Age, y												
18–29	32.6 (0.71)	25.2 (0.65)	28.2 (0.52)	17.9 (0.59)	16.0 (0.62)	17.1 (0.47)	16.2 (0.79)	14.9 (0.64)	15.6 (0.52)	18.2 (2.72)	13.4 (1.34)	15.1 (1.34)
30–44	28.4 (0.72)	31.6 (0.56)	30.3 (0.45)	33.3 (0.73)	27.8 (0.76)	31.1 (0.55)	33.7 (0.90)	28.7 (0.90)	31.2 (0.61)	35.0 (3.19)	34.8 (1.83)	34.9 (1.64)
45–64	23.6 (0.67)	26.0 (0.53)	25.0 (0.42)	33.6 (0.65)	34.7 (0.84)	34.0 (0.51)	39.0 (0.94)	38.3 (0.87)	38.6 (0.58)	39.5 (2.99)	41.4 (1.96)	40.7 (1.68)
65+	15.4 (0.60)	17.3 (0.52)	16.5 (0.46)	15.2 (0.56)	21.6 (0.66)	17.8 (0.47)	11.1 (0.56)	18.1 (0.67)	14.6 (0.49)	7.3 (1.42)	10.4 (1.10)	9.3 (0.86)
Marital status												
Married/cohabiting	54.4 (0.83)	58.5 (0.76)	56.8 (0.64)	69.8 (0.65)	61.5 (0.83)	66.4 (0.56)	71.0 (0.98)	57.6 (0.91)	64.4 (0.74)	67.5 (3.22)	51.0 (2.17)	56.8 (1.71)
Widowed/separated/ divorced	11.7 (0.47)	21.0 (0.53)	17.2 (0.40)	12.2 (0.39)	24.0 (0.55)	17.0 (0.32)	11.5 (0.51)	26.2 (0.65)	18.7 (0.43)	10.2 (1.61)	27.0 (1.84)	21.1 (1.34)
Never married	33.9 (0.89)	20.5 (0.70)	26.0 (0.70)	18.1 (0.60)	14.5 (0.64)	16.6 (0.51)	17.5 (0.87)	16.3 (0.66)	16.9 (0.60)	22.3 (2.77)	22.1 (1.44)	22.1 (1.34)
Personal income, $												
0–19,999	41.7 (0.95)	57.5 (0.76)	51.0 (0.70)	28.3 (0.85)	60.6 (0.92)	41.3 (0.78)	29.5 (1.05)	63.1 (1.10)	45.9 (0.80)	31.5 (3.24)	67.4 (2.12)	54.8 (1.92)
20,000–34,999	23.3 (0.76)	20.4 (0.53)	21.6 (0.48)	25.0 (0.74)	20.9 (0.60)	23.3 (0.52)	26.6 (0.92)	21.1 (0.89)	23.9 (0.64)	31.6 (3.25)	19.1 (1.62)	23.5 (1.58)
35,000–69,999	23.8 (0.69)	17.7 (0.58)	20.2 (0.51)	31.2 (0.70)	15.1 (0.62)	24.7 (0.57)	32.0 (1.03)	13.9 (0.76)	23.2 (0.66)	28.3 (3.38)	12.5 (1.45)	18.0 (1.63)
70,000+	11.2 (0.68)	4.4 (0.37)	7.2 (0.41)	15.6 (0.83)	3.4 (0.33)	10.7 (0.57)	11.9 (0.73)	1.9 (0.27)	7.0 (0.40)	8.7 (1.82)	1.0 (0.37)	3.7 (0.67)
Education												
Less than high school	16.0 (0.66)	11.8 (0.49)	13.5 (0.44)	15.0 (0.71)	17.2 (0.92)	15.9 (0.72)	16.8 (0.93)	20.6 (0.91)	18.7 (0.75)	17.6 (2.89)	17.3 (1.58)	17.4 (1.58)
High school	27.5 (0.86)	27.7 (0.74)	27.6 (0.67)	28.0 (0.92)	30.4 (0.72)	29.0 (0.71)	31.2 (0.97)	32.8 (0.90)	32.0 (0.71)	36.2 (3.27)	35.8 (1.99)	35.9 (1.75)
Some college or higher	56.6 (1.07)	60.5 (0.81)	58.9 (0.80)	57.0 (0.94)	52.4 (0.97)	55.2 (0.77)	52.0 (1.12)	46.6 (0.99)	49.3 (0.81)	46.2 (3.51)	46.9 (2.26)	46.7 (2.00)
Region												
Northeast	19.0 (3.71)	20.1 (3.56)	19.7 (3.59)	20.8 (3.46)	20.2 (3.59)	20.6 (3.48)	18.2 (2.89)	18.9 (3.21)	18.5 (3.01)	16.0 (3.19)	15.7 (2.87)	15.8 (2.77)
Midwest	22.0 (3.26)	22.5 (3.36)	22.3 (3.29)	23.0 (3.16)	22.9 (3.29)	23.0 (3.18)	25.9 (3.16)	23.8 (3.19)	24.8 (3.12)	22.4 (4.07)	28.5 (3.82)	26.4 (3.53)
South	34.2 (3.44)	34.1 (3.44)	34.1 (3.40)	34.6 (3.28)	35.8 (3.37)	35.1 (3.28)	36.1 (3.10)	37.1 (3.22)	36.6 (3.10)	42.1 (4.35)	38.6 (3.45)	39.9 (3.32)
West	24.8 (4.09)	23.3 (3.76)	23.9 (3.88)	21.6 (3.50)	21.2 (3.61)	21.4 (3.52)	19.8 (3.13)	20.3 (3.25)	20.0 (3.14)	19.6 (3.79)	17.2 (2.98)	18.0 (2.93)
Urbanicity												
Urban	82.4 (1.65)	81.6 (1.63)	81.9 (1.59)	80.1 (1.68)	80.1 (1.74)	80.1 (1.66)	76.9 (1.81)	79.0 (1.75)	77.9 (1.71)	75.1 (3.16)	74.0 (2.60)	74.4 (2.35)
Rural	17.7 (1.65)	18.4 (1.63)	18.1 (1.59)	19.9 (1.68)	19.9 (1.74)	19.9 (1.66)	23.1 (1.81)	21.0 (1.75)	22.1 (1.71)	24.9 (3.16)	26.0 (2.60)	25.6 (2.35)

[a]Based on body mass index (BMI), excluding pregnant women: underweight, BMI < 18.5 kg/m^2; healthy weight, BMI = 18.5–24.9 kg/m^2; overweight, BMI = 25.0–29.9 kg/m^2; obese, BMI = 30.0–39.9 kg/m^2; extremely obese, BMI ≥ 40.0 kg/m^2.

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intervals were estimated using SUDAAN,[41] a software package that adjusted for design characteristics of the NESARC.

RESULTS

Sociodemographic Characteristics

The distributions and associations between sociodemographic characteristics by BMI status and sex are shown in Tables 1 and 2. The odds of overweight, obesity, and extreme obesity were significantly lower among Asian men and women relative to their white counterparts. With the exception of overweight men, the odds of overweight, obesity, and extreme obesity were significantly greater among black men and women. The odds of overweight and obesity were also significantly increased among Hispanic women, whereas the odds of obesity were increased among Native American women.

The age gradient varied by sex. The odds of overweight and obesity were significantly lower among 18- to 29-year-old men but significantly greater among 30- to 64-year-old men relative to the oldest age group. Women demonstrated a similar pattern with one exception: the odds of overweight and obesity were lower among 30- to 44-year-olds. Men who were never married generally had lower odds of overweight, obesity, and extreme obesity, whereas never-married women had increased odds of extreme obesity. In contrast, widowed/separated/divorced men had lower odds of overweight and obesity, whereas widowed/separated/divorced women had greater odds of obesity and extreme obesity relative to those who were married/cohabiting.

With regard to income, men in the 2 lowest income groups had lower odds and women had greater odds of overweight and obesity, with these results generalizing to extreme obesity among women. Among those in the $35,000 to $69,999 income category, men had greater odds of obesity, while women had greater odds of obesity and extreme obesity relative to those in the highest income category. With few exceptions, men and women with a high school education had greater odds of overweight, obesity, and extreme obesity, a result that generalized to those with less than a high school education among women.

In general, the odds of overweight, obesity, and extreme obesity were greater in the South and Midwest relative to the West and greater among respondents living in rural compared with urban areas.

BMI Status and Psychopathology

Table 3 shows associations of BMI and each specific 12-month psychiatric disorder, controlling for all covariates. Among men, drug dependence was negatively associated with obesity (OR = 0.5) and nicotine dependence was negatively related to overweight (OR = 0.8), obesity (OR = 0.7), and extreme obesity (OR = 0.4). In addition, overweight men were significantly more likely to have panic disorder (OR = 1.5) compared with healthy weight men.

Among women, drug dependence was negatively associated (OR = 0.3) with obesity. Specific phobia was positively associated with overweight (OR = 1.2) and obesity (OR = 1.3), and antisocial PD was positively associated with overweight (OR = 1.5) and extreme obesity (OR = 1.9). Further, bipolar I disorder was associated with obesity (OR = 1.4) and extreme obesity (OR = 1.8), and avoidant PD was associated with extreme obesity (OR = 1.7).

DISCUSSION

Consistent with recent prior research,[42,43] the prevalences of obesity and extreme obesity were lower among 18- to 29-year-olds and greater among 30- to 64-year-olds relative to the oldest age group, and rates of these conditions and overweight were greatest among never married and separated, divorced, and widowed adults. The observed age associations may suggest greater mortality from adverse obesity-related medical conditions among older adults and reductions in physical exercise with age. Findings on marital status in this study suggest that the effects of overweight and obesity are not only medical. Negative societal attitudes toward obesity, particularly among women, translate into several economic and interpersonal disadvantages, including divorce, separation, and the absence of an intimate relationship with a partner. Future research on cohort effects and marital status in relation to overweight and obesity appears warranted, especially in view of anticipated changes in the distribution of these characteristics of the U.S. population as the "baby boom" generation ages.

In this study, the prevalence of overweight was greater among black women, and rates of obesity were greater among black men and black, Hispanic, and Native American women, while rates of extreme obesity were greater among black women. In contrast, rates of overweight, obesity, and extreme obesity were lowest among Asian men and women. Our study supports the findings from earlier national surveys of the general population[42,43] as well as those focusing on sex and racial-ethnic differences in the perception of body weight.[44,45] In these studies, self-perceived overweight and obesity were significantly lower among overweight and obese black men compared with overweight and obese white and Hispanic men. Self-perceived overweight was also significantly lower among overweight black and Hispanic women relative to overweight white women, but there was no significant discrepancy between self-perceived and actual obesity among obese black, Hispanic, and white women. Paralleling these results, the greater rates of

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Table 2. Odds Ratios (ORs) of Sociodemographic Characteristics and BMI Status[a] by Sex

Sociodemographic Characteristic	Men			Women			Total		
	Overweight, OR (95% CI)	Obese, OR (95% CI)	Extremely Obese, OR (95% CI)	Overweight, OR (95% CI)	Obese, OR (95% CI)	Extremely Obese, OR (95% CI)	Overweight, OR (95% CI)	Obese, OR (95% CI)	Extremely Obese, OR (95% CI)
Race-ethnicity									
White	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Black	0.9 (0.78 to 1.01)	**1.2** (1.02 to 1.40)	**1.4** (1.05 to 1.98)	**2.0** (1.75 to 2.22)	**3.0** (2.65 to 3.34)	**3.4** (2.81 to 4.21)	**1.3** (1.20 to 1.45)	**2.0** (1.77 to 2.18)	**2.5** (2.12 to 2.97)
Native American	1.0 (0.74 to 1.34)	1.5 (0.99 to 2.16)	0.6 (0.18 to 1.99)	1.1 (0.81 to 1.55)	**1.7** (1.21 to 2.34)	1.8 (1.00 to 3.08)	1.1 (0.85 to 1.31)	**1.6** (1.22 to 2.02)	1.3 (0.78 to 2.21)
Asian	**0.5** (0.34 to 0.58)	**0.3** (0.17 to 0.39)	**0.1** (0.03 to 0.53)	**0.6** (0.44 to 0.74)	**0.4** (0.29 to 0.57)	**0.03** (0.01 to 0.12)	**0.5** (0.43 to 0.62)	**0.3** (0.25 to 0.44)	**0.1** (0.02 to 0.21)
Hispanic	1.1 (0.92 to 1.21)	1.1 (0.94 to 1.23)	1.1 (0.70 to 1.66)	**1.5** (1.35 to 1.71)	**1.5** (1.28 to 1.65)	1.2 (0.90 to 1.60)	**1.3** (1.17 to 1.40)	**1.3** (1.15 to 1.40)	1.1 (0.88 to 1.49)
Age, y									
18–29	**0.6** (0.49 to 0.63)	**0.7** (0.58 to 0.82)	1.2 (0.69 to 2.00)	**0.5** (0.45 to 0.57)	**0.6** (0.49 to 0.64)	0.9 (0.64 to 1.23)	**0.6** (0.52 to 0.62)	**0.6** (0.56 to 0.70)	1.0 (0.71 to 1.26)
30–44	**1.2** (1.05 to 1.35)	**1.6** (1.41 to 1.91)	**2.6** (1.62 to 4.15)	**0.7** (0.63 to 0.79)	**0.9** (0.76 to 0.99)	**1.8** (1.43 to 2.35)	1.0 (0.88 to 1.04)	**1.2** (1.05 to 1.30)	**2.0** (1.63 to 2.56)
45–64	**1.5** (1.28 to 1.63)	**2.3** (1.95 to 2.69)	**3.5** (2.25 to 5.53)	1.1 (0.96 to 1.19)	**1.4** (1.25 to 1.58)	**2.7** (2.02 to 3.46)	**1.3** (1.17 to 1.37)	**1.8** (1.59 to 1.94)	**2.9** (2.29 to 3.64)
65+	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Marital status									
Married/ cohabiting	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Widowed/ separated/ divorced	**0.8** (0.72 to 0.91)	**0.8** (0.66 to 0.86)	0.7 (0.48 to 1.04)	1.1 (1.00 to 1.19)	**1.3** (1.14 to 1.40)	**1.5** (1.20 to 1.81)	**0.8** (0.79 to 0.90)	1.0 (0.88 to 1.04)	**1.2** (1.03 to 1.47)
Never married	**0.4** (0.38 to 0.45)	**0.4** (0.35 to 0.45)	**0.5** (0.38 to 0.74)	**0.7** (0.60 to 0.75)	**0.8** (0.71 to 0.92)	**1.2** (1.01 to 1.50)	**0.5** (0.51 to 0.59)	**0.6** (0.52 to 0.63)	0.9 (0.72 to 1.01)
Personal income, $									
0–19,999	**0.5** (0.43 to 0.56)	**0.7** (0.56 to 0.79)	1.0 (0.60 to 1.60)	**1.4** (1.09 to 1.71)	**2.6** (1.83 to 3.62)	**5.4** (2.46 to 11.87)	**0.6** (0.49 to 0.62)	0.9 (0.80 to 1.07)	**2.1** (1.47 to 3.06)
20,000–34,999	**0.8** (0.68 to 0.88)	1.1 (0.90 to 1.28)	**1.8** (1.07 to 2.90)	**1.3** (1.05 to 1.69)	**2.4** (1.71 to 3.44)	**4.3** (1.96 to 9.53)	**0.7** (0.65 to 0.83)	1.1 (0.99 to 1.31)	**2.2** (1.43 to 3.23)
35,000–69,999	1.0 (0.83 to 1.08)	**1.3** (1.06 to 1.51)	1.5 (0.93 to 2.56)	1.1 (0.86 to 1.43)	**1.8** (1.27 to 2.66)	**3.3** (1.41 to 7.57)	**0.8** (0.73 to 0.94)	**1.2** (1.01 to 1.38)	**1.8** (1.15 to 2.71)
70,000+	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Education									
Less than high school	0.9 (0.81 to 1.07)	1.1 (0.98 to 1.34)	1.4 (0.88 to 2.09)	**1.7** (1.48 to 1.91)	**2.3** (1.99 to 2.56)	**1.9** (1.49 to 2.39)	**1.3** (1.13 to 1.39)	**1.6** (1.48 to 1.83)	**1.6** (1.29 to 2.05)
High school	1.0 (0.92 to 1.11)	**1.2** (1.10 to 1.39)	**1.6** (1.18 to 2.20)	**1.3** (1.15 to 1.38)	**1.5** (1.37 to 1.72)	**1.7** (1.36 to 2.04)	**1.1** (1.05 to 1.20)	**1.4** (1.27 to 1.51)	**1.6** (1.38 to 1.95)
Some college or higher	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Region									
Northeast	**1.3** (1.04 to 1.51)	1.2 (0.92 to 1.56)	1.1 (0.65 to 1.75)	1.1 (0.98 to 1.24)	1.1 (0.92 to 1.26)	1.1 (0.79 to 1.40)	**1.2** (1.04 to 1.31)	1.1 (0.95 to 1.34)	1.1 (0.79 to 1.42)
Midwest	**1.2** (1.03 to 1.39)	**1.5** (1.17 to 1.84)	1.3 (0.78 to 2.12)	1.1 (0.99 to 1.27)	**1.2** (1.05 to 1.40)	**1.7** (1.28 to 2.30)	**1.2** (1.03 to 1.27)	**1.3** (1.14 to 1.55)	**1.6** (1.18 to 2.08)
South	**1.2** (1.03 to 1.32)	**1.3** (1.09 to 1.60)	**1.6** (1.05 to 2.31)	**1.2** (1.03 to 1.30)	**1.3** (1.08 to 1.44)	**1.5** (1.17 to 2.00)	**1.2** (1.05 to 1.26)	**1.3** (1.11 to 1.47)	**1.5** (1.22 to 1.96)
West	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Urbanicity									
Urban	**0.9** (0.77 to 0.97)	**0.7** (0.62 to 0.82)	**0.7** (0.48 to 0.88)	0.9 (0.82 to 1.00)	**0.8** (0.76 to 0.95)	**0.6** (0.52 to 0.79)	**0.9** (0.82 to 0.96)	**0.8** (0.71 to 0.86)	**0.6** (0.53 to 0.77)
Rural	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

*Odds ratios in **boldface** type are significant ($p < .05$).

[a]Based on body mass index (BMI), excluding pregnant women: underweight, BMI < 18.5 kg/m^2; healthy weight, BMI = 18.5–24.9 kg/m^2; overweight, BMI = 25.0–29.9 kg/m^2; obese, BMI = 30.0–39.9 kg/m^2; extremely obese, BMI ≥ 40.0 kg/m^2.

overweight, obesity, and extreme obesity found among black men and black and Hispanic women in this study suggest that among these subgroups higher weights may be culturally valued as a positive sign of health, or that overeating is less disparaged in communities where there has been a history of scarcity.[46,47] Alternatively, these findings suggest that evaluation of weight status in these subgroups is based on the weight distribution of their peer groups, rather than any externally imposed health-based ideal.[44,48] Further, that self-perception of obesity did not differ among obese black, Hispanic, and white women in a prior study but that rates of obesity were greater among black and Hispanic women in the current study, suggests that black and Hispanic women may correctly perceive their weight but experience the disparity between perceived and actual weight at a higher BMI threshold than white women.[45,49,50] Future research on the health and behavioral implications of weight misperception, especially among Native Americans and Asians, for whom few data are available, will be most relevant to any clinical or public health effort to slow the obesity epidemic in the United States.

Table 3. Adjusted Odds Ratios (ORs)[a] of 12-Month DSM-IV Psychiatric Disorders and

	Men			
Substance Use/ Psychiatric Disorder	Healthy Weight, (N = 5984)	Overweight (N = 7814) OR (95% CI)	Obese, (N = 3856) OR (95% CI)	Extremely Obese, (N = 354) OR (95% CI)
Alcohol use disorder				
Alcohol abuse	1.0	0.9 (0.79 to 1.14)	0.9 (0.75 to 1.15)	1.4 (0.84 to 2.40)
Alcohol dependence	1.0	1.0 (0.82 to 1.31)	0.8 (0.60 to 1.06)	0.9 (0.44 to 2.01)
Drug use disorder				
Drug abuse	1.0	0.9 (0.69 to 1.27)	1.3 (0.84 to 1.96)	0.8 (0.20 to 3.35)
Drug dependence	1.0	1.2 (0.73 to 1.93)	**0.5** (0.22 to 0.99)	0.5 (0.07 to 3.85)
Nicotine dependence	1.0	**0.8** (0.62 to 0.99)	**0.7** (0.55 to 0.97)	**0.4** (0.19 to 0.91)
Mood disorder				
Major depressive disorder	1.0	0.9 (0.68 to 1.10)	1.1 (0.86 to 1.43)	1.4 (0.84 to 2.51)
Dysthymia	1.0	1.0 (0.60 to 1.60)	1.7 (0.96 to 2.92)	1.7 (0.58 to 5.01)
Bipolar I	1.0	1.0 (0.71 to 1.43)	0.9 (0.58 to 1.25)	0.7 (0.27 to 1.87)
Bipolar II	1.0	0.9 (0.49 to 1.47)	1.0 (0.53 to 1.91)	0.2 (0.03 to 1.86)
Anxiety disorder				
Panic disorder	1.0	**1.5** (1.02 to 2.07)	1.1 (0.65 to 1.74)	1.4 (0.49 to 1.74)
Social phobia	1.0	1.0 (0.69 to 1.31)	1.0 (0.69 to 1.46)	1.1 (0.49 to 2.29)
Specific phobia	1.0	1.1 (0.92 to 1.38)	1.1 (0.87 to 1.42)	1.2 (0.71 to 1.99)
Generalized anxiety	1.0	1.5 (0.98 to 2.30)	1.1 (0.67 to 1.78)	0.5 (0.13 to 1.61)
Personality disorder				
Avoidant	1.0	0.9 (0.60 to 1.20)	0.9 (0.60 to 1.33)	0.8 (0.36 to 1.68)
Dependent	1.0	0.7 (0.29 to 1.47)	0.6 (0.26 to 1.58)	1.2 (0.23 to 6.39)
Obsessive-compulsive	1.0	1.0 (0.85 to 1.20)	0.9 (0.75 to 1.09)	0.6 (0.34 to 1.01)
Paranoid	1.0	0.8 (0.58 to 1.00)	0.8 (0.57 to 1.03)	0.7 (0.36 to 1.51)
Schizoid	1.0	0.9 (0.70 to 1.17)	0.9 (0.69 to 1.29)	1.6 (0.80 to 3.24)
Histrionic	1.0	0.7 (0.50 to 1.01)	0.8 (0.52 to 1.18)	0.8 (0.33 to 2.02)
Antisocial	1.0	0.8 (0.68 to 1.04)	0.9 (0.74 to 1.21)	1.0 (0.53 to 1.81)

*Odds ratios in **boldface** type are significant ($p < .05$).
[a]Adjusted for age, race-ethnicity, marital status, education, income, region, urbanicity, 12-month physical conditions and impairment and stressful life events, 12-month and prior to 12-month alcohol, drug, and tobacco use, and all other comorbid psychiatric disorders. Past year physical conditions included arteriosclerosis, hypertension; angina; tachycardia; myocardial infarction; any other form of heart disease; stomach ulcer; gastritis; arthritis; cirrhosis of the liver; and any other form of liver disease. Past year stressful life events included death of family member/significant other; serious injury/illness of family member/significant other; fired/laid off from job; unemployed; trouble with boss/co-worker; change jobs/responsibilities at work; separated/divorced/break off a steady relationship; serious problems with family/relative/neighbor; major financial crisis/bankruptcy/unable to pay bills; respondent/family member legal problems/arrested/jailed; respondent/family member victim of crime. Healthy BMI was the referent group.
[b]Based on body mass index (BMI), excluding pregnant women: underweight, BMI < 18.5 kg/m^2; healthy weight, BMI = 18.5–24.9 kg/m^2; overweight, BMI = 25.0–29.9 kg/m^2; obese, BMI = 30.0–39.9 kg/m^2; extremely obese, BMI ≥ 40.0 kg/m^2.

Consistent with the majority of studies conducted since the early 1960s,[51] this study found a strong inverse relationship of overweight, obesity, and extreme obesity with socioeconomic status (SES: education and income) among women (i.e., the lower the income and education, the greater the risk of overweight, obesity, and extreme obesity) but not among men. Various mechanisms have been posited to explain how attitudes toward obesity and thinness among women in developed societies may translate into the inverse relationship between SES and obesity, including dietary constraints, physical activity, and social mobility, all of which favor women of higher SES.[51] Social inheritance of wealth and other attitudes may also play a role in the relationship between SES and obesity,[52] and findings regarding genetic transmission of SES and obesity[53] suggest that application of the gene-environment model combining both social and genetic perspectives can provide insights for further research in the SES-obesity relationship found in this study.

Prevalences of overweight, obesity, and extreme obesity were generally greater in the South and Midwest relative to the West, a result consistent with greater rates found in rural areas and among black men and women, whose population is highly concentrated in the southern regions of the country. Recent studies, however, suggest that rates of overweight and obesity could increase in the West over the next decade, thereby eliminating the differential found in this study. In that research,[55–57] the prevalence of overweight and obesity among foreign-born Hispanic and Asian individuals, a majority of whom reside in the West, reaches rates about as high as those of their U.S.-born counterparts as their durations of residence become longer (about 10 years). These trends in

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Body Mass Index Status[b] by Sex								
Women				Total				
Healthy Weight, (N = 9944)	Overweight, (N = 6727) OR (95% CI)	Obese, (N = 4828) OR (95% CI)	Extremely Obese, (N = 881) OR (95% CI)	Healthy Weight, (N = 15,928)	Overweight (N = 14,541) OR (95% CI)	Obese, (N = 8684) OR (95% CI)	Extremely Obese, (N = 1235) OR (95% CI)
1.0	0.9 (0.66 to 1.10)	0.8 (0.60 to 1.14)	0.6 (0.32 to 1.12)	1.0	1.0 (0.90 to 1.21)	1.0 (0.85 to 1.21)	1.1 (0.71 to 1.68)
1.0	1.1 (0.81 to 1.41)	0.9 (0.64 to 1.23)	0.9 (0.52 to 1.68)	1.0	1.1 (0.95 to 1.38)	0.9 (0.71 to 1.09)	0.9 (0.52 to 1.39)
1.0	0.8 (0.46 to 1.34)	1.0 (0.51 to 1.79)	0.6 (0.23 to 1.32)	1.0	0.9 (0.69 to 1.16)	1.1 (0.81 to 1.58)	0.6 (0.29 to 1.32)
1.0	1.1 (0.63 to 1.97)	**0.3** (0.10 to 0.81)	0.8 (0.25 to 2.30)	1.0	1.2 (0.79 to 1.67)	**0.4** (0.21 to 0.69)	0.7 (0.28 to 1.85)
1.0	0.9 (0.70 to 1.23)	0.8 (0.58 to 1.03)	0.6 (0.39 to 1.06)	1.0	**0.8** (0.67 to 0.97)	**0.7** (0.58 to 0.89)	**0.5** (0.33 to 0.72)
1.0	0.9 (0.78 to 1.13)	1.1 (0.88 to 1.28)	1.1 (0.75 to 1.56)	1.0	**0.8** (0.73 to 0.97)	1.0 (0.88 to 1.18)	1.1 (0.84 to 1.55)
1.0	1.1 (0.77 to 1.53)	1.1 (0.75 to 1.53)	1.0 (0.59 to 1.77)	1.0	1.0 (0.77 to 1.39)	1.2 (0.91 to 1.69)	1.2 (0.74 to 1.93)
1.0	1.1 (0.80 to 1.51)	**1.4** (1.02 to 1.96)	**1.8** (1.15 to 2.93)	1.0	1.0 (0.82 to 1.28)	1.1 (0.87 to 1.42)	1.4 (0.93 to 2.13)
1.0	1.1 (0.69 to 1.66)	1.3 (0.80 to 2.08)	0.9 (0.41 to 1.80)	1.0	0.9 (0.64 to 1.26)	1.1 (0.75 to 1.63)	0.7 (0.37 to 1.33)
1.0	1.1 (0.85 to 1.38)	1.0 (0.76 to 1.35)	1.1 (0.69 to 1.76)	1.0	1.1 (0.94 to 1.40)	1.0 (0.78 to 1.29)	1.2 (0.79 to 1.77)
1.0	1.1 (0.86 to 1.48)	1.0 (0.78 to 1.39)	1.3 (0.87 to 2.08)	1.0	1.0 (0.85 to 1.27)	1.0 (0.81 to 1.28)	1.3 (0.94 to 1.94)
1.0	**1.2** (1.10 to 1.36)	**1.3** (1.10 to 1.51)	1.2 (0.90 to 1.62)	1.0	1.0 (0.93 to 1.18)	**1.2** (1.02 to 1.31)	1.2 (0.96 to 1.60)
1.0	1.1 (0.82 to 1.46)	1.1 (0.81 to 1.51)	0.9 (0.56 to 1.40)	1.0	1.2 (0.94 to 1.51)	1.1 (0.84 to 1.41)	0.9 (0.58 to 1.29)
1.0	1.1 (0.84 to 1.48)	1.3 (0.96 to 1.74)	**1.7** (1.02 to 2.69)	1.0	1.0 (0.80 to 1.25)	1.1 (0.88 to 1.43)	1.4 (0.90 to 2.07)
1.0	1.3 (0.76 to 2.18)	1.2 (0.67 to 2.14)	1.7 (0.80 to 3.44)	1.0	1.0 (0.64 to 1.49)	0.9 (0.56 to 1.52)	1.4 (0.73 to 2.74)
1.0	0.9 (0.74 to 1.03)	0.9 (0.74 to 1.06)	0.9 (0.62 to 1.22)	1.0	1.0 (0.85 to 1.08)	0.9 (0.79 to 1.02)	0.8 (0.58 to 1.04)
1.0	1.1 (0.93 to 1.39)	1.2 (1.00 to 1.50)	1.1 (0.76 to 1.61)	1.0	1.0 (0.81 to 1.13)	1.0 (0.84 to 1.21)	1.0 (0.70 to 1.33)
1.0	1.1 (0.87 to 1.42)	1.1 (0.87 to 1.44)	0.9 (0.58 to 1.43)	1.0	1.0 (0.87 to 1.25)	1.1 (0.86 to 1.29)	1.1 (0.73 to 1.64)
1.0	1.1 (0.82 to 1.51)	0.8 (0.56 to 1.12)	0.8 (0.44 to 1.39)	1.0	0.9 (0.70 to 1.11)	0.8 (0.61 to 1.02)	0.8 (0.47 to 1.21)
1.0	**1.5** (1.13 to 2.08)	1.1 (0.74 to 1.58)	**1.9** (1.09 to 3.45)	1.0	1.1 (0.93 to 1.31)	1.0 (0.86 to 1.28)	1.2 (0.80 to 1.80)

obesity among immigrants may reflect adoption of the U.S. lifestyle of increased sedentary behavior, poor dietary habits, increased availability of calorically dense foods, and higher reliance on labor-saving technologies. Taken together, these results underscore the need to examine variations in dietary habits and physical exercise across regions of the country and, importantly, examine their interactions with race-ethnicity, SES, and acculturation. More research also is warranted to explain the geographic differentials in overweight and obesity observed in the South and Midwest, differentials that may reflect migratory patterns of the U.S. population.

The central focus of this study was on the associations of overweight, obesity, and extreme obesity with specific DSM-IV Axis I and II disorders. As hypothesized, MDD was not significantly associated with BMI status among men or women. The discrepancy between these results and those of most clinical studies[4] and some general population surveys[5–10] could be attributed to lack of control for a broad array of sociodemographic and other covariates demonstrated to affect the depression-BMI association, especially comorbid psychopathology. In fact, when only sociodemographic factors were controlled (as in much of the previous literature), MDD was significantly related to obesity (OR = 1.9, 95% CI = 1.3 to 2.6) and extreme obesity (OR = 1.5, 95% CI = 1.2 to 1.8) among women. These findings highlight the importance of control for comorbidity, sociodemographic factors, and other critical covariates related to medical conditions, disability, stressful life events, and substance use when examining the relationships between BMI and psychopathology.

A major finding from this study was the significant association of bipolar I disorder with obesity and extreme obesity among women but not men. Although this relationship was hypothesized due to the failure to differentiate MDD from bipolar I disorder in previous surveys, the specificity of the finding to women was surprising. However, there were major differences between obese women and obese men with regard to the types of episodes associated with bipolar I disorder: 80.8% and 84.8% of obese women and obese men, respectively, experienced a manic episode within the context of bipolar I disorder during the past year, whereas 73.0% of obese women and 45.3% of obese men with bipolar I disorder, respectively, experienced a major depressive episode during that time. The prevalence of bipolar I disorder among extremely obese men was too low, precluding a similar comparison. These findings suggest that, at least among women, obesity and, perhaps, extreme obesity may be related to major depressive episodes, but only those occurring in bipolar illness.

Consistent with other research,[8,14] there were also differences in reported weight gain, increased appetite, and hypersomnia, symptoms of the DSM-IV atypical major depressive subtype measured in previous studies,[57,58]

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among obese and extremely obese men and women. Obese women were significantly more likely to report weight gain, increased appetite, and hypersomnia (46.2%, 52.6%, and 59.6%, respectively) compared with obese men (31.6%, 38.8%, and 45.1%, respectively) during their worst episode of major depression. Similarly, extremely obese women were significantly more likely to report weight gain, increased appetite, and hypersomnia (63.7%, 67.8%, and 60.2%, respectively) relative to extremely obese men (42.6%, 57.3%, and 37.5%, respectively). These results suggest that an important subtype of mood disorder, at least among women, might be major depressive episode with atypical features occurring in bipolar I disorder. That avoidant PD was significantly associated with extreme obesity among women, but not men, provides further support for the existence of this subtype—that is, a key feature of DSM-IV atypical depression is a longstanding pattern of sensitivity to perceived interpersonal rejection often characterized by avoidance of relationships due to this fear; such avoidance is the essential feature of avoidant PD. Since research suggests that obesity is associated with more severe illness and poorer outcome among patients with bipolar I disorder,[59] the results of this study suggest increased vigilance in detecting and treating bipolar I disorder among obese and extremely obese women, particularly those with atypical depression. Given that medications commonly used to treat bipolar I disorder are themselves associated with weight gain, the clinical complexity of working with these patients is clear.

Consistent with prior surveys,[8,10] this study showed no (or negative) associations of alcohol abuse, alcohol dependence, drug abuse, and nicotine dependence with overweight, obesity, or extreme obesity among men or women. These findings are consistent with research that suggests that neural circuits in the brain serving the functions of desiring, seeking, procuring, and consuming food, ethanol, and other psychoactive substances may overlap.[60] In this regard, recent evidence[61,62] has shown that, as BMI increases, marijuana and alcohol consumption decrease, again suggesting that overeating may compete with alcohol and other substances of abuse for brain reward sites and result in reduced substance intake and substance use disorders among the overweight and obese.[63] Alternatively, drug-dependent individuals may be less likely to overeat because the effects of some drugs reduce appetite. However, a complete analysis of drug-specific effects on overweight and obesity was precluded by sample sizes too small to be reliable. Understanding the relationship between obesity and substance use disorders will be critical to the development of more effective treatment strategies.

Increased rates of panic disorder were also observed among overweight men. This relationship may reflect, in part, shared symptoms between panic attacks and overweight and its associated medical complications. Overweight is highly associated with cardiovascular disease and diabetes mellitus, type 2, both of which may be manifest in symptoms that mimic those of panic attacks (e.g., palpitations, sweating, shortness of breath, chest pain or discomfort, feeling dizzy, lightheaded, or faint, paresthesias, chills and hot flashes, and nausea and abdominal distress). Since DSM-IV diagnoses of panic disorder require the occurrence of at least 2 spontaneous panic attacks (i.e., those occurring in the absence of a situational trigger), and the prevalence of cardiovascular disease and diabetes mellitus, type 2, is greater among men than women, a diagnosis of panic disorder in an overweight man may signal the presence of undiagnosed cardiovascular disease or diabetes mellitus, type 2, particularly if there is no history of situationally cued or situationally predisposed panic attacks.

By contrast, rates of specific phobia were elevated among overweight and obese women. These findings are consistent with 2 other findings of this study. The first showed significant increases in the rates of traumatic stressful life events during the past year among overweight (OR = 1.1, 95% CI = 1.01 to 1.06) and obese (OR = 1.1, 95% CI = 1.07 to 1.13), women, but not men (overweight: OR = 0.9, 95% CI = 0.91 to 1.02; obese: OR = 1.0, 95% CI = 0.92 to 1.14), compared with their healthy weight counterparts. Second, overweight ($\overline{\chi}$ = 3.34) and obese ($\overline{\chi}$ = 3.53) women reported significantly more fears associated with their specific phobias than overweight ($\overline{\chi}$ = 2.50) and obese ($\overline{\chi}$ = 2.81) men ($p < .01$). Taken together, these results suggest that overweight and obese women may experience a more severe subtype of specific phobia than men, one that generalizes across a number of situations with greater opportunity for intercurrent anticipatory anxiety that may be exacerbated by stressful life events. In view of these results, it would be of value to assess specific phobia among overweight and obese women. This assessment may be particularly important, since the very symptoms these individuals seek to relieve (i.e., fear, anxiety, and avoidance of a variety of situations) may interfere with their ability to seek treatment, increasing the probability that specific phobia may go undiagnosed.

Information on associations of DSM-IV PDs with BMI has not previously been available. Rates of antisocial PD were significantly elevated among overweight and extremely obese women. These results are consistent with the findings of previous research[14,15] that showed positive associations of conduct disorder symptoms in adolescence and overweight and obesity during adulthood, though data were not reported by sex. Although the clinical literature[64] has established a relationship between borderline PD and obesity among women, there are no prior studies on obesity and antisocial PD. However, antisocial PD may be elevated among overweight/obese women through its

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shared essential feature with borderline PD, namely, impulsivity. Extremely obese women were also significantly more likely to have avoidant PD. Although individuals who are extremely obese often live isolated lives, women may be more likely to withdraw socially since discrimination is greater and obesity more severely stigmatized among women than men. Future research on the comorbidity of overweight and obesity and PDs appears warranted.

This study has limitations common to most large-scale surveys. First, because the NESARC sampled only households and group quarters and those 18 years and older, information on adolescents, prisoners, and the homeless was unavailable. Second, the BMI measure was self-reported. However, self-reported BMI has been shown to yield valid results in epidemiologic surveys, and correlations between the NESARC BMI measure and the NHANES, which measures actual height and weight, were extremely strong. Third, variables known to be strongly related to overweight, obesity, and psychopathology were not measured in the Wave 1 NESARC. Fourth, some issues addressed in this work are best studied longitudinally. Accordingly, the Wave 2 NESARC, conducted from 2004 to 2005, will address issues of weight change and psychopathology over time; it includes extensive measures of physical activity, adverse childhood events, and weight discrimination, variables not assessed in Wave 1.

CONCLUSION

Taken together, the NESARC data showed that there are specific psychiatric disorders related to overweight and obesity and that these relationships are sex-specific. With regard to clinical implications, comprehensive assessment of these psychiatric disorders appears warranted among overweight and obese individuals, including those presenting for weight loss treatment. Further, evaluations of patients presenting with these psychiatric conditions should include assessment of BMI status, as well as medical conditions and behavioral factors (e.g., physical activity level, dietary habits) associated with these conditions that closely relate to sex, age, race-ethnicity, marital status, SES, and geographic region through various mediating pathways. Foremost, there is an urgent need to update current treatment guidelines for specific psychiatric disorders to address the management of comorbid overweight and obesity. Current treatment guidelines for obesity also do not address management of comorbid psychopathology.

With regard to research implications, the finding that a specific form of major depressive episode (i.e., an episode with atypical features occurring in bipolar I disorder) is associated with obesity and extreme obesity among women generates hypotheses related to the common cause-heterogeneity model that can be tested in future research.[4,65] In this model, both obesity and this specific form of major depressive episode share common pathogenic factors, while other forms of major depressive episodes (e.g., those occurring in MDD) do not. Adoption of clear, well-defined models should enhance future epidemiologic, neuroscience, and genetic research. Findings from this study also underscore the need to examine sociodemographic characteristics as common factors that give rise to mechanisms underlying specific obesity-psychopathology associations.

More research is also needed in the development and testing of specific interventions that target overweight and obesity in patients with specific comorbid psychopathology and unique sociodemographic profiles. Imaging studies examining the highly overlapping neural circuits in the brain underlying the consumption of food, alcohol, and other psychoactive substances, conducted collaboratively between obesity and addiction specialists, are also sorely needed. A greater understanding of the mechanisms underlying psychopathology-BMI associations, together with coordinated interventions for comorbid disorders, promises to decrease the morbidity and mortality related to both types of disorder and enhance the psychological and physical well-being of comorbid individuals.

Disclosure of off-label usage: The authors have determined that, to the best of their knowledge, no investigational information about pharmaceutical agents that is outside U.S. Food and Drug Administration–approved labeling has been presented in this article.

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