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Associations Between Perceived Weight Discrimination and the Prevalence of Psychiatric Disorders in the General Population

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Abstract

Despite the increased prevalence of weight discrimination, few studies have examined the association between perceived weight discrimination and the prevalence of current psychiatric disorders in the general population. This study utilized a subsample of overweight and obese individuals (N = 22,231) from Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), a cross-sectional nationally representative study of noninstitutionalized US adults. Perceived weight discrimination is associated with substantial psychiatric morbidity and comorbidity. These results remained significant after adjusting for a potential confound, perceived stress. Moreover, social support did not buffer against the adverse effects of perceived weight discrimination on mental health. Controlling for BMI did not diminish the associations, indicating that perceived weight discrimination is potentially harmful to mental health regardless of weight. These results highlight the urgent need for a multifaceted approach to address this important public health issue, including interventions to assist overweight individuals in coping with the mental health sequelae of perceived weight discrimination.

INTRODUCTION

According to recent estimates, close to 60% of Americans are currently classified as overweight or obese (1). Although the medical (2) and psychiatric (3) comorbidities associated with overweight/obesity are well established, less is known regarding the risk factors for adverse mental health outcomes within this population. Weight discrimination is one possible determinant of poor mental health among the overweight and obese (4). Discrimination is defined as unequal treatment due to membership in a particular social group (5), and recent evidence suggests that perceived discrimination due to weight has increased in the United States in the past 10 years (6).

Three studies, using nationally representative data from the Midlife Development in the United States (MIDUS) dataset, have examined the prevalence of perceived weight discrimination (7–9). These studies documented that institutional and interpersonal forms of

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perceived weight discrimination are common, and that the risk of perceiving weight discrimination increases substantially among higher levels of obesity across sociodemographic groups. Although these studies have provided important information regarding the prevalence and patterns of perceived weight discrimination, there were some limitations, including relatively small power ($N = 504$ with BMI ≥ 30) to detect vulnerability to perceived discrimination due to weight among different subgroups of overweight/obese individuals. Moreover, these studies relied on combinations of weight or height discrimination (8) and weight, height, or appearance discrimination (7). Although the authors attempted to account for this combination of weight or height by showing significantly higher weight and BMI (but not shorter height) among those reporting perceptions of weight/height discrimination (8), the potential for misclassification introduces some measurement bias.

A number of questions regarding the effects of perceived weight discrimination remain unanswered. First, there is a paucity of research examining the mental health sequelae of perceived weight discrimination. Studies using treatment-seeking and community-based samples (10–12) have indicated elevated psychological distress among those respondents reporting weight-based stigma and discrimination, but the nonrepresentative nature of these samples limits generalizability. One study from the MIDUS dataset showed that among the entire sample, perceiving any form of discrimination was associated with major depression and generalized anxiety disorder (13). This effect was maintained among the subsample of participants perceiving discrimination due to the combined category of physical appearance/weight. Further research is needed, however, to examine whether this relationship holds for additional classes of Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV)-defined criteria for psychiatric disorders, including substance use disorders, and whether these effects are consistent across increasing levels of BMI.

Second, research on the discrimination–psychopathology link has rarely considered variables that may confound this relationship. Although discrimination has been conceptualized as a stressor distinct from general life stressors (13), the same appraisal processes that make individuals more likely to perceive discrimination may also render them more vulnerable to perceptions of general life stressors and reporting of psychopathological symptoms (14). This potential for confounding suggests the importance of disentangling the unique effects of discrimination on mental health from general perceptions of stress; however, prior studies have not controlled for perceived stress in statistical models (7,8,13). Consequently, this study sought to determine whether the association between perceived weight discrimination and psychiatric disorders persisted after controlling for perceived stress, a methodological improvement over existing studies.

Third, research is needed to identify potential moderators of the association between perceived weight discrimination and psychopathology in order to facilitate the development of effective preventive interventions among overweight/obese individuals. The stress-buffering hypothesis (15) states that people utilize social support in order to cope with the effects of stressful life events. Accordingly, we examined whether social support, a well-documented protective factor against the development of adverse mental health outcomes (16), modified the relationship between perceived weight discrimination and psychopathology.

In sum, the current study has three primary aims: (i) to document prevalence and patterns of perceived weight discrimination; (ii) to identify relationships between perceived discrimination based on weight and multiple DSM-IV psychiatric disorders; and (iii) to examine potential confounds (perceived stress) and moderators (social support) of this relationship. Data were examined from Wave 2 of the National Epidemiologic Survey on

Alcohol and Related Conditions (NESARC), a cross-sectional nationally representative survey of over 34,000 participants. The large sample size, population-based sampling scheme, careful measurement of DSM-IV diagnoses, and consideration of important explanatory covariates were all advantages for investigating the research questions.

METHODS AND PROCEDURES

Sample

Data are drawn from Wave 2 of the NESARC (N = 34,653), a longitudinal population-based epidemiologic survey conducted in 2001–2002 and followed up between 2004–2005. The NESARC was designed to be a nationally representative sample of US adults aged ≥18 residing in households or group quarters. Of the Wave 1 participants (N = 43,093), 1,403 died, 781 were deported or became mentally or physically impaired, and 950 entered the armed forces. Of those respondents eligible to participate in Wave 2, 86.7% completed face-to-face interviews, creating a cumulative response rate of 70.2%. Attrition analyses revealed that respondents who were overweight at Wave 1 were more likely to be included in Wave 2 (χ^2 (2) = 66.64, P < 0.01). In the total sample (N = 34,653), mean BMI was 26.6 (interquartile range: 23.6–30.5); 37% had a BMI <25, 25.8% had BMI of 25–30, and the remainder had BMI >30. The age of the sample ranged from 20 to 90 (mean age = 48.2). The research protocol, including informed consent procedures, received full ethical review and approval from the US Census Bureau and US Office of Management and Budget. Further information on the study design and implementation are found elsewhere (17). The present study included only those individuals with BMI >25 (N = 22,231), based on the World Health Organization's definition of overweight and obesity (18). Table 1 describes the demographic characteristics of the present sample.

Measures

BMI—BMI was scored using self-reported height and weight and was defined as weight in kg relative to height in m^2.

Perceived weight discrimination—Participants with BMI ≥ 25 who perceived themselves to be overweight in the past 12 months (assessed via self-report) were asked, "How often have you experienced discrimination, been prevented from doing something, or been hassled or made to feel inferior in any of the following situations because of your weight?" The frequency of five discrimination experiences in the past 12 months were assessed, including: (i) difficulty obtaining health care or health insurance coverage "because of your weight"; (ii) discriminatory treatment by health-care providers "because of your weight"; (iii) discrimination in public settings (e.g., streets, restaurants, stores) or on public transportation (e.g., buses, airplanes) "because of your weight"; (iv) difficulty obtaining a job or while on the job, or in being admitted to a school, or training program "because of your weight"; and (v) discrimination in any other situations (e.g., obtaining housing, or in the courts) "because of your weight." These questions were modeled after the Experiences with Discrimination scales developed by Krieger and colleagues (19). The scale showed good internal consistency reliability (α = 0.76). All discrimination variables were dichotomized at "sometimes," "fairly often," or "very often" vs. "rarely" or "never." Previous analyses indicated good test-retest reliability (intraclass correlation coefficient = 0.79) for this scale (20).

Mood and anxiety disorders—Current DSM-IV (21) mood and anxiety disorders assessed by the Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV Version were major depression, dysthymia, mania, hypomania, generalized anxiety disorder, panic disorder with or without agoraphobia, social phobia, and post-traumatic

stress disorder (22). The reliability of mood and anxiety disorder diagnosis and symptom items (23,24) range from fair (κ for specific phobia diagnosis = 0.42) to good (κ for post-traumatic stress disorder diagnosis = 0.77). Diagnoses were further validated using the SF-12v2, a mental disability score, in controlled linear regressions; mood and anxiety disorders were associated with substantial levels of disability (25).

Substance use disorders—The Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV Version (22) used over 40 items to assess the criteria for current DSM-IV (21) substance abuse and dependence for alcohol as well as 10 different classes of drugs, including sedatives, tranquilizers, opiates (other than heroin or methadone), stimulants, hallucinogens, cannabis, cocaine (including crack cocaine), inhalants/solvents, heroin, and other drugs. The substance use disorders showed excellent reliability in clinical and general population studies in the United States and other countries, with alcohol diagnoses having a minimum κ of 0.74 and drug diagnoses having a minimum reliability of 0.79 (refs. 23,24). The validity of these diagnoses has been documented in numerous studies (25,26), including psychiatrist reappraisal (24).

Perceived stress—The 4-item Perceived Stress Scale (27) was designed to assess the extent to which individuals view their lives as unpredictable, uncontrollable, and overloading. It is the most commonly used measure of perceived stress in the research literature. Items assessed the frequency with which participants felt the following in the last 12 months: (i) able to control important things in their lives; (ii) confident about their abilities to handle personal problems; (iii) that things were going their way; and (iv) that difficulties were piling up so high that they could not overcome them. Items 2 and 3 were reverse coded so that higher scores indicated greater perceived stress. The scale showed good reliability ($\alpha = 0.61$), and previous analyses (20) indicated good test-retest reliability ($\alpha = 0.82$).

Social support—Participants were asked 12 questions indexing emotional and instrumental support from their social networks (e.g., “If I were sick, I know I would find someone to help me with my daily chores.”). These questions were taken from the general population version of the Interpersonal Support Evaluation List (28). The scale showed good internal consistency reliability ($\alpha = 0.75$), and previous analyses (20) indicated good test-retest reliability (intraclass correlation coefficient = 0.63).

Statistical analysis

Data analysis was conducted among the 22,231 respondents with BMI ≥ 25. Those respondents who did not perceive themselves to be overweight or obese ($N = 4,864$) and were, therefore, not screened into the discrimination questions were included in the analyses as having no perceived weight discrimination (i.e., were given scores of 0 on the discrimination scale).

The prevalence of perceived discrimination experiences due to weight and psychiatric disorders were estimated using cross-tabulations; bivariate significance was estimated using χ^2 or unadjusted logistic regressions. Multivariable logistic regressions were used to estimate the association of perceived weight discrimination experiences with psychopathology. Control variables included were those associated with both perceived weight discrimination and psychopathology: sex, age, race/ethnicity, income, education, marital status, BMI, and perceived stress. Social support and BMI were also tested as potential effect modifiers in logistic regression models. Odds ratios (ORs) and 95% confidence intervals (CIs) were derived from logistic regressions with SUDAAN software

version 9.1 (Research Triangle Institute, Research Triangle Park, NC) to obtain standard errors adjusted for the complex sample design.

RESULTS

Prevalence and patterns of perceived weight discrimination

Among overweight respondents (BMI ≥ 25, $N = 22,231$), 3.1% reported experiencing at least one discrimination event due to their weight at least "sometimes." These reports were slightly higher among obese (BMI ≥ 30, $N = 9,327$) respondents (6.1%). However, there were substantial differences in the prevalence of perceived weight discrimination across weight groups. Tables 2 and 3 depict the dose–response relationship between BMI category and prevalence of perceived weight discrimination by gender. Women reported higher percentages of perceived weight discrimination, overall; gender differences were statistically significant for insurance ($P < 0.001$), health care ($P < 0.0001$), and public settings ($P < 0.0001$). As demonstrated in Tables 2 and 3, there was evidence of a dose–response relation between BMI and perceived weight discrimination among both men and women.

Bivariate analyses indicated that perceptions of weight discrimination differ across sociodemographic groups. In adjusted logistic regression models, perceived discrimination due to weight was more common among women (OR = 3.15, 95% CI = 2.4–4.1) and those never married or widowed/separated/divorced vs. married (ORs = 1.68, 1.60 respectively). Discrimination perceptions due to weight were less common among those 65+ compared to <25 years old (OR = 0.10, 95% CI = 0.1–0.2), those with higher income compared to lower income (OR = 0.53, 95% CI = 0.3–0.8), as well as among Blacks (OR = 0.67, 95% CI = 0.5–0.9), Asians (OR = 0.06, 95% CI = 0.02–0.23), and Hispanics (OR = 0.57, 95% CI = 0.41–0.78), compared to whites.

Associations between perceived weight discrimination, perceived stress, and social support

Those who perceived discrimination due to weight were 3.21 (95% CI = 2.42–4.26) times more likely to be in the highest quartile of perceived stress compared to those who did not perceive weight discrimination (controlling for demographics and BMI). In contrast, there was an inverse relationship between perceived weight discrimination and social support. Those in the highest quartile of social support were the least likely to perceive weight discrimination (OR = 0.36, 95% CI = 0.16–0.81). Note that perceived stress, social support, and perceived weight discrimination scale scores were significantly ($P < 0.01$) but only weakly ($r \leq 0.17$) correlated in the full sample, so multicollinearity was unlikely to affect models including these variables.

Associations between perceived weight discrimination and current psychopathology

The results indicated a robust relationship between perceptions of weight discrimination and prevalence of current psychiatric and substance use disorders (Table 4). Importantly, the direction and magnitude of the effects remained unchanged when respondents with BMI ≥ 25 who did not perceive themselves to be overweight or obese ($N = 4,864$) were excluded from the analyses.

Over half (56%) the respondents who perceived discrimination due to their weight met criteria for at least one Axis-I disorder. In logistic regression models adjusted for sociodemographic variables and BMI, perceived weight discrimination was associated with all seven mood and anxiety disorders, as well as nicotine dependence, alcohol dependence, and drug dependence. These relationships remained unchanged when perceived stress was added to the model. Contrary to the stress-buffering hypothesis, social support did not

interact with perceived weight discrimination to predict psychopathology (results not shown). Moreover, no significant interactions between level of BMI and perceived weight discrimination were detected for disorder- specific outcomes ($P > 0.05$).

Perceived weight discrimination was also associated with greater psychiatric comorbidity. In models adjusted for sociodemographic variables, BMI, and perceived stress, those who perceived weight discrimination were 2.41 times more likely (95% CI = 1.80–3.24) to have more than three psychiatric diagnoses than those who did not perceive such discrimination.

DISCUSSION

Among obese participants, 6.1% reported at least one discrimination experience due to their weight, which is comparable to rates in the MIDUS dataset (7–9), the only other nationally representative study to examine the prevalence of perceived weight discrimination. Our results showed a stark, step-wise gradient in perceptions of weight discrimination with increasing rates of obesity in both men and women. Additionally, unlike the MIDUS dataset, the NESARC assessed the settings in which perceived weight-based discrimination is frequently reported. Results documented that perceived weight discrimination is most likely to be experienced in public settings, followed by insurance and health care. This information suggests specific targets for policies and prevention programs, but future studies need to provide more detailed assessments of the settings in which weight discrimination occurs.

Subgroups differed on perceived weight discrimination. Although perceptions of weight discrimination were found in both genders, women were more likely to report experiencing weight discrimination than men, consistent with most (8,9), although not all (11) prior studies. In addition, younger obese individuals were at particular risk, consistent with other research (29). In contrast to results from the MIDUS dataset (8), our findings showed that whites were the most likely to report discriminatory experiences. Given higher rates of obesity among racial/ethnic minority groups (1), and different body weight norms (e.g., greater acceptance of heavier bodies) among minority groups (30), future research is needed to determine how cultural factors (e.g., acculturation) protect against the negative effects of perceived weight discrimination among these groups.

Perceived weight discrimination is associated with low self-esteem (12), poor psychosocial functioning (31), binge eating (32), and psychological distress (10,11) in treatment-seeking and community-based samples of obese individuals. Additionally, one general population study showed that perceiving any form of discrimination, including physical appearance/ weight discrimination, predicted psychopathology (13). The present study extends this research in a larger population-based sample by documenting that perceptions of weight discrimination, specifically, may be a prominent risk factor for multiple diagnoses of mental and substance use disorders, as well as psychiatric comorbidity. Importantly, controlling for BMI did not attenuate these relationships, suggesting that perceived weight discrimination is harmful to mental health, regardless of weight. Further, BMI and perceived weight discrimination did not significantly interact to predict psychopathology, indicating that perceived weight discrimination is a robust predictor at all weight levels.

The potential for confounding between perceived discrimination, a specific stressor, and general perceptions of stress has been previously recognized (13), although not controlled for in previous studies (7,8,13). We showed that perceived weight discrimination was significantly associated with greater perceived stress, suggesting the importance of separating the unique effects of perceived discrimination on mental health from general perceptions of stress. Importantly, the association between perceived weight discrimination and psychopathology remained strong and significant when perceived stress was statistically

controlled. Measures of perceived stress have known limitations (33), but this study represents an important first step in incorporating psychological variables into research on perceived weight discrimination.

We also assessed a putative moderator of the discrimination–psychopathology relationship, social support, which has been proposed as a buffer against the deleterious effects of stress on mental health (15). We found no consistent interactions between social support and perceived weight discrimination in the prediction of psychopathology. Thus, similar to studies of psychological distress (34,35), our results do not indicate that social support buffers the adverse effects of perceived weight discrimination on mental health.

Limitations of the study are noted. First, body weight and height were self-reported. Although this can provide biased estimates (36), self-reported weights are highly correlated with scale weights (37). Second, like most studies on discrimination (13,19), this study relied on subjective reports of weight discrimination. Such measures capture perceived experiences of weight discrimination, rather than actual discrimination, which requires different assessment procedures (e.g., examination of weight-based disparities in employment practices, such as hiring or wages). Subjective discrimination measures may also confound individuals' current mental status and their perception of discrimination (14); however, perceived discrimination remains a significant predictor of psychopathology, controlling for initial symptoms (38). Third, the study is cross-sectional, so inferences about the direction of effects cannot be made. Longitudinal studies that assess how changes in body weight over time influence both perceived weight discrimination and onset of psychopathology are needed to address this research question. Fourth, the screening item for discrimination experiences excluded a large number of overweight and obese individuals because they did not consider themselves overweight, despite their BMI. Because removing these participants from the analyses could have produced inflated estimates of perceived weight discrimination, we included them as having reported no discrimination experiences, which did not impact the direction or magnitude of the results. Nevertheless, this group differed from other overweight and obese individuals in several ways. The factors contributing to these differences are not well understood and deserve further study.

With no signs that the prevalence of overweight/obesity is decreasing among children or adults in the US population (1), the current study suggests that the harmful consequences of perceived weight-based discrimination for mental health may have a significant impact on population mental health in the United States. The results highlight the urgent need for a multifaceted approach to address this significant public health issue. In particular, no evidence-based interventions exist for individuals currently suffering from the psychological sequelae of weight-based discrimination. Research on adaptive coping in response to weight-based stigma (12) may be especially helpful in the development of such interventions, an important public health priority.

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Table 1

Demographic characteristics of overweight (BMI ≥ 25) individuals in the United States, 2004–2005

Characteristics	Overweight *N* = 22,231
Sex	
Male	53.77 (0.4)
Female	43.23 (0.4)
Race/ethnicity	
White	69.30 (1.6)
Black	12.71 (0.8)
Native American	2.34 (0.2)
Asian	2.76 (0.3)
Hispanic	12.89 (1.4)
Age, years	
<25	7.30 (0.3)
25–44	38.74 (0.5)
45–64	36.78 (0.4)
≥65	17.19 (0.4)
Marital status	
Married/cohabiting	66.06 (0.6)
Widowed/separated/divorced	18.23 (0.3)
Never married	15.71 (0.5)
Education	
Less than high school	14.98 (0.6)
High school	25.21 (0.5)
College or higher	59.81 (0.6)
Personal annual income, $	
0–19,999	39.81 (0.6)
20,000–34,999	23.69 (0.4)
35,000–69,999	25.51 (0.4)
70,000	10.99 (0.5)
Region	
Northeast	17.71 (1.2)
Midwest	18.77 (1.1)
South	38.73 (1.5)
West	24.78 (0.9)

Table 2

Prevalence of perceived weight discrimination based on BMI category, men

	BMI (25–29.9) (*N* = 5,813)	BMI (30–34.9) (*N* = 3,542)	BMI (35–39.9) (*N* = 1,484)	BMI (40–44.9) (*N* = 661)	BMI (45>) (*N* = 393)	χ^2 *P* value	BMI (30>) (*N* = 6,080)	BMI (35>) (*N* = 2,538)
Discrimination experiences ("sometimes" "fairly often" or "very often")								
Insurance (%, s.e.)	0.09 (0.0)	0.56 (0.1)	1.15 (0.4)	2.50 (0.9)	7.27 (2.9)	<0.001	1.03 (0.2)	2.06 (0.5)
Health care (%, s.e.)	0.05 (0.0)	0.60 (0.2)	1.19 (0.4)	3.68 (1.8)	5.24 (2.6)	0.002	1.09 (0.2)	2.14 (0.5)
Public settings (%, s.e.)	0.09 (0.0)	0.63 (0.2)	2.47 (0.7)	9.29 (2.3)	13.57 (3.9)	<0.001	2.04 (0.3)	5.08 (0.8)
Job or school (%, s.e.)	0.08 (0.0)	0.48 (0.2)	1.40 (0.5)	4.21 (1.9)	7.11 (2.9)	0.003	1.15 (0.3)	2.59 (0.6)
Other setting such as with the police or courts (%, s.e.)	0.03 (0.0)	0.05 (0.0)	0.55 (0.3)	0.95 (0.7)	1.32 (0.8)	0.12	0.26 (0.1)	0.71 (0.3)

Table 3

Prevalence of perceived weight discrimination based on BMI category, women

	BMI (25–29.9) (*N* = 5,813)	BMI (30–34.9) (*N* = 3,542)	BMI (35–39.9) (*N* = 1,484)	BMI (40–44.9) (*N* = 661)	BMI (45>) (*N* = 393)	χ^2*P* value	BMI 30> (*N* = 6,080)	BMI 35> (*N* = 2,538)
Discrimination experiences (“sometimes” “fairly often” or “very often”)								
Insurance (%, s.e.)	0.16 (0.1)	0.77 (0.2)	3.84 (0.7)	6.29 (1.3)	12.44 (2.2)	<0.001	2.76 (0.3)	5.72 (0.6)
Health care (%, s.e.)	0.35 (0.1)	0.84 (0.2)	2.52 (0.5)	9.85 (1.7)	12.47 (2.7)	<0.001	2.85 (0.3)	5.85 (0.7)
Public settings (%, s.e.)	0.95 (0.2)	2.37 (0.3)	6.01 (0.8)	12.19 (1.7)	25.82 (2.8)	<0.001	5.63 (0.4)	10.48 (0.8)
Job or school (%, s.e.)	0.32 (0.1)	0.48 (0.1)	2.56 (0.7)	6.12 (1.3)	9.37 (1.9)	<0.001	2.08 (0.3)	4.46 (0.6)
Other setting such as with the police or courts (%, s.e.)	0.06 (0.0)	0.09 (0.0)	0.68 (0.2)	1.24 (0.4)	2.52 (1.0)	0.007	0.50 (0.1)	1.09 (0.2)

Table 4

Prevalence and odds of past year psychiatric disorders by perceived weight discrimination among individuals with BMI ≥ 25

Diagnosis	Perceived weight discrimination (*N* = 730)	Did not perceive weight discrimination (*N* = 21,501)	OR (95% CI)[a]	AOR (95% CI)[b]
Any Axis-I diagnosis (%, s.e.)	56.6 (2.3)	31.3 (0.5) **	2.38 (1.95–2.91)	2.19 (1.79–2.67)
Any mood disorder (%, s.e.)	32.1 (2.0)	9.7 (0.3) **	2.75 (2.25–3.36)	2.48 (2.01–3.06)
Major depressive episode (%, s.e.)	27.1 (2.1)	7.8 (0.2) **	2.68 (2.12–3.40)	2.41 (1.90–3.07)
Manic or hypomanic episode (%, s.e.)	11.0 (1.3)	3.0 (0.2) **	2.74 (1.98–3.79)	2.43 (1.73–3.40)
Dysthymia (%, s.e.)	3.4 (0.9)	1.2 (0.1) *	2.55 (1.32–4.93)	2.10 (1.10–4.01)
Any anxiety disorder (%, s.e.)	32.6 (2.1)	10.6 (0.3) **	2.92 (2.36–3.60)	2.62 (2.11–3.25)
Generalized anxiety disorder (%, s.e.)	8.1 (1.3)	2.5 (0.2) **	2.88 (1.88–4.40)	2.39 (1.56–3.68)
Social phobia (%, s.e.)	10.8 (1.5)	2.4 (0.2) **	3.68 (2.56–5.29)	3.08 (2.17–4.36)
Post-traumatic stress disorder (%, s.e.)	20.0 (1.7)	6.2 (0.2) **	2.67 (2.11–3.38)	2.43 (1.91–3.08)
Panic disorder (%, s.e.)	10.9 (1.4)	2.4 (0.1) **	3.11 (2.13–4.54)	2.78 (1.89–4.08)
Any substance disorder (%, s.e.)	27.7 (2.2)	20.7 (0.5) **	1.58 (1.24–2.01)	1.46 (1.15–1.86)
Nicotine dependence (%, s.e.)	19.6 (2.0)	13.3 (0.4) **	1.49 (1.14–1.94)	1.37 (1.06–1.78)
Alcohol abuse (%, s.e.)	2.9 (0.8)	5.5 (0.2) **	0.67 (0.37–1.18)	0.67 (0.38–1.17)
Alcohol dependence (%, s.e.)	6.7 (1.2)	4.1 (0.2) *	2.12 (1.38–3.27)	1.95 (1.25–3.03)
Drug abuse (%, s.e.)	2.5 (0.8)	1.4 (0.1)	1.92 (0.99–3.72)	1.72 (0.87–3.39)
Drug dependence (%, s.e.)	2.4 (0.8)	0.6 (0.1) *	4.18 (1.98–8.84)	3.56 (1.67–7.60)

AOR, adjusted odds ratio; CI, confidence interval; OR, odds ratio.

[a] OR controlled for demographics and BMI (25–29.9, 30–34.9, 35–39.9, 40–44.9, 45+);

[b] AOR1 controlled for demographics, perceived stress, and BMI.

* Bivariate difference significant at $P < 0.01$ level.

** Bivariate difference significant at $P < 0.05$ level.