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Pain Interference and Incident Mood, Anxiety, and Substance-Use Disorders: Findings from a Representative Sample of Men and Women in the General Population[1]

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Abstract

To examine gender differences in the longitudinal relationship between past-month pain interference and incident mood, anxiety, and substance-use disorders, chi-square tests and binomial logistic regression analyses were performed on data obtained from the National Epidemiologic Survey on Alcohol and Related Conditions from 34,465 adult respondents (47.9% men; 52.1% women) who completed waves 1 (2000–2001) and 2 (2004–2005) data collection. Models were adjusted for potentially confounding factors (i.e., age, race, marital status, educational level, employment, household income, number of stressful life events, number of general medical conditions, and wave-1 psychopathology). Respondents were categorized at wave 1 according to their past-month level of pain interference (i.e., no or low pain interference, moderate pain interference, severe pain interference). Moderate and severe pain interference (as compared to no or low pain interference) in male and female respondents was associated with the incidence of several psychiatric disorders. A stronger relationship was observed in male respondents as compared to female ones between past-month moderate pain interference and a

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CONFLICT OF INTEREST

All authors report that they have no conflicts of interest over the past five years to report as related to the subject of the report. Dr. Potenza consults for Lundbeck, receives research support from Mohegan Sun Casino and the National Center for Responsible Gaming, has received research support from Ortho-McNeil, Glaxo-SmithKline, Forest, and Psyadon, has consulted for Somaxon and Boehringer-Ingelheim, and has consulted for law offices and the federal defender's office as an expert in impulse control disorders and addictions.

CONTRIBUTORS

Drs. Potenza, Pilver and Hoff designed the study and wrote the protocol. Drs. Pilver and Hoff undertook the statistical analysis. Dr. Barry managed the literature searches and wrote the first draft of the manuscript. All authors contributed to drafts of the manuscript. Drs. Potenza and Barry provided clinical expertise. All authors have approved the final manuscript.

new onset of any mood disorder (OR = 1.57, p = .03) and major depressive disorder (OR = 1.60, p = 0.03), and between past-month severe pain interference and a new onset of alcohol abuse or dependence (OR = 1.69, p = .045) and nicotine dependence (OR = 1.48, p = .04). These findings suggest that providers should consider screening patients with past-month moderate or severe pain interference for mood, anxiety, and substance-use problems and monitor the possible development of subsequent comorbid psychiatric disorders.

Keywords

pain; mental disorders; incidence; comorbidity; gender

1. Introduction

Pain interference (or the perceived disruption in daily activities, relationships, roles, and employment resulting from physical pain) is an important yet understudied topic in psychiatry (Elman et al, 2011). In clinical samples, higher pain interference is associated with greater psychopathology (e.g., anxiety, depression) and poorer psychiatric treatment response (Bair et al, 2004; Kroenke et al, 2008; Means-Christensen et al, 2008; Teh et al, 2009). Epidemiological studies that have examined the psychiatric correlates of pain interference have typically targeted specific population subgroups (e.g., older adults, individuals misusing or abusing prescription analgesics, adults with bipolar-I disorder) (Scudds & Ostbye, 2001; McWilliams et al, 2003; McWilliams et al, 2004; Thomas et al, 2007; McWilliams et al, 2008; Goldstein et al, 2009; Novak et al, 2009; Ohayon & Schatzberg, 2010). Fewer studies have examined the psychiatric concomitants of pain interference in the general population. A recent study that used data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) found a stronger relationship between moderate levels of pain interference and alcohol-use disorders in men (as compared to women), and a stronger relationship between severe levels of pain interference and non-alcohol substance-use disorders in women (as compared to men) (Barry et al, 2012). The origins of these gender-related differences (e.g., biological, sociocultural) have not been systematically examined and remain unclear (Barry et al, 2012).

One potential drawback of existing studies is the absence of longitudinal data regarding the temporal sequencing of pain interference and associated psychiatric morbidity. However, the recent release of successive waves of NESARC data permits such analyses. The purpose of the current study was to extend previous work on pain interference by examining the association of past-month pain interference in men and women with the incidence of DSM-IV (American Psychiatric Association, 1994) Axis-I psychiatric disorders at a 3-year follow-up point, after adjusting for potentially confounding variables, including sociodemographics (age, race, marital status, educational level, employment, household income), number of stressful life events, number of general medical conditions, and wave-1 psychopathology (Axis-I and Axis-II psychiatric disorders). We also examined the extent to which incidence odds ratios were stronger in male as compared to female respondents. Based on cross-sectional NESARC data indicating a stronger accordance between moderate levels of pain interference and alcohol-use disorders in male as compared to female respondents, and between severe levels of pain interference and non-alcohol substance-use disorders in female as compared to male respondents (Barry et al, 2012), we hypothesized that higher levels of pain severity would be associated with incident Axis-I psychopathology in men and women, with stronger relationships between moderate pain interference and alcohol-use disorders in men and severe pain interference and drug-use disorders in women.

2. Materials and methods

2.1. Sample

We used data from waves 1 (2000–2001) and 2 (2004–2005) of the NESARC, which was conducted by the National Institute on Alcohol Abuse and Alcoholism and the US Census Bureau. Wave 1 recruited a nationally-representative sample of 43,093 non-institutionalized residents, 18 years and older, and was designed to over-sample young adults aged 18 to 24 years as well as African American and Hispanic households to provide sufficient statistical power to investigate patterns of alcohol use in young people and minority populations (American Psychiatric Association, 1994; Grant et al, 2003; Grant et al, 2004). Wave-2 interviews were conducted on 34,653 respondents, representing a response rate of 86.7% (from wave 1, 1403 respondents had died, 781 had been deported or were physically or mentally impaired, and 950 were unavailable because they were on active duty in the U.S. Armed Forces). Data from waves 1 and 2 were weighted to account for sampling strategies and non-responses. Wave-2 data were also weighted to adjust for the presence of any lifetime wave-1 substance-use or other psychiatric disorder (Grant et al, 2007). For the purposes of the current study, we restricted the sample to the 34,465 respondents who provided information about their level of pain interference at wave 1 and participated in both survey waves. While participants provided informed consent, the current study of publicly accessible, de-identified data from the NESARC was presented to the Yale Human Investigations Committee and exempted from IRB review under federal regulation 45 CFR Part 46.101(b).

2.2 Survey instrument

The NESARC used trained lay-interviewers to collect DSM-IV Axis-I and Axis-II psychiatric-disorder data at waves 1 and 2 using the Alcohol Use Disorder and Associated Disability Interview Schedule-DSM-IV version (AUDADIS-IV) (American Psychiatric Association, 2000; Grant & Anawalt, 2003). The AUDADIS-IV is a structured diagnostic interview that demonstrated test-retest reliability at waves 1 and 2, and it has been found to be a useful tool for detecting psychiatric disorders in a community sample (Grant et al, 2003; Grant et al, 2008).

2.3. Measures

2.3.1. Sociodemographics—Participants provided information about their gender (male, female), race or ethnicity (black, Hispanic, white, other), marital status (married, previously married, never married), education (less than high school, high-school graduate, some college, college or higher), employment (full-time, part-time, not working), age, and household annual income.

2.3.2. Dependent variables—Dependent variables were DSM-IV Axis-I disorders, which were coded as binary variables to denote the absence or presence of incidence in the interval between waves 1 and 2. Consistent with previous research (Grant et al, 2009; Pilver et al, 2013), we grouped AUDADIS-IV-derived DSM-IV-related Axis-I diagnostic variables as follows: mood disorders (major depression, dysthymia, mania, hypomania); anxiety disorders (panic disorder with or without agoraphobia, agoraphobia, social phobia, specific phobia, generalized-anxiety disorder); substance-use disorders (alcohol abuse/dependence, drug abuse/dependence, nicotine dependence). In waves 1 and 2, Axis-I diagnoses with general-medical-condition and substance-use exclusions were employed; thus, research diagnoses can be viewed as orthogonal or “primary” as per DSM-IV/DSM-IV-TR guidelines (American Psychiatric Association, 1994; American Psychiatric Association, 2000; Desai & Potenza, 2008).

2.3.3. Independent variable—Pain interference was assessed at wave 1 using an item from the 12-item short-form self-report scale (SF-12) of health-related quality of life (HRQL) (Ware et al, 1996): "During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)." Similar to previous research, respondents' answers to this 5-point item were used to classify them into one of three pain interference groups: a) "no/low pain interference" (i.e., those reporting their pain interference as "not at all" or "a little bit"); b) "moderate pain interference" (i.e., those reporting their pain interference as "moderate"); and c) "severe pain interference" (i.e., those reporting their pain interference as "a lot" or "extreme") (Novak et al, 2009; Barry et al, 2012).

2.3.4. Covariates—We adjusted for the following variables collected at wave 1, since they have previously been found to be associated with the prevalence of pain interference or Axis-I psychopathology: age, race, marital status, educational level, employment, household income, number of stressful life events, number of general medical conditions, and any Axis-II psychiatric disorder. Additionally, we adjusted for the presence in wave 1 of any mood disorder, any anxiety disorder, and any substance-use disorder. The NESARC assessed for 11 past-year general medical conditions: arteriosclerosis, hypertension, cirrhosis, other liver disease, angina, tachycardia, myocardial infarction, other heart disease, stomach ulcer, gastritis, and arthritis. Consistent with prior studies, only medical conditions which respondents indicated were diagnosed by a physician or other medical professional were considered positive (Goldstein et al, 2009; Barry et al, 2012). The following AUDASIS-IV-derived Axis-II disorders were used in this study: clusters A (paranoid, schizoid), B (histrionic, antisocial), and C (avoidant, dependent, obsessive-compulsive).

2.4. Data Analysis

Data analyses were conducted with SUDAAN 10.1, a statistical package that accounts for the multi-stage clustered sampling strategy and the weighting of the survey data using Taylor Series Linearization. The three-year incidence of each disorder (by gender, by pain interference level, and by pain interference level according to gender) was calculated by dividing the number of new cases by the baseline population at risk and multiplying this value by 100 (presented as weighted %). Longitudinal data analytic procedures used in this study are based on those used in prior studies that have examined NESARC data for incident outcomes (Chou & Afifi, 2011; Chou et al, 2011; Dakwar et al, 2012; Lazareck et al, 2012; Martins et al, 2012). We used logistic regression procedures to construct a fully adjusted model that included the main effects of gender and pain interference, and the interaction effect of gender-by-pain interference.

Additionally, models were adjusted for sociodemographic covariates, general medical conditions, stressful life events, and relevant wave-1 Axis-I and Axis-II psychiatric comorbidity. Adjustment for these covariates is widely practiced and arguably considered a standard approach (Chou et al, 2011; Lazareck et al, 2012; Martins et al, 2012; Pilver et al, 2013). Importantly, individuals with a lifetime history of the disorder(s) of interest at wave 1 were excluded from the analytical sample so that outcomes represented incident rather than chronic or recurrent episodes of the disorder of interest.

We present the multivariate-adjusted gender-specific odds ratios (ORs) as well as the interaction ORs and their associated 95% confidence intervals (CIs). Gender-specific ORs reflect the magnitude and direction of the association between pain interference level and the incident psychiatric disorder of interest, separately for women and men. The interaction OR is the ratio of the gender-specific ORs (i.e., OR_{women}/OR_{men}). An interaction OR that is statistically significant (CI does not include 1.0) indicates that the association between pain-

interference level and the incident psychiatric disorder of interest varies between men and women. Statistical significance was determined with the Wald F-test and considered to be $p<.05$ for the category of any incident Axis-I disorder. Given that significant findings were observed in women and men for this category, follow-up analyses examined clusters of disorders (mood, anxiety, and substance-use disorders) and then individual disorders.

3. Results

3.1. Baseline Pain Interference Levels and Associated Sociodemographic Characteristics

The prevalence of no or low pain interference, moderate pain interference, and severe pain interference at wave 1 was 81.2% (n = 27,522), 7.4% (n = 2,659), and 11.4% (4,284), respectively. Significant gender differences in pain interference were observed at wave 1 ($p<.0001$); the prevalence of moderate and severe pain interference was higher among women compared to men (moderate: 8.2% vs. 6.4%; severe: 12.8% vs. 9.9%), whereas the prevalence of no or low interference was higher among men compared to women (83.7% vs. 80.0%). Associations between pain-interference levels and sociodemographic characteristics were largely similar for male and female respondents (Table 1).

In the total sample, pain interference was associated with marital status, education, employment, age, and household annual income. Generally, the no or low pain-interference group, as compared to the moderate or severe pain-interference groups, more frequently acknowledged being never married, having a college or higher level of education, having fulltime employment, being younger, and having a household annual income of at least $70,000. Similar patterns were observed when these associations were examined separately in male and female respondents.

3.2. Pain interference and incident psychiatric disorders

Table 2 summarizes the pattern of bivariate associations observed between past-month pain-interference levels at wave 1 and the new onset of Axis-I psychiatric disorders among male and female respondents during the 3-year follow-up period. In unadjusted analyses, wave-1 pain interference in male and female respondents was associated with the new onset of any Axis-I disorder, any mood disorder, any anxiety disorder, and any substance-use disorder (all p's<.05).

Table 3 summarizes the multivariable associations between pain-interference levels at wave 1 and incidence of Axis-I psychiatric disorders among male and female respondents after adjusting for sociodemographics, stressful life events, general medical conditions, any Axis-II disorders, and wave-1 psychopathology. After adjusting for wave-1 covariates, male and female respondents who reported moderate or severe pain interference were more likely than those with no or low pain interference to exhibit a new onset of generalized-anxiety disorder. Respondents (irrespective of gender) with moderate pain interference at wave 1 were more likely than those with no or low pain interference to have a new onset of social phobia, while those with severe pain interference at wave 1 were more likely to exhibit a new onset of any Axis-I disorder, any mood disorder, major depressive disorder, any anxiety disorder, and panic disorder.

In comparison to male respondents with no or low pain interference at wave 1, male respondents with moderate pain interference were more likely to have a new onset of were more likely to have a new onset of any mood disorder, major depressive disorder, mania, and any anxiety disorder, while male respondents with severe pain interference were more likely to have a new onset of dysthymia, specific phobia, any substance-use disorder, and nicotine dependence. In comparison to female respondents with no or low pain interference at wave 1, female respondents with moderate pain interference were more likely to have a

new onset of panic disorder and drug abuse or dependence, while female respondents with severe pain interference were more likely to have a new onset of mania, hypomania, and agoraphobia.

Interactions analyses indicated different relationships for male and female respondents for four disorders after adjusting for covariates: A stronger relationship was observed in male respondents as compared to female ones between past-month moderate pain interference and a new onset of any mood disorder (OR=1.57, p=0.031) and major depression (OR=1.60, p=0.027), and past-month severe pain interference and a new onset of alcohol abuse or dependence (OR=1.69, p=0.045) and nicotine dependence (OR=1.48, p=0.035).

4. Discussion

Studies to date that have documented the association between pain interference and DSM-IV Axis-I psychiatric disorders have employed a cross-sectional design and have generally focused on individuals with specific psychiatric disorders (Bair et al, 2004; Goldstein et al, 2009; Novak et al, 2009; Barry et al, 2012). The current study extends our understanding by examining— in a prospective, longitudinal manner— gender-related differences in the relationship between past-month pain interference and incident psychiatric disorders in a nationally representative sample after controlling for several potentially confounding variables. The primary findings of this study are that a stronger relationship was observed in male respondents (as compared to female ones) between moderate pain interference and a new onset of any mood disorder and major depression and between severe pain interference and a new occurrence of alcohol abuse or dependence and nicotine dependence.

4.1. Pain interference and incident psychiatric disorders

Study findings expand upon prior epidemiological studies that documented a strong association (at one time-point) between past-month pain interference and a range of Axis I psychiatric disorders (Scudds & Ostbye, 2001; McWilliams et al, 2003; McWilliams et al, 2004; Thomas et al, 2007; McWilliams et al, 2008; Ohayon & Schatzberg, 2010). Our study hypothesis was partially supported: While a previous study on wave-1 NESARC data found a stronger relationship between moderate pain interference and alcohol abuse or dependence in male respondents and between severe pain interference and drug abuse or dependence in female respondents (Barry et al, 2012), findings from the current study indicate that men who report past-month moderate pain interference may be at increased risk (as compared to women) for developing a subsequent occurrence of any mood disorder or major depressive disorder, while male respondents who report past-month severe pain interference may be at increased risk for a new onset of alcohol abuse or dependence and nicotine dependence.

To our knowledge, this is the first study to demonstrate gender-related patterns in incident psychiatric disorders associated with pain interference. Prior studies have demonstrated that pain is associated with worse depression treatment outcomes and that pain and depression may involve similar biological pathways (e.g., descending pathways of the central nervous system) and neurotransmitters (e.g., serotonin, norepinephrine) (Bair et al, 2003; Bair et al, 2004). The relationship between chronic pain and depression is well established: Depression can be an antecedent, consequent, or concomitant of pain (Dersh et al, 2002); findings from this study offer support for the “consequence hypothesis” (especially in men) in which depression results from pain (Fishbain et al, 1997). The associations between past-month pain interference and incident nicotine- and alcohol-use disorders are consistent with findings: a) from laboratory research regarding the antinociceptive effects of alcohol and nicotine (Zarrindast et al, 1997; Campbell et al, 2006); b) documenting the relationship between chronic pain status and increased odds of current or lifetime nicotine dependence (Goldberg et al, 2000; Zvolensky et al, 2009; Fishbain et al, 2013); and c) regarding the high

rates of cigarette use as a pain coping strategy among patients with persistent pain (Jamison et al, 1991; Patterson et al, 2012). The increased risk of incident nicotine dependence among individuals with past-month pain interference suggests the importance of tailoring addictions-related public health prevention efforts to this group, especially since nicotine dependence may be a risk factor for prescription opioid misuse (Novy et al, 2012).

4.2. Limitations and Strengths

Several potential limitations are worth noting. First, pain interference was assessed using a single item from the SF-12. Although this item has been used in previous epidemiologic and community studies (Blyth et al, 2004; Thomas et al, 2007; Goldstein et al, 2009; Novak et al, 2009; Barry et al, 2012), future research might benefit from including a more comprehensive pain-interference scale (e.g., West Haven-Yale multidimensional Pain Inventory (Kerns et al, 1985); Brief Pain Inventory-Short Form (Cleeland, 1991)) to delineate specific domains of pain interference (e.g., work, social). The use of the single item measure of pain interference precluded an investigation of potentially important contextual information related to pain interference such as pain onset, location, intensity, and duration; associated aggravating and alleviating factors; and pain-related conditions or treatments (Barry et al, 2012). Second, the NESARC did not exhaustively assess Axis-I and Axis-II disorders because of concerns about response burden. Therefore, certain diagnoses of potential clinical relevance to pain interference were not assessed, including sleep disorders. Future research examining the psychiatric correlates of levels of pain interference might benefit from the inclusion of measures that assess these psychiatric diagnoses.

Despite these limitations, this study has multiple strengths. First, this is the first longitudinal examination of the relationships between pain interference and incident psychiatric disorders in a nationally representative sample of adults in the United States. Analyses adjusted for potential confounders such as demographics, psychiatric comorbidity, general medical conditions, and stressful life events. The AUDASIS-IV has demonstrated reliability and validity in diagnosing psychiatric disorders (Ruan et al, 2008). Findings from this study complements those on pain interference collected on clinical samples; unlike studies on clinical samples, which are biased toward individuals with greater pathology, this study may present a more accurate investigation of the relationship between pain interference and incident psychopathology in general in the community.

Pain is a common presenting problem among patients seeking primary care (Kroenke & Mangelsdorff, 1989), and it can negatively affect treatment outcomes for mood and anxiety disorders (Bair et al, 2004; Morone et al, 2013). The strong associations across study groups between pain interference—especially severe pain interference—and the new onset of a variety of Axis-I psychopathology emphasizes the importance of the routine assessment of these psychiatric disorders in patients presenting with severe pain interference in a primary care setting. Untreated anxiety and mood disorders among pain patients is associated with greater disability and lower health-related quality of life (Bair et al, 2008). Our findings suggest that addiction providers should consider the potential for pain interference in their patients, and do so with a particular consideration for nicotine and alcohol abuse/dependence in men, while general practitioners treating individuals for pain should consider in a gender-informed manner the potential for substance-related and other psychiatric disorders in their patients. Currently, the potential mechanisms (e.g., biological, sociocultural) underlying the differences in the strength of associations between mood and substance-related disorders and pain interference in men and women are unclear as is the extent to which these differences might influence treatment-related factors (e.g., help-seeking behaviors, treatment outcome), and both areas merit further examination. Additionally, controlled studies on interventions to address pain interference as a strategy to mitigate the onset of psychiatric disorders may be warranted. As the “baby-boomer” generation ages, the examination of the new onset of

psychiatric disorders associated with pain interference is likely to increase in clinical importance.

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Table 1

Baseline sociodemographic characteristics of male and female respondents by pain-interference severity. [1]

Characteristics	Male Respondents					Female Respondents				
	No/Low Pain n=12,008[2]	**Moderate Pain n=960[2]**	**Severe Pain n=1517[2]**			**No/Low Pain n=15,514[2]**	**Moderate Pain n=1,699[2]**	**Severe Pain n=2,767[2]**		
	%	%	%	χ^2	p	%	%	%	χ^2	p
Race/Ethnicity				1.46	.2053				3.53	**.0043**
White	71.15	74.44	70.62			70.69	73.17	68.67		
Black	9.92	9.57	11.07			11.62	11.37	14.21		
Hispanic	6.37	5.93	7.06			6.51	6.71	6.52		
Other	12.57	10.07	11.25			11.18	8.74	10.60		
Marital status				16.49	**<.0001**				33.70	**<.0001**
Married	65.72	69.15	66.09			61.89	57.59	55.10		
Previously married	9.94	14.89	17.26			18.79	31.29	32.36		
Never married	24.33	15.96	16.65			19.32	11.12	12.54		
Education				18.63	**<.0001**				22.62	**<.0001**
Less than HS	13.00	22.21	24.84			12.27	19.01	25.42		
HS graduate	27.98	28.10	31.94			28.63	34.15	32.49		
Some college	29.77	31.18	26.81			32.43	30.13	29.02		
College or higher	29.25	18.51	16.41			26.67	16.70	13.08		
Employment				42.77	**<.0001**				35.86	**<.0001**
Full-time	69.85	49.24	41.85			48.39	29.60	24.47		
Part-time	7.06	8.92	6.00			15.18	11.76	9.24		
Not working	23.09	41.84	52.15			36.43	58.64	66.29		
Age (mean age ± SD)[3]	43.0 (0.2)	50.7 (0.7)	49.5 (0.6)	197.78	**<.0001**	44.0 (0.2)	53.4 (0.6)	52.8 (0.5)	485.69	**<.0001**
Household annual income				22.09	**<.0001**				27.11	**<.0001**
$0–19,999	13.29	22.95	30.33			21.37	31.62	39.33		
$20,000–34,999	19.37	21.08	22.22			19.06	22.41	21.09		
$35,000–69,999	36.53	34.15	29.74			33.66	32.01	25.43		
$70,000+	30.80	21.82	17.71			25.91	13.96	14.16		

[1] Proportions in table represent weighted percentages.

[2] Ns are unweighted.

[3] Numbers represent weighted mean values. Bold values indicate statistically significant results. HS=high school; SD=standard deviation.

Table 2

Unadjusted (bivariate analyses) examining the relationship between pain interference and incident Axis-I psychopathology among male and female respondents.

	Male Respondents					Female Respondents				
	No/Low Pain n=12,008[1]	Moderate Pain n=960[1]	Severe Pain n=1,517[1]			No/Low Pain n=15,514[1]	Moderate Pain n=1,699[1]	Severe Pain n=2,767[1]		
Psychiatric Diagnoses	**%**	**%**	**%**	**χ^2**	**p**	**%**	**%**	**%**	**χ^2**	**p**
Any Axis-I disorder	35.3	42.2	48.3	24.95	**<.0001**	33.8	39.6	43.5	23.58	**<.0001**
Any mood disorder	7.5	14.1	14.7	24.05	**<.0001**	13.7	17.4	22.6	26.93	**<.0001**
Major depression	5.5	11.2	11.1	21.44	**<.0001**	11.7	15.5	18.9	20.98	**<.0001**
Dysthymia	0.7	1.3	2.1	4.67	.0127	1.3	2.3	4.1	16.21	**<.0001**
Mania	1.7	4.6	3.9	8.40	**.0006**	2.2	3.7	4.5	14.20	**<.0001**
Hypomania	1.5	1.5	1.8	0.35	.7064	1.5	1.5	2.5	2.07	.1347
Any anxiety disorder	8.5	14.6	16.3	19.09	**<.0001**	16.3	22.6	24.2	24.01	**<.0001**
Panic disorder[2]	1.8	3.3	4.9	9.68	**.0002**	3.6	6.7	8.0	22.26	**<.0001**
Agoraphobia	0.1	0.3	0.2	0.60	.5507	0.1	0.3	0.6	3.71	.0297
Social phobia	2.1	4.3	4.5	9.34	**.0003**	3.0	4.9	4.9	8.91	**.0004**
Specific phobia	4.7	7.0	8.0	7.83	**.0009**	9.9	13.3	13.8	12.50	**<.0001**
Generalized-anxiety disorder	2.1	5.4	6.1	15.33	**<.0001**	5.0	8.0	10.0	17.90	**<.0001**
Any substance-use disorder	28.8	31.7	36.8	11.12	**.0001**	17.5	18.8	21.3	6.67	**.0023**
Alcohol abuse/dependence	18.1	16.9	16.1	1.38	.2585	7.4	6.0	5.5	6.51	**.0026**
Drug abuse/dependence	15.0	20.6	24.9	17.98	**<.0001**	12.1	14.5	18.0	17.54	**<.0001**
Nicotine dependence	4.2	5.7	4.7	1.24	.2963	2.0	2.9	2.3	2.06	.1356

[1] Ns are unweighted; p = p-value from Wald Chi-Square test; % = incidence (weighted). Bold values indicate statistically significant results ($p < .05$).

[2] With or without agoraphobia

Table 3

Adjusted (regression model) results relating pain interference to incident Axis-I psychopathology among male and female respondents.

	Male respondents		Female respondents		Interaction (male vs. female)	
Psychiatric Diagnoses	**OR (95% CI) for oderate pain vs. No/Low pain**	**OR (95% CI) for Severe pain vs. No/Low pain**	**OR (95% CI) for Moderate pain vs. No/Low pain**	**OR (95% CI) for Severe pain vs. No/Low pain**	**OR (95% CI) for Moderate pain vs. No/Low pain**	**OR (95% CI) for Severe pain vs. No/Low pain**
Any Axis-I disorder	1.21(0.89–1.63)	**1.61(1.21–2.15)**	1.17(0.92–1.49)	**1.5(1.21–1.86)**	1.03(0.70–1.50)	1.07(0.79–1.47)
Any mood disorder[1]	**1.82(1.31–2.53)**	**1.87(1.43–2.45)**	1.16(0.90–1.49)	**1.61(1.31–1.97)**	**1.57(1.04–2.37)**	1.17(0.85–1.62)
Major depression	**1.82(1.28–2.60)**	**1.78(1.30–2.44)**	1.14(0.89–1.46)	**1.50(1.20–1.88)**	**1.60(1.06–2.43)**	1.19(0.83–1.69)
Dysthymia	1.27(0.56–2.90)	**2.10(1.05–4.22)**	1.10(0.65–1.87)	1.39(0.88–2.21)	1.16(0.45–3.00)	1.51(0.68–3.37)
Mania	**2.21(1.25–3.92)**	1.51(0.98–2.33)	1.28(0.80–2.06)	**1.80(1.29–2.50)**	1.73(0.87–3.41)	0.84(0.50–1.40)
Hypomania	0.90(0.41–1.97)	1.43(0.83–2.44)	0.98(0.60–1.61)	**1.77(1.04–2.99)**	0.92(0.35–2.37)	0.81(0.40–1.65)
Any anxiety disorder[2]	**1.67(1.20–2.31)**	**1.73(1.33–2.25)**	1.22(0.96–1.56)	**1.31(1.05–1.63)**	1.36(0.89–2.07)	1.33(0.97–1.82)
Panic disorder[*]	1.56(0.89–2.72)	**2.01(1.26–3.20)**	**1.67(1.18–2.35)**	**1.71(1.30–2.27)**	0.93(0.48–1.81)	1.17(0.73–1.88)
Agoraphobia	3.14(0.57–17.18)	2.28(0.32–16.51)	2.75(0.87–8.69)	**5.75(1.91–17.25)**	1.14(0.17–7.35)	0.40(0.05–3.16)
Social phobia	**1.74(1.04–2.93)**	1.52(0.96–2.41)	**1.47(1.03–2.08)**	1.05(0.77–1.43)	1.19(0.64–2.22)	1.45(0.85–2.46)
Specific phobia	1.36(0.94–1.98)	**1.58(1.17–2.13)**	1.08(0.83–1.40)	1.24(1.00–1.53)	1.26(0.78–2.03)	1.28(0.91–1.79)
Generalized-anxiety disorder	**2.48(1.54–4.00)**	**2.36(1.63–3.41)**	**1.52(1.14–2.03)**	**1.69(1.28–2.24)**	1.63(0.94–2.83)	1.39(0.90–2.15)
Any substance-use disorder[3]	1.18(0.85–1.62)	**1.56(1.15–2.10)**	1.13(0.84–1.52)	1.12(0.86–1.45)	1.04(0.67–1.61)	1.39(0.95–2.03)
Alcohol abuse/dependence	1.34(0.88–2.03)	1.19(0.85–1.67)	1.11(0.70–1.7)	0.70(0.47–1.05)	1.21(0.67–2.18)	**1.69(1.01–2.84)**
Drug abuse/dependence	1.12(0.57–2.20)	0.94(0.57–1.54)	**1.85(1.12–3.03)**	1.13(0.68–1.88)	0.60(0.27–1.35)	0.83(0.41–1.69
Nicotine dependence	1.26(0.89–1.77)	**1.83(1.39–2.41)**	0.97(0.67–1.41)	1.23(0.95–1.6)	1.29(0.81–2.05)	**1.48(1.03–2.14)**

All models included the following covariates: sociodemographics (age, race, marital status, educational level, employment, household income), number of stressful life events, number of general medical conditions, and wave-1 Axis-II psychiatric disorders.

OR = odd ratio; CI = confidence interval. Bold values indicate statistically significant results ($p < .05$).

[1] For all mood disorders, we adjusted for wave-1 past-year diagnosis of any substance-use disorder and any anxiety disorder.

[2] For all anxiety disorders, we adjusted for wave-1 past-year diagnosis of any mood disorder and any substance-use disorder.

[3] For all substance-use disorders, we adjusted for wave-1 past-year diagnosis of any mood disorder and any anxiety disorder.

[*] with and without agoraphobia diagnosis of any mood disorder and any anxiety disorder.