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Prevalence and Psychiatric Correlates of Pain Interference Among Men and Women in the General Population[1]

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Abstract

Objective—To examine gender differences in the associations of levels of pain interference and psychiatric disorders among a nationally representative sample of adult men and women.

Method—Chi-square tests and multinomial logistic regression analyses were performed on data obtained from the National Epidemiologic Survey on Alcohol and Related Conditions from 42,750 adult respondents (48% men; 52% women), who were categorized according to three levels of pain interference (i.e., no or low pain interference [NPI], moderate pain interference [MPI], severe pain interference [SPI]).

Results—Female respondents in comparison to male respondents were more likely to exhibit moderate ($p < 0.001$) or severe pain interference ($p < 0.001$). Levels of pain interference were associated with past-year Axis I and lifetime Axis II psychiatric disorders in both male and female respondents ($p < 0.05$), with the largest odds typically observed in association with moderate or severe pain interference. A stronger relationship between MPI and alcohol abuse or dependence (OR = 1.61, $p < 0.05$) was observed in male participants as compared to female ones, while a stronger relationship between SPI and drug abuse or dependence (OR = 0.57, $p < 0.05$) was observed in female respondents as compared to male ones.

Conclusions—Levels of pain interference are associated with the prevalence of Axis I and Axis II psychiatric disorders in both men and women. Differences in the patterns of co-occurring substance-related disorders between levels of pain interference in male and female respondents

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indicate the importance of considering gender-related factors associated with levels of pain interference in developing improved mental health prevention and treatment strategies.

Keywords

pain; mental disorders; comorbidity; gender

1. Introduction

Pain interference, the perceived disruption in daily activities, interpersonal relationships, life roles, and employment resulting from physical pain, is an important component of a comprehensive pain assessment and a key outcome variable in the treatment of diverse pain-related medical conditions, such as cancer, neuralgias, and spinal cord injury (Katz et al, 2002; Putzke et al, 2002; Kalliomäki et al, 2008; Teh et al, 2009). Elevated pain interference is associated with psychiatric disorders, including mood and anxiety disorders, and non-medical use of prescription opioids, and it has been demonstrated to deleteriously influence psychiatric treatment response (Bair et al, 2004; Olfson & Gameroff, 2007; Kroenke et al, 2008; Means-Christensen et al, 2008; Goldstein et al, 2009; Novak et al, 2009; Teh et al, 2009). While some epidemiological surveys have examined the psychiatric profiles associated with specific pain-related conditions (e.g., arthritis) or among specific population cohorts (e.g., older adults), these studies have largely ignored the examination of the psychiatric correlates of pain interference, irrespective of pain-related conditions, among the general adult population (Scudds & Ostbye, 2001; McWilliams et al, 2003; McWilliams et al, 2004; Thomas et al, 2007; McWilliams et al, 2008; Ohayon & Schatzberg, 2010). For example, recent studies that examined pain interference from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) data focused on respondents with bipolar I disorder or non-medical use of prescription analgesics (Goldstein et al, 2009; Novak et al, 2009). Additionally, studies on the psychiatric correlates of pain interference have generally focused on treatment-seeking individuals with specific pain-related or psychiatric disorders (Osborne et al, 2007); consequently, the degree to which these findings generalize to the general population is unclear.

Recent years have witnessed a noticeable expansion in research on gender differences in pain (Fillingim et al, 2009). In comparison to men, women are more likely to report and seek help for certain clinical pain conditions (e.g., chronic tension, fibromyalgia) (Hurley & Adams, 2008), report higher pain severity at lower thresholds and exhibit lower pain tolerance in experimental pain paradigms, especially those involving mechanical pain induction procedures (Riley et al, 1998). However, debate persists about the reliability and meaning of these gender differences (Hurley & Adams, 2008). For example, an absence of gender differences has been reported in at least one-third of the published studies examining perception of noxious experimental stimuli (Riley et al, 1998). Moreover, there is a paucity of studies that have examined gender differences in pain interference; of those that have examined such differences, findings are inconclusive (Hirsh et al, 2006). For example, greater psychiatric distress was associated with higher pain-related disability among female (but not male) pain patients in one study of pain patients (Bolton, 1994), whereas another study found that greater anxiety was associated with higher pain interference among male (but not female) participants (Edwards et al, 2000).

The purpose of the current study was to extend previous work on pain interference by examining the relationships between sociodemographic characteristics and psychiatric disorders accompanying varying levels of past-month pain interference among a large, representative and well-characterized sample of men and women. To investigate, we used data from the National Epidemiologic Survey on Alcohol and Related Conditions

(NESARC) to examine the prevalence of recent pain interference levels among male and female respondents. Given previous findings indicating a relationship between psychiatric disorders and pain interference (Olfson & Gameroff, 2007; Means-Christensen et al, 2008; Goldstein et al, 2009; Novak et al, 2009), we predicted that (1) female respondents would exhibit higher levels of pain interference than male respondents and (2) for male and female respondents, greater levels of pain interference would be associated with a higher prevalence of psychiatric disorders. We also examined the prevalence of general medical conditions and substance use in the overall sample as well as among male and female respondents stratified by recent pain interference levels. While published studies on the NESARC have examined (a) the prevalence of substance use disorders and their association with general medical conditions based on specific psychiatric presentations (e.g., gambling disorder, bipolar disorder), medical issues (e.g., BMI), or demographic characteristics (e.g., older adults), and (b) the association between pain interference and non-medical use of prescription opioids or a prescription opioid use disorder, they have not—to our knowledge— investigated the prevalence of general medical conditions or substance use among those with varying levels of pain interference or among respondents based on gender (Morasco et al, 2006; Pietrzak et al, 2007; Goldstein, Dawson, Chou, et al, 2008; Goldstein, Dawson, Stinson, et al, 2008; Goldstein et al, 2009; Novak et al, 2009).

2. Materials and methods

2.1. Sample

The NESARC was conducted by the National Institute on Alcohol Abuse and Alcoholism and the US Census Bureau and recruited a nationally-representative sample of US non-institutionalized residents (citizens and non-citizens) aged 18 years and older (Grant, Dawson, et al, 2003; Grant et al, 2004). The NESARC was designed to over-sample individuals 18 to 24 years old 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. Multi-stage cluster sampling was used to identify respondents: Census sampling units, households, and then household members were sampled in sequence. While individuals residing in jails, prisons, or hospitals were excluded, the sample was augmented with members of group living environments, such as dormitories, group homes, shelters, and facilities for housing workers. Weights have been calculated to adjust standard errors for these over-samples, the cluster sampling strategy, and non-responses (Grant, Moore, et al, 2003).

The final NESARC sample consisted of 43,093 respondents with an overall response rate of 81 percent. For the purposes of the current study, we restricted the sample to 42,750 respondents who provided information about their level of pain interference. All participants provided informed consent. However, 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. Measures

2.2.1. 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.

2.2.2. Psychiatric Disorders—Trained lay interviewers collected specific DSM-IV Axis I and II psychiatric disorder data 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 with demonstrated test-retest reliability, and it has been found to be a useful tool for detecting psychiatric disorders in a community sample (Grant, Dawson, et al, 2003). Not all DSM-IV Axis I or Axis II psychiatric disorders were assessed in the NESARC because of concerns about participant burden and time constraints (Grant et al, 2005). The following DSM-IV-related Axis I and II diagnostic variables (derived from AUDADIS-IV), which are accessible on the publicly accessible NESARC database (http://pubs.niaaa.nih.gov/publications/NESARC_DRM/NESARCDRM.htm), were used in this study and—consistent with previous research (Grant et al, 2009)— grouped as follows: mood disorders (major depression, dysthymia, mania, hypomania); anxiety disorders (panic disorder with or without agoraphobia, social phobia, specific phobia, generalized anxiety disorder); substance use disorders (alcohol abuse/dependence, drug abuse/dependence, nicotine dependence); and personality disorders belonging to clusters A (paranoid, schizoid), B (histrionic, antisocial), and C (avoidant, dependent, obsessive-compulsive).

Past-year Axis I diagnoses with general medical condition and substance use exclusions were used; thus, research diagnoses can be viewed as orthogonal or “primary” as per DSM-IV/DSM-IV-TR guidelines (American Psychiatric Association, 2000; Desai & Potenza, 2008). Unlike Axis I psychiatric diagnoses, Axis II diagnostic criteria were not restricted to the past year. Instead, respondents were asked how they felt or acted most of the time, irrespective of the situation, throughout their lives.

2.2.3. Pain Interference—Pain interference was assessed using a subscale from the 12-item short form self-report scale (SF-12) of health-related quality of life (HRQL) (Ware et al, 1996). Similar to previous research, respondents' answers to the 5-point item: “During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)” 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).

2.2.4. General Medical Conditions—Respondents were asked whether they had experienced any of the following 11 general medical conditions in the past year: arteriosclerosis, hypertension, cirrhosis, other liver disease, angina, tachycardia, myocardial infarction, other heart disease, stomach ulcer, gastritis, and arthritis. For each past-year medical condition endorsed, respondents were asked whether a physician or other medical professional had diagnosed it. As previously done, only medical conditions which respondents reported were diagnosed by a physician or other medical professional were considered positive (Goldstein et al, 2009).

2.2.5. Substance Use—Respondents were asked about their past-year use of 10 non-alcohol-related substances, including illicit drugs (i.e., cannabis, cocaine, hallucinogens, heroin, inhalants) and non-medical use of prescription drugs (i.e., opioids other than heroin or methadone, sedatives, stimulants, tranquilizers), and “other drugs.” Non-medical use was defined as prescribed medication use “without or beyond the bounds of a prescription” http://pubs.niaaa.nih.gov/publications/NESARCDRM/NESARCDRM.htm#TOC20). Three patterns of substance use were examined in the current study: “past-year use,” “lifetime use” (i.e., use but not in the past 12 months), and “lifetime nonuse.”

2.3. Data Analysis

The primary research questions concerned differences among male and female respondents in the association between past-month pain interference levels and psychiatric disorders. To address these questions, data analyses proceeded in several steps. First**,** we examined using chi-square tests (χ^2) the associations between pain interference levels and socio-demographic characteristics (race/ethnicity, marital status, education level, employment status, age, and household annual income), stratified by gender (male and female), in order to identify sociodemographic variables potentially influencing the relationship between gender, pain interference levels, and psychiatric disorders. Second, we examined unadjusted weighted rates of psychiatric disorders, stratified by both pain interference levels and gender. Third, we fit a series of multinomial logistic regression models with psychiatric variables as the dependent variable of interest and the 3-level pain interference level variable (i.e., no pain interference or low pain interference [NPI], moderate pain interference [MPI], severe pain interference [SPI]), gender (male, female), and the interaction between gender and pain interference level as the independent variables of interest, adjusting for potentially confounding sociodemographic variables (i.e., race/ethnicity, marital status, education, employment, age, household annual income). Our analysis began by examining psychiatric disorders grouped into Axis I and II categories. If significant findings were observed, 3 categories within each Axis were examined to investigate further the nature of the findings: any mood disorder, any anxiety disorder, and any substance use disorder for Axis I categories, and any Cluster A, any Cluster B, and any Cluster C for Axis II categories. When significant associations were found between these categories and pain interference levels and gender, we pursued further analysis of the individual disorders. The NPI category was used as a reference level for two sets of adjusted odds ratios: MPI versus NPI and SPI versus NPI. Interaction term odds ratios were tested to determine whether the adjusted odds ratios for male respondents were significantly different from those for female respondents. Given the complex design of the study sample and the goal of estimating as accurately as possible the national rates of co-occurring psychiatric disorders, analyses were performed using NESARC-calculated weights and SUDAAN software (Research Triangle Institute, 2001). Consequently, sample proportions are based on weighted percentages.

In bivariate analyses, we examined whether past-year general medical conditions were associated with levels of pain interference in the entire sample and among men and women, separately. We also examined whether the use of different substances in the past year was associated with varying levels of pain interference in the overall sample as well as among men and women, separately. The significance of these associations was determined by using chi-square tests. We then constructed a series of logistic regression models which included the variables of gender, pain interference, and the gender-by-pain interference interaction to determine whether gender modified the nature of the association between pain interference and each general medical condition or each class of substance use, respectively. In the case of the three-level categorical variable, substance use patterns (i.e., past-year use, lifetime use, and lifetime nonuse), we constructed a multinomial logistic regression model to evaluate the significance of the gender-by-pain interference interaction. The statistical significance of the interaction term was evaluated with the chi-square test. Bonferroni adjustments for multiple comparisons were used on chi-square tests involving general medical conditions (i.e., [0.05 ÷ 11 = 0.0045]) and substance use (i.e., [0.05 ÷ 10 = 0.005]). For all other analyses, statistical significance was set at $p < 0.05$.

3. Results

Forty-eight percent of respondents were men (n = 18,365) and 52% were women (n = 24,385); 8,157 of respondents self-identified as Black (11.0%), 8,257 as Hispanic (11.6%), 24,317 as White (70.9%), and 2,019 as either American Indian or Asian American (6.5%).

Participants' ages ranged from 18 to 90 years old (M = 45.2, SD = 0.18). More than half (62% [n = 21,976]) of the sample was married, 18% (n = 11,052) was previously married, and 21% (n = 9,722) was never married.

While most participants had at least a high-school level of education (29% [n =12,436] had graduated high school, 30% [n = 12,584] had some college education, and 25% [n = 9,946] had graduated college), a minority (16%; [n= 7,784]) had never completed high school. Approximately one-half of respondents (53% [n = 22,088]) reported working full-time, 10% (n = 4,219) had part-time employment, and 36% (n = 16,443) did not have a job. Approximately, 21% of respondents (n = 11,847) reported an annual household income between $0-19,999, 20% (n = 9,301) between $20,000-34,999, 33% (n = 13,198) between $35,000-69,999, and 25% (n = 8,404) of at least $70,000 (weighted percentages provided).

Associations between pain interference levels and sociodemographic characteristics were largely similar for male and female respondents (Table 1). The NPI, as compared to the MPI and SPI groups, more frequently acknowledged being never married, having a college degree or higher, working full time, and having a household annual income of at least $70,000. In comparison to the MPI and SPI groups, the NPI group was younger.

3.1. Pain Interference Levels

The majority (n = 33,864; 81%) of respondents reported no pain interference or low levels of pain interference (83% for men and 78% for women). The prevalence rates of MPI and SPI were higher for women in comparison to men (8.2% vs. 6.5%, $p < 0.001$; and 13.5% vs. 10.6%, $p < 0.001$ for MPI and SPI, respectively). Overall, 12.1% (n = 5,613) of the sample, including 14.3% of Blacks, 11.4% of Hispanics, 11.9% of Whites, and 12.3% of individuals self-described as either American Indian or Asian American, reported SPI. Pain interference among male and female respondents did not vary as a function of race/ethnicity ($p = 0.27$).

3.2. Psychiatric Disorders

Table 2 summarizes the patterns of associations observed between pain interference levels and psychiatric morbidity among male and female respondents. Significant associations between pain interference levels were observed for any Axis I disorder, any mood disorder, any anxiety disorder, any substance use disorder, any Axis II disorder, any Cluster A personality disorder, any Cluster B personality disorder, and any Cluster C personality disorder in both men and women. Differences were suggested between male and female respondents within two of the contributing categories in the Axis I disorder domain (anxiety disorder and substance use disorder): The associations between pain interference levels and social phobia, alcohol abuse or dependence, and drug abuse or dependence were significant at $p < 0.01$ for female but not for male respondents.

Adjusted odds ratios from multivariate models investigating the strength of associations between psychiatric disorders and pain interference level groups are presented for male and female respondents, using same-gender NPI group as the reference group (Table 3). The odds of any Axis I disorder, any mood disorder, any anxiety disorder, any substance use disorder, any Axis II disorder, any Cluster A personality disorder, any Cluster B personality disorder, and any Cluster C personality disorder were elevated in association with MPI and SPI in both male and female respondents. However, interactions analyses indicated different relationships for male and female respondents for only two disorders: A stronger relationship between MPI and alcohol abuse or dependence (OR = 1.61, $p < 0.05$) was observed in male participants as compared to female ones, while a stronger relationship between SPI and drug abuse or dependence (OR = 0.57, $p < 0.05$) was observed in female respondents as compared to male ones.

3.3. General Medical Conditions

As summarized in Tables 4 and 5, each of the general medical conditions was increasingly prevalent at increasing levels of pain interference in the entire sample, as well as among male and female respondents, separately. The most frequently reported general medical conditions by NPI, MPI, and SPI groups were arthritis and hypertension. After adjusting for multiple comparisons (0.05 ÷ 11 = 0.0045), higher (as opposed to lower) levels of pain interference continued to be associated (with the exception of cirrhosis among female respondents) with greater past-year prevalence of all general medical conditions in the entire sample, as well as among male and female respondents. As summarized in Table 5, interaction analyses yielded significant gender differences in the relationship between pain interference and two general medical conditions: hypertension and gastritis. However, neither of these interactions remained significant after the application of a Bonferroni correction for multiple comparisons.

3.4. Substance Use

A complex pattern of findings emerged regarding the associations between levels of pain interference and categories of past-year substance use. As summarized in Table 6, levels of pain interference among the entire sample were associated with each category of past-year substance use, with the exception of cocaine, inhalants, and “other drugs.” After adjusting for multiple comparisons (0.05 ÷ 10 = 0.005), levels of pain interference among the entire sample continued to be associated with past-year use of cannabis, opioids, sedatives, stimulants, and tranquilizers. Higher levels of pain interference among the entire sample were associated with lower prevalence rates of past-year cannabis use. In contrast, respondents with severe pain interference were numerically less likely than those with moderate pain interference to endorse past-year use of opioids, sedatives, stimulants, and tranquilizers. As summarized in Table 7, after adjusting for multiple comparisons (0.05 ÷ 10 = 0.005), levels of pain interference were associated with past-year use of hallucinogens, opioids, sedatives, stimulants, and tranquilizers among male respondents, and past-year use of cannabis and hallucinogens among female respondents. As summarized in Table 7, interaction analyses yielded significant gender differences in the relationship between levels of pain interference and past-year use of five substances: cannabis, hallucinogens, inhalants, sedatives, and tranquilizers. However, only the interaction related to hallucinogens remained significant after the application of a Bonferroni correction for multiple comparisons. While increasing levels of pain interference among male respondents were associated with greater past-year prevalence of hallucinogens, female respondents with low or no pain interference were more likely to report past-year use of hallucinogens than female respondents with severe pain interference.

4. Discussion

To our knowledge, this study is the first to systematically investigate differences between adult men and women in the associations between past-year Axis I and Axis II psychiatric disorders and different levels of pain interference in a nationally representative sample. The findings support our hypotheses: female respondents reported higher levels of pain interference than their male counterparts and the rates of psychiatric disorders were associated with past-month pain interference levels in both male and female respondents. The relationship between pain interference severity and the vast majority of Axis I and Axis II disorders was largely the same for men and women, with the most statistically significant differences across gender groups observed in the relationships between pain interference and alcohol and drug abuse or dependence. Specifically, the relationship between past-month moderate pain interference and alcohol abuse or dependence were stronger in men as compared to women while the relationship between past-month severe pain interference and

drug abuse or dependence was stronger in women as compared to men. Clinical implications are discussed below.

4.1. Pain Interference Levels

Our finding that female respondents exhibited higher rates of MPI or SPI extends previous findings documenting that in comparison to men, women report higher pain severity at lower thresholds and exhibit lower pain tolerance in mechanical pain induction experimental paradigms (Riley et al, 1998). Our findings suggest that further investigation of male-female pain interference differences is warranted; future studies might benefit from examining systematically the extent to which potential differences in pain interference between male and female respondents are mediated or moderated by sex-related (e.g., endocrine levels) or gender-related (e.g., sex role identification) factors or medical conditions (e.g., osteoporosis).

4.2. Pain Interference Levels, Axis I Psychiatric Disorders, and Substance Use

Study findings corroborate those previously reported on the high rates of co-occurrence between high levels of pain interference and Axis I psychiatric disorders among patients in treatment or seeking help (Bair et al, 2004; McWilliams et al, 2008; Means-Christensen et al, 2008). We found elevated rates of mood, anxiety, and substance use disorders among both male and female respondents with MPI or SPI. More than one third of male or female respondents reporting MPI or SPI exhibited an Axis I disorder in the previous year.

Study findings also extend those previously documented regarding the high rates of non-medical use of prescription opioids among adults with past-month MPI or SPI (Alegría et al, 2009) by specifying the types of past-year substance use disorder (any substance use disorder, alcohol abuse or dependence, nicotine dependence) that were associated with MPI or SPI. Previous research has documented an association between lifetime history of chronic pain and increased odds of current and lifetime prevalence of nicotine dependence (Zvolensky et al, 2009); furthermore, nicotine dependence criteria (as opposed to no nicotine dependence criteria) are associated with a higher probability of pain (John et al, 2009). Given that laboratory pain models have found opioid-mediated antinociceptive effects of nicotine and that nicotine and other substances of abuse such as alcohol may produce a synergistic analgesic response, future research focusing on clinical populations with co-occurring pain, nicotine abuse/dependence, and other substance use disorders (e.g., opioid dependence) appears warranted (Zarrindast et al, 1997; Campbell et al, 2006).

The relationship between levels of pain interference and prevalence rates of self-reported substance use was complex. For example, after adjusting for multiple comparisons, higher levels of pain interference among female respondents and among the entire sample were associated with lower levels of cannabis use, while levels of pain interference and prevalence of past-year cannabis use were not associated among male respondents. These findings are somewhat surprising since cannabis is known to have analgesic properties (Reisfield, 2010). Furthermore, among the entire sample, after adjusting for multiple comparisons, the prevalence rates of past-year use of opioids, sedatives, stimulants, and tranquilizers were numerically higher among respondents with moderate pain interference as opposed to those with severe pain interference. After adjusting for multiple comparisons, one interaction effect remained significant. While male respondents with severe pain interference were more likely than male respondents with no or low pain interference to report greater past-year prevalence of hallucinogens, female respondents with no or low pain interference were more likely to report past-year use of hallucinogens than female respondents with severe pain interference. Overall, these findings suggest that the

relationship between levels of pain interference and prevalence of past-year substance use is not straightforward and that future research should assess and address this complexity.

Study findings confirm and expand upon prior epidemiological studies showing a robust association between pain interference and a range of psychiatric disorders (Scudds & Ostbye, 2001; McWilliams et al, 2003; McWilliams et al, 2004; Thomas et al, 2007; McWilliams et al, 2008; Ohayon & Schatzberg, 2010). The current study also extends previous NESARC studies (those examining the differences in the relationship between levels of pain interference and psychopathology as related to bipolar I disorder (Goldstein et al., 2009) and non-medical use of prescription opioids (Novak et al., 2009)) by focusing on gender differences in psychiatric disorders associated with levels of pain interference. Our findings support the conceptualization of past-month pain interference as having a clinical threshold; although the rates of psychiatric disorders were significantly higher for both male and female respondents with MPI or SPI as compared to their counterparts with NPI, the prevalence of Axis I psychopathology did not differ noticeably among those reporting either MPI or SPI, suggesting that clinicians might benefit from assessing and addressing the psychiatric correlates of MPI in addition to SPI. Longitudinal studies that investigate how moderate or greater pain interference and psychiatric symptoms co-vary over time are needed and should be done in a gender-informed manner.

A largely similar pattern in the associations between levels of pain interference and Axis I disorders was observed in male and female respondents; however, a stronger relationship between MPI and alcohol abuse or dependence was observed in male participants as compared to female ones, while a stronger relationship between SPI and drug abuse or dependence was observed in female respondents as compared to male ones. Specific medical conditions might influence this relationship differently in men and women. For example, the relationships between hypertension and gastritis and more severe pain are stronger in women than in men. Women as compared to men tend to engage in drug use for negative reinforcement motivations (Brady & Randall, 1999), and it is possible that pain symptoms related to conditions like gastritis promote increased drug use preferentially in women. Alternatively, specific abused drugs (e.g., stimulants like cocaine) may increase hypertension (Albertson et al, 1995) and lead to pain, and this may explain the stronger relationships in women between severe pain and drug abuse/dependence and severe pain and hypertension (see (Fillingim & Maixner, 1996)). These and other possibilities warrant additional investigation. Regardless of the nature of the association, the findings suggest that clinicians treating individuals for substance use disorders should consider the potential for pain interference in their patients, and do so with a particular consideration for alcohol abuse/dependence in men and drug abuse/dependence in women. Similarly, general practitioners treating individuals for pain should consider in a gender-informed manner the potential for substance use disorders in their patients.

Prior research on the NESARC has highlighted the importance of attending to patterns of odds ratios (ORs) between gender and psychiatric disorders (Desai & Potenza, 2008). In the present study, the ORs for panic disorder, generalized anxiety disorder, and dependent personality disorder across levels of pain interference were numerically higher among men and women than for the other psychiatric disorders measured. Although major depressive disorder is sometimes characterized as a more severe psychiatric condition than dysthymia, numerically lower ORs generally emerged between levels of pain interference and major depression than between levels of pain interference and dysthymia. We also found a strong association in multivariable analyses between mania and severe pain interference among females. To our knowledge, the pattern of ORs found in the present study has not been reported elsewhere and warrants further empirical investigation.

4.3. Levels of Pain Interference and Axis II Psychiatric Disorders

Community studies prior to the NESARC generally omitted measures of both levels of pain interference and personality disorders (PDs). Results from this study expand upon prior studies demonstrating an association between PDs and chronic pain (Weisberg & Keefe, 1997). For both men and women, any PD, any Cluster A, B, or C PD, and individual PDs across clusters were more frequently observed in respondents with MPI or SPI as compared to those with NPI. Overall, study findings suggest that providers should be alert to the possible presence of a PD among patients reporting MPI and not just among those presenting with SPI, especially since the presence of a PD may complicate the treatment for pain (Weisberg & Keefe, 1997).

4.4. Levels of Pain Interference and General Medical Conditions

Levels of pain interference were associated (with the exception of cirrhosis among female respondents) with greater past-year prevalence of general medical conditions in all, male, and female respondents. In contrast to the NPI group (12%), a substantial proportion of both MPI and SPI groups (over 40%) reported arthritis. Similar to findings from the 2007-2009 National Health Interview Survey, respondents' age was associated with the rate of reported arthritis (the MPI and SPI groups were older than the NPI group) (Centers for Disease Control and Prevention, 2010). In comparison to male respondents, female respondents with varying levels of pain interference reported—after controlling for multiple comparisons—equivalent rates of past-year arthritis and other general medical conditions.

4.5. Limitations and Strengths

Several potential limitations are worth noting. The cross-sectional design of the NESARC limits statements regarding causation among study variables. Pain interference was assessed using a single item from the SF-12. While 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), future research in this area might benefit from using 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)) that would elucidate the specific domains of pain interference (e.g., work, social). The use of the single item measure of pain interference also precluded an analysis of potentially important contextual information such as pain onset (e.g., “When did the pain start?”), location (e.g., “Where is the pain located?”), pain intensity (“What is the intensity of the pain when it was at its worst in the past week?”), pain quality (e.g., “Describe your pain in your own words”); associated features (e.g., “How does pain affect your appetite?”); aggravating and alleviating features (e.g., “What factors make your pain worse?” “What brings about relief of your pain”); presence of specific pain-related conditions (e.g., chronic pain, myofascial pain); and pain-related treatment (e.g., “What treatment(s) are you receiving for your pain?”). The NESARC did not exhaustively assess Axis I and Axis II disorders because of concerns about response burden. Consequently, certain diagnoses of potential clinical relevance to levels of pain interference were not assessed, including sleep disorders, sexual dysfunction, somatoform disorders, and borderline personality disorder. Future research examining the psychiatric correlates of levels of pain interference might benefit from the inclusion of measures that assess these psychiatric diagnoses. Similar to other epidemiological surveys, findings from the NESARC may not generalize to individuals seeking or enrolled in treatment.

Despite these limitations, the current study represents an important investigation of differences in the psychiatric comorbidity of varying levels of pain interference among men and women. To our knowledge, this study is among the first to systematically investigate differences in psychiatric disorders accompanying variable levels of past-month levels of pain interference among a nationally-representative sample of male and female respondents.

The strong associations across study groups between a variety of Axis I and Axis II disorders and pain interference emphasizes the importance of the routine assessment of these psychiatric disorders in patients presenting for pain, as well as assessing and addressing levels of pain interference among patients seeking treatment for psychiatric disorders. Study findings also highlight the increased prevalence of a variety of Axis I and II disorders among respondents with MPI or SPI in comparison to their counterparts with NPI. Currently, the potential mechanisms (e.g., biological, sociocultural) underlying the differences in the associations between 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.

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Table 1

Sociodemographic characteristics of male and female respondents by pain interference severity.[1]

	Male Respondents					Female Respondents				
	No/Low Pain n=15,097 [2]	Moderate Pain n=1,207 [2]	Severe Pain n=2,061 [2]			No/Low Pain n=18,767 [2]	Moderate Pain n=2,066 [2]	Severe Pain n=3,552 [2]		
Characteristics	%	%	%	χ^2	p	%	%	%	χ^2	p
Race/Ethnicity				3.10	0.01				4.65	0.001
White	70.9	75.8	70.5			70.6	74.0	68.8		
Black	9.9	9.3	11.5			11.7	10.8	14.1		
Hispanic	12.7	9.5	11.5			11.2	8.6	10.5		
Other	6.5	5.4	6.5			6.5	6.6	6.6		
Marital status				21.16	<0.001				34.04	<0.001
Married	64.4	68.2	65.0			60.7	56.0	52.5		
Previously married	10.7	15.6	18.4			19.6	32.6	34.6		
Never married	24.9	16.2	16.6			19.7	11.4	12.9		
Education				24.14	<0.001				23.26	<0.001
Less than HS	13.9	24.2	26.8			12.9	20.4	26.7		
HS graduate	28.3	28.3	31.7			29.0	33.7	32.6		
Some college	29.4	30.4	25.2			32.1	29.6	27.5		
College or higher	28.4	17.1	16.3			26.0	16.3	13.2		
Employment				47.09	<0.001				38.02	<0.001
Full time	69.8	46.6	38.5			47.8	29.7	23.2		
Part time	7.1	8.2	5.0			14.8	11.5	8.7		
Not working	23.2	45.3	56.5			37.4	58.8	68.1		
Age (*mean age* ± SD)[3]	42.9 ± 0.2	51.8 ± 0.6	50.6 ± 0.5	328.35	<0.001	44.0 ± 0.2	53.8 ± 0.6	53.6 ± 0.4	642.47	<0.001
Household annual income				25.34	<0.001				27.29	<0.001
$0-19,999	14.3	24.0	33.3			22.3	32.1	40.1		
$20,000-34,999	19.5	22.5	21.5			19.5	22.8	21.6		
$35,000-69,999	36.1	32.7	28.8			33.0	30.0	24.8		
$70,000+	30.1	20.8	16.4			25.2	15.1	13.5		

[1] Proportions in table represent weighted percentages, stratified by sex

[2] Ns represent actual number in each category

[3] Numbers represent weighted mean values, stratified by gender

Table 2

Prevalence of psychiatric diagnoses by pain interference severity among male and female respondents

	Male Respondents					Female Respondents				
	No/Low Pain n=15,097 [1]	Moderate Pain n=1,207 [1]	Severe Pain n=2,061 [1]			No/Low Pain n=18,767 [1]	Moderate Pain n=2,066 [1]	Severe Pain n=3,552 [1]		
Psychiatric Diagnoses	%	%	%	χ^2	p	%	%	%	χ^2	p
Any Axis I disorder	29.6	36.4	38.6	19.01	<0.001	28.3	36.8	38.3	37.98	<0.001
Any mood disorder	7.3	11.3	12.6	16.25	<0.001	10.2	15.2	19.0	43.72	<0.001
Major depression	4.2	7.8	8.7	16.52	<0.001	7.8	11.9	15.2	38.77	<0.001
Dysthymia	0.9	2.4	3.0	13.67	<0.001	1.7	3.9	5.6	31.70	<0.001
Mania	1.3	2.1	3.1	7.62	0.001	1.4	2.6	3.6	17.84	<0.001
Hypomania	2.3	2.7	1.6	2.37	0.102	1.9	1.6	2.0	0.49	0.613
Any anxiety disorder	6.7	10.9	12.7	19.69	<0.001	12.8	20.2	20.2	36.34	<0.001
Panic disorder [2]	0.9	2.9	3.1	12.54	<0.001	2.3	4.9	5.5	18.33	<0.001
Social phobia	2.0	2.4	3.0	2.36	0.102	2.9	4.9	5.4	15.77	<0.001
Specific phobia	4.2	6.0	6.9	6.80	0.002	8.8	11.9	12.6	15.46	<0.001
Generalized anxiety disorder	0.9	2.4	3.2	11.09	<0.001	2.0	5.1	5.9	30.97	<0.001
Any substance use disorder	22.3	27.2	27.6	9.47	<0.001	14.3	16.9	18.2	10.78	<0.001
Alcohol abuse/dependence	12.5	13.5	11.2	1.25	0.293	5.2	3.8	4.0	5.57	0.006
Drug abuse/dependence	2.8	2.8	2.9	0.02	0.976	1.1	1.5	1.9	5.45	0.007
Nicotine dependence	13.1	18.8	20.3	18.92	<0.001	10.5	14.6	15.9	22.21	<0.001
Any Axis II disorder	14.4	21.8	21.6	22.75	<0.001	12.7	19.4	19.6	34.21	<0.001
Any Cluster A	5.0	9.7	10.4	18.03	<0.001	5.5	10.2	10.9	35.96	<0.001
Paranoid	3.2	6.6	7.4	17.81	<0.001	4.2	7.7	8.0	27.78	<0.001
Schizoid	2.7	5.8	5.3	9.51	<0.001	2.4	5.0	5.9	24.77	<0.001
Any Cluster B	6.2	8.9	10.7	14.29	<0.001	3.0	4.4	5.1	9.41	<0.001
Histrionic	1.7	2.7	3.2	3.89	0.025	1.6	2.5	2.8	5.63	0.006
Antisocial	5.0	7.5	8.9	12.38	<0.001	1.7	2.4	2.7	4.79	0.011
Any Cluster C	8.3	13.4	12.0	11.34	<0.001	8.6	14.5	13.1	24.81	<0.001
Avoidant	1.6	3.5	3.3	3.49	0.036	2.3	5.3	4.3	13.93	<0.001

	Male Respondents					Female Respondents				
	No/Low Pain n=15,097 [1]	Moderate Pain n=1,207 [1]	Severe Pain n=2,061 [1]			No/Low Pain n=18,767 [1]	Moderate Pain n=2,066 [1]	Severe Pain n=3,552 [1]		
Psychiatric Diagnoses	**%**	**%**	**%**	**χ^2**	**p**	**%**	**%**	**%**	**χ^2**	**p**
Dependent	0.2	0.8	1.1	7.56	0.001	0.4	1.3	1.7	15.09	<0.001
Obsessive-compulsive	7.4	11.3	10.1	8.37	0.001	7.2	11.6	10.3	19.48	<0.001

[1] Ns represent actual number in each category

[2] With or without agoraphobia

Table 3

Association between psychiatric diagnoses and pain interference severity among male and female respondents

	Male respondents		Female respondents		Interaction (male vs. female)	
Psychiatric Diagnoses	**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**	**OR (95% CI) for Moderate pain vs. No/Low pain**	**OR (95% CI) for Severe pain vs. No/Low pain**
Any Axis I disorder	1.67(1.43-1.96)†	1.79(1.55-2.06)†	1.82(1.60-2.07)†	1.95(1.74-2.18)†	0.92(0.75-1.12)	0.92(0.77-1.09)
Any mood disorder	1.95(1.52-2.49)†	2.03(1.67-2.48)†	1.85(1.57-2.18)†	2.41(2.12-2.73)†	1.05(0.79-1.40)	0.84(0.66-1.08)
Major depression	2.28(1.67-3.11)†	2.38(1.89-2.99)†	1.83(1.52-2.20)†	2.39(2.07-2.75)†	1.24(0.88-1.76)	0.99(0.75-1.32)
Dysthymia	2.62(1.47-4.68)**	2.90(2.00-4.21)†	2.19(1.64-2.93)†	2.99(2.37-3.76)†	1.20(0.63-2.28)	0.97(0.62-1.51)
Mania	1.98(1.84-3.75)*	2.62(1.18-3.31)†	2.25(1.55-3.29)†	3.04(2.36-3.91)†	0.88(0.47-1.63)	0.86(0.56-1.33)
Hypomania	1.56(1.02-2.38)*	0.87(0.57-1.34)	1.10(0.71-1.70)	1.43(1.06-1.93)*	1.42(0.79-2.54)	0.61(0.37-1.03)
Any anxiety disorder	1.84(1.46-2.30)†	2.11(1.74-2.56)†	1.90(1.63-2.23)†	1.89(1.66-2.14)†	0.96(0.72-1.29)	1.12(0.89-1.40)
Panic disorder [1]	3.51(2.15-5.73)†	3.48(2.46-4.93)†	2.44(1.78-3.34)†	2.69(2.08-3.47)†	1.44(0.80-2.58)	1.29(0.84-2.00)
Social phobia	1.25(0.79-1.98)	1.55(1.09-2.21)*	1.86(1.40-2.47)†	2.05(1.62-2.59)†	0.67(0.39-1.15)	0.76(0.49-1.17)
Specific phobia	1.56(1.13-2.16)**	1.78(1.39-2.29)†	1.54(1.28-1.85)†	1.64(1.41-1.91)†	1.01(0.70-1.47)	1.08(0.82-1.44)
Generalized anxiety disorder	2.94(1.60-5.43)**	3.62(2.42-5.40)†	2.80(2.08-3.78)†	3.28(2.59-4.15)†	1.05(0.54-2.06)	1.10(0.71-1.72)
Any substance use disorder	1.65(1.38-1.97)†	1.65(1.41-1.94)†	1.50(1.26-1.77)†	1.68(1.47-1.92)†	1.10(0.86-1.42)	0.99(0.79-1.22)
Alcohol abuse/dependence	1.61(1.28-2.02)†	1.26(1.03-1.54)*	1.00(0.76-1.32)	1.10(0.83-1.44)	1.61(1.12-2.31)*	1.15(0.83-1.60)
Drug abuse/dependence	1.43(0.85-2.41)	1.34(0.94-1.91)	1.92(1.16-3.15)*	2.35(1.69-3.27)†	0.75(0.35-1.62)	0.57(0.35-0.92)*
Nicotine dependence	1.73(1.41-2.12)†	1.87(1.56-2.23)†	1.60(1.34-1.92)†	1.80(1.56-2.08)†	1.08(0.81-1.43)	1.04(0.82-1.31)
Any Axis II disorder	1.89(1.55-2.32)†	1.79(1.53-2.09)†	1.90(1.59-2.26)†	1.87(1.64-2.14)†	1.00(0.77-1.30)	0.96(0.79-1.15)
Any Cluster A	2.33(1.71-3.16)†	2.27(1.81-2.86)†	2.15(1.70-2.70)†	2.15(1.82-2.54)†	1.08(0.74-1.59)	1.06(0.81-1.37)
Paranoid	2.53(1.74-3.68)†	2.54(1.92-3.34)†	2.17(1.69-2.80)†	2.08(1.73-2.50)†	1.17(0.76-1.79)	1.22(0.90-1.65)
Schizoid	2.44(1.63-3.65)†	2.00(1.52-2.64)†	2.33(1.71-3.16)†	2.57(2.05-3.23)†	0.78(0.55-1.09)	1.05(0.62-1.77)
Any Cluster B	1.86(1.37-2.51)†	2.10(1.71-2.58)†	1.78(1.36-2.32)†	2.05(1.62-2.60)†	1.04(0.69-1.57)	1.02(0.75-1.39)
Histrionic	2.07(1.22-3.53)**	2.31(1.57-3.39)†	1.98(1.33-2.94)**	2.24(1.62-3.12)†	1.05(0.58-1.90)	1.03(0.60-1.75)
Antisocial	1.89(1.36-2.61)†	2.09(1.67-2.63)†	1.70(1.18-2.47)**	1.87(1.37-2.54)†	1.11(0.66-1.86)	1.12(0.76-1.65)

	Male respondents		Female respondents		Interaction (male vs. female)	
Psychiatric Diagnoses	**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**	**OR (95% CI) for Moderate pain vs. No/Low pain**	**OR (95% CI) for Severe pain vs. No/Low pain**
Any Cluster C	1.90(1.45-2.48)†	1.64(1.34-2.00)†	2.01(1.67-2.43)†	1.81(1.55-2.12)†	0.94(0.69-1.30)	0.90(0.71-1.15)
Avoidant	2.43(1.44-4.11)*	2.08(1.54-2.81)†	2.68(1.98-3.65)†	2.04(1.60-2.59)†	0.90(0.51-1.61)	1.02(0.70-1.48)
Dependent	3.25(1.14-9.26)*	3.77(1.90-7.46)†	3.47(1.90-6.34)†	4.09(2.53-6.62)†	0.94(0.29-2.99)	0.92(0.40-2.10)
Obsessive-compulsive	1.78(1.35-2.33)†	1.58(1.27-1.96)†	1.92(1.57-2.36)†	1.73(1.45-2.07)†	0.92(0.66-1.29)	0.91(0.69-1.20)

Adjusted for race/ethnicity, marital status, education, employment, age, and annual household income. CI = confidence interval

*p < 0.05

**p < 0.01

†p < 0.001

1With or without agoraphobia

Table 4

Association between general medical conditions and pain interference severity among all respondents

	Low/No Pain	Moderate Pain	Severe Pain	
General Medical Conditions	**n (%)**	**n (%)**	**n (%)**	**p**
Arteriosclerosis	299 (0.9)	119 (3.6)	328 (5.5)	<0.0001
Hypertension	5568 (15.4)	1087 (31.2)	2165 (35.7)	<0.0001
Cirrhosis	29 (0.1)	12 (0.3)	55 (0.9)	<0.0001
Other liver disease	117 (0.3)	32 (1.0)	103 (1.7)	<0.0001
Angina	711 (2.0)	306 (9.1)	759 (12.8)	<0.0001
Tachycardia	818 (2.4)	305 (8.6)	731 (12.2)	<0.0001
Myocardial infarction	185 (0.5)	62 (1.8)	194 (3.1)	<0.0001
Other heart disease	561 (1.6)	198 (5.9)	491 (8.7)	<0.0001
Stomach ulcer	546 (1.6)	153 (4.4)	400 (6.5)	<0.0001
Gastritis	1079 (3.0)	280 (8.3)	633 (10.6)	<0.0001
Arthritis	4034 (11.6)	1302 (40.1)	2523 (43.0)	<0.0001

Table 5

Association between general medical conditions and pain interference severity among male and female respondents

	Male respondents				Female respondents				Interaction
General Medical Conditions	Low/No Pain n (%)	Moderate Pain n (%)	Severe Pain n (%)	p	Low/No Pain n (%)	Moderate Pain n (%)	Severe Pain n (%)	p	(male vs. female) p
Arteriosclerosis	167 (1.1)	57(4.6)	124 (5.9)	<0.0001	132 (0.7)	62 (2.8)	204 (5.3)	<0.0001	0.1385
Hypertension	2349 (14.9)	350 (27.1)	707 (32.5)	<0.0001	3219 (15.9)	737 (34.2)	1458 (37.9)	<0.0001	0.0088
Cirrhosis	20 (0.1)	6 (0.5)	37 (1.8)	0.0005	9 (0.07)	6 (0.2)	18 (0.4)	0.0064	0.4943
Other liver disease	59 (0.4)	17 (1.4)	52 (2.4)	<0.0001	58 (0.3)	15 (0.7)	51 (1.1)	0.0001	0.1744
Angina	295 (1.9)	110 (9.1)	268 (12.7)	<0.0001	416 (2.1)	196 (9.1)	491 (12.8)	<0.0001	0.8556
Tachycardia	263 (1.7)	93 (7.5)	216 (10.5)	<0.0001	555 (3.0)	212 (9.5)	515 (13.5)	<0.0001	0.0976
Myocardial infarction	102 (0.6)	31 (2.6)	96 (4.2)	<0.0001	83 (0.4)	31 (1.3)	98 (2.3)	<0.0001	0.3795
Other heart disease	267 (1.7)	81 (6.3)	182 (9.0)	<0.0001	294 (1.5)	117 (5.8)	309 (8.5)	<0.0001	0.8519
Stomach ulcer	230 (1.5)	51 (4.3)	111 (4.9)	<0.0001	316 (1.7)	102 (4.5)	289 (7.6)	<0.0001	0.1098
Gastritis	399 (2.6)	67 (6.1)	159 (6.7)	<0.0001	680 (3.5)	213 (9.9)	474 (13.4)	<0.0001	0.0223
Arthritis	1365 (9.1)	369 (31.9)	744 (35.7)	<0.0001	2669 (14.1)	933 (46.1)	1779 (48.3)	<0.0001	0.5343

Table 6

Association between substance use and pain interference severity among all respondents

Substance Use	Low/No Pain n (%)	Moderate Pain n (%)	Severe Pain n (%)	p
Cannabis	6690 (21.3)	577(19.7)	889 (18.2)	0.0012
Cocaine	1993 (6.1)	219 (7.3)	314 (6.4)	0.1912
Hallucinogens	1718 (5.7)	196 (7.4)	256 (5.9)	0.0485
Heroin	95 (0.3)	17 (0.6)	38 (0.5)	0.0441
Inhalants	513 (1.7)	54 (1.7)	95 (2.0)	0.5690
Opioids[1]	1350 (4.5)	182 (6.6)	280 (5.8)	0.0011
Other drugs	60 (0.2)	13 (0.5)	14 (0.3)	0.1678
Sedatives	1194 (3.9)	178 (6.2)	233 (4.8)	0.0004
Stimulants	1330 (4.5)	177 (6.4)	242 (5.4)	0.0021
Tranquilizers	950 (3.2)	136 (4.8)	214 (4.5)	0.0005
Substance Use Pattern[2]				0.0008
Past year use	1901 (6.1)	197 (6.5)	358 (7.3)	
Lifetime use	5488 (17.2)	464 (15.8)	716 (14.2)	
Lifetime nonuse	26475 (76.8)	2612 (77.7)	4539 (78.5)	

[1] Opioids other than heroin or methadone

[2] Lifetime use refers to use but not in the past year

Table 7

Association between substance use and pain interference severity among male and female respondents

	Male respondents				Female respondents				Interaction
	Low/No Pain n (%)	Moderate Pain n (%)	Severe Pain n (%)	p	Low/No Pain n (%)	Moderate Pain n (%)	Severe Pain n (%)	p	(male vs. female) p
Substance Use									
Cannabis	3679 (25.3)	278 (25.3)	445 (24.5)	0.8353	3011 (17.4)	299 (15.6)	444 (13.7)	0.0003	0.0200
Cocaine	1187 (8.0)	127 (10.8)	173 (9.4)	0.0226	806 (4.2)	92 (4.7)	141 (4.1)	0.7238	0.2291
Hallucinogens	1062 (7.5)	107 (10.2)	170 (10.5)	0.0016	656 (3.9)	89 (5.3)	86 (2.7)	0.0023	0.0001
Heroin	66 (0.4)	12 (1.0)	25 (0.9)	0.0468	29 (0.1)	5 (0.3)	13 (0.2)	0.3514	0.6911
Inhalants	364 (2.6)	35 (2.7)	69 (4.0)	0.0977	149 (0.9)	19 (0.9)	26 (0.6)	0.1865	0.0146
Opioids[1]	768 (5.6)	94 (9.5)	150 (8.1)	0.0009	582 (3.4)	88 (4.4)	130 (4.1)	0.0582	0.1955
Other drugs	49 (0.4)	8 (0.8)	10 (0.7)	0.2507	5 (0.3)	4 (0.1)	20 (0.1)	0.3636	0.2581
Sedatives	661 (4.7)	94 (8.7)	130 (7.2)	0.0004	533 (3.0)	84 (4.4)	103 (3.2)	0.0895	0.0482
Stimulants	780 (5.7)	91 (8.4)	144 (8.4)	0.0041	550 (3.2)	86 (4.9)	98 (3.3)	0.0398	0.0920
Tranquilizers	545 (4.1)	71 (7.0)	121 (7.1)	0.0002	405 (2.3)	65 (3.2)	93 (2.7)	0.1502	0.0470
Substance Use Pattern[2]				0.1635				0.0006	0.0534
Past year use	1091 (7.6)	90 (7.9)	181 (9.8)		810 (4.60)	107 (5.49)	177 (5.42)		
Lifetime use	2874 (19.5)	218(19.7)	337 (18.2)		2614 (14.96)	246 (13.02)	379 (11.31)		
Lifetime nonuse	11132 (73.0)	899 (72.5)	1543 (72.0)		15343 (80.44)	1713 (81.49)	2996 (83.27)		

[1] Opioids other than heroin or methadone

[2] Lifetime use refers to use but not in the past year