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Exploring relations among traumatic, posttraumatic, and physical pain experiences in methadone-maintained patients

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Abstract

Differences in lifetime trauma exposure and screened symptoms of PTSD were examined in methadone maintenance treatment (MMT) patients with a variety of pain experiences. Parametric and non-parametric statistical tests were performed on data obtained from 150 patients currently enrolled in MMT. In comparison to MMT patients reporting no pain in the previous week, those with chronic severe pain (CSP) (i.e., pain lasting at least 6 months with moderate to severe pain intensity or significant pain interference) exhibited comparable levels of trauma involving sexual assault, but reported significantly higher levels of trauma involving physical assault, number of traumatic events, and screened symptoms of PTSD. A third group, i.e., non-CSP MMT patients reporting some pain in the past week, differed significantly from the CSP group on number of traumatic events but reported comparable levels of sexual assault and physical assault. In comparison to men, women reported higher levels of sexual assault and were more likely to score above the cutoff on the PTSD screener, but reported comparable levels of physical assault and number of traumatic events. Pain-related differences in trauma and screened symptoms of PTSD exist in MMT patients and may have implications for program planning and outreach efforts.

Keywords

Pain; methadone; opioid-related disorders; trauma; PTSD

INTRODUCTION

Exposure to trauma is common among individuals with substance use disorders (SUDs), particularly among those with opioid-related disorders, and is associated with elevated rates of posttraumatic stress disorder (PTSD).[10,22] Lifetime prevalence estimates of PTSD

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among patients in methadone maintenance treatment (MMT) exceed those for the general population and vary from 14 to 41%.[6,15,17,19,20,34] While MMT patients with and without PTSD demonstrate comparable rates of treatment retention,[15] those with PTSD are more likely to exhibit psychopathology and polysubstance use 3 months after treatment admission.[6,15,34]

Investigations among different clinical populations have also demonstrated that trauma and PTSD are associated with chronic pain; i.e., pain lasting at least 6 months.[2,9,26,31,33,35] Prevalence estimates of chronic pain in MMT exceed those for the general population and range from 37% with chronic severe pain to more than 60% with chronic pain of any intensity.[16,30] While the importance of diagnosing and treating PTSD in SUD treatment settings has been emphasized,[11,23] the extent to which MMT patients with and without chronic pain differ on lifetime trauma exposure and current PTSD symptoms is unclear.

An improved understanding of lifetime trauma exposure and PTSD symptoms among methadone-maintained patients with a variety of pain experiences could help resource and program planning for MMT programs. Recent studies have highlighted the importance of assessing three varieties of pain among patients in SUD treatment, namely chronic severe pain (CSP) (i.e., pain lasting at least 6 months with moderate to severe pain intensity or significant pain interference), “some pain” (i.e., pain experienced in the previous week but not CSP) and “no pain” (i.e., no pain reported in the past week and no CSP).32 Consequently, the present study compared trauma and screened symptoms of PTSD among MMT patients with chronic severe pain, some pain, and no pain. We previously reported on the prevalence (and psychiatric and substance use correlates) of these three pain groups in MMT: In comparison to the no pain group, the CSP group exhibited higher levels of depression, anxiety, somatization, overall psychiatric distress, and personality disorder criteria, and the three pain groups reported comparable rates of alcohol and tobacco use; illegal drug use (cannabis, cocaine, and heroin); and nonmedical use of prescription drugs (opioids, amphetamines, and benzodiazepines).3 However, we did not report on (a) the association between trauma, PTSD, and substance use, or (b) pain groups’ trauma exposure or PTSD screening totals.

Since chronic pain status is associated with exposure to trauma and PTSD symptoms[2,9,31] we hypothesized that, in comparison to patients without pain, those with CSP would exhibit higher levels of lifetime trauma exposure (i.e., physical assault, sexual assault, total number of traumatic events) and screened symptoms of PTSD. Whereas research studies on opioid dependent patients have generally found a higher prevalence of exposure to sexual assault among women as compared to men, the association between gender and prevalence of exposure to physical assault is less robust.[6,20,27] We hypothesized that female participants enrolled in MMT would exhibit higher levels of lifetime trauma exposure involving sexual assault and male participants would exhibit higher levels of lifetime trauma exposure involving physical assault. We did not advance a gender hypothesis regarding pain status in the current study since we have previously noted that the three pain groups did not differ significantly on gender composition.3 Given previous findings regarding gender differences in susceptibility to PTSD, we hypothesized that women in MMT would be more likely than men to exhibit screened symptoms of PTSD.[4,12,20] Finally, we examined the association between trauma, PTSD, and substance use.

MATERIALS AND METHODS

Participants

Participants were 150 MMT patients (85 men and 65 women) aged 19 to 61 years (*M*, 41.5; *SD*, 10.2) who were in treatment for at least six months (*Mdn* = 24; Q_1 = 12; Q_3 = 60) at one

of the three opioid agonist treatment programs operated by the APT Foundation, Inc. (hereafter referred to as APT), a private not-for-profit community-based organization located in New Haven, CT that had a census of approximately 1,500 patients at the beginning of data collection. Participants were predominantly Caucasian (58%), male (57%), never married (53%), and unemployed (43%) or disabled (29%). A majority of participants had at least a high school level of education (68%). All participants had at least one prior MMT episode; the frequency of prior MMT episodes ranged from 1 to 15 (*Mdn* = 2; $Q_1 = 1$; $Q_3 = 3$).

Design

The current study employed a cross-sectional survey design.

Procedures

Participants were self-selected in response to study flyers indicating, “This study aims to better understand patients’ experiences and treatment needs at APT.” No references to trauma or pain were printed on the flyer. Flyers were posted at APT’s Legion, Orchard, and Park MMT clinics. Study inclusion criteria were that participants needed to be (1) currently enrolled in MMT at APT and (2) English speaking. The first 50 patients from each of the 3 clinics who responded to the flyer by contacting a research assistant were admitted into the study. All patients who spoke with a research assistant about the study agreed to participate. Research assistants administered the questionnaire packet (measures described below) after describing the study, including potential risks and benefits of study participation. Participants were compensated $10 for study participation. This study, involving the use of survey data without identifiers, was presented to the Human Investigations Committee at APT and the Yale University School of Medicine and was exempted from review per United States Department of Health and Human Services (HHS) regulation 45 CFR 6.101(b)(2). Consequently, rather than collecting written informed consent prior to study enrollment, research assistants provided prospective participants with an information sheet regarding the nature of the study, reviewed its content, including potential costs and benefits of study enrollment, and answered questions about the study.

Measures

Life Experiences Checklist (LEC).[14]—Respondents were asked to report if they had experienced 13 possible traumatic experiences (yes/no): natural disaster (e.g., tornado, flood), fire or explosion, transportation accident (e.g., car accident, train wreck), serious accident (at work, home, or during recreational activity), exposure to toxic substance (e.g., dangerous chemicals, radiation), physical assault (e.g., being attacked, beaten up), assault with a weapon (e.g., being shot or stabbed), sexual assault (e.g., rape, attempted rape, made to perform any type of sexual contact through force or threat or harm), other unwanted or uncomfortable sexual experience, combat or exposure to a warzone, captivity (in the military or as a civilian), life-threatening illness or injury, and severe human suffering (e.g., ongoing poverty or starvation, continued homelessness). LEC items were designed to screen for lifetime exposure to possible traumatic experiences that meet threshold for DSM-IV-TR PTSD Criterion A1.[1] As previously done, respondents were coded as having a lifetime history of exposure to sexual trauma if they reported that they had experienced sexual assault or other unwanted or uncomfortable sexual contact, and they were coded as having a lifetime history of exposure to physical assault if they reported that they had experienced physical assault, assault with a weapon, or captivity.25 The LEC is a well-standardized instrument that has been used in studies of patients with a variety of medical and psychiatric conditions, including chronic pain and substance dependence.[13,21,25,28] In the present study, Cronbach alpha reliability coefficients for the Physical Assault subscale and the 13-

item total scale were .60 and .70, respectively. The inter-item correlation coefficient of the 2-item Sexual Assault subscale was .63.

Primary Care PTSD Screen (PC-PTSD).[29]—The PC-PTSD is a 4-item PTSD screening instrument that asks respondents whether in the past month they had experienced nightmares or intrusive re-experiencing, avoidance of trauma reminders, hypervigilance or hyperarousal, and detachment or numbness. A cutoff of 3 or more items on the PC-PTSD has demonstrated good sensitivity and specificity for identifying individuals diagnosed with PTSD in primary care (.78 and .87, respectively) and substance use disorder treatment settings (.91 and .87, respectively).[18,29] In the present study, the Cronbach alpha reliability of the PC-PTSD was .84.

Respondents provided information about the duration of their current pain episode. On an 11-point scale (0 to 10), they also rated 3 facets of pain experienced in the past 7 days (i.e., "pain at its worst," "pain at its least" and "typical level of pain"). In addition, they completed 3 pain interference items (scored on a scale from 0 to 10) from the Brief Pain Inventory (BPI)[7,8] that assessed the extent to which their pain in the last 7 days had interfered with their "everyday life," "normal work," and "relationships with other people." Respondents' answers to these items were used to classify them into one of three pain groups: a) "chronic severe pain" (i.e., pain lasting at least 6 months with moderate to severe pain intensity or significant pain interference)—consistent with previous reports,[30,32] respondents who had pain lasting at least 6 months and who scored 5 or higher on the item pertaining to the worst level of pain intensity in the last 7 days or on any of the items relating to pain interference in the last 7 days were considered to exhibit chronic severe pain; b) "some pain" (i.e., pain reported in past week but not CSP; and c) "no pain" (i.e., no pain reported in the past week and no CSP). Respondents also provided information about past week use of psychoactive substances: alcohol and tobacco; illegal drugs (cannabis, cocaine, heroin); and non-medical use of prescription drugs (opioids, amphetamines, benzodiazepines).

Data Analysis

Group differences on lifetime exposure to traumatic experiences, current screened symptoms of PTSD, and past week substance use were examined using multivariate analyses of variance (MANOVA) procedures for continuous data and Pearson chi-square tests for frequency data. Since we were examining 4 dependent variables (i.e., LEC total, LEC Sexual Assault subscale, LEC Physical Assault subscale, PC-PTSD total), which are conceptually related and significantly correlated (pearson correlations ranged from $r = .29$ to $r = .74$, all p values $< .001$), we deemed it more appropriate to employ a single MANOVA model rather than 4 single ANOVAs. Using this methodology reduces the likelihood of encountering a Type I error. Since the three pain groups differed significantly on age, we also performed a multivariate analysis of covariance (MANCOVA) to control for age on comparisons involving continuous data related to lifetime prevalence of exposure to traumatic experiences and current screened symptoms of PTSD. When MANOVA analyses revealed significant differences among the three pain groups, we performed posthoc comparisons using the conservative Scheffe method to further examine these differences. Statistical significance was set at $p < 0.05$.

RESULTS

Demographic Characteristics

As reported previously,[3] among the 150 respondents, 24% were in the "no pain" group, 39% in the "some pain" group, and 37% in the "chronic severe pain" group. While gender, race/

ethnicity, employment status, educational level, and relationship status did not vary by pain group (i.e., no pain [NP], some pain [SP], chronic severe pain [CSP]), the three groups differed significantly on age ($F[2, 147] = 4.94$, $p < 0.05$). Scheffe post hoc analyses revealed that participants with chronic severe pain were significantly older (44.8) than those with some pain (mean 39.0, mean difference 5.8, 95% confidence interval [CI] = 1.1 to 10.3, $p < 0.01$, two-tailed test). Although the mean age of the CSP group, on average, was numerically higher than the NP group (40.6), this difference was not statistically significant ($p = 0.15$).

Traumatic Experience Exposure

As summarized in Table 1, after controlling for age, the three pain groups had comparable levels of lifetime prevalence of exposure to sexual assault but differed on lifetime prevalence of exposure to physical assault and number of traumatic events. Scheffe posthoc tests indicated that while the SP and NP groups had comparable levels of lifetime exposure to physical assault, in comparison with the NP group, the CSP group reported higher levels of lifetime exposure to physical assault [mean difference, 0.50; 95% CI, 0.10 to 0.99; $p<0.05$]. In contrast, Scheffe posthoc tests revealed that while the NP and SP groups reported comparable levels of lifetime prevalence of exposure to number of traumatic events, the CSP group reported that they had been exposed to a greater number of lifetime traumatic events than both the NP [mean difference, 1.96; mean difference 95% CI, 0.61 to 3.31; $p<.005$] and SP groups [mean difference, 1.35; mean difference 95% CI, 0.18 to 2.52; $p<0.05$].

After controlling for age, male and female participants reported similar levels of lifetime physical assault exposure and number of traumatic events, but in comparison to men, women reported higher levels of lifetime sexual assault ($F[2, 143] = 27.38$, $p < 0.001$). There were no significant pain group-by-gender interactions on lifetime prevalence of trauma exposure (i.e., LEC total, LEC Sexual Assault subscale, LEC Physical Assault subscale).

Although our primary focus was the examination of differences on physical assault, sexual assault, and number of traumatic events, we provide the following descriptive data to assist in the clinical interpretation of our findings. Chi-square analyses revealed significant differences for the NP, SP, and CSP groups on lifetime exposure to natural disaster (21% vs. 29% vs. 50%; $p < 0.05$), transportation accident (23% vs. 35% vs. 43%; $p < 0.05$), toxic substance (14% vs. 21% vs. 64%; $p < 0.01$), and severe human suffering (17% vs. 34% vs. 49%; $p < 0.001$).

Respondents reported comparable levels of past week substance use irrespective of lifetime history of physical or sexual assault. As reported previously, respondents reported the following rates of past week substance use: alcohol (27%), tobacco (89%) cannabis (11%), cocaine (25%), and heroin (11%); and non-medical use of prescription opioids (3%), amphetamines (0%), and benzodiazepines (11%) irrespective of history of sexual assault or physical assault.[3]

Screened Symptoms of PTSD

As summarized in Table 1, after controlling for age, the three pain groups differed on current screened symptoms of PTSD. The NP group had lower levels of screened symptoms of PTSD than the SP [mean difference, −1.11; mean difference 95% CI, −1.91 to −0.72; $p<0.005$] and CSP [mean difference, −1.31; mean difference 95% CI, −2.12 to −0.49; $p<0.001$] groups, which did not differ significantly from one another. Men and women reported comparable levels of screened symptoms of PTSD. There was no significant pain group-by-gender interaction on current screened symptoms of PTSD.

While similarly high proportions of men and women reported lifetime exposure to physical assault (82% vs. 74%), women were more likely than men to report lifetime exposure to sexual assault 62% vs. 17%, $p<0.001$). When we used a cutoff of > 2 for the PC-PTSD scale, chi-square analyses revealed significant differences for the NP, SP, and CSP groups (14% vs. 36% vs. 45%; $p < 0.05$). Women were more likely than men to score above the cutoff of > 2 (43% vs. 27%; $p < 0.05$). Respondents who did and did not score above the cutoff of > 2 on the PC-PTSD scale reported comparable levels of alcohol and tobacco use; illegal drug use (cannabis, cocaine, and heroin); and nonmedical use of prescription drugs (opioids, amphetamines, and benzodiazepines).

DISCUSSION

The hypothesis that those with chronic severe pain (in contrast to patients without pain) would exhibit higher levels of lifetime trauma exposure (i.e., physical assault, sexual assault, total number of traumatic events[1]) and screened symptoms of PTSD was partially supported. After controlling for age, the “some pain” and “chronic pain” groups had comparable levels of lifetime prevalence of exposure to sexual assault but the CSP group reported higher levels of exposure to lifetime physical assault, number of traumatic events experienced, and screened symptoms of PTSD. Our findings extend those reported in previous studies documenting the high prevalence of trauma and PTSD in substance use disorder treatment programs[11,23] by suggesting that levels of trauma exposure and screened symptoms of PTSD may be particularly prevalent among MMT patients with some pain or chronic severe pain. Whereas 14% of MMT patients in our study who reported no pain in the previous week scored above the clinical cutoff for PTSD, these proportions increased noticeably for those endorsing some pain and chronic severe pain (36% and 45%, respectively). The robust association between trauma and substance use disorders has led some authors to conclude that the presence of one should lead clinicians to assess for the presence of the other.[5] Our findings support the current clinical standard of assessing for trauma and PTSD among patients in treatment, including those in treatment for substance use disorders, and they suggest that trauma and PTSD may be especially prevalent in MMT patients with pain (particularly those with chronic severe pain).

Our hypothesis that women would be more likely to report higher levels of lifetime trauma exposure involving sexual assault and men would be more likely to report higher levels of lifetime trauma exposure involving physical assault was partially supported. While men and women reported similarly high number of lifetime trauma events involving physical assault, women reported significantly more lifetime trauma events involving sexual assault. Furthermore, while more than three-quarters of men and women (82% and 74%, respectively) reported lifetime exposure to physical assault, women were more likely than men to report lifetime exposure to sexual assault (62% and 17%, respectively). The equivalently high rates of endorsement of lifetime exposure to physical assault among men and women and the high rates of lifetime exposure to sexual assault (especially among women) concur with previously reported findings of opioid dependent patients in a large Australian study and highlight the importance of assessing and addressing exposure to trauma among MMT patients.[20]

Whereas men and women in our study did not differ on lifetime prevalence of exposure to physical assault or the total number of trauma events experienced or screened symptoms of PTSD, women were more likely than men to score above the PC-PTSD screener cutoff. These findings support those previously reported regarding sex differences in susceptibility to PTSD[4,12,20] and highlight the importance of assessing and addressing PTSD among

[1]Traumatic events assessed by the Life Event Checklist pertain to DSM-IV-TR PTSD Criterion A1 (and not Criterion A2).

patients (especially, female patients) in MMT. The extent to which exposure to sexual vs. physical assault is associated with sex/gender and pain status among MMT patients is unknown and merits further investigation. Future research on sex/gender differences in susceptibility to PTSD in MMT might benefit from a more detailed assessment of trauma, pain, and PTSD, including pain and trauma type (e.g., combat vs. crime physical trauma, recurrent vs. intermittent pain), frequency, and chronology. For example, while many women in substance use disorder treatment report repetitive childhood exposure of physical and/or sexual assault,[24] the extent to which trauma frequency (e.g., repetitive vs. singular) and type (e.g., physical vs. sexual) are associated with the presence of physical pain and PTSD is unclear and merits further investigation. The pain groups differed on rates of lifetime exposure to natural disaster, transportation accident, toxic substance, and severe human suffering. The sequencing and timing of exposure to these traumas and the onset of pain was not measured in this study and merits further research attention. Recent findings indicating that the presence of pain shortly following trauma may be a risk factor for the onset of PTSD25 suggests the importance of a more detailed assessment of the chronology of pain, trauma, and PTSD among MMT patients.

Respondents reported comparable rates of self-reported past week substance use irrespective of lifetime exposure to physical or sexual trauma, or scoring above the cutoff on the PC-PTSD. Study participants were in MMT for at least 6 months; prospective studies examining the rates of substance use as a function of pain, trauma, and PTSD status might elucidate the interrelationships between these variables. In addition to patients' self-reports of drug use, future studies in this area might also benefit from the inclusion of urine toxicology findings.

Several potential limitations are worth noting. Participants were drawn from three opioid agonist treatment programs operated by one organization in a particular geographic region; thus our findings may or may not generalize to other MMT programs. Although our study attempted to differentiate between non-chronic severe pain patients with "some pain" and those with "no pain" based on the presence or absence of pain in the past week, the "some pain" group is comprised of individuals with differing pain durations. Future research in this area may benefit from further dividing the "some pain" group into subgroups based on varying pain durations and pain genesis.

Our study did not employ formal diagnostic assessments of trauma/PTSD or collect medical histories (including age of onset of trauma, PTSD screening symptoms, and pain), and no independent assessment of patients' pain status or medical history was conducted. Instead, the focus of our study was screening for lifetime exposure to sexual and physical assault and for PTSD. A comprehensive assessment of trauma and PTSD would not only better define the sample with regard to psychological problems, it would also further elucidate the mental health needs of MMT patients with a variety of pain experiences and might allay concerns about the presence of possible "false positives" (i.e., "overdiagnosing") associated with screening instruments. A comprehensive DSM-IV-TR multiaxial diagnosis1 might yield important data regarding potentially important mediators or moderators of the relationship between pain and PTSD in this patient population. While the proportion of participants who scored above PC-PTSD cutoff (34%) is consistent with previous prevalence estimates of PTSD in MMT settings,[15,19,20] the extent to which MMT attendance (all patients were in MMT for at least 6 months) and engagement in different components of treatment (e.g., counseling) affected the rates of PTSD and chronic pain was not examined and merits further research attention. Given that comprehensive pain management services for MMT patients with chronic pain will likely require a multidisciplinary approach, future research in this area might benefit from an examination of interventions that are designed to address pain directly (e.g., medications, somatic treatments) in addition to further examination of co-occurring PTSD.

Although previous studies have examined the association between chronic pain and trauma/PTSD, and trauma/PTSD and substance use disorders (e.g.,[6,15,26,31,33,35]), the present study is among the first to systematically examine the prevalence of exposure to trauma and PTSD symptoms in MMT patients with a variety of pain experiences. Future research in MMT settings may benefit from the examination of possible biological risk factors that underlie PTSD, chronic pain, and opioid dependence. For example, one approach might involve extending the work of Yehuda and colleagues on the role of biological risk factors in the development of PTSD (e.g., peripheral catecholamine levels) to the co-occurrence of PTSD, chronic pain, and opioid dependence.[36] Future research may also benefit from a more thorough examination of mind-body issues in MMT patients with pain. For example, while study participants reported high levels of physical and sexual assault, it is unclear whether PTSD resulting from physical vs. psychological trauma is differentially associated with pain sensitivity and tolerance in MMT patients. In addition, it is unclear whether MMT patients with similar levels of trauma but who differ in terms of the manifestation of PTSD vary in pain perception. The findings on differences in the trauma and PTSD characteristics of patients among pain groups have implications for resource and program planning in MMT programs (e.g., increased psychiatric services targeting co-occurring PTSD and pain). While previous studies have highlighted the importance of examining shared vulnerabilities and mutual maintenance pathways for co-occurring pain and PTSD,[2,31] our findings suggest that extending this approach to include co-occurring pain, PTSD, and opioid dependence may be worthwhile.

Perspective: This article demonstrates that trauma and screened symptoms of PTSD vary as a function of gender and pain status in methadone maintained patients. Future studies may benefit from developing and assessing interventions that address chronic pain, PTSD, and opioid dependence in MMT.

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Table 1

Comparison of NP, SP, and CSP groups on Trauma Exposure and PTSD Symptoms

	No Pain (*n* = 35)		Some Pain (*n* = 59)		Chronic Severe Pain (*n* = 56)		MANOVA*		MANCOVA[1]**	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	***F*(2,147)**	***p***	***F*(2,143)**	***p***
LEC										
Sexual Assault	0.4	0.7	0.5	0.8	0.6	0.8	1.56	.214	1.16	.069
Physical Assault	1.1[a]	0.9	1.4	0.9	1.6[a]	0.9	3.18	.045	2.93	.037
LEC Total	3.9[a]	1.9	4.5[b]	2.8	5.9[a,b]	2.6	7.47	.001	49.03	.001
PC-PTSD										
Total	0.7[a,b]	1.2	1.8[a]	1.6	2.0[b]	1.7	8.59	<.001	21.19	<.001

[1] Controlling for age

[ab] Scales with the same superscripts differ significantly from each other at p <.05 for two-tailed tests using Scheffe post hoc tests; scales without superscripts do not differ significantly from other scales in that row.