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Number and Type of Post-Traumatic Stress Disorder (PTSD) Symptom Domains are associated with Patient-Reported Outcomes in Patients with Chronic Pain

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Abstract

Post-Traumatic Stress Disorder (PTSD) commonly accompanies complex chronic pain, yet PTSD is often overlooked in chronic pain management. Using the 4-item Primary Care (PC)-PTSD screening tool, we evaluated the relationship between the number and type of PC-PTSD symptoms endorsed and a set of patient-reported outcomes, including: pain intensity and interference; function; mood; quality of life; and substance abuse risk in a consecutive sample of patients with chronic pain (n=4,402). Patients completed PainTracker™, a web-based patient-reported outcome tool that provides a multidimensional evaluation of chronic pain, as part of their intake evaluation at a specialty pain clinic in a community setting. Twenty-seven percent of the sample met PC-PTSD screening criteria for PTSD by endorsing three of the four symptom domains. Significant ordinal trends were observed between increasing number of PTSD symptoms and all outcomes evaluated. The occurrence of even one PTSD symptom was associated with overall poorer outcomes, suggesting that subsyndromal PTSD is clinically significant in the context of chronic pain. Among the four PTSD domains assessed, “numbness/detachment” was most strongly associated with negative pain outcomes by relative weight analysis. Results from this cross-sectional study suggest that a range of pain-related outcomes may be significantly related to comorbid PTSD.

Perspective—We present evidence that PTSD symptoms are significantly related to a broad set of pain-related patient-reported outcomes. These findings highlight the need to evaluate for PTSD symptoms in patients with chronic pain, especially feelings of numbness or detachment from others, in order to improve understanding and management of chronic pain.

Keywords

post-traumatic stress disorder; PTSD symptoms; chronic pain; patient-reported outcomes

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Introduction

Post-traumatic stress disorder (PTSD) commonly accompanies chronic pain. Population-based data from the National Comorbidity Survey suggest that prevalence of PTSD in patients with chronic pain is nearly four times that of the general population, controlling for sociodemographic characteristics.²⁹ Estimates of PTSD in individuals with chronic pain range from 10% to 50%,³ depending on sample characteristics and the type of trauma experienced. Individuals with chronic pain and concurrent PTSD report increased pain intensity, more physical co-morbidities,³² and greater pain-related disability² than those without PTSD.

The vast majority of research on the topic of PTSD and chronic pain has focused on a comparison of individuals with and without the full PTSD syndrome. However, PTSD is a multidimensional disorder³⁷ that may not be fully captured by a binary “PTSD”/“No PTSD” classification. In addition to exposure to a traumatic event, DSM-V criteria for PTSD require that patients endorse multiple symptom domains (i.e., re-experiencing, avoidance, negative thoughts or feelings, arousal) that significantly interfere with daily functioning for more than one month. The observation that many symptomatic individuals do not fulfill all of these criteria stimulated the concept of partial or subsyndromal PTSD.³⁹

Subsyndromal PTSD has been associated with a number of clinically meaningful outcomes, including: increased rates of lifetime mood disorders, substance use disorders, and attempted suicide;^{33,34} increased likelihood of physical diagnoses, including musculoskeletal disorders;^{17, 32} impaired social and occupational functional status;^{44, 50} and increased pain and pain interference among female veterans.⁴ In general, these studies found that individuals with subsyndromal PTSD had intermediate frequency or severity of most outcomes assessed compared to individuals with and without PTSD. It is therefore likely that subsyndromal PTSD may be similarly associated with negative outcomes in patients with chronic pain.

In addition to the number of PTSD symptoms, the type of PTSD symptoms may be important in patients with chronic pain. Multiple relationships among specific PTSD symptom domains and pain outcomes have been identified in previous studies. Hyperarousal has been associated with pain intensity, disability, and pain acceptance among chronic pain outpatients.^{10, 46} Emotional numbing and avoidance were associated with pain-related disability in homogenous samples of patients with chronic pain.^{11, 23, 28} Finally, avoidance predicted pain-related disability, and re-experiencing predicted pain-related distress in women with orofacial pain.¹³ These studies differed with respect to sample characteristics (i.e., sample size, pain diagnoses, etc.) and analytic methods used, precluding any real consensus regarding the relative importance of distinct PTSD symptom domains in chronic pain. The relationship between dimensions of trauma-related mental disorder (PTSD) and chronic pain outcomes therefore remains unclear. Thorough and systematic examination of the relationship between PTSD symptom domains and multi-dimensional chronic pain outcomes is needed to clarify the possible role of psychological trauma-focused therapies in chronic pain care.

The objectives of the current study were two-fold: (1) to evaluate the relationship between incremental increases in the number of PTSD symptom domains endorsed, spanning “subsyndromal” (one and two symptoms) and “syndromal” (three and four symptoms), using the Primary Care-PTSD (PC-PTSD) screen for four prototypical PTSD symptom domains (intrusion, avoidance, hyperarousal, numbness/detachment) and (2) to determine the relative importance of specific PTSD symptom domains in terms of their relationship with pain-related outcomes in a large sample of treatment-seeking patients with chronic pain. A better understanding of the complex relationship between the symptoms of PTSD and the multi-dimensional experience of chronic pain is necessary in order to deliver and optimize comprehensive pain care for patients suffering from chronic pain.

Methods

Patients and Setting

Study participants (N=4,402) were consecutive, predominantly civilian, patients seeking care for various chronic pain conditions at the University of Washington Center for Pain Relief (UW CPR) between June of 2014 and October of 2017, who completed an initial PainTracker™ assessment. PainTracker™ is a web-based patient-reported outcome (PRO) measurement tool that was developed to facilitate comprehensive, multi-dimensional pain assessment and management to improve outcomes for patients with chronic pain, described below.⁴⁰

Instruments

Basic demographic data was extracted from patients’ electronic medical records and merged with PainTracker™ data. The following measures were included in the PainTracker™ assessment.

PTSD Symptoms—The *Primary Care-PTSD Screen (PC-PTSD)*³⁵ was used to evaluate the occurrence of PTSD symptoms. The PC-PTSD is a brief 4-item instrument developed by the Veteran’s Administration (VA) to screen for PTSD in primary care settings. It asks: “In your life, have you ever had any experience that was so frightening, horrible, or upsetting that, in the past month you...” This statement is followed by four items that broadly correspond to DSM-V diagnostic criteria: (1) intrusion (unwanted nightmares or thoughts about the experience); (2) avoidance (avoiding thoughts or situations that are reminders of the experience); (3) hyperarousal (“constantly on guard, watchful, or easily startled”), and (4) numbness or detachment (from others, activities, or surroundings). The PC-PTSD has been found to be superior to other PTSD screening tests, including the PTSD Checklist (PCL), with better sensitivity (85%) and specificity (82%) in a civilian primary care setting.¹⁸ The PC-PTSD was also found to perform similarly to the PCL in identifying PTSD risk among patients admitted to a trauma center²⁰ and predicting PTSD among soldiers returning from combat.⁶

Pain and Interference—Pain and interference were evaluated using the 3-item *Pain intensity and interference with Enjoyment of life and General activity (PEG)*.²⁵ Pain Intensity was rated on an 11-point numeric rating scale (NRS), from 0 “no pain” to 10 “pain

as bad as you can imagine.” For interference items, patients indicated how much pain interfered with enjoyment of life and with general activity from 0 “does not interfere” to 10 “completely interferes.” The PEG has established reliability and validity in a community and veteran populations with chronic pain and has shown similar responsiveness to improvement as the Brief Pain Inventory.²⁴

Function—The *Oswestry Disability Index (ODI)*¹⁵ was used to evaluate pain-related functional disability. The ODI is a 10-item questionnaire that evaluates pain intensity and functional disability (e.g., personal care, lifting, walking, sleeping) associated with chronic low back pain. It is also a valuable outcome measure for other chronic pain conditions.¹⁶ It has established reliability and construct and discriminant validity.^{38, 48}

Mood and Quality of Life—The *Patient Health Questionnaire-9 (PHQ-9)*²⁶ The PHQ-9 is a 9-item questionnaire developed to screen for depression in the primary care setting. The items are based on DSM criteria for depressive disorders and has well-established validity and reliability.²⁷ Patients are asked how often in the previous two weeks had they been bothered by these nine problems, such as “little interest or pleasure in doing things” or “feeling down, depressed, or hopeless” (0 “not at all”, 1 “several days”, 2 “more than half the days”, 3 “nearly every day”). Responses are summed to yield a total score and scores 10 or greater indicate a likely diagnosis of depression.

The *Generalized Anxiety Disorder-7 (GAD-7)*⁴² was used to evaluate the severity of symptoms of anxiety. The GAD-7 is a 7-item scale developed to screen for generalized anxiety disorder in the primary care setting. Similar to the PHQ-9 described above, patients are asked to indicate how often they have been bothered by the 7 problems, such as “feeling nervous, anxious, or on edge” or “becoming easily annoyed or irritable” (0 “not at all”, 1 “several days”, 2 “over half the days”, 3 “nearly every day”). Responses are summed to yield a total score, where higher scores indicate more severe anxiety. Total scores of 10 or higher indicate a likely diagnosis of GAD.⁴²

The *Patient Reported Outcome Measurement Information System (PROMIS) Global Health Short Form*⁹ questionnaire was used to evaluate overall health-related quality of life (HRQOL). This reliable and valid scale is part of a National Institutes of Health initiative to standardize the collection of patient reported outcome measurement across studies and medical conditions.⁹ The scale consists of 10 items, spanning physical and mental health domains. Items are scored using a 5-point Likert scale from 1 to 5, where lower scores indicate poorer HRQOL.

Substance Abuse Risk—The *Opioid Risk Tool*⁴⁹ was used to evaluate the risk of opioid misuse. The ORT evaluates the presence of risk factors associated with substance abuse, including personal and family history of substance abuse, sex, age (16–45 years), history of sexual abuse and select psychological disorders. The total number of risk factors correspond to low (0–3 risk factors), moderate (4–7 risk factors), and high (8 risk factors) risk for opioid misuse. Scores for certain items (e.g., history of preadolescent sexual abuse) are scored differentially for males and females. Higher scores denote greater risk for opioid misuse.

The *Alcohol Use Disorders Identification Test-Consumption (AUDIT-C)*⁸ was used to measure alcohol consumption. The AUDIT-C is a 3-item screening tool for risky drinking behavior, where total scores range from 0 – 12. Total scores ≥ 4 in men and ≥ 3 in women indicate hazardous drinking behavior. The AUDIT-C has shown similar efficiency as the 10-item AUDIT scale and has demonstrated good reliability and validity.¹⁴

Study Procedures

Consecutive new patients who attended the University of Washington (UW) Center for Pain Relief (CPR), between July of 2014 and June of 2016, completed a collection of pain-relevant patient-reported outcome questionnaires (PRO) using PainTracker.TM All new patients were asked to complete the online questionnaires within one week of their scheduled appointment. Given that the PTSD screen is only included in the baseline assessment, only baseline questionnaire data were analyzed for the purposes of the current study. This cross-sectional study is an examination of existing PainTrackerTM PRO data from patients' intake visits at UW CPR. The use of PainTrackerTM data for research purposes was reviewed and approved by the Institutional Review Board at the University of Washington and a waiver of the requirement to obtain participant consent was obtained.

Data Analysis

Descriptive statistics and frequency distributions were calculated for sample characteristics. One-way analyses of variance (ANOVA) and Jonckheere-Terpstra tests (for ordered independent variable) for continuous variables and chi-square tests for categorical variables were used to evaluate for differences among patients with 0, 1, 2, 3, or 4 positive responses on the PC-PTSD. Posthoc Dunnett's test and chi-square tests with Bonferroni corrections were conducted for continuous and categorical variables, respectively, to determine differences between patients with and without PTSD symptoms. A p-value of <0.05 was considered statistically significant. Data were analyzed using SPSS v.19 (IBM, Armonk, NY, USA). Adjustments were not made for missing data. The average completion rate across all outcome variables was 98.7% (n=4,346), with completion rates ranging from 95.5% (n=4,205) to 99.7% (n=4,390).

Relative weight analysis (RWA),²² a technique most commonly used in business psychology and organizational research, was used to evaluate the relative contribution of specific PTSD symptom domains to the variance observed in pain and related outcomes. In brief, RWA applies an orthogonal transformation to predictor variables to overcome issues with multicollinearity and standard multiple regression analysis can be performed using transformed predictor variables.^{22, 45} Resultant beta weights are rescaled by combining them with standardized regression coefficients derived from regressing the original predictor variables on their orthogonal transformations.⁴⁵ RWA thus captures the unique contribution of each predictor as well as its contribution in combination with other predictor variables.²² Specific PTSD symptom domains (i.e., intrusion, avoidance, hyperarousal, numbness/detachment) were entered as "predictor" variables and the various pain-related outcomes were entered in separate multiple regression models as independent criterion variables. Pairwise deletion was used to handle missing data and the recommended 10,000 bootstrap replications were applied to test for statistical significance at an alpha level of 0.05. Data

were analyzed using the free, RWA web application (<http://relativeimportance.davidson.edu/>).⁴⁵ De-identified data were uploaded to this interactive website and RWA code was executed in R, a free statistical software program (<http://www.R-project.org/>). R output raw and rescaled weights corresponding to the proportion of variance accounted for by each predictor and the “relative weight” of each predictor, respectively.⁴⁵ Rescaled relative weights were interpreted as the percentage of predicted variance attributed to each predictor.

Results

Sample Characteristics

Table 1 describes the characteristics of the total sample. Online PainTracker™ completion rate was 71.3% for the study period. Patients were predominantly female (64.4%) and 48 years old, on average. The highest proportion of patients had private insurance (36.4%), followed by Medicaid (33.1%). On average, patients reported 1.4 ± 1.6 PTSD symptoms and 27.7% screened positive for PTSD (i.e., 3 of 4 PC-PTSD symptoms endorsed). Patients rated their pain intensity as 6.6 (SD=1.9) out of 10, on average, and 2,427 patients (57.5%) met or exceeded a cut-off of 7 for severe pain.

Occurrence of PC-PTSD Symptoms and Pain-Related Outcomes

Table 2 describes the relationship between the number of PTSD symptoms and demographic and pain-related outcomes: 2,111 (48.0%) reported zero PTSD symptoms; 557 (12.7%) reported one PTSD symptom; 516 (11.7%) reported two PTSD symptoms, 444 (10.1%) reported three PTSD symptoms; and 774 (17.6%) reported all four PTSD symptoms.

As displayed in Table 2, significant Jonckheere-Terpstra tests for ordered independent variables were observed for all pain-related outcomes evaluated. In general, incremental increases in the number of PTSD symptoms was associated with increased pain intensity and interference, increased pain-related disability, increased depressive symptom and anxiety severity, and reduced HRQOL, as well as increased risk for opioid misuse (all $p < 0.001$).

Compared to patients with no PTSD symptoms, patients who endorsed *one or more PTSD symptom* reported: greater pain interference (with general activity and enjoyment of life; greater pain-related functional disability; greater depression and anxiety symptoms; reduced HRQOL; increased risk for opioid misuse; and decreased alcohol use (all post-hoc multiple comparisons, $p < 0.05$). Compared to patients with no PTSD symptoms, patients who endorsed *two, three, or four PTSD symptoms* also reported: increased pain intensity ratings (post-hoc multiple comparisons, $p < 0.01$).

Relative Weight Analyses

Figure 1 displays the RWA findings. The relative weights of each PTSD symptom, expressed as the percent of predicted variance in the outcome attributed to each symptom domain, are displayed for each of the outcomes assessed. If each of the symptom domains contributed an equal proportion of variance, each of their respective weights would be ~25% ($25\% \times 4 = 100\%$). As Figure 1 depicts, numbness or detachment was the only PTSD symptom that

accounted for more than 25% variance for every outcome assessed. Raw and rescaled weights, including 95% confidence intervals, for each of the models evaluated are displayed in Supplemental Table 1. Supplemental Table 1 also indicates whether numbness or detachment accounted for significantly more of the predicted variance than the other PTSD symptoms. For pain interference with general activity, pain interference with enjoyment of life, pain-related disability (ODI score), depressive symptoms, anxiety, and HRQOL, numbness/detachment accounted for significantly more of the predicted variance than each of the other symptoms (i.e., intrusion, avoidance, hyperarousal). For pain intensity, numbness/detachment accounted for significantly more of the predicted variance than intrusion.

Discussion

This cross-sectional study of patients at a specialty pain center serving a predominantly civilian population documents the important relationship between PTSD symptoms and a broad array of pain-related outcomes. It also highlights the especially important role of the symptom, “numbness or detachment from others”, which accounted for a larger proportion of the predicted variance than the other PTSD symptom domains for most pain related outcomes assessed. This cross-sectional study cannot verify that PTSD symptoms are causing patients to experience worse pain-related outcomes, but it suggests that there is a strong relationship that should be studied with longitudinal data.

The proportion of patients screened positive for PTSD in this sample (27%) is consistent with previous reports.^{1, 2, 36} The finding that patients who screened positive for PTSD were younger, more likely to be women, and reported significantly worse pain, function, and mood outcomes, also corroborates previous findings,^{1, 2, 12, 19, 30, 31, 43} and provides additional confirmation of the importance of evaluating for PTSD symptoms in the setting of chronic pain. Patients with likely PTSD also reported lower alcohol use than patients without PTSD symptoms. This latter finding may be due to avoidance of an alcohol-related traumatic experience, medical comorbidities or medications that prohibit alcohol use, or avoidance due to a history of alcohol use disorder.

We observed a significant relationship between increases in the number of PTSD symptom domains endorsed and increases in the severity of all pain-related outcomes evaluated. Among this large, heterogeneous sample of patients with chronic pain, the occurrence of even one or two PTSD symptoms was associated with a host of negative outcomes. Compared to patients with no symptoms, patients who reported two PTSD symptoms reported higher pain intensity and pain interference, greater pain-related disability, more severe depressive and anxiety symptoms, poorer HRQOL, and greater risk of opioid misuse than those without PTSD symptoms. Even patients who endorsed only one PTSD symptom reported greater pain interference with general activity and enjoyment of life; greater pain-related functional disability; greater depression and anxiety symptoms; reduced HRQOL; increased risk for opioid misuse; and lower alcohol use. Of note, increased risk of opioid misuse may be, at least partially, explained by the fact that the ORT contains items related to a history of preadolescent sexual abuse and the occurrence of psychological disorders. Overall, even the experience of one PTSD symptom appears to incur significantly elevated

risk for poorer pain-related outcomes. These findings suggest that subsyndromal PTSD is clinically meaningful in patients with chronic pain. The standard threshold for a positive PTSD screen using the PC-PTSD (i.e., endorsement of any three of four symptoms) may overlook a substantial proportion of patients (25%) who do not fulfill diagnostic criteria (i.e., one or two symptoms), yet still have significant pain-related impairment relative to patients with no PTSD symptoms. In fact, Prins et al. proposed a PC-PTSD cut-off score of 2 in circumstances where maximization of sensitivity is preferable.³⁵ Given the substantial association between PTSD symptoms and the outcomes studied, patients with chronic pain who endorse *even one* PTSD symptoms may warrant closer evaluation.

Findings from the RWA indicated that emotional numbness or detachment from others had the largest contribution to the total variance in nearly all of the predicted outcomes. This finding provides additional support for recent modifications made to DSM-V criteria, which separate the DSM-IV PTSD grouping of avoidance and emotional numbing into two separate domains.⁵ Moreover, these findings are in line with previous investigations into the factor structure of PTSD symptoms that identified four distinct PTSD symptom domains (re-experiencing, avoidance, numbing, hyperarousal).³ Interestingly, among patients who reported only one PTSD symptom, nearly half (46.7%; n=260/557) endorsed numbness or detachment. In turn, these patients experienced overall worse-pain related outcomes (increased pain intensity, pain interference with general activity and enjoyment of life, pain-related disability, depressive symptoms, anxiety, and reduced HRQOL) compared to patients who reported only one of the other symptom domains (data not shown).

Existing theoretical models like the Shared Vulnerability³ and Mutual Maintenance⁴¹ models provide a valuable framework for conceptualizing the intricate relationship between chronic pain and PTSD. The Shared Vulnerability Model posits that a predisposing factor, such as anxiety sensitivity, underlies the development of and/or response to both chronic pain and PTSD.³ Anxiety sensitivity has also been proposed as a key predisposing factor in the diathesis-stress model of chronic pain.⁴⁷ The Mutual Maintenance Model proposes that elements of chronic pain impact the experience of PTSD and vice versa (e.g., anxiety sensitivity, avoidance), resulting in a negative cyclic relationship that exacerbates both conditions.⁴¹ Both models highlight the importance of anxiety sensitivity and avoidance or fear of pain as key mediators of the relationship between chronic pain and PTSD. However, neither model incorporates or accounts for emotional numbing or detachment.

In another study, emotional numbing, but not avoidance, was found to significantly predict pain-related disability 6- and 12-months following thoracotomy.²³ Similarly, emotional numbing was associated with impaired functioning in patients injured in motor vehicle accidents.¹¹ Moreover, emotional numbing and hyperarousal symptoms (not re-experiencing or avoidance) were significantly associated with pain intensity and disability among patients with chronic musculoskeletal pain, a relationship mediated by anxiety sensitivity, catastrophizing, and fear of pain.²⁸ This relative importance of numbness/detachment in pain outcomes is notable given that opioid treatment of chronic pain in patients with PTSD appears to relieve mostly re-experiencing and hyperarousal symptoms.⁷ In contrast, opioids and benzodiazepines, may deepen numbing and detachment. Alternate interventions that target the numbness and detachment of PTSD are needed.

This study had important limitations. Because of the cross-sectional nature of the current study, the causal relationship between chronic pain and PTSD symptoms cannot be determined. However, in a longitudinal study of pain and PTSD associated with accidental injury, PTSD symptoms were found to significantly predict improvement in pain over time, but not the converse,²¹ suggesting that interventions that target PTSD symptoms may have an important impact on pain reduction. Follow-up studies will evaluate the subset of patients who continued their care at UW CPR to determine how pain outcomes and PTSD symptoms change over time.

In addition, time since the traumatic event and duration of chronic pain were not captured. Therefore, it is not known whether the pain experienced by the patients is a result of a traumatic event (e.g., motor vehicle accident, multiple failed surgeries, sexual abuse), or if pain preceded the traumatic event. Specific information related to dose of pain medication use was not collected; therefore, although the risk for opioid misuse was captured, the dose of opioids at the time of data collection is not known. Finally, the PC-PTSD is a relatively simple instrument, only capturing one or two symptoms from each PTSD symptom domain. Other symptoms not captured by the PC-PTSD screen, such as self-blame or destructive behavior, might also be associated with the experience of chronic pain. A revised PC-PTSD screen (PC-PTSD-5) was recently introduced to more comprehensively reflect DSM-V criteria for PTSD, including self-blame. Of note, 71.3% of patients seeking care at UW CPR completed the new patient PainTracker™ assessment during the observation period. Reasons for non-completion were not documented, therefore generalizability to all patients receiving care at specialty pain clinics is limited.

In summary, our screening study suggested that PTSD and subsyndromal PTSD are highly prevalent among patients with chronic pain (>50%) and are associated with significantly worse pain intensity and interference, function, mood, and HRQOL outcomes. Numbness or detachment as a result of trauma exposure appears to be the PTSD symptom most strongly associated with pain-related outcomes. This numbness and detachment warrants further investigation and may comprise an important target for interventions that improve both PTSD symptoms and pain.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- PTSD symptoms are associated with multiple outcomes in patients with chronic pain
- Even one PTSD symptom was associated with poorer pain-related outcomes overall
- The PTSD symptom of numbness or detachment is particularly important
- Subsyndromal PTSD and numbness or detachment are important in chronic pain

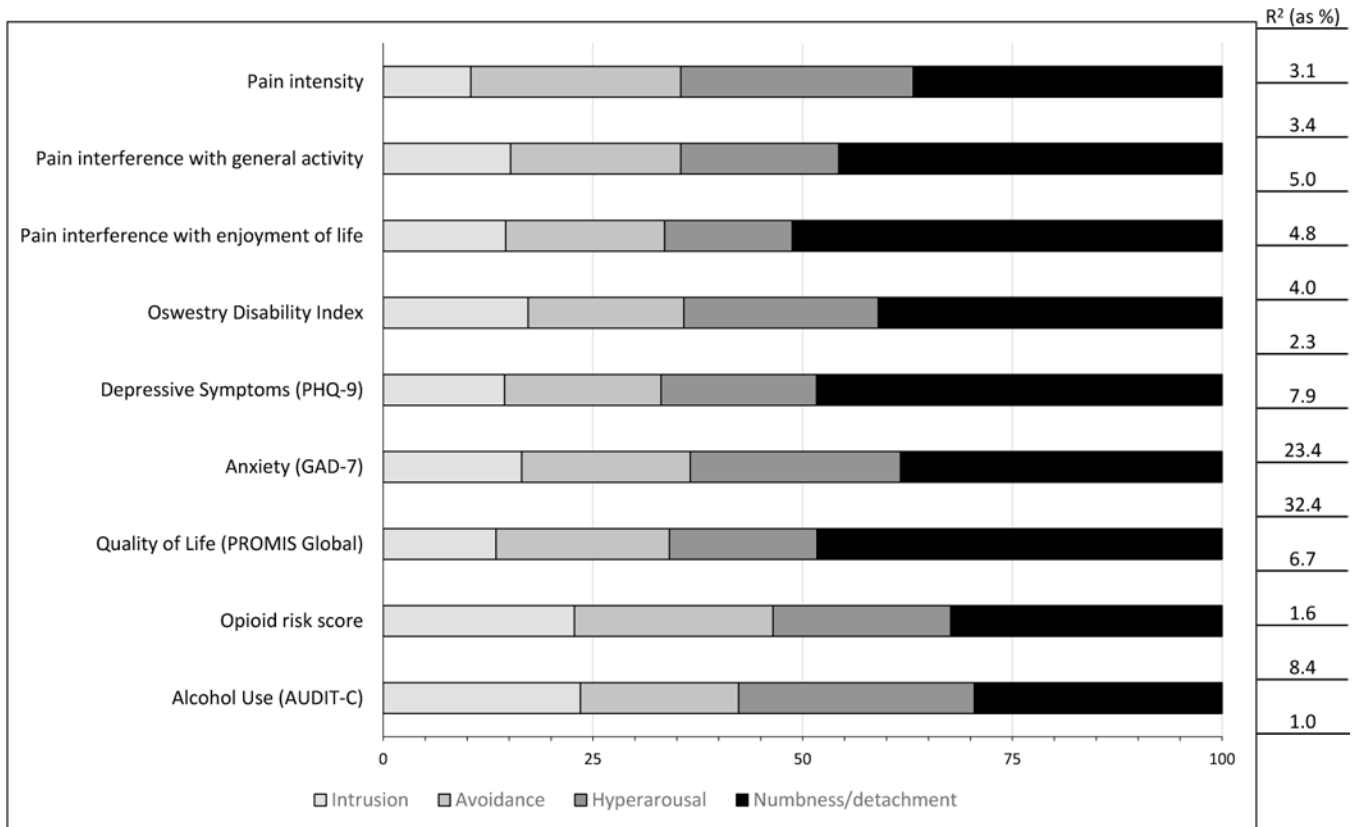


Figure 1. Results of the relative weight analysis (RWA). The relative weights of each PTSD symptom, expressed as the percent of predicted variance in the outcome attributed to each symptom domain, are displayed for each of the patient-reported outcomes assessed.

Table 1

Demographic characteristics, PTSD, and pain intensity of the total sample (N=4,402).

DEMOGRAPHICS	
Sex - % Female (n)	64.4 (2,834)
Age, Mean (SD)	48.3 (14.6);Range: 18–96
Payor Category, % (n)	
Private Insurance	36.4 (1,484)
Medicaid	33.1 (1,347)
Medicare	24.0 (976)
Other (e.g., LNI/Charity/Tricare)	6.6 (267)
PC-PTSD	
PC-PTSD score, Mean (SD)	1.4 (1.6);Range: 0–4
Positive screen for PTSD 3, % (n)	27.7% (1,218)
% (n) sample endorsed:	
Intrusion	35.1 (1,554)
Avoidance	34.9 (1,538)
Hyperarousal	30.4 (1,340)
Numbness/detachment	36.2 (1,595)
PAIN INTENSITY	
Pain intensity (SD)	6.6 (1.9) Range: 0–10
% with Severe Pain 7 (n)	57.5% (2,427)

Abbreviations: LNI = Labor & Industries; PC = Primary Care; PTSD = Post-traumatic Stress Disorder; SD = standard deviation; VA = Veterans Administration

Table 2
Association between Number of PTSD Symptoms and Pain-related Outcome Measures (N=4,402).

	Number of PTSD Positive Answers					ANOVA or Chi-square/Jonckheer e-Terpstra p-values
	0	1	2	3	4	
DEMOGRAPHICS						
Sex, % female (n)	62.0 (1,302)	63.3 (349)	67.0 (343)*	67.7 (300)*	70.1 (440)*	0.001
Age, Mean (SD)	50.2 (15.2)	49.9 (14.9)	47.6 (14.2)*	46.5 (13.4)*	43.8 (12.2)*	<0.001/<0.001
Payor category - % (n)						
Private insurance	45.0 (890)	32.3 (164)*	31.5 (149)*	28.1 (115)*	23.5 (166)*	<0.001
Medicaid	25.2 (499)	31.4 (159)*	34.0 (161)*	43.8 (179)*	49.4 (349)*	<0.001
Medicare	24.8 (491)	28.6 (145)	27.9 (132)	21.8 (89)	16.8 (119)*	<0.001
Other (e.g., LNI/Tricare)	5.0 (98)	7.7 (39)	6.6 (31)	6.4% (26)	10.3 (73)*	<0.001
PAIN & INTERFERENCE						
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Pain intensity	6.3 (1.9)	6.5 (2.0)	6.7 (1.8)*	7.0 (1.7)*	7.1 (1.7)*	<0.001/<0.001
Pain interference with general activity	6.6 (2.4)	7.0 (2.3)*	7.1 (2.1)*	7.5 (2.1)*	7.7 (2.1)*	<0.001/<0.001
Pain interference with enjoyment of life	6.6 (2.5)	7.2 (2.4)*	7.2 (2.3)*	7.8 (2.2)*	7.9 (2.1)*	<0.001/<0.001
FUNCTION						
ODI score	43.0 (16.2)	47.4 (16.3)*	48.8 (15.7)*	51.7 (15.1)*	54.6 (15.1)*	0<.001/0<.001
MOOD, QOL, SATISFACTION						
PHQ-9 score	8.7 (5.7)	11.9 (6.0)*	12.7 (5.7)*	14.8 (6.0)*	16.6 (6.5)*	0<.001/0<.001
GAD-7 score	4.5 (4.4)	7.4 (5.0)*	8.6 (5.0)*	10.9 (5.4)*	13.0 (5.8)*	<0.001/<0.001
PROMIS global	27.5 (4.8)	26.3 (4.6)*	25.7 (4.2)*	25.3 (4.4)*	24.7 (4.0)*	<0.001/0<.001

	Number of PTSD Positive Answers					ANOVA or Chi-square/Jonckheer e-Terpstra p-values
	0	1	2	3	4	
SUBSTANCE ABUSE/MISUSE	48.0% (N=2,111)	12.7% (N=557)	11.7% (N=516)	10.1% (N=444)	17.6% (N=774)	
ORT score	2.5 (3.3)	3.7 (4.1)*	4.3 (4.1)*	4.8 (4.6)*	5.5 (4.9)*	<0.001/<0.001
AUDIT-C score	1.4 (1.6)	1.2 (1.5)*	1.1 (1.5)*	1.1 (1.4)*	1.0 (1.3)*	0.002/<0.001

Abbreviations: AUDIT = Alcohol Use Disorders Identification Test; GAD = Generalized Anxiety Disorder; LNI = Labor & Industries; ODI = Oswestry Disability Index; ORT = Opioid Risk Tool; PHQ = Patient Health Questionnaire; PROMIS = Patient-Reported Outcomes Measurement Information System; PTSD = Post-traumatic Stress Disorder; QOL = quality of life; SD = standard deviation