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Prevalence and correlates of pain interference in older adults: Why treating the whole body and mind is necessary

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Summary

Our study presents pain-related interference rates in a sample of community-dwelling, older adults and determines factors associated with these restrictions. Participants were 9506 respondents to the Biopsychosocial Religion and Health Study (66.8% female and 33.2% male; average age = 62.3 years). In this sample, 48.2% reported no pain-related interference, whereas 37.7% reported moderate and 14.1% reported severe interference. As hypothesized, older age, female gender, lower education, financial strain, traumatic experiences, worse health, increased body mass index, poor sleep, and depressive symptoms all were associated with higher pain interference ratings (ordered logistic regression/three-level pain criterion; odds ratios $p < 0.05$). Our findings are similar to those from younger adults, and they suggest enduring effects of trauma on health and reveal the complexity of chronic pain in community-dwelling, older adults.

Keywords

Pain interference; Chronic pain; Older adults; Trauma; Depression

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An estimated 100 million individuals in the United States suffer from chronic pain at an annual cost of \$560–\$635 billion in healthcare expenses and loss of productivity (National Research Council, 2011). Persistent and disabling pain is prevalent in older, community-dwelling adults. Approximately 33–50% experience chronic pain, and 20% experience pain that limits activity (American Geriatrics Society, 2009). The present study was designed to provide evidence that will help explain why older adults with chronic pain have been resistant to traditional treatment strategies directed exclusively at biological causes (Barry et al., 2009).

Pain as a disease entity

Pain serves a preservative function by signaling present or potential tissue damage (Melzak and Wall, 1988). When pain is acute, a clear relationship usually exists between medical findings and the location of the pain. When pain becomes chronic, this relationship no longer is obvious, and a consistent biomarker for pain has been difficult to demonstrate. The relationships among chronic pain, pain diagnoses, objective findings, and pain intensity are not consistent.

To illustrate the problem, in older adults, the relationship between radiographic evidence of osteoarthritis and pain is difficult to explain because many in pain have no known pathology, and many with known pathology report no pain (Odding et al., 1998). More than 50% of people with magnetic resonance imaging findings in their lumbar spine report no detectable pain (Jensen et al., 1994). Moreover, many functional pain disorders (e.g., fibromyalgia and tension-type headache) have no objective findings, yet they are extremely painful and disabling. Such evidence supports the often-cited contention that objective medical findings do not predict pain or pain levels (Parks et al., 2003). To further complicate matters, current evidence suggests that objective medical findings do not predict pain-related disability (Weiner et al., 2004). The most consistent biomarker for chronic pain is changes in the function and structure of cortical areas, findings that have been consistent among most chronic pain diagnoses (Apkarian et al., 2009; Tracey, 2008).

Further insight emerges by examining factors that contribute to the progression of acute pain to chronic pain and factors that maintain chronic pain. Most factors are associated with sub-optimal cognition, depressive symptoms, and adverse experiences, as opposed to objective medical findings (Young-Casey et al., 2008). As an example, pain catastrophizing has been shown to predict pain outcomes better than medical variables (Sullivan and Neish, 1998). As evidence accumulates, many believe that pain should be viewed as an independent disease entity (see, for example, Breivik, 2004; and, when treated as such, preliminary evidence suggests better outcomes (Przekop et al., 2010)).

Pain correlates in older adults

Persistent pain can be especially disabling for older adults (Mossey and Gallagher, 2004). Increased numbers of pain locations, pain intensity and advancing age all have been associated with pain-related restrictions in older adults (Ayis and Dieppe, 2009; Mottram et al., 2008). Other factors associated with pain intensity and pain-related interference ratings in older adults are depressive symptoms, increased weight, low socioeconomic status (SES),

poor sleep, and a sedentary lifestyle (Dorner et al., 2011; Shi et al., 2010). Consideration of these factors in treatment planning affords opportunities for novel approaches because traditional treatment strategies have been inadequate. We believe that these approaches should include body oriented therapy, movement, and cognitive and emotional growth and change. This will afford us opportunities to research alternative treatment strategies that will be successful in older adults with chronic pain.

Persistent pain and traumatic experiences

Traumatic events across the lifespan can have a dramatic effect upon future cognitions, behavior, and disease development (e.g., Lovallo et al., 2013). Moreover, studies consistently have shown that traumatic experiences are associated with the development of persistent pain (Hart- Johnson and Green, 2012; Paras et al., 2009; Wuest et al., 2010). This relationship may exist due to an increased vulnerability to stress and an altered and prolonged stress response (Dudley et al., 2011). The relationship between traumatic experiences and persistent pain in older adults, however, has not been explored.

The older persistent pain patient

The evidence cited above characterizes the older persistent pain patient as sedentary, overweight, less educated, having experienced trauma, in poor physical and mental health (typically with depressive symptoms), and socially and economically isolated. These factors lead to high stress, high pain intensity, severe pain-related restrictions, maladaptive coping, sub-optimal decision making, and low motivation. We believe that all of the factors above must be considered in treating these patients.

Purpose of present study

We designed the present study to (a) establish the pain-related interference rate in a sample of community-dwelling, older adults, (b) determine factors associated with this interference, and (c) make treatment and research recommendations. We hypothesized that (a) a substantial percentage of sampled older adults would report pain-related restrictions, (b) reports of traumatic experiences would be associated with increased pain-related restrictions, and (c) significant associations with more severe restrictions would include older age, female gender, lower SES, sleep difficulties, and worse physical and mental health.

Method

Data source

Data were from the Biopsychosocial Religion and Health Study (BRHS; Lee et al., 2009). BRHS investigators drew a random sample of 20,000 cases from the 96,194 in the Adventist Health Study database (AHS-2; Butler et al., 2008). Of the 20,000, 10,988 (54.9%) returned completed BRHS questionnaires. The AHS-2 is a long-standing study series of cancer, diet, and lifestyle among Seventh-day Adventists (SDA), and it includes SDA church members living in the United States and Canada. BRHS investigators, however, sampled only those living in the United States. Recruitment was through 1000 Black and 3500 non-Black (mostly White, but some Asian and Latino) churches as well as through SDA newspapers

and television programs. The BRHS is an AHS-2 sub-study, a survey of the interrelationships among adverse experiences in child and adulthood, religious engagement, and physical and mental health outcomes primarily among Black and White SDAs (Morton et al., 2012). Both the AHS-2 and BRHS study protocols were given an expedited review by the Loma Linda University Institutional Review Board, and respondents consented by returning the completed questionnaire.

Participants

Of the 10,988 BRHS survey respondents, 9506 (86.5%) met study criteria: 40 years of age or older and complete information on age, gender, race/ethnicity, education, present financial status, and pain rating (the variables in our first multivariable model; details following). Average age was 62.3 years; 66.8% were female and 33.2% male. The majority (61.5%) were White; 33.1% were Black, 2.8% Hispanic, 1.8% Asian, and 0.8% other race/ethnicity.

Measures

Pain criterion—Pain interference: answers to an individual SF-12v2 item, “During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?” Ratings were on a 5-point scale, ranging from 1 (not at all) to 5 (extremely) (Ware et al., 2002). For the statistical analyses, ratings were recoded into three categories, 1 (no pain interference), 2 and 3 (moderate pain interference) and 4 and 5 (severe pain interference).

Potential pain interference correlates—*Age*: in years.

Gender: female = 0; male = 1.

Race/ethnicity: five categories (White, Black, Hispanic, Asian, and other) recoded to non-Black = 0 and Black = 1 based on preliminary bivariate and multivariable analyses.

Education: nine levels recoded to less than a college degree = 0 and college degree/higher = 1 (also based on preliminary analyses).

Financial strain: answers to the question, “On average, how difficult was it for your family to meet expenses for basic needs like food, clothing, and housing in the last year;” rated on a 5-point scale, not at all difficult (1), a little (2), somewhat (3), fairly (4), or very difficult (5).

Trauma: four trauma variables derived from a modified version of the Trauma Assessment in Adults and Ryff and colleagues’ child abuse scales (Cusack et al., 2004; McHugo et al., 2005; Ryff et al., 2004). In this section of the BRHS questionnaire, subjects were asked about “different types of stressful or difficult life events” (both in child and adulthood, with no event timeline). Traumatic experiences are those that likely involved actual or threatened death (actual death of another person) or serious injury (or threat to one’s physical integrity) and elicited intense reactions, such as fear, helplessness, or horror (American Psychiatric Association, 2000; Lazarus and Folkman, 2004; Shalev, 1996). We then grouped the items by trauma type:

- a. bad/life-threatening accident (one question, “Have you ever been in a really bad accident – car, at work, or somewhere else – and thought you might be killed or injured?”),
- b. physical assault/abuse (two assault questions, actual and threatened in subject’s lifetime; four abuse questions between age 5 and 15 years, mother or father pushing, slapping, throwing objects, kicking, biting, striking with an object),
- c. sexual assault/abuse (three questions about actual and threatened experiences in one’s lifetime),
- d. emotional abuse/neglect (two questions about mother or father insulting, swearing at, or ignoring between ages 5 and 15 years).

For each of these trauma variables, participants were given a score of 0 in the category if their answers to all of the questions in that category were no/never and given a score of 1, if otherwise.

General health: answers to the question, “In general, would you say your health is: poor (1), fair (2), good (3), very good (4), or excellent (5)?”

Body mass index (BMI): self-reported weight scaled by the inverse of self-reported height squared. Interpretive labels have been given to various score ranges (obese = 30, overweight=25–29.9, and normal=18.5–24.9) (National Heart, Lung, and Blood Institute, 2014).

Poor sleep quality: averaged ratings (4-point scale ranging from rarely or never [1] to almost every day [4]) on three items: trouble falling asleep, waking up in the middle of the night and finding it hard to get back to sleep, waking up very early and having difficulty getting back to sleep (lower scores =better/good sleep; higher scores =worse/ poor sleep). Scores were means of the completed items; in creating these means, one missing item was allowed.

Depressive symptoms: responses to the 11-item Center for Epidemiological Studies-Depression Scale (CES-D). Items were rated on a three-point scale: none/rarely or 0, occasionally or a moderate amount or 1, and most/all of the time or 2. Total scores were transformed to full 20-item CES-D equivalent scores (Kohout et al., 1993); scores ≥ 16 are at the screening (not diagnostic) cut-point for clinical depression. Prior to transformation, scores were means of the completed items; and two missing items were allowed.

Analytic plan

We used frequencies and percentages to describe the severity of pain-related restrictions. To evaluate the relationships between the pain criterion and the potential correlates, we used chi-squared and Kruskal–Wallis tests as well as ordered logistic regression. Because the pain rating was measured on a 5-point scale, and its histogram showed a highly right-skewed distribution, we chose ordered logistic regression (with three ordinal pain interference groups: low, moderate, and severe, as defined above) rather than ordinary least squares regression (OLS). Although we failed to meet the proportional odds assumption for this procedure, this occurrence is common with large sample sizes. For purposes of simplicity

and clarity, we present the results of the ordered logistic regression rather than those from a series of binary logistic regressions, which fully are in agreement with the presented results.

We tested four models in succession: the first with age, sex, race/ethnicity, education, and financial strain; the second adding to these the four trauma variables; the third adding the general health, BMI, and sleep variables; and the fourth adding depressive symptoms. In preliminary fourth models, we also tested four trauma–depression interaction terms (components centered) to determine whether depression mediated the relationship between trauma and pain interference (see Kosseva et al., 2010). None was significant and, thus, all were dropped from the final model.

All computations and statistical significance tests were run in SAS v. 9.2; $\alpha = 0.05$.

Results

Of the 9506 participants, 4583 (48.2%) reported no pain-related interference, 3585 (37.7%) moderate interference, and 1338 (14.1%) severe interference.

The bivariate statistics are shown in Table 1. All comparisons were statistically significant. (We re-ran these associations with one-way ANOVA, and the results were virtually identical.) Among the most striking comparisons was the roughly 20 percentage point difference in college graduates in the no pain (49.7%) and the severe pain (30.7%) groups.

Physical abuse/assault was the most common traumatic experience (44.1% of the sample), and just over half (51.7%) of those in the severe pain group had experienced physical abuse/assault. Across the four trauma types, there were approximately 10 percentage point differences between those in the no and the severe pain groups. Striking, too, is the percentage of all respondents who had experienced any trauma, 80.1%; 77.0% in the no pain interference group and 83.1 and 82.7% in the moderate and severe pain interference groups, respectively.

The results of the logistic regression models are shown in Table 2. All variables were statistically significant in each of the four models with two exceptions: being Black was not significant in the first model ($p = 0.218$), and trauma-emotional abuse/neglect narrowly missed statistical significance in model four ($p = 0.058$). The strongest predictors of less pain interference in the fourth model were general health (0.50 [95% confidence interval = 0.47, 0.53], being Black (0.76 [0.70, 0.84]), having a college degree (0.85 [0.78, 0.93]), and being male (0.87 [0.79, 0.95]). The strongest predictors of more pain were accident, poor sleep, and physical abuse (respective ORs = 1.31 [1.20, 1.43], 1.27 [1.19, 1.36], and 1.23 [1.12, 1.36]).

We re-ran all analyses using OLS, and there were no substantive differences. Given the relatively small effects (ORs < 2) and the demonstrated associations in this sample between trauma and functional disorders (Haviland et al., 2010; Przekop et al., 2012), we re-ran the logistic regression without those who reported a fibromyalgia or an irritable bowel syndrome diagnosis. Results were the same for those using the full sample with two

exceptions: Being Black was not significant in the second model ($p = 0.37$), and being male was not significant in model 4 ($p = 0.06$).

Discussion

Purpose

Pain restricts the lives of older adults (Barry et al., 2012), and medical findings are of limited use in predicting the extent of the restriction (Weiner et al., 2004). The main purpose of the present study was to determine correlates associated with reports of pain-related restrictions. Our data show that advancing age, female gender, lower education, financial strain, traumatic experiences, worse health, increased weight, poor sleep, and depressive symptoms all were associated with higher pain interference ratings in older adults. Below, we set our findings in the context of current knowledge of chronic pain.

Pain interference rates

In our sample, 37.7% of respondents reported moderate and 14.1% reported severe pain interference. The 51.8% who reported interference in our study is comparable to the 50% rate reported by the American Geriatrics Society (American Geriatrics Society, 2009) but higher than rates in other studies (e.g., range of 26–37.9%; Shi et al., 2010). The 14.1% who reported severe pain-related interference in our study is comparable to other nationally representative samples (12.1%; Barry et al., 2012). Rate discrepancies likely reflect differences in sample composition as well as methods of obtaining pain data. Nonetheless, a substantial percentage of older adults report pain and pain interference, and those in our sample were no exception.

Pain interference correlates

In older adults, a consistent finding throughout the pain literature is that pain frequency and interference increases with age (Thomas et al., 2004), as was true in our sample. This may reflect the overall burden of number of years in pain, loss of muscle strength, coordination, and, perhaps, cumulative stress effects (Ayis and Dieppe, 2009; Dominick et al., 2012).

Female gender, lower educational level, increased financial strain, higher BMI, and poor sleep also were associated with severe pain restrictions. These findings are consistent throughout the literature (Shi et al., 2010; Weiner et al., 2004). Female gender often has been associated with the development of pain (Ramage-Morin, 2008; Shah et al., 2011; Thomas et al., 2004) and worse disabling pain similar to our findings. There has been no unifying theory which explains the consistency of this finding throughout the pain literature (Mogil, 2012).

The association we report between lower educational levels and increased pain restrictions has been related in previous studies to physically oriented job status, chronic adversity, and high pain intensities (Arean et al., 2010; Dorner et al., 2011). Present financial strain also was associated with worse pain interference. Financial strain may increase stress when essentials of everyday life are difficult to attain, and these situations are associated with disabling pain (Dorner et al., 2011; Lacey et al., 2013).

In our study, increasing BMI was associated with worse pain interference. The average BMI in the severely restricted pain group was 29.8 (BMI ≥ 30 = obese). Overweight status has been associated with the development of pain, worse pain, and disabling pain in older adults (Guh et al., 2009; Heim et al., 2008). It may relate to increased weight bearing stress, deconditioning, or other unhealthy lifestyles, such as addiction.

Lack of sleep, sleep interruptions, and non-restorative sleep all have been associated with increased levels of pain and pain restrictions (Artner et al., 2013; O'Donoghue et al., 2009). Lack of sleep can lead to increased stress and poor cognitive abilities that contribute to increased pain and disability.

General health ratings—Self-perception of health status has been shown to be related to pain and disability (Reyes-Gibby et al., 2002; Shah et al., 2011). Similarly, we reported that lower self-rated general health was correlated with an increase in pain-related interference. This is troubling because in older adults, poor perception of health might affect morbidity and mortality (Hardy and Gill, 2005).

Interestingly, in chronic pain patients, there is a mismatch between self-perceived activity and objective measures of activity. Chronic pain patients believe that they move much less than has been shown objectively, and this increases the self-perception of disability and beliefs about poor health. Bridging the gap between expected and actual movement ability in older adults may improve their pain and pain-related restrictions (Disner et al., 2011).

Traumatic experiences—Traumatic events during one's lifetime have been associated with the development of pain in later life (Hart-Johnson and Green, 2012; Jones et al., 2009; Paras et al., 2009; Wuest et al., 2010). In our study, all traumatic experiences significantly predicted more severe pain restrictions except emotional abuse/neglect. Emotional abuse/neglect failed to reach statistical significance albeit by the smallest of margins. The strongest trauma predictors were those involving physical pain (bad accident and physical assault/abuse), but all odds ratios were roughly comparable and relatively small. These findings illustrate the enduring effects of trauma and a direct association between trauma and pain-related interference (Gureje et al., 2008).

Approximately eighty percent of all respondents in our study reported traumatic events, and the differences across the three pain subgroups were not substantial. This suggests that the event itself may not be the cause of future persistent pain. Rather, the ability to cope with the adverse event, changes in the ability to cope with future events, and the inability to attenuate the stress response once initiated may be more relevant to the development of pain (Goosby, 2013). Consistently, studies have shown that adverse events can alter the hypothalamic–pituitary–adrenal axis, thereby, increasing chronic stress (Lovallo et al., 2013).

Other studies have shown that our brain processes all painful events with similar neural networks. Therefore, what may be perceived as social or emotional pain (e.g., the abrupt loss of a loved one, sexual abuse) is processed by the brain the same as physical pain (Eisenberger, 2012a, 2012b). When one's ability to cope with adverse events is not

adequate, prolonged chronic stress results, and the probability of persistent physical pain is increased (Walter et al., 2010).

Depressive symptoms—In older adults, even sub-syndromal depressive symptoms can have dramatic effects upon both overall health and chronic disability (Lee and Park, 2008), and in our cohort, increased depressive symptoms were associated with increases in pain-related interference. Depressive symptoms have been associated with a higher risk of physical and cognitive decline (Bruce, 2001; Dalle Carbonare et al., 2009; Dotson et al., 2008). Of interest, depressive symptoms appear to reduce self-efficacy (self-confidence in one's ability) in older adults (Reid et al., 2003).

In recent studies, researchers have explored the cognitive content of chronic pain patients with depressive symptoms. Chronic pain patients' cognitive content is about poor health status, poor functional status, and somatic symptoms. In contrast, the content for those with depressive symptoms and no pain is about hopelessness, worthlessness, and suicide (Rusu et al., 2012). Understanding the content of depressed chronic pain patients' thoughts, such as poor self-efficacy and limited movement, may lead to more effective treatment approaches.

Study strengths and limits

Strengths—This is a relatively large community (versus clinical) sample of older adults, and the BRHS survey included detailed questions about traumatic experiences. Moreover, most BRHS questions and scales were standardized questions and instruments commonly used in large-scale studies of physical and mental health, including chronic pain investigations.

Limits—This was a cross-sectional study and secondary data analysis. Thus, one must use caution in making causal inferences. Clearly, the relationship between the pain criterion and the independent variable set is complex, as are the interrelationships among the independent variables. Moreover, all data are self-reported. A self-report bias can lead to an underreporting of child abuse or violence exposure, for example (Ruiz-Perez et al., 2009) and, perhaps, this potential bias weakened the trauma-pain relationship in the present study. Finally, as noted, this is a unique sample, relatively well educated members of a single Protestant denomination (approximately 1.1 million members in the U.S.) with an overrepresentation of Black and underrepresentation of Hispanic respondents (compared to their distributions in the U.S. population). How this uniqueness may have affected our prevalence estimates and the observed associations is not readily apparent. There is no reason to believe, for example, that SDAs are physically, mentally, or genetically different from other U.S. adults or develop or respond to pain differently. SDAs, however, generally do endorse several healthy lifestyle practices; they live longer than average, only 1% smoke, 7% consume alcohol, and less than half eat meat. Taken together, we may have under-estimated both the prevalence of pain-related restrictions and the strength of associations among them.

Implications

Older adults with chronic pain are complex and, thus, will demand the formulation of innovative treatment paradigms. It will be interesting to see whether alterations in brain

structure and function (Apkarian et al., 2009; Tracey, 2008) can be influenced by innovative treatment as has been shown in middle aged adults (Seminowicz et al., 2011). Treatments of older adults with pain-related restrictions should emphasize cognitive-affective aspects of the restrictions such as catastrophizing, self-efficacy, negative health image, and depressive symptoms (Quartana et al., 2009). Programs that incorporate social connection and make pain less rewarding may prove to be helpful (Hanssen et al., 2013). Movement and exercise, such as Qi Gong and Tai Chi, have been shown to help with pain and recovery in older adults (Hardy and Gill, 2005; Lee and Park, 2008). We believe that a comprehensive program incorporating the above strategies in addition to movement, massage, external Qi Gong, and acupuncture can have a dramatic effect upon these patients.

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Table 1

Bivariate statistics.

	Total		By pain interference category						P-value	
	Mean	SD	No		Moderate		Severe			
			Mean	SD	Mean	SD	Mean	SD		
<i>N</i> (%)	9506		4583	(48.2%)	3585	(37.7%)	1338	(14.1%)		
Age (years)	62.3	12.5	60.4	12.1	63.6	12.4	65.6	12.6	<0.0001 ^a	
Financial strain	1.5	1.0	1.4	0.9	1.6	1.0	1.8	1.3	<0.0001 ^a	
General health	3.6	0.9	4.0	0.8	3.4	0.8	2.9	1.0	<0.0001 ^a	
BMI (kg/m ²)	27.3	6.1	26.2	5.1	27.8	6.2	29.8	7.6	<0.0001 ^a	
Poor sleep	1.7	0.7	1.5	0.6	1.8	0.7	2.0	0.9	<0.0001 ^a	
Depression	3.8	3.9	2.8	3.2	4.3	3.9	5.8	4.6	<0.0001 ^a	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%		
Female	6354	66.8	2908	63.5	2461	68.7	985	73.6	<0.0001 ^b	
Non-Black	6359	66.9	3004	65.6	2481	69.2	874	65.3	0.001 ^b	
College degree	4109	43.2	2279	49.7	1419	39.6	411	30.7	<0.0001 ^b	
Trauma: Accident	3394	36.1	1428	31.4	1418	40.1	548	41.6	<0.0001 ^b	
Trauma: Physical	4185	44.1	1802	39.3	1693	47.2	690	51.7	<0.0001 ^b	
Trauma: Sexual	2644	28.3	1122	24.8	1063	30.2	459	35.1	<0.0001 ^b	
Trauma: Emotional	3451	36.5	1499	32.9	1392	39.1	560	42.2	<0.0001 ^b	

^a Kruskal–Wallis test.^b Chi-squared test.

Table 2

Ordered logistic regression.

Dependent variable		Pain interference categories, (no):(moderate):(severe)					
N	Parameter	Beta	SE	OR	95% Conf. Interval	Lower	Upper
Model 1 9506	Intercept (moderate)	-1.758	0.120				<0.0001
	Intercept (severe)	-3.736	0.125				<0.0001
	Age	0.027	0.002	1.027	1.024	1.031	<0.0001
	Male	-0.263	0.043	0.769	0.706	0.836	<0.0001
	Black	-0.053	0.043	0.948	0.872	1.032	0.2181
	College degree	-0.389	0.041	0.678	0.625	0.735	<0.0001
	Financial strain	0.280	0.020	1.323	1.273	1.375	<0.0001
	Intercept (moderate)	-2.338	0.131				<0.0001
Model 2 9264	Intercept (severe)	-4.346	0.137				<0.0001
	Age	0.031	0.002	1.031	1.028	1.035	<0.0001
	Male	-0.250	0.045	0.779	0.712	0.851	<0.0001
	Black	-0.118	0.044	0.889	0.815	0.969	0.0078
	College degree	-0.342	0.042	0.711	0.655	0.771	<0.0001
	Financial strain	0.249	0.020	1.283	1.232	1.335	<0.0001
	Trm. accident	0.306	0.043	1.358	1.249	1.476	<0.0001
	Trm. physical abuse	0.277	0.047	1.319	1.204	1.446	<0.0001
Model 3 9164	Trm. sexual abuse	0.236	0.048	1.266	1.153	1.390	<0.0001
	Trm. emotional abuse	0.199	0.048	1.220	1.111	1.340	<0.0001
	Intercept (moderate)	-0.642	0.229				0.0050
	Intercept (severe)	-2.936	0.231				<0.0001
	Age	0.022	0.002	1.022	1.018	1.026	<0.0001
	Male	-0.154	0.048	0.857	0.781	0.941	0.0012
	Black	-0.288	0.047	0.750	0.684	0.822	<0.0001
	College degree	-0.166	0.044	0.847	0.777	0.923	0.0002
	Financial strain	0.129	0.022	1.137	1.090	1.186	<0.0001
	Trm. accident	0.282	0.045	1.326	1.215	1.447	<0.0001

Dependent variable		Pain interference categories, (no):(moderate):(severe)					
N	Parameter	Beta	SE	OR	95% Conf. Interval		P-value
					Lower	Upper	
Model 4	9131						
	Trm. physical abuse	0.218	0.049	1.244	1.130	1.369	<0.0001
	Trm. sexual abuse	0.186	0.050	1.204	1.092	1.328	0.0002
	Trm. emotional abuse	0.129	0.050	1.138	1.031	1.255	0.0100
	General health	-0.742	0.026	0.476	0.452	0.502	<0.0001
	BMI	0.043	0.004	1.043	1.036	1.051	<0.0001
	Poor sleep	0.357	0.032	1.429	1.343	1.520	<0.0001
	Intercept (moderate)	-3.164	0.234				<0.0001
	Intercept (severe)	-0.849	0.231				0.0002
	Age	0.023	0.002	1.024	1.020	1.027	<0.0001
	Male	-0.145	0.048	0.865	0.788	0.950	0.0025
	Black	-0.270	0.047	0.763	0.696	0.837	<0.0001
	College degree	-0.163	0.044	0.849	0.779	0.926	0.0002
	Financial strain	0.092	0.022	1.096	1.050	1.144	<0.0001
	Trm. accident	0.271	0.045	1.311	1.201	1.431	<0.0001
	Trm. physical abuse	0.210	0.049	1.234	1.121	1.359	<0.0001
	Trm. sexual abuse	0.172	0.050	1.188	1.076	1.311	0.0006
	Trm. emotional abuse	0.095	0.050	1.100	0.997	1.214	0.0584
General health	-0.695	0.027	0.499	0.474	0.526	<0.0001	
BMI	0.043	0.004	1.043	1.036	1.051	<0.0001	
Poor sleep	0.240	0.034	1.272	1.190	1.359	<0.0001	
Depression	0.060	0.006	1.062	1.048	1.075	<0.0001	