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The Role of Childhood Trauma, PTSD Symptoms and Pain Coping Strategies in Individuals with Chronic and Acute Pain: A Strength-Based Approach

Norma Rosenek[1] · Lyn Ellett[1] · Jayne Morriss[1]

Abstract

Purpose While links between chronic pain and childhood trauma or PTSD symptoms are well-established, less is known about how these factors are related in individuals experiencing different types of pain. This study explores associations among childhood trauma, PTSD symptoms, and pain coping strategies interact in individuals with chronic versus acute pain.
Methods A total of 159 participants (chronic and acute pain groups) completed an online survey assessing childhood trauma pain coping strategies and current PTSD symptoms. Correlations between variables within each group, and differences between chronic and acute pain groups were evaluated using z-tests.
Results Pain intensity was positively associated with childhood trauma, particularly emotional ($r=.32$) and physical abuse ($r=.24$). PTSD symptoms, specifically re-experiencing ($r=.29$) and hyperarousal ($r=.28$) were also linked to greater pain intensity. Adaptive coping strategies like distraction and coping self-statements were negatively associated with pain intensity. These strategies showed stronger negative correlations with childhood trauma and PTSD symptoms in the chronic pain group ($z=-2.57$ to $z=5.43$), suggesting more complex coping dynamics. Associations between trauma, PTSD symptoms, and pain were more pronounced in chronic pain sufferers.
Conclusions These results have important clinical implications, emphasising the need for trauma-informed care in pain management interventions. Further research should explore effective strategies for managing the intersection of pain and trauma, particularly in chronic pain populations.

Keywords Childhood trauma · PTSD · Chronic pain · Pain coping strategies

Introduction

Over the past two decades, a strong link between chronic pain (persistent pain lasting over three months) and post-traumatic stress disorder (PTSD) has been well established (Fishbain et al., 2017). PTSD, characterised by symptoms such as flashbacks, hypervigilance, and avoidance, is significantly more prevalent in individuals with chronic pain (up to 57%) compared to the general population (2–9%) (Siqveland et al., 2017). This comorbidity poses significant challenges in pain management, being associated with higher pain severity and greater disability. Additionally, individuals with both conditions often experience heightened PTSD severity (Morasco et al., 2013), emotional distress, and report additional psychiatric comorbidities (Outcalt et al., 2015). In contrast to chronic pain, the International Association for the Study of Pain (IASP) describes acute pain defined as a sudden-onset, time-limited pain typically linked to tissue injury or a specific event, and it serves a protective function, unlike chronic pain, which persists beyond normal healing time and often lacks a clear protective or biological purpose (Nicholas et al., 2019; Treede et al., 2019).

Conceptual models, such as shared vulnerability and mutual maintenance, propose overlapping cognitive, emotional and neurobiological processes in this comorbidity

✉ Jayne Morriss
  j.morriss@soton.ac.uk

  Norma Rosenek
  n.r.rosenek@soton.ac.uk

  Lyn Ellett
  l.a.ellett@soton.ac.uk

[1] University of Southampton, Southampton, United Kingdom

(Asmundson et al., 2002; Sharp & Harvey, 2001). However, the precise nature of the relationship remains uncertain, with evidence suggesting that pain may contribute to and sustain PTSD, while PTSD can also increase the risk of developing chronic pain. In fact, several longitudinal studies support a bidirectional relationship: in burn survivors and military veterans, PTSD symptoms have been shown to predict later increases in chronic and acute pain intensity, and vice versa (Bair et al., 2020; Benedict et al., 2020; Giannoni-Pastor et al., 2016; Ravn et al., 2018; Stratton et al., 2014; Sveen et al., 2011; Van Loey et al., 2003). Specific clusters, including intrusive symptoms and hyperarousal, appear central to maintaining this cycle (de Vries et al., 2021; Giummarra et al., 2017; Short et al., 2022). These findings align with the fear-avoidance model of pain, in which catastrophic thinking and avoidance can reinforce both chronic pain and PTSD symptoms (Vlaeyen & Linton, 2000).

A history of childhood trauma is also common in individuals with chronic pain and PTSD (Karimov-Zwienenberg et al., 2024). Emotional, physical and sexual abuse increase risk of developing PTSD (Nishith et al., 2000) and are associated with higher levels of baseline stress, as well as stress reactivity (Lemieux & Coe, 1995; Nicolson et al., 2010) and greater likelihood of chronic pain conditions (Davis et al., 2005; Lampe et al., 2003), which are known factors to exacerbate pain and physical disability (Hannibal & Bishop, 2014; Pratchett & Yehuda, 2011; Stephens & Wand, 2012). Among the PTSD symptom clusters, hyperarousal and intrusions have been closely linked to heightened pain intensity and disability, as both can arise from trauma experienced in childhood as well as later in life, underscoring the cumulative impact of adversity across the lifespan (Kendall-Tackett, 2000).

Coping strategies are a key factor in understanding the associations between childhood trauma, PTSD and pain. Patients with chronic pain tend to use a wider range of coping strategies compared to those presenting with acute pain, frequently relying on emotion-focused or passive response (e.g., catastrophising, activity reduction), whereas individuals with acute pain more often employ problem-focused and active coping strategies (e.g., exercise, relaxation techniques, problem-solving, positive self-statements, and distraction Baastrup et al., 2016; Jensen et al., 1991)). It is important to emphasise that in this work, we intentionally move away from pathologising or labelling these strategies as "maladaptive." While some strategies have been associated with greater distress or disability in the literature, they often reflect attempts to manage unpredictable and overwhelming symptoms, particularly in contexts where individuals may feel a lack of control over their pain (Sullivan et al., 2001). These responses can serve meaningful and functional purposes, such as conserving energy, seeking safety,

or attempting to emotionally regulate in the face of persistent discomfort. However, when such responses are relied upon rigidly or without support for alternative approaches, they may inadvertently contribute to a cycle of distress and reduced functioning. In contrast, individuals experiencing acute pain may use similar strategies (e.g., rest or distraction), but typically in the context of short-term discomfort or for general well-being, rather than as necessary tools for ongoing pain management (Jensen et al., 1991; López-López et al., 2023).

Meta-analytic findings suggest that that psychological interventions are more effective in reducing PTSD symptoms than improving pain outcomes (Goldstein et al., 2019). This gap highlights the importance of clarifying how pain coping strategies operate in the overlap of trauma and pain and how they may differ depending on whether pain is acute or chronic. Identifying these differences is not only of theoretical value but has direct clinical implications: if certain coping responses are more strongly linked to trauma exposure in chronic pain than in acute pain, interventions can be adapted to specifically target patterns. Conversely, recognising strategies that remain effective across both pain types could help build resilience-focused and trauma-informed care and therefore could inform more integrated and patient-centred interventions. A strength-based approach that focuses on existing coping resources while addressing less flexible patterns may therefore enhance treatment efficacy for those experiencing co-occurring chronic or acute pain and trauma, emphasising the need for further research to address these interconnected factors. By adapting interventions to account for pain type and trauma history, clinicians may be better equipped to improve both PTSD and chronic and acute pain outcomes (Åkerblom et al., 2024; Birdsey, 2020; Lumley et al., 2022).

To our knowledge, no empirical research has directly compared pain coping strategies in individuals managing their acute or chronic pain experiences within the context of trauma. To extend this literature, we conducted an online survey assessing childhood trauma (emotional abuse, emotional neglect, sexual abuse, physical abuse, physical neglect), PTSD symptoms (re-experiencing, avoidance, hyperarousal, and negative alterations in cognition and mood), and pain coping strategies (catastrophising, distraction, ignoring, distancing, coping self-statements, and praying). Pain coping strategies were assessed in relation to pain experienced within the last month, with participants indicating whether the pain was chronic or acute. Building on prior research, our first three hypotheses (H1–H3) aimed to replicate and extend established findings regarding the associations among trauma, pain, and PTSD. Our fourth hypothesis (H4), however, represents the unique contribution of this study, testing whether the link between trauma

and coping strategies differs between individuals with acute versus chronic pain. This allows us to examine whether chronic pain constitutes a distinct context in which trauma shapes coping responses. We hypothesised that:

(H1) individuals with chronic pain will report significantly greater exposure to trauma compared to those with acute pain, reflecting the potential role of trauma in the development and maintenance of chronic pain conditions (Davis et al., 2005; Karimov-Zwienenberg et al., 2024).

(H2) pain coping strategies will differ between acute and chronic pain groups, with individuals experiencing chronic pain more likely to engage in coping responses oriented toward managing emotional distress or perceived threat, such as heightened pain-related worry and activity reduction compared to those with acute pain (Baastrup et al., 2016; Jensen et al., 1991; Vlaeyen & Linton, 2000).

(H3) the type of childhood trauma experienced will be correlated with the severity of both pain and current PTSD symptoms (Karimov-Zwienenberg et al., 2024).

(H4) beyond these expected associations, we hypothesised that the associations between trauma exposure and coping strategies would differ in strength between individuals with acute and chronic pain. Identifying such differences would provide novel insights into how trauma may shape coping processes differently depending on pain chronicity, highlighting chronic pain as a potentially distinct context for understanding trauma–coping dynamics (Siqveland et al., 2017).

Method

Participants

Participants in the analyses were recruited internationally to complete a cross-sectional online survey. Eligibility criteria included being at least 18 years old and able to read and understand English. The survey, hosted on Qualtrics, was distributed via various online platforms to ensure a diverse sample.

Based on previous research (Cohen, 2013; Hruschak et al., 2021; Neville et al., 2018) we used a small effect size to determine this study's sample size. In G*power (Faul et al., 2009), we ran a power analysis for a bivariate correlation ($r = 0.2$ with $\alpha = .05$, $\beta = .8$). The power calculation suggested recruiting a minimum of 153 participants, consistent with previous studies that used a cross-sectional survey data design (Hirsh et al., 2011; Lee et al., 2019). We ran two additional power analyses: one for the planned one-way ANOVAs ($f = 0.25$ with $\alpha = .95$, $\beta = .8$), which suggested a sample size of at least 128, and one to determine the appropriate sample size for comparing two correlation coefficients

($q = 0.5$, $\alpha = .05$, $\beta = .8$), which showed that a sample size of 132 would be sufficient. Given these analyses, we oversampled to increase power and to account for potential dropout for online data.

A total of 213 participants were initially recruited for this study. To ensure data quality, we applied Qualtrics' automated bot detection, which flagged suspicious entries based on system indicators such as duplicate IP addresses and abnormal completion times. In addition, all survey responses were manually screened for internal consistency and plausibility, with particular attention to the quality of open-text entries (e.g., relevance, coherence, and non-random input). Responses identified as non-genuine through either automated or manual review were excluded from the final sample. After excluding participants who did not complete the key questionnaires (CTQ-SF, PCL-5, CSQ-R; $n = 46$) and those identified as bot responses ($n = 8$), 159 participants remained (117 females; 40 males; 2 preferred not to disclose their sex). The mean age of participants was 37.36 years (SD = 12.22), ranging from 20 to 78 years. The sample was internationally diverse, with participants representing multiple continents, including Europe ($n = 121$), North America ($n = 47$), Australia ($n = 18$), Africa ($n = 6$), Asia ($n = 5$), and South America ($n = 3$), while 13 participants did not provide nationality data. In terms of ethnicity, the sample comprised individuals identifying as White ($n = 173$), Mixed ($n = 12$), Asian ($n = 6$), Other ($n = 5$) and Black ($n = 4$), with 13 participants not reporting their ethnicity.

Participants were recruited through online forums focused on trauma-related and pain-related content. These forums advertised our study to their members, providing information about the research objectives and participation details. The advertisements reached a diverse audience, including individuals with lived experiences relevant to the study's focus. The forums who advertised the study details included MyPTSD, Sexual Violence Research Initiative, Blue Knot Foundation, PainConcern, CRPS UK, Pain Relief Foundation, Guts, UK. Given the nature of online data collection, responses were screened for potential bot activity to ensure data quality. The following variables were measured: childhood trauma (emotional neglect, emotional abuse, sexual abuse, physical neglect, physical abuse), current post-traumatic stress symptoms (re-experiencing, avoidance, hyperarousal, negative alterations in cognition and mood), pain coping strategies (catastrophising, distraction, ignoring, distancing, self-coping statements, praying).

Chronic Pain Sample

Seventy-four participants reported 82 chronic pain conditions, with the excess reflecting comorbidity. Conditions were categorised into eight groups (see supplementary

material, Table 5): joint and connective tissue disorders ($n=24$; 29.3%), spinal and back pain ($n=15$; 18.3%), neurological and nerve pain ($n=14$; 17.1%), systemic syndromes ($n=7$; 8.5%), headache/migraine ($n=6$; 7.3%), other conditions ($n=6$; 7.3%), gynaecological pain ($n=5$; 6.1%), and autoimmune/inflammatory conditions ($n=5$; 6.1%).

Fibromyalgia was most frequently reported ($n=8$), followed by CRPS ($n=6$) and chronic migraines ($n=5$). Pain duration varied considerably, with many participants experiencing decades-long conditions (range: 1 year to 40+ years). Several reported childhood onset, particularly for hypermobility disorders and CRPS. The majority represented established chronic pain cases with extensive healthcare experience, indicating a sample well-suited for investigating long-term pain management challenges.

Acute Pain Sample

Only participants who classified their selected pain as acute were included in the acute pain analysis group. Eighty-five participants completed the acute pain protocol and were included in analyses. Importantly, none of the participants who classified their selected pain as acute reported having any concurrent chronic pain conditions, ensuring clear group distinction.

Questionnaires

Idiosyncratic Questions About Pain

Participants were asked to indicate which types of pain they had experienced within the previous month from a standardised list: headache, back pain, muscle pain, joint pain, stomach pain, dental pain, (pre)menstrual pain, or other (with specification required). For each applicable pain type, participants rated intensity using a VAS from 0 to 100, with a "not applicable" option available. Participants were then instructed to select one pain type that they had rated above 50/100 for completion of the remaining Coping Strategies Questionnaire-Revised (CSQ-R) items. Following pain selection, participants were asked to classify their chosen pain as either acute or chronic in nature.

To assess the presence of chronic and acute pain, participants were asked to confirm their diagnosis, describe the nature of their pain, and indicate how long they had been experiencing it, ensuring the condition met the diagnostic criterion of more than three months (Merskey, 1986). This approach allowed us to distinguish between individuals with chronic pain, who rated their coping strategies in relation to their ongoing condition as experienced within the past month, and those with acute pain, who rated their coping strategies in response to an episode of acute pain

experienced during the same period. This reference pain was used to guide responses to the CSQ-R, which evaluates the coping strategies participants use during pain episodes. When completing the CSQ-R, participants were asked to rate the intensity and unpleasantness of the pain they had experienced in the past month, as identified at the beginning of the questionnaire (i.e., their specific chronic pain or a particular episode of acute pain). The pain rating scale were collected using Visual Analogue Scales (VAS) ranging from 0 to 100, with the initial pointer set to 20 although the numerical value was not displayed to participants until the pointer was moved.

Coping Strategies Questionnaire—CSQ-R (Riley & Robinson, 1997)

The CSQ-R is a pain coping assessment tool that was designed to evaluate the extent to which patients employ six distinct cognitive coping strategies and two behavioural coping strategies (Riley & Robinson, 1997). The CSQ contains 27 items that load onto six subscales (distraction, catastrophising, ignoring pain, distancing from the pain, coping self-statements, praying). Participants rate responses on a 7-point Likert scale, ranging from 0 (never do that) to 6 (always do that), to indicate how often they employ particular coping activities when they experience pain. The pain catastrophising subscale consists of six items. Higher scores indicate more pain catastrophising (scores range from 0 to 36). All subscales demonstrated acceptable to excellent internal consistency, with the following Cronbach's alpha values: catastrophising ($\alpha=.91$), distraction ($\alpha=.89$), ignoring ($\alpha=.86$), distancing ($\alpha=.91$), coping self-statements ($\alpha=.84$), and praying ($\alpha=.86$).

Although the Coping Strategies Questionnaire-Revised (CSQ-R) includes a subscale traditionally labelled "pain catastrophising," we made a deliberate decision not to use this term in the present manuscript. This choice was informed by discussions with individuals with lived experience of complex trauma and chronic pain, who shared that such language does not reflect the nuance of their experiences and may feel pathologising or invalidating. While we acknowledge that "catastrophising" is a well-established and psychometrically valid construct within the pain literature, we also recognise the importance of using inclusive and compassionate language, particularly given that this work is intended for both academic and clinical audiences, as well as individuals with lived experience. Therefore, in alignment with trauma-informed and person-centred values, we refer to this construct using more neutral descriptors such as "pain-related worry", which we believe better capture the function of this coping response without imposing deficit-based assumptions.

Childhood Trauma Questionnaire (Short Form)—CTQ-SF (Bernstein et al., 2003)

The Childhood Trauma Questionnaire-Short Form (CTQ-SF) is a 28-item self-report questionnaire designed to evaluate a history of childhood maltreatment. It was developed through exploratory and confirmatory factor analyses of the original 70-item version (Bernstein et al., 2003). The CTQ-SF uses a five-point Likert scale for respondents to rate the items, ranging from 0 ("never") to 5 ("very often"). This questionnaire comprises five clinical subscales: Sexual, Physical, and Emotional Abuse, as well as Physical and Emotional Neglect. Scores from each subscale (5 to 25) can be summed to a total score (5–125). Our data showed that all subscales showed excellent to acceptable internal consistency ($\alpha > .70$), with the following values: emotional abuse ($\alpha = .89$), physical abuse ($\alpha = .85$), sexual abuse ($\alpha = .95$), emotional neglect ($\alpha = .90$), and physical neglect ($\alpha = .75$).

Posttraumatic Stress Disorder Checklist—PCL-5 (Weathers et al., 2013).

The PCL-5 is a self-report questionnaire consisting of 20 items designed to assess the extent to which an individual has experienced distress in the past month due to PTSD symptoms as defined by the DSM-5, related to their most currently distressing event (Weathers et al., 2013). Respondents rate items on a 5-point Likert scale from 0 ("not at all") to 4 ("extremely"), which is added up to a *total severity* score (0 to 80). The four subscales represent the DSM-5 PTSD symptom clusters: re-experiencing, avoidance, negative alterations in cognitions and mood and hyperarousal. The current study had internal consistency (Cronbach's alpha) of $\alpha = .92$ for B symptoms (Reexperiencing), $\alpha = .88$ for C symptoms (Avoidance), $\alpha = .93$ for D symptoms (Alterations in Cognition and Mood), and $\alpha = .90$ for E symptoms (Hyperarousal). Instructions were adapted to emphasise responses in relation to "emotionally stressful experiences", ensuring clarity that this was distinct from pain-related questionnaires. Given the population from which we recruited, participants were not asked to specify the trauma to minimise the risk of re-traumatisation.

Current PTSD Symptoms

Based on the PCL-5 a total symptom severity score was calculated, with a cutoff score of 33 used to indicate moderate to severe PTSD symptoms (Weathers et al., 2013). Based on this criterion, 82.1% of participants met the threshold for moderate-severe PTSD symptoms, while 17.9% scored below the cutoff. This distribution suggests a high prevalence of moderate to severe PTSD symptoms within the sample.

Procedure

Informed consent was obtained electronically before participation, and all responses were anonymised to maintain confidentiality. Ethical approval for this study was obtained from the Ethics Committee at the XXX [ERGO: 92746], and all procedures adhered to the ethical guidelines outlined in the Declaration of Helsinki.

Participants were recruited through the Qualtrics recruitment panel and completed the study online via the Qualtrics survey platform. Upon accessing the survey, participants first provided informed consent before proceeding to the questionnaire. They were informed that they could opt in to participate in a random prize draw at the end of data collection. To ensure data completeness, participants were required to respond to all questions on each page before progressing further (see description of questionnaires above). In addition to the above questionnaires, participants were asked to complete measures on dissociation (Dissociative Experiences Scale—DES-II (Carlson & Putnam, 2000)), paranoia (The Revised Green et al. Paranoid Thoughts Scale—R-GPTS (Freeman et al., 2021)) and intolerance of uncertainty (Intolerance of Uncertainty—IUS-12 (Carleton et al., 2007)). However, data from these additional measures were not included in the present analysis as they were beyond the scope of the current study's research questions. Only participants who consented to their data being used and who completed all core measures relevant to the study's aims were included in the final sample.

Data Analysis

Statistical analyses were conducted using SPSS version 29.0 (SPSS, Inc., Chicago, Illinois). Initially, descriptive statistics were calculated to assess the distributions of childhood trauma, current PTSD symptoms, and pain-related variables among individuals with chronic and acute pain. To determine whether there were significant differences in trauma severity between individuals with chronic and acute pain, independent samples t-tests were conducted. Subsequently, a one-way analysis of variance (ANOVA) was performed to examine whether individuals with chronic pain utilised different pain coping strategies compared to those with acute pain.

Due to non-parametric data, non-parametric correlation analyses were conducted to investigate the relationships between childhood trauma, current PTSD symptoms, pain unpleasantness, pain intensity, and pain coping strategies across the full sample. Additionally, correlation analyses

were conducted separately for two subsamples: (a) individuals with chronic pain and (b) individuals with acute pain, to explore potential differences in these associations within each group. Finally, *r*-to-*z* transformations were employed to compare the strength of correlations between trauma and pain coping strategies across the chronic and acute pain groups, with $|z| \geq 1.96$ considered indicative of a significant difference.

Given the number of comparisons conducted across trauma domains, PTSD symptom clusters, and coping strategies (H1 and H2), *p*-values from all ANOVAs were adjusted using the Benjamini–Hochberg false discovery rate (FDR) procedure (*q* = .05). This method was employed to control for Type I error while retaining statistical power, and all reported results reflect FDR-corrected p-values. All adjusted *p*-values remained significant after using FDR correction (see Table 4). Additionally, given the large number of correlations tested (H3; H4), *p*-values were adjusted using FDR (*q* = .05) to control for multiple comparisons. After adjusting for multiple comparisons using FDR correction, seven correlations in the full sample, six in the chronic pain subsample, and nine in the acute pain subsample did not retain statistical significance (see supplementary material, Tables 6 and 7).

Statistical significance was set at *p* < .05 for all analyses. Effect sizes were interpreted following conventional guidelines, with correlation coefficients (*r*) of .10, .30, and .50 representing small, medium, and large effects, respectively (Cohen, 1988). Similarly, for eta squared (η^2), values of .01, .06, and .14 were considered small, medium, and large effects, respectively (Cohen, 1988).

Results

Descriptive Statistics

Pain-Related Characteristics

Out of a total sample of 159 participants, 74 (46.5%) were in the chronic pain group and 85 in the acute pain group. Participants with chronic pain reported significantly higher levels of pain intensity (M = 63.11; SD = 23.44; *t*(156) = 3.41, *p* < .01, *d* = .54) and pain unpleasantness (M = 65.68; SD = 25.85; *t*(156) = 3.88, *p* < .01, *d* = .62) compared to those experiencing acute pain (intensity: M = 49.88; SD = 25.15; unpleasantness: M = 49.45; SD = 26.54). These findings highlight the greater severity of pain-related experiences in the chronic pain group. Data was normally distributed.

Table 1 Severity of childhood trauma questionnaire (CTQ) subscales

CTQ subscale	None (%)	Low (%)	Moderate (%)	Severe (%)
Emotional abuse	23.5	18.8	10.3	20.2
Physical abuse	39.9	7.5	11.7	13.6
Sexual abuse	38.0	4.2	15.5	15.0
Emotional neglect	18.8	30.0	12.2	13.6
Physical neglect	29.6	12.7	18.3	14.1

Percentages reflect the proportion of participants reporting different levels of childhood maltreatment severity on each CTQ subscale

Table 2 Descriptive statistics for childhood trauma questionnaire (CTQ) by pain chronicity

Scale	Chronic pain (n = 75)		Acute pain (n = 84)	
	Mean	SD	Mean	SD
CTQ—total score	56.68	17.41	47.66	18.21
Emotional abuse	13.18	5.33	11.22	5.57
Physical abuse	9.92	4.32	7.45	3.50
Sexual abuse	10.17	5.84	7.82	5.44
Emotional neglect	13.50	4.66	12.53	5.21
Physical neglect	9.92	3.51	8.65	3.70
PCL—total score	63.20	17.63	45.71	19.59
Re-experiencing	15.41	4.88	11.08	5.47
Avoidance	6.62	2.30	5.56	2.74
Hyperarousal	18.81	5.61	13.00	6.02
Negative alterations in cognition and mood	22.35	6.92	16.08	7.60

Trauma-Related Characteristics

Childhood Trauma A substantial proportion of participants reported experiences of childhood abuse and neglect, with varying levels of severity (Table 1). Emotional abuse was reported at severe levels by 20.2% of the sample, while 13.6% reported severe physical abuse and 15% reported severe sexual abuse. Emotional neglect was the most commonly reported.

H1: *Prevalence of Trauma in Chronic Pain*

One-way ANOVAs were conducted to examine differences in childhood trauma and PTSD symptoms between individuals reporting chronic and acute pain, with results evaluated using FDR-corrected *p*-values. Individuals with chronic pain reported significantly more childhood trauma (CTQ-SF total score; Table 2): *F*(1,154) = 9.85, *p* = .003, η^2 = .06) across most domains, including emotional abuse (*F*(1,154) = 4.98, *p* = .03, η^2 = .03), physical abuse (*F*(1,154) = 15.44, *p* = .002, η^2 = .09), sexual abuse (*F*(1,154) = 6.70, *p* = .02, η^2 = .04), and physical neglect (*F*(1,154) = 4.74, *p* = .04, η^2 = .03), compared to those with acute pain. However, there was no significant difference

between the groups in emotional neglect ($F(1,154)=1.47$, $p=.23$, $\eta^2=.01$). In addition to greater childhood trauma exposure, individuals with chronic pain also reported more severe PTSD symptoms (PCL-5 total score: $F(1,154)=32.89$, $p=.002$, $\eta^2=.18$), including higher levels of re-experiencing ($F(1,154)=26.10$, $p=.002$, $\eta^2=.15$), avoidance ($F(1,154)=6.49$, $p=.02$, $\eta^2=.04$), hyperarousal ($F(1,154)=37.42$, $p=.002$, $\eta^2=.20$), and negative alterations in cognition and mood ($F(1,154)=27.91$, $p=.002$, $\eta^2=.16$). These findings suggest that chronic pain is associated with both a history of more extensive childhood trauma and more pronounced PTSD symptomatology.

H2: *Use of Pain Coping Strategies for Chronic and Acute Pain*

One-way ANOVAs were conducted to examine differences in pain coping strategies between individuals with chronic pain and those with acute pain, with results evaluated using FRD-corrected p-values. Individuals with chronic pain were significantly more likely to use a range of coping strategies, including pain-related worry ($F(1,154)=7.56$, $p=.002$, $\eta^2=.09$; Table 3), distraction ($F(1,154)=14.13$, $p=.002$, $\eta^2=.15$), distancing ($F(1,154)=6.37$, $p=.003$, $\eta^2=.08$), coping self-statements ($F(1,154)=14.13$, $p=.003$, $\eta^2=.15$) and praying ($F(1,154)=5.33$, $p=.009$, $\eta^2=.06$), when reflecting on their most recent pain experience within the past month and related to their chronic pain. There was no significant difference between the groups in the use of ignoring as a coping strategy ($F(1,154)=1.51$, $p=.23$, $\eta^2=.02$).

H3: *Relationship between childhood trauma history, current PTSD symptoms and pain coping strategies*

All reported p-values reflect FDR correction. Pain intensity and pain unpleasantness were strongly correlated (r=.89, $p<.001$). Significant associations were observed between childhood trauma and pain and PTSD outcomes. Emotional abuse ($r=.32$, $p<.001$) and physical abuse ($r=.24$, $p=.005$) were positively associated with pain intensity. Emotional

Table 3 Descriptive statistics for pain coping strategies (CSQ-R) by pain group

CSQ-R subscale	Chronic pain (n=75)		Acute pain (n=84)	
	Mean	SD	Mean	SD
Pain-related worry	16.41	9.40	10.95	8.88
Distraction	15.91	7.63	9.77	6.88
Ignoring	12.27	7.64	11.63	6.82
Distancing	9.43	7.24	5.70	6.50
Coping self-statements	16.10	7.12	13.30	5.41
Praying	7.36	5.53	4.60	5.65

neglect was weakly associated ($r=.19$, $p=.03$) and physical neglect was not ($r=.03$, $p=.77$). CTQ total score correlated significantly with pain intensity ($r=.26$, $p=.002$), PTSD total score ($r=.54$, $p<.001$) and several PTSD subscales: re-experiencing ($r=.47$, $p<.001$), avoidance ($r=.47$, $p<.001$), negative alterations in cognition/mood ($r=.53$, $p<.001$) and hyperarousal ($r=.47$, $p<.001$).

PTSD total score was associated with pain intensity ($r=.32$, $p<.001$) and pain unpleasantness ($r=.34$, $p<.001$). Significant subscales included re-experiencing ($r=.29$, $p<.001$) and avoidance ($r=.28$, $p<.001$).

Pain-related worry was positively associated with pain intensity ($r=.36$, $p<.001$) and PTSD total score ($r=.55$, $p<.001$), whereas distraction ($r=-.01$, $p=.056$) and coping self-statements ($r=.17$, $p=.061$) were non-significant after FDR correction. CTQ total was not significantly associated with coping strategies, except for a weak correlation with pain-related worry ($r=.27$, $p=.002$; Table 4).

Within the chronic pain sample, the correlations showed several significant associations between pain, childhood trauma, current PTSD symptoms, and coping strategies. Pain intensity and pain unpleasantness were strongly correlated (r=.84, $p<.001$). Among childhood trauma subscales, emotional abuse ($r=.32$, $p=.02$) and emotional neglect ($r=.32$, $p=.02$) were positively associated with pain intensity, whereas physical abuse ($r=.14$, $p=.24$), sexual abuse ($r=.04$, $p=.77$), emotional neglect ($r=.32$, $p=.13$) and physical neglect ($r=.02$, $p=.88$) were non-significant. CTQ total score was associated with pain intensity ($r=.31$, $p=.03$), PTSD total score ($r=.21$, $p=.02$), and PTSD subscales including re-experiencing ($r=.19$, $p=.02$), avoidance ($r=.13$, $p=.02$), hyperarousal ($r=.17$, $p=.02$), and negative alterations in cognition/mood ($r=.23$, $p=.02$).

PTSD total score correlated with pain intensity ($r=.37$, $p=.008$) and pain unpleasantness ($r=.41$, $p<.001$). Significant subscales included re-experiencing (r=.33, $p=.02$), hyperarousal ($r=.39$, $p<.001$), avoidance ($r=.28$, $p=.04$) and negative alterations in cognition/mood ($r=.33$, $p=.02$).

Coping strategies showed that pain related worry was positively associated with pain intensity ($r=.42$, $p<.001$), pain unpleasantness and PTSD total score ($r=.51$, $p<.001$), as well as all PTSD subscales: re-experiencing ($r=.415$, $p<.001$), avoidance ($r=.408$, $p<.001$), hyperarousal ($r=.508$, $p<.001$), and negative alterations in cognition/mood ($r=.450$, $p<.001$). Small but significant negative associations were observed for distraction (pain intensity $r=-.293$, $p=.029$; pain unpleasantness r=-.280, $p=.040$), distancing (pain intensity $r=-.276$, p=.042; pain unpleasantness $r=-.312$, $p=.020$), and ignoring (pain unpleasantness $r=-.286$, $p=.035$). Praying and coping self-statements were non-significant after FDR correction. CTQ total correlated weakly with pain-related worry ($r=.307$, $p=.025$),

Table 4 Correlations between pain ratings, childhood trauma and PTSD symptoms ($n = 159$)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 Pain intensity	1.000																	
2 Pain unpleasantness	.888**	1.000																
3 CTQ—Total score	.257**	.227**	1.000															
4 CTQ—Emotional abuse	.316**	.264**	.878**	1.000														
5 CTQ—Physical abuse	.241**	.235**	.757**	.614**	1.000													
6 CTQ—Sexual abuse	.168†	.169†	.584**	.406**	.424**	1.000												
7 CTQ—Emotional neglect	.185†	.172*	.786**	.716**	.495**	.263**	1.000											
8 CTQ—Physical neglect	.030	.031	.732**	.518**	.528**	.293**	.575**	1.000										
9 PCL—Total score	.322**	.343**	.541**	.506**	.433**	.404**	.357**	.415**	1.000									
10 PCL—Re-experiencing	.293**	.292**	.473**	.427**	.403**	.359**	.302**	.402**	.908**	1.000								
11 PCL—Avoidance	.281**	.274**	.466**	.486**	.344**	.301**	.315**	.314**	.743**	.660**	1.000							
12 PCL—Negative alterations in cognition and mood	.296**	.325**	.530**	.515**	.394**	.440**	.361**	.356**	.944**	.787**	.640**	1.000						
13 PCL—Hyperarousal	.279**	.315**	.469**	.420**	.390**	.329**	.302**	.405**	.935**	.792**	.626**	.844**	1.000					
14 CSQ—Pain Catastrophising	.362**	.392**	.273**	.260**	.268**	.131	.246**	.226**	.546**	.487**	.449**	.524**	.505**	1.000				
15 CSQ—Distraction	−0.011	0.016	−0.014	−0.056	0.106	0.033	−0.103	0.118	0.145	.170†	0.061	0.089	0.157	.283**	1.000			
16 CSQ—Ignoring	−0.152	−.191*	0.009	0.014	−0.018	0.027	0.031	−0.108	0.088	0.053	0.099	0.091	0.070	−0.151	.270**	1.000		
17 CSQ—Distancing	−0.065	−0.059	0.123	0.106	0.156	.162†	0.024	0.126	.349**	.346**	.278**	.296**	.319**	.249**	.538**	.439**	1.000	
18 CSQ—Coping self-statements	0.072	0.109	0.076	0.084	0.123	0.068	0.021	0.006	.172†	.195†	.167†	0.125	0.148	0.012	.421**	.527**	.369**	1.000
19 CSQ—Praying	−0.003	0.044	−0.011	−0.087	0.127	0.046	−0.073	0.149	.209**	.279**	0.074	0.145	.204*	.402**	.467**	−0.080	.300**	.198*

*p < .01; **p < .001; †p-value no longer significant after FDR correction

but no other coping strategies were significant (see supplementary material, Table 6).

Within the acute pain group, significant correlations revealed meaningful relationships between psychological and pain-related variables. Pain intensity was highly correlated with pain unpleasantness ($r = 0.92$, $p < .001$). Childhood trauma subscales were generally not significantly associated with pain intensity: emotional abuse ($r = .24$, $p = .05$; after FDR correction), physical abuse ($r = .22$, $p = .08$), sexual abuse ($r = .20$, $p = .20$), emotional neglect ($r = .06$, $p = .78$) and physical neglect ($r = -.04$, $p = .78$). CTQ total score correlated strongly with PTSD total score ($r = .75$, $p < .001$) and PTSD subscales: re-experiencing ($r = .63$, $p < .001$), avoidance ($r = .69$, $p < .001$), hyperarousal ($r = .66$, $p < .001$) and negative alterations in cognition and mood ($r = .68$, $p < .001$).

PTSD total score was not significantly correlated with pain intensity ($r = .07$, $p = .11$). Similarly, re-experiencing ($r = .18$, $p = .17$), avoidance ($r = .24$, $p = .056$; non-significant after FDR correction), hyperarousal ($r = .07$, $p = .60$), and negative alterations in cognition and mood ($r = .14$, $p = .28$), were not significantly correlated with pain intensity.

Coping strategies revealed that pain-related worry was positively associated with pain intensity ($r = .26$, $p = .04$) and pain unpleasantness ($r = .31$, $p = .01$). Pain-related worry was also strongly related to PTSD outcomes, including total score ($r = .50$, $p < .001$) and subscales, such as re-experiencing ($r = .48$, $p < .001$), avoidance ($r = .45$, $p < .001$), hyperarousal ($r = .38$, $p < .001$) and negative alterations in cognition and mood ($r = .49$, $p < .001$). CTQ total score was modestly correlated with pain-related worry ($r = .30$, $p = .01$) and coping-self-statements ($r = .25$, $p = .047$), and distancing ($r = .30$, $p = .014$). Other coping strategies, including distraction ($r = .005$, $p = .71$) and praying ($r = -.002$, $p = .85$) showed no associations with childhood trauma (see supplementary material, Table 7).

H4: *Difference in relationship between trauma and pain coping by pain chronicity*

Relationship Between Childhood Trauma and Pain Coping All reported *p*-values reflect FDR correction. In comparing the chronic pain and acute pain groups, significant differences emerged in the correlations between pain coping strategies and both childhood trauma and current posttraumatic stress symptoms (Fig. 1). For childhood trauma, although no significant group differences were observed in the correlation between coping strategies and the CTQ total score for pain-related worry ($z = -0.78$, $p = 0.44$), ignoring ($z = -1.57$, $p = 0.12$), or praying ($z = -0.97$, $p = 0.30$), significant differences were found for distraction ($z = -2.57$, $p = 0.01$), distancing ($z = -3.17$, $p < 0.001$), and coping self-statements ($z = -3.30$, $p < 0.001$), with the chronic pain group showing stronger negative associations.

At the subscale level, emotional neglect was more strongly negatively correlated with distraction ($z = -3.59$, $p < 0.001$), distancing ($z = -3.78$, $p < 0.001$), and self-statements ($z = -2.79$, $p = 0.003$). Physical neglect also showed stronger negative correlations with ignoring ($z = -2.84$, $p = 0.004$), distancing ($z = -4.02$, $p < 0.001$), and self-statements ($z = -3.53$, $p < 0.001$). Emotional abuse was more negatively associated with distraction ($z = -2.78$, $p = 0.003$), distancing ($z = -2.53$, $p = 0.008$), and self-statements ($z = -2.13$, $p = 0.03$). Additionally, physical abuse and sexual abuse each showed one significant group difference: self-statements were more negatively correlated with physical abuse ($z = -2.90$, $p = 0.003$) and sexual abuse ($z = -2.08$, $p = 0.03$).

Overall, the associations between childhood trauma and adaptive coping strategies (particularly distraction, distancing, and self-statements) differed significantly between groups. Compared to the acute pain group, individuals with chronic pain showed more negative correlations, indicating distinct patterns of trauma–coping relationships.

Relationship Between Current PTSD Symptoms and Pain Coping In relation to PTSD symptoms, although no significant group differences were found in the correlations between PCL total scores and pain-related worry ($z = 0.08$, $p = 0.94$) or praying ($z = -1.14$, p = 0.23), Stronger negative associations were observed for distraction ($z = -5.43$, $p < 0.001$), ignoring ($z = -3.32$, $p < 0.001$), distancing ($z = -3.43$, $p < 0.001$), and self-statements ($z = -3.46$, $p < 0.001$) in the chronic pain group.

At the subscale level, re-experiencing symptoms were more negatively correlated with distraction ($z = -3.12$, $p < 0.001$) and self-statements ($z = -2.45$, $p = 0.01$). Avoidance was more negatively associated with distraction ($z = -2.02$, $p = 0.04$) and self-statements ($z = -2.43$, p = 0.01). Similarly, negative alterations in cognition and mood showed stronger negative correlations with distraction ($z = -2.72$, $p = 0.003$), distancing ($z = -2.79$, $p = 0.003$), and self-statements ($z = -3.64$, p < 0.001). Hyperarousal was also more negatively correlated with distraction ($z = -4.55$, $p < 0.001$), distancing ($z = -2.20$, $p = 0.028$), and self-statements ($z = -4.51$, $p < 0.001$).

A similar pattern to childhood trauma emerged for PTSD symptoms, with chronic pain participants showing stronger negative correlations between PTSD symptom clusters and adaptive coping strategies (distraction, ignoring, distancing, and self-statements) compared to acute pain participants.
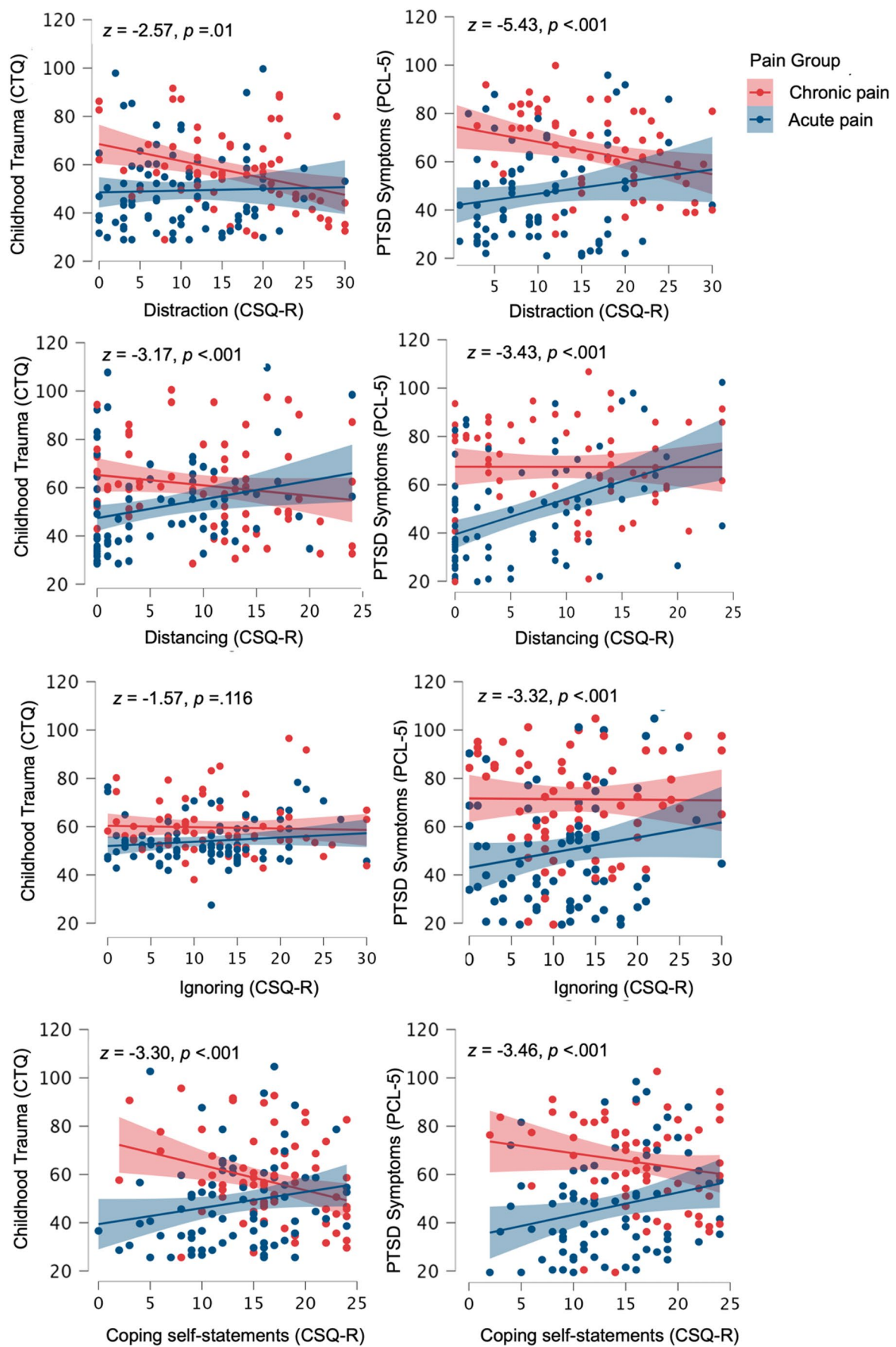
Fig. 1 Significant differences in correlations of pain coping strategies (CSQ-R) and childhood trauma (CTQ-SF) as well as current PTSD symptoms (PCL-5) between individuals who reported acute and chronic pain in the last month. R-to-z transformations performed. Confidence intervals of 95% displayed

These findings suggest group differences in how PTSD symptoms relate to coping.

In sum, individuals with chronic pain exhibit distinct patterns of coping in relation to both childhood trauma and PTSD symptoms, with more pronounced negative associations between certain adaptive coping strategies, particularly distraction, distancing, and self-statements and specific forms of childhood adversity and post-traumatic symptomatology (Supplementary material; Table 8).

Discussion

We examined the relationship between childhood trauma, PTSD symptoms and pain coping strategies, comparing individuals with chronic and acute pain. Those with chronic pain reported greater exposure to childhood trauma, particularly emotional, physical, and sexual abuse, and physical neglect (H1). They also engaged in a broader range of coping strategies, including pain-related worry, distraction, distancing, coping self-statements, and praying, whereas ignoring did not differ between groups (H2). Pain intensity and unpleasantness were strongly associated with childhood trauma history, PTSD symptoms, and several coping strategies, with individuals with chronic pain showing stronger negative correlations between certain coping strategies and PTSD symptoms and trauma history (H3). Finally, the associations between trauma exposure and pain coping strategies differed in strength between groups, with individuals with chronic pain showing stronger negative correlations between certain coping strategies and both PTSD symptoms, as well as certain trauma subtypes (H4). Together, these findings highlight the complex interplay between trauma history, PTSD, and pain coping and underscore the need for interventions targeting both trauma and pain management.

Our findings are in line with the well-established link between childhood trauma (Davis et al., 2005; Lampe et al., 2003), post-traumatic stress symptoms (Karimov-Zwienenberg et al., 2024), and pain experiences, supporting theoretical models such as the mutual maintenance model of chronic pain and PTSD (Asmundson et al., 2002). This model suggests that the interaction between trauma-related distress and pain perception creates a reinforcing cycle, wherein physiological hyperarousal, heightened threat sensitivity, and cognitive-emotional processes contribute to the persistence of both pain and psychological distress. The strong associations observed between pain intensity and both childhood emotional and physical abuse, as well as PTSD symptoms such as re-experiencing and hyperarousal, align with this perspective. These findings suggest that traumatic experiences may shape pain perception and responses, which is characterised by heightened sensitivity of the nervous system and changes in central pain processing pathways (Moeller-Bertram et al., 2014).

Individuals with chronic pain engaged in a broader set of coping strategies, reflecting the enduring psychological burden of persistent pain. This aligns with prior work showing that chronic pain is often associated with heightened emotional and cognitive engagement with pain-related cues (Baastrup et al., 2016; Vlaeyen & Linton, 2000), especially given that Prior studies have found that avoidance-based strategies can occur across pain types and may reflect a short-term attempt to maintain functioning (Eccleston & Crombez, 1999; McCracken & Eccleston, 2003). Ignoring emerged as an exception: while trauma history did not differentiate its use, it was less frequently employed in relation to PTSD symptoms among individuals with chronic pain. One explanation is that PTSD-related hypervigilance reduces the feasibility of cognitive disengagement strategies, consistent evidence that trauma can disrupt attentional control and avoidance processes, as well as increase emotional reactivity (Blair et al., 2013; Clauss et al., 2021). At the same time, several adaptive strategies, particularly distraction, coping self-statements, and praying, were negatively correlated with pain outcomes in individuals reporting chronic pain. These findings reinforce cognitive-behavioural models that emphasise the role of meaning-making and emotional regulation in chronic pain adaptation (Turk, 2003; Turk et al., 2008). Clinically, this finding may highlight the need to assess for trauma-related symptoms in chronic pain populations, as individuals with elevated PTSD may require alternative strategies to manage pain-related distress, beyond those based on cognitive avoidance. Notably, the link between praying and lower pain intensity suggests that spiritual coping, may serve as a resilience factor, consisitent with prior work on religious coping and adjustment (Pargament et al., 2001).

Different types of childhood trauma were linked to both pain severity and current PTSD symptoms, with abuse types more strongly associated with pain intensity, and neglect related to both pain and PTSD. These findings are consistent with prior research showing that childhood maltreatment contributes to heightened pain sensitivity and greater risk for post-traumatic stress (Cay et al., 2022; Marin et al., 2021). PTSD symptom clusters, particularly re-experiencing and avoidance, were associated with higher pain intensity and unpleasantness, highlighting the complex interplay between psychological distress and pain perception. Pain-related worry emerged as a key factor exacerbating both pain

and PTSD, whereas coping strategies including distraction and distancing showed weaker associations. These patterns align with theoretical models that emphasise cognitive-emotional processes in maintaining pain and trauma symptoms, including the fear-avoidance (Cook et al., 2006; Vlaeyen & Linton, 2000), mutual maintenance model (Sharp & Harvey, 2001), and shared vulnerability frameworks (Asmundson et al., 2002)). Importantly, however, developmental trauma perspectives add nuance by highlighting long-term effects on emotional regulation, self-perception, and interpersonal trust, which may influence coping capacity (Schimmenti & Caretti, 2016; Van der Kolk, 2003; Villalta et al., 2018). Evidence from experimental and longitudinal studies support the bidirectional nature of the PTSD-pain relationship (e.g., Bair et al., 2020; Benedict et al., 2020; Giannoni-Pastor et al., 2016; Ravn et al., 2018; Stratton et al., 2014; Sveen et al., 2011; Van Loey et al., 2003). Within this context, our finding that distraction and coping self-statements were more strongly associated with lower pain and trauma symptoms is noteworthy, suggesting potential protective effects. Yet, individuals with more severe trauma histories were less likely to report using these strategies, which could be indicative of trauma-related barriers, such as shame, emotional numbing, or fear of vulnerability potentially making it more difficult to access or benefit from them (DeCou et al., 2019; Harman & Lee, 2010; Lee et al., 2001; Saraiya & Lopez-Castro, 2016). This provides novel evidence that developmental trauma shapes the repertoire of coping strategies individuals can access and should inform future research.

Building on these findings, interventions that support adaptive coping in the context of trauma and chronic pain are particularly warranted. Approaches such as Cognitive Behaviour Therapy (CBT; Morley, 2011), Acceptance and Commitment Therapy (ACT; McCracken et al., 2022), mindfulness-based interventions (Chiesa & Serretti, 2011), and trauma-focused therapies (De Roos et al., 2010; Lumley et al., 2022) may help individuals develop coping strategies that reduce distress while validating prior coping efforts. ACT, for instance, encourages acceptance of pain and engagement in actions aligned with their values, despite ongoing symptoms (Hughes et al., 2017; McCracken & Vowles, 2014; Vowles & McCracken, 2008), providing an alternative when traditional strategies are insufficient. Compassion-Focused Therapy (CFT) may further enhance outcomes by addressing self-criticism and shame, which can limit access to adaptive coping strategies and self-compassion and reduce emotional safety (Au et al., 2017; Lee, 2010, 2022; Luoma & Platt, 2015). Importantly, the current findings add value by highlighting specific trauma-related barriers that may prevent individuals from benefiting fully from these therapies, such as shame, emotional numbing, and fear of vulnerability, and by identifying which coping strategies are accessible in the context of chronic pain and trauma. This knowledge can inform targeted adaptations to existing interventions, such as emphasising engagement with strategies that are less impacted by trauma or integrating preparatory modules to address barriers before introducing standard coping skills. Tailoring interventions to the specific type of childhood trauma experienced, and integrating compassion-focused approaches could improve engagement with other resourceful or empowering strategies, supporting self-compassion, pain-related functioning and resilience in individuals with complex trauma histories (Hadley & Novitch, 2021; Malpus et al., 2023; Marelli et al., 2025; Sveen et al., 2011).

A key strength of this study is the novelty: it is the first to directly compare coping strategies between individuals with acute and chronic pain, in relation to trauma history and PTSD symptoms, offering new insights to inform more responsive clinical approaches. Additional strengths include the use of validated measures and the integration of multiple psychological constructs and inclusion of trauma history and PTSD symptomatology, supporting a holistic and person-centred perspective on pain. Limitations include the cross-sectional design, which prevents causal inference or the direction of effects. Future research would benefit from using longitudinal designs to track changes in coping, pain, and psychological symptoms over time, particularly in relation to trauma history and the transition from acute to chronic pain (Bair et al., 2020; Giannoni-Pastor et al., 2016). While we collected diagnostic information through self-report, it was not verified through a medical professional, which may reduce its reliability. Additionally, the chronic pain group was heterogeneous, limiting our ability to draw conclusions about specific pain types. PTSD symptoms were assessed via survey rather than interview, which may also reduce measurement precision. In addition, participants with greater pain, distress, disability or PTSD may have been more likely to engage with the study via online forums, introducing potential selection bias. The sample was predominantly female and White, underscoring the need for more diverse recruitment to account for cultural and gender influences on pain, coping and access to care (Fillingim et al., 2009; Lee et al., 2001; Samulowitz et al., 2018). Finally, although early efforts to develop a more compassionate alternative to the term "pain catastrophising", which many individuals with lived experience of trauma and chronic pain felt to be deficit-focused, could not be fully realised, these discussions highlight the importance of language in research and clinical engagement and the value of Patient and Public Involvement (PPI). Creating space for their voices to be genuinely heard is essential for research that aims to reflect, respect, and support the communities it seeks to serve.

In conclusion, this study provides novel and valuable insights into how childhood trauma and PTSD symptoms are associated with pain coping strategies between acute and chronic pain populations. Individuals with chronic pain showed stronger negative associations between certain coping strategies (e.g., distraction, coping self-statements) and trauma-related symptoms, suggesting that some strategies may be less effective in this group. These findings emphasise the importance of tailored interventions that consider both pain chronicity and trauma history. Approaches, such as CBT, ACT, and CFT may support adaptive coping by addressing emotional and cognitive responses rather than the pain itself. Overall, this study advances understanding of the challenges faced by trauma-exposed individuals living with chronic pain conditions and informs future research and intervention development to improve clinical outcomes.

Declarations

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