Journal of Pain Research

Dovepress
Taylor & Francis Group

Open Access Full Text Article

REVIEW

Perspectives on Pain: A Narrative Review of Pain Beliefs, Coping, and Clinical Implications

Chandler Pugh[1,*], Kristina Snoddy[1,*], Reagan Boyett[1], Halle Bakir[2], Daniel Cawley[1], Mary K Piscura[1]

[1]Department of Biomedical Affairs and Research, Edward via College of Osteopathic Medicine, Auburn, AL, USA; [2]Department of Graduate Psychology, Pacific University, Forest Grove, OR, USA

*These authors contributed equally to this work

Correspondence: Mary K Piscura, Department of Biomedical Affairs and Research, Edward via College of Osteopathic Medicine, 910 South Donahue Drive, Auburn, AL, 36832, USA, Tel +1334422-4022, Email mpiscura@vcom.edu

Video Abstract

Point your SmartPhone at the code above. If you have a QR code reader the video abstract will appear. Or use: https://youtu.be/7iqoQ53A1_4
Access transcript: https://www.dovepress.com/article/video_transcript/603074

Abstract: Pain beliefs and coping strategies are often linked to treatment outcomes across various pain conditions, yet their roles are often examined in isolation across specific conditions. This narrative review synthesizes evidence across neuropathic, nociplastic, and nociceptive pain to examine how pain-related beliefs shape coping behaviors, treatment adherence, and clinical outcomes. Guided by the Common Sense Model of Illness, we integrate findings from neurobiological, psychological, and clinical literature to demonstrate how negative pain beliefs, such as fear-avoidance, pain catastrophizing, and lower self-efficacy, have been linked to heightened pain perception, maladaptive coping, reduced adherence, and poorer functional recovery. In contrast, positive pain beliefs emphasizing resilience and self-efficacy are often linked to adaptive coping, improved engagement in care, and more favorable outcomes, in part through modulation of prefrontal, limbic, and descending pain regulatory systems. This review synthesizes findings across diverse patient populations and conditions, with an emphasis on the differences in the various effects of pain beliefs and coping strategies. Across conditions, consistent patterns emerge in which belief-driven processes influence both behavioral and neurophysiological responses to pain. We further highlight gaps in current clinical assessment, particularly the underrepresentation of multidimensional belief constructs in routine care, and discuss implications for multidisciplinary, belief-informed interventions. Targeting pain beliefs through cognitive-behavioral strategies, patient education, and individualized care models represents a critical opportunity to improve adherence, reduce disability, and enhance long-term recovery.

Keywords: pain beliefs, coping strategies, chronic pain, pain catastrophizing, self-efficacy, treatment adherence

Introduction

Pain is commonly described as an unpleasant sensory and emotional experience, often associated with tissue or nervous damage.[1] For many, pain persists even after the causative stimulus is removed. Furthermore, individuals experience pain differently, even when exposed to the same pain-causing stimulus. The experience of pain is influenced by a range of biological and psychosocial factors, rendering it inherently subjective and variable across individuals.[2] Pain beliefs and pain coping strategies are key determinants of physical and psychological outcomes and contribute to the severity and/or frequency of the pain. Pain beliefs form the cognitive framework through which individuals understand and interpret their pain experiences. These beliefs function as a lens that shapes how pain is encountered, encompassing attitudes, perceptions, and expectations regarding its significance and implications. Conversely, pain coping refers to the cognitive and behavioral responses intended to reduce the impact of pain. These coping strategies represent the ways that an individual compensates for and responds to their pain, such as using relaxation breathing during a pain flare or distracting themselves with an enjoyable activity.[3] Both pain beliefs and coping strategies can be classified into categories based on their effect on the individual experiencing pain.

https://doi.org/10.2147/JPR.S603074
Received: 12 February 2026
Accepted: 14 April 2026
Published: 23 April 2026

Pain beliefs can be classified as positive or negative. Positive pain beliefs include optimism regarding treatment efficacy, belief that one can control one's own pain (locus of control) and belief that one can manage pain, even if it is challenging (high self-efficacy). These belief patterns are generally associated with more favorable health outcomes and recovery trajectories. In contrast, negative pain beliefs are chiefly characterized by hopelessness, rumination, and magnification of pain, collectively referred to as pain catastrophizing.[4] Catastrophizing is associated with higher pain intensity, potentially due to an increased cognitive focus on pain sensations and their anticipated consequences.[5] While pain catastrophizing is the most widely studied of the negative pain beliefs, others include beliefs of being disabled by pain (low self-efficacy), beliefs that pain is permanent, and expectations that activity will inevitably worsen pain (fear-avoidance).[3]

While the literature acknowledges inconsistency in how coping is classified, it has been suggested that approaches emphasize their adaptive processes; therefore, in this study, we will define these responses to pain as either maladaptive or adaptive coping.[6] Maladaptive coping strategies are defined as those that are shown to worsen pain, such as guarding, excessive rest, fear of movement (kinesiophobia), and excessive solicitation of assistance. Adaptive coping strategies, on the other hand, include task persistence, exercise, support seeking, and self-directed coping behaviors, many of which promote movement and social engagement.[3] In the postsurgical setting, adaptive coping may be reflected by participation in physical therapy and community engagement, characteristics frequently associated with more favorable surgical outcomes.[7] Importantly, coping strategies are not limited to pain management alone but may also encompass reliance on external support systems that enhance psychological resilience. For example, individuals who identify as religious or spiritual may demonstrate greater capacity to cope with chronic pain, potentially due to embedded social and psychological support mechanisms within these frameworks.[8]

Pain beliefs are intricately linked to coping behaviors, as individuals' interpretations of pain shape their emotional and behavioral responses to perceived threat. Pain is frequently appraised as dangerous, eliciting fear and avoidance as protective coping strategies intended to prevent recurrence.[9] Among patients with inflammatory arthritis, higher pain levels are associated with greater concern about disease progression, treatment-related adverse effects, quality of life, and disruption of daily activities, reflecting increased cognitive and emotional engagement with pain.[10] Persistent worry and rumination promote maladaptive coping patterns such as catastrophizing, which is associated with elevated anxiety and depression and higher reported pain intensity, underscoring the interrelated nature of pain beliefs, emotional distress, and pain outcomes.[11–13]

These belief-driven coping responses have meaningful clinical implications. Higher levels of preoperative anxiety are associated with increased anesthetic requirements, greater postoperative pain, and higher rates of postoperative complications, suggesting that anxiety-mediated coping influences recovery trajectories.[14] Conversely, interventions that target pain beliefs, such as cognitive behavioral therapy (CBT), have been associated with reduced pain and enhanced perceived control in postoperative patients.[15] Greater self-efficacy and stronger control beliefs are linked to a lower daily impact of depression and fewer negative affective symptoms, lower anxiety levels, and increased pain tolerance and endurance, even when perceived pain intensity remains unchanged.[16–19]

Collectively, these findings align with the Common Sense Model (CSM) of Illness, which asserts one's representations about illness guide subsequent behaviors or responses.[20,21] The perceived effectiveness of these behaviors in managing illness symptoms then reinforces or deconstructs initial perceptions, creating a dynamic feedback loop. Holistic extensions of CSM further acknowledge the influence of contextual and sociocultural factors that shape illness representations, such as lived experiences in which pain is normalized or cultural beliefs framing pain as a personal weakness.[22] Together, these perspectives highlight the multidimensional and context-dependent nature of pain-related beliefs and behaviors. To illustrate these dynamics, Figure 1 presents a modified version of the CSM that situates the pain experience with acknowledgement of these extensions. This framework offers a critical lens for examining how beliefs direct pain outcomes, which can provide value in improving patient-provider communications, treatment adherence, and effective interventions. Within this framework, contextual factors, including but not limited to race, socioeconomic status, health literacy, and social environment, play a central role in shaping illness representations. These influences affect how pain is interpreted, the degree of perceived control, and the coping strategies employed, ultimately contributing to variability in clinical outcomes. Accordingly, this narrative review explores the ways in which pain beliefs influence patient outcomes and integrates recommendations derived from the synthesized literature.

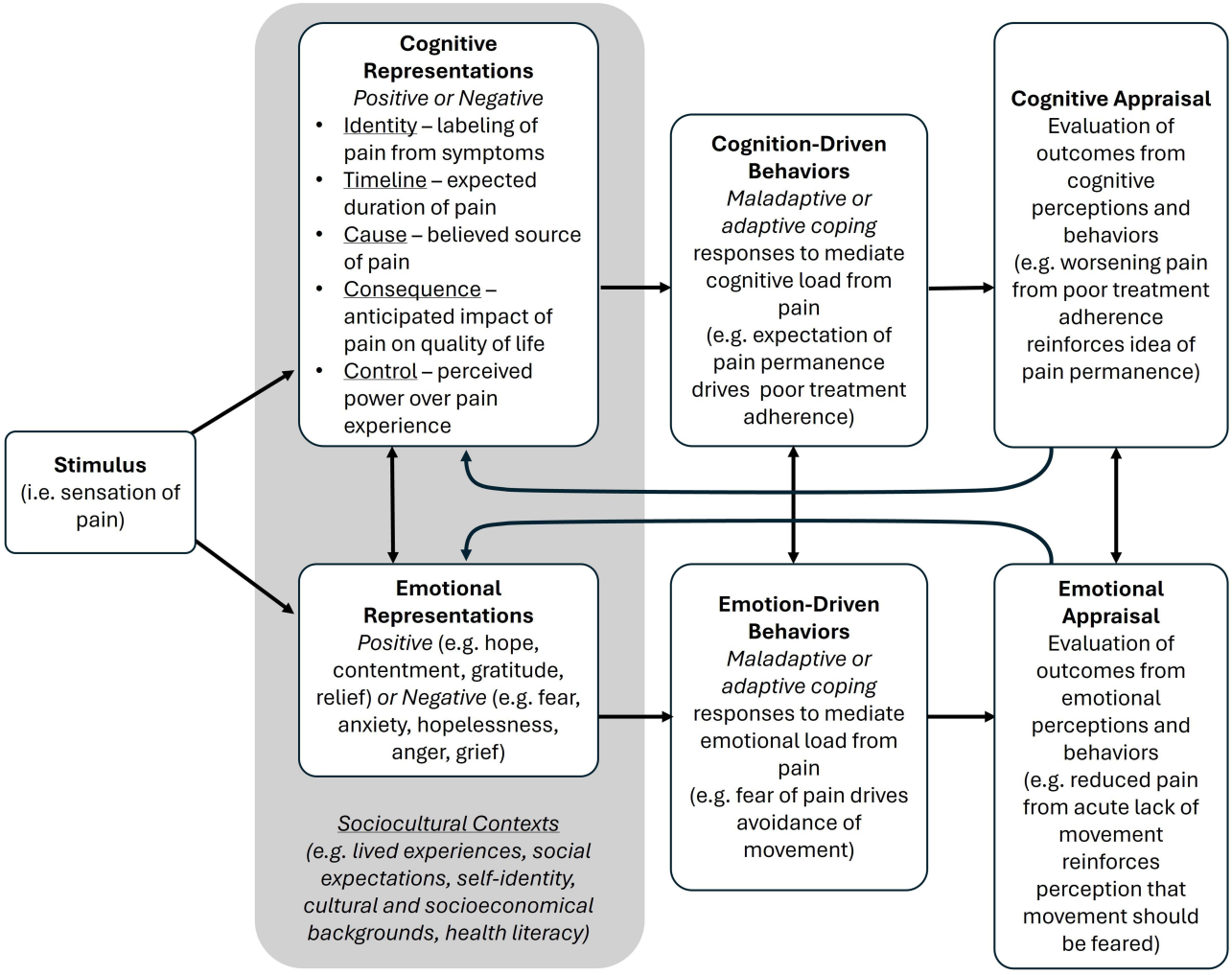

Figure 1 Modified Common Sense Model (CSM) for Pain. Since its original development by Leventhal et al, CSM has guided the consideration of patient representations and coping strategies for a multitude of illnesses This adapted model is created under the context of pain experiences and includes contemporary considerations from the literature for further influencers of cognitive perceptions.[20] Key components of the model include: "stimulus," which refers to the symptom trigger; "cognitive representations," which reflect how patients understand and interpret their condition; "emotional representations," which reflect the emotional responses elicited by the condition; "cognition-driven behaviors" and "emotion-driven behaviors," which represent coping responses guided by cognitive or emotional processes; and "cognitive appraisal" and "emotional appraisal," which refer to the evaluation of coping behaviors through cognitive and emotional processes, respectively.

Literature Search and Selection Approach

Relevant studies were identified through targeted searches of PubMed and Google Scholar using keywords such as "pain beliefs", "pain catastrophizing", "fear-avoidance", "self-efficacy", and "coping strategies." The search was conducted through December 2025. Articles were selected based on relevance to the conceptual focus of the review, with emphasis on studies examining cognitive and psychosocial influences on pain outcomes. Additional references were identified through citation tracking. Contextual factors, including age, socioeconomic status, health literacy, and cultural influences, are addressed in dedicated sections of the review, as these variables are not consistently reported across all studies. This approach was designed to provide a focused, concept-driven synthesis of key themes related to pain beliefs and coping.

Neurobiological Basis for Pain Beliefs

To better understand the processes shaping the complexity of an individual's pain experience, it is important to consider the pathways linking pain beliefs to nociceptive processing. Pain signaling involves four key processes: transduction, transmission, modulation, and perception. Nociceptors, or specialized pain receptors, detect harmful stimuli such as extreme temperatures, pressure, or noxious chemicals. Distinct nociceptor subtypes respond to specific

stimuli; for example, chemical nociceptors are activated by inflammatory mediators during inflammatory pain states. During transduction, these stimuli are converted into electrical signals that are conveyed to higher centers via afferent neurons (transmission). These neurons, primarily A-delta and C fibers, travel along organized pathways within the spinal and supraspinal systems, with the spinothalamic tract serving as the principal ascending route. Ascending signals are relayed through the thalamus (Th) to the primary (S1) and secondary (S2) somatosensory cortices. Modulation, referring to alterations of these signals, largely occurs at the spinal level through interneurons and the brainstem, such as the periaqueductal gray (PAG) and rostral ventromedial medulla (RVM). These centers generate descending modulatory circuits that can amplify or suppress nociceptive transmission, enabling adaptive regulation of pain. Ultimately, this integrated processing culminates in cortical networks supporting the conscious perception of pain (Figure 2).

Pain beliefs shape our responses to pain through top-down regulation of supraspinal networks and descending modulatory systems. These processes reflect coordinated activity across distributed neural networks rather than isolated brain regions, with pain emerging from dynamic interactions among cognitive, affective, sensory, and motivational systems. Importantly, these same beliefs and coping strategies also drive the remodeling of those networks over time. Negative pain-related beliefs, particularly pain catastrophizing, are associated with heightened pain perception and increased activity in areas of the prefrontal cortices (PFCs) involved in cognitive and emotional processing and decision-making. These include the ventromedial prefrontal cortex (vmPFC), dorsolateral prefrontal cortex (dlPFC), and orbitofrontal cortex (OFC).[23,24] Functionally, the vmPFC and OFC contribute to appraisal and valuation of stimuli, while the dlPFC has been attributed to regulating decision-making based on assigned emotional value.[30,31] Belief-driven processes also engage reward and motivational circuits, as implicated in involvement with the nucleus accumbens (NAc) and ventrotegmental area (VTA). Corticostriatal connectivity between the NAc and PFC predicts the transition from subacute to chronic pain, linking expectation and valuation processes to pain persistence and affective modulation.[25,32] Similarly, fear-avoidance beliefs reinforce hypervigilance and behavioral disengagement, increasing disability and promoting chronicity within a cognitive-behavioral framework involving the anterior cingulate cortex (ACC).[26,33] Expectancy further shapes conditioned pain modulation, demonstrating that beliefs recalibrate the modulatory system itself through the amygdala, ACC, dlPFC, and PAG.[27]

In contrast, positive pain beliefs are associated with reduced pain perception and are frequently examined within the context of expectancy and placebo-related mechanisms. The vmPFC plays a central role in how one assigns value to stimuli, a function closely tied to perceived control and expectations surrounding pain.[34,35] Control-based reappraisal of pain appears anatomically specific, as activation of the right, but not left, ventrolateral prefrontal cortex (vlPFC) has been observed during such processes.[36] Expectancy and cognitive reappraisal recruit prefrontal-cingulo-insular circuits that engage the PAG and brainstem, resulting in inhibition of nociceptive processing and reductions in reported pain.[28] Social and contextual influences further shape positive expectancy formation and adaptive coping through engagement of regions such as the posterior cingulate cortex (PCC) and precuneus (PCu), dlPFC, vmPFC, and insula.[37]

Coping strategies that operationalize positive beliefs are linked with experience-dependent neural plasticity. CBT for chronic pain has been associated with increased gray matter in prefrontal and somatosensory regions, alongside reductions in catastrophizing linked to dlPFC alterations. The same study reports mindfulness and cognitive self-regulation reduce pain via prefrontal and ACC–insula systems while attenuating primary somatosensory responses.[29] Control beliefs and self-efficacy engage valuation and control hubs (vmPFC, OFC, ventral striatum), mechanisms that support down-regulation of pain and resilience.[38] Although substantial overlap exists among neural circuits involved in pain regardless of belief valence, evidence suggests that amygdala–ACC connectivity preferentially underlies negative pain expectations, whereas OFC–hippocampal connectivity supports positive expectancy and contextual learning.[39] Together, these findings support a network-based understanding of pain in which beliefs and coping strategies dynamically shape interactions among prefrontal, limbic, striatal, and brain-stem systems, biasing prediction, valuation, and modulation of nociceptive input. Within this framework, pain is not solely the product of ascending sensory signals, but an emergent experience arising from flexible, experience-dependent neural networks that integrate expectation, emotion, and context.

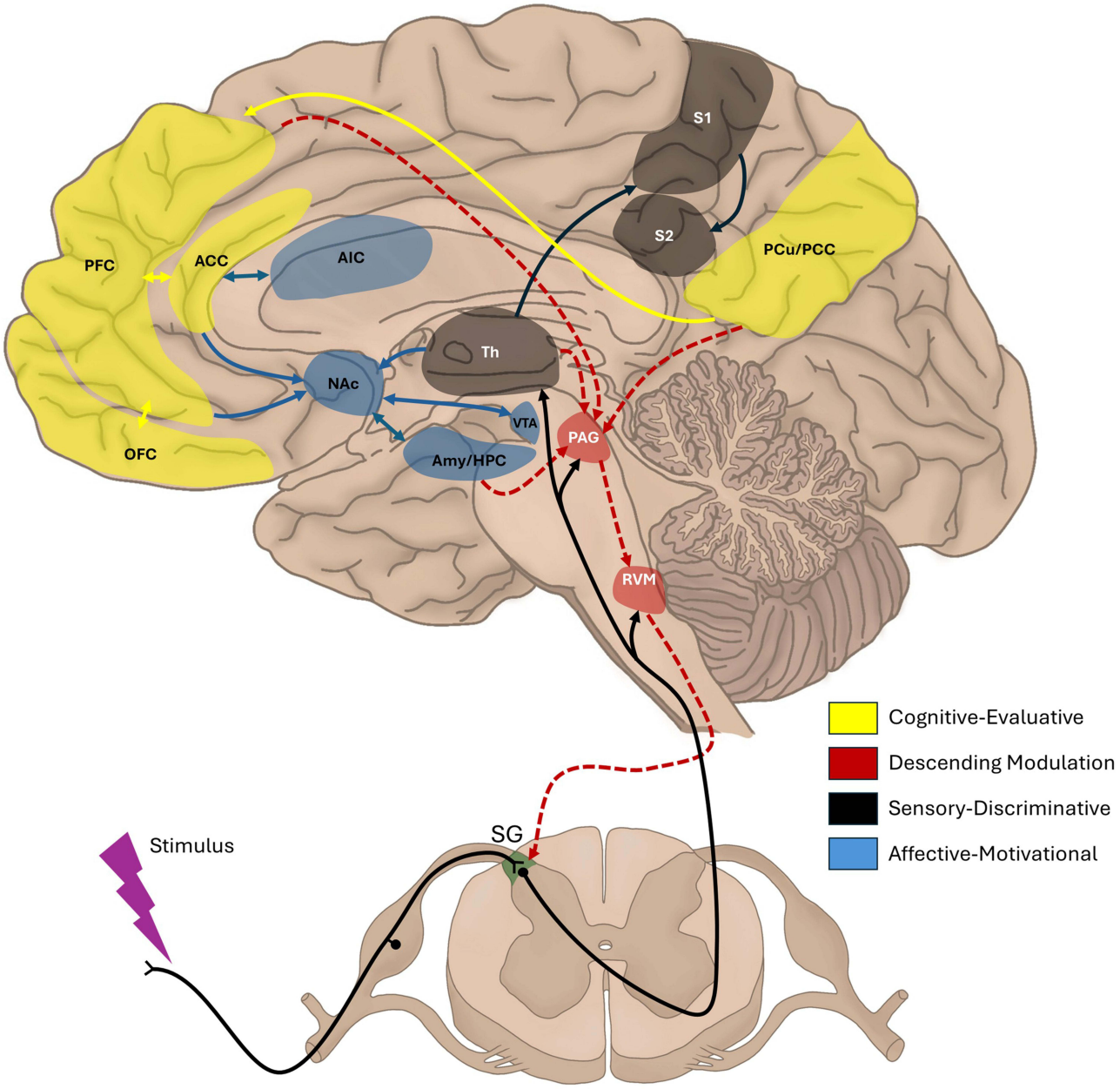

Figure 2 Primary Spinal and Supraspinal Pathways for Pain Transmission and Modulation. Pain pathways and modulatory circuits illustrated are synthesized from foundational and contemporary literature on nociceptive transmission, affective–cognitive processing, and descending modulation of pain.[23–29]
Abbreviations: ACC, anterior cingulate cortex; AIC, anterior insular cortex; Amy, amygdala; HPC, hippocampus; NAc, nucleus accumbens; OFC, orbitofrontal cortex; PAG, periaqueductal gray; PCC, posterior cingulate cortex; PCu, precuneus; PFC, prefrontal cortex; RVM, rostral ventromedial medulla; S1, primary somatosensory cortex; S2, secondary somatosensory cortex; SG, substantia gelatinosa; Th, thalamus; VTA, ventral tegmental area.

Types of Pain and Pain Beliefs and Coping Strategies

Pain, though a universal experience, can be classified into three primary categories: neuropathic, nociplastic, and nociceptive. These categories reflect distinct mechanisms of pain generation and modulation, underscoring the importance of examining how pain beliefs and coping strategies interact across pain types to shape patient experiences and outcomes. Although disentangling pain etiology from associated beliefs remains challenging, this review identifies common beliefs and coping patterns across some of the most frequently studied pain conditions.

https://doi.org/10.2147/JPR.S603074

Neuropathic Pain

Neuropathic pain is defined as pain caused by a disease or lesion affecting the somatosensory nervous system and may be classified as central or peripheral.[40] The peripheral neuropathic pain conditions discussed here are painful diabetic neuropathy, HIV-related neuropathy, and post-herpetic neuralgia, whereas central neuropathic pain conditions include multiple sclerosis and central poststroke pain. Although not exhaustive, these conditions illustrate the clinical diversity of neuropathic pain, across which patient pain beliefs and coping strategies play a critical role in shaping outcomes.[41]

Diabetic Neuropathy

The most common type of neuropathic pain, diabetic neuropathy, is a prominent peripheral disorder that affects both sensory and autonomic fibers. Higher self-efficacy and more positive expectations correlate with better functional outcomes, whereas depression and anxiety are linked to decreased adherence and sustained disability.[42–44] Interventions that target patient beliefs, provide education, and encourage social support have been shown to enhance adherence and reduce diabetic neuropathy-related disability.[44–46]

Post-Infectious Neuropathies

Postherpetic neuralgia is characterized by persistent shooting or burning pains following herpes zoster infection, with negative pain beliefs associated with greater pain intensity and disability.[47,48] Psychological factors, particularly maladaptive cognitions, predict symptom severity and poorer outcomes.[49,50] Addressing these pain beliefs through patient education, cognitive-behavioral strategies, and various coping strategies has been associated with meaningful improvements in therapeutic adherence and long-term outcomes.[51]

Similarly, human immunodeficiency virus (HIV)-related neuropathy commonly manifests as distal sensory neuropathy resulting from small-fiber demyelination.[52,53] Individuals with HIV-related pain often report lower self-efficacy, reduced health-related quality of life, and greater depressive symptoms compared to those without pain.[54,55] Depression shows one of the strongest associations with neuropathic pain severity in this population, highlighting the reciprocal relationship between mood, pain beliefs, and pain outcomes.[56] Although psychological management of HIV-related neuropathy remains an active area of investigation, existing research is limited in scope.[57,58]

Multiple Sclerosis

Multiple sclerosis (MS) is a common cause of central neuropathic pain, with pain intensity and functional impairment strongly influenced by self-efficacy and coping capacity.[59,60] Studies have reported that high self-efficacy and adaptive coping mechanisms are associated with lower pain severity and better long-term outcomes.[60,61] In contrast, negative pain beliefs are linked to pain exacerbation and disability in MS patients.[62,63] Cognitive behavioral therapy has been beneficial in improving beliefs surrounding MS pain, which improves long-term outcomes.[64,65]

Central Poststroke Pain

Central poststroke pain arises from damage to central sensory pathways and significantly interferes with recovery following stroke.[66] Patients with lower self-efficacy, maladaptive coping strategies, beliefs in pain permanence, and higher levels of psychological distress experience more severe pain, and prolonged disability and recovery.[66–68] Coexisting anxiety, depression, and fatigue have been shown to heighten pain and diminish quality of life.[69] In contrast, higher self-efficacy and strong social support are associated with better coping, functional recovery, and improved quality of life.[70–73]

Nociplastic Pain

Nociplastic pain encompasses a group of conditions characterized by altered central pain processing in the absence of identifiable tissue damage or neural lesions. Common examples include fibromyalgia, chronic tension-type headaches and migraines, temporomandibular disorders, irritable bowel syndrome, and related functional pain conditions.[74,75] These conditions share altered pain modulation, heightened sensory gain, and strong associations with psychological stress, catastrophizing, and impaired self-efficacy, despite the absence of identifiable tissue damage or neural lesions.

Fibromyalgia

Fibromyalgia is a chronic pain condition marked by widespread pain, tenderness, fatigue, and sleep disturbances, and is now widely recognized as a disorder of central sensitization or pain amplification.[76,77] Although its precise pathophysiology is not completely understood, alterations in neurochemical systems, including substance P, cortisol, serotonin, and growth hormone, have been implicated, with cortisol and serotonin dysregulation contributing to the high prevalence of anxiety and depression observed in this population.[78] Chronic C-fiber stimulation has also been proposed as a contributing mechanism by producing central nervous system adaptations, such as diminished opioid and GABAergic inhibitory responses, ultimately resulting in heightened pain sensitivity.[79]

Pharmacologic treatments such as pain medication, antidepressants, and gabapentinoids have offered limited relief, prompting increased focus on psychological and behavioral contributors to fibromyalgia.[53] Pain beliefs play a critical role in shaping patient experiences and behaviors. Lower self-efficacy, particularly regarding physical activity, is associated with reduced activity levels and increased avoidance behaviors.[80] Pain catastrophizing not only predicts the severity of fibromyalgia-related pain, but also mediates the relationship between pain self-efficacy and disease severity, suggesting that improving self-efficacy could reduce symptom burden.[81] Chronic pain may further reinforce hopelessness and pain catastrophizing, perpetuating maladaptive coping cycles and worsening outcomes.[82] CBT may interrupt these cycles by promoting adaptive coping mechanisms, reframing negative thought patterns, and ultimately improving both physical and psychological functioning in fibromyalgia patients.[83]

Headaches and Migraines

Some of the most prevalent nociplastic syndromes manifest as chronic tension-type headaches and migraines, both of which are increasingly understood through the lens of central sensitization dysregulation and altered pain modulation. Despite differences in symptom presentation and underlying pathophysiology, consistent patterns emerge in how pain beliefs and coping strategies relate to outcomes across these conditions.[84] Pain catastrophizing, fear of pain recurrence or disability, and reduced self-efficacy are associated with increased headache- and migraine-related disability, greater health care needs, and poorer quality of life.[85–87] Conversely, stronger internal and external locus of control are positively correlated with migraine-related quality of life and psychological states.[88,89] Individuals with higher confidence in their ability to manage headache symptoms are less likely to engage in activity avoidance or rely excessively on pharmacologic treatments and other maladaptive coping strategies, which may further perpetuate symptom chronicity.[90,91] Notably, expectations regarding headache and migraine triggers appear to be largely shaped by individual beliefs rather than consistent diagnostic or environmental factors.[92] Additionally, interventions that target pain beliefs, such as CBT, stress management, and biofeedback, are shown to substantially reduce headache frequency and severity both alone and in combination with pharmacologic treatments.[93–96]

Nociceptive Pain

Nociceptive pain is classically associated with acute tissue injury; however, prolonged or repeated nociceptive input can induce neuroplastic changes that promote central sensitization and persistent pain beyond expected tissue healing. This transition from acute to chronic pain is strongly influenced by psychological factors, including fear-avoidance beliefs, pain catastrophizing, and perceived lack of control, which amplify pain perception and reinforce maladaptive behaviors. Consequently, chronic nociceptive pain often reflects the interplay between ongoing peripheral input and centrally mediated cognitive-affective processes, blurring distinctions between nociceptive and nociplastic mechanisms.

Chronic Musculoskeletal Pain

Chronic musculoskeletal pain (CMSP) is defined as persistent pain or recurrent pain affecting joints, tendons, muscles, and bones for three months or longer, and is best understood within a biopsychosocial framework where psychological and social factors interact with biological processes to drive disability and heightened pain severity.[97,98] Common causes of CMSP include arthritis, connective tissue disorders, gout, myopathies, bone conditions, and regional pain syndromes.[99,100] CMSP also often exhibits features of central sensitization and nociplastic pain, particularly following injury, where altered pain processing contributes to symptom persistence.[101] Although maladaptive coping strategies such

as catastrophizing exacerbate pain and disability, structured pain education and cognitive-behavioral approaches have been shown to reduce symptom burden.[26,102]

Pain beliefs play a central role in the development and persistence of CMSP. Among individuals with low back pain, outcomes are strongly influenced by perceptions of control, illness identity, and pain self-efficacy, while fear-avoidance beliefs and kinesiophobia are consistently associated with greater pain intensity, disability, and reduced occupational functioning.[103–106] Conversely, higher expectations of recovery and self-efficacy predict lower pain and disability over time.[105] Patients who focus primarily on mechanical explanations for pain, such as posture, while neglecting psychosocial contributors, may develop hypervigilance and avoidance behaviors that worsen prognosis and treatment adherence.[107] Similarly, minimizing the emotional dimensions of pain is associated with reduced engagement in self-management strategies.[108] Cultural differences also shape coping strategies in CMSP, with African-American patients more likely to use emotion-focused strategies and report lower self-efficacy compared to Caucasian patients.[109]

Effective management of CMSP emphasizes personalized, multimodal care that addresses the whole person.[99] Maladaptive coping strategies are associated with rumination of symptoms, whereas CBT promoting adaptive coping is linked to reductions in pain severity, catastrophizing, fear, and avoidance.[110] Even brief fear-avoidance–focused interventions combining education, graded activity, and feedback have demonstrated improvements in mobility and reductions in fear-related behaviors in chronic low back pain.[111] As such, current guidelines from the American Psychological Association recommend treating CMSP with nonpharmacological interventions, such as exercise, CBT, physical therapy, and education as first-line treatments.[112] Integrating psychological support, supervised physical activity, education, and social support is essential for improving long-term outcomes and quality of life in this population.[113]

Perioperative and Postoperative Pain

Surgical care presents a unique model for investigating pain trajectories, as routine follow-up enables repeated assessment of pain beliefs and observation of pain chronification. Postoperative pain is temporally dynamic and shaped by interacting biological and psychosocial factors. While acute postoperative pain largely reflects nociceptive input from the surgical site, chronic post-surgical pain may arise from persistent inflammatory processes, nerve injury, and cognitive–affective influences.[114]

Negative pain beliefs predict poorer post-surgical outcomes. For instance, those with greater fear of pain and consequent avoidance of physical activity after rotator cuff repair reported worse pain and functionality at follow-up.[115] Similarly, kinesiophobia and pain catastrophizing predicted poorer recovery and may reflect more complex injuries, such as an additional muscle tear.[116,117] Long-term effects are also evident, as those with higher pain catastrophizing scores have low-grade inflammation present five years after total knee arthroplasty.[118] Across surgical populations, catastrophizing, anxiety, depression, and rumination are associated with worse pain, reduced function, and increased risk of postoperative complications such as infection and revision surgery.[119–121] These findings have been replicated across shoulder, hip, and knee arthroplasty, where preoperative anxiety and pain catastrophizing are significant risk factors for postoperative pain.[122]

Conversely, positive pain beliefs are associated with improved post-surgical outcomes. Higher self-efficacy and stronger locus of control predict improvements in postoperative quality of life, functional recovery, and return to normal activity.[123–125] Resilience, which reflects a patient's ability to tolerate their pain and maintain control over it, is also linked to better postoperative knee function.[126,127] Optimism regarding pain resolution similarly predicts better outcomes following rotator cuff repair.[128]

Across pain types, consistent patterns emerge in which maladaptive pain beliefs bias coping strategies toward avoidance and disengagement, whereas adaptive beliefs support engagement, flexibility, and recovery, reinforcing the view that pain outcomes are shaped less by etiology alone than by belief-driven behavioral and neural responses.

Treatment Adherence

As discussed thus far, pain-related beliefs are closely tied to subsequent behaviors and clinical outcomes. Similarly, these same beliefs play a central role as to whether one persists with recommended therapies, behavioral changes, and treatments. Adherence is shaped by psychological factors that overlap with pain beliefs, such as self-efficacy,

catastrophizing, perceived control, and treatment effectiveness. The following section examines how these factors interact to support or undermine adherence across various pharmacological and nonpharmacological pain management approaches.

Pharmacological Adherence

Patients' beliefs about their pain and its treatment can influence psychological, physical, and pharmacological outcomes. In postoperative settings, greater distress tolerance has been associated with lower morphine consumption following laparoscopy, whereas higher pain catastrophizing is linked to increased opioid use.[129] Importantly, patterns of opioid use and adherence are not inherently beneficial or harmful, but are highly dependent on individual pain severity, treatment goals, risk profiles, and clinical context. Higher self-efficacy has been associated with greater consistency in following prescribed opioid regimens; however, individuals reporting more severe pain may demonstrate increased medication use as an attempt to maintain function and symptom control rather than as an indicator of optimal pain management. Conversely, negative beliefs about opioids, such as fears of addiction, are associated with poorer adherence to prescribed dosing schedules, underscoring the need for clear patient-provider communication that addresses concerns, aligns expectations, and supports informed, individualized decision-making regarding opioid use.[130]

Pain-related beliefs also shape medication adherence in chronic disease populations. Among individuals with HIV/Acquired Immunodeficiency Syndrome (AIDS) experiencing neuropathic pain, pain catastrophizing is strongly associated with pain severity and disability; however, neither catastrophizing nor depressive symptoms independently predict medication nonadherence.[131] In contrast, HIV/AIDS patients reporting pain are less likely to adhere to antiretroviral therapy than those without pain, a relationship that may be bidirectional, as poor adherence can worsen pain through increased viral load. Importantly, adherence self-efficacy partially mediates the relationship between pain and antiretroviral adherence, whereas depression severity does not, highlighting the central role of perceived control in adherence behaviors.[54]

In other chronic pain conditions, adherence is influenced more by beliefs about treatment effectiveness and disease mechanisms than by pain severity alone. Patients with psoriatic arthritis or axial spondyloarthritis who discontinued medication therapy demonstrate greater catastrophizing and higher pain levels, suggesting that perceived treatment inefficacy may contribute to nonadherence.[132] Conversely, in fibromyalgia, medication adherence is higher among individuals reporting greater affective pain, potentially reflecting differences in treatment targets and patient expectations.[133] In inflammatory arthropathies, persistent pain despite disease-modifying therapy may lead patients to disengage from treatment when perceived benefits are limited. In contrast, fibromyalgia treatments often target centralized pain processing and psychological distress, and adherence is highest among patients prescribed antidepressants rather than anticonvulsants, suggesting that addressing mood symptoms may play a particularly important role in supporting adherence in this population.[134]

Non-Pharmacological Adherence

Adherence to non-pharmacological pain interventions is also subject to influence by patient beliefs. Exercise therapy, a first-line intervention for CMSP, demonstrates moderate evidence for reducing pain and improving function compared to no intervention or usual medical care. Programs that are individualized and supervised demonstrate higher adherence and better patient outcomes than generalized approaches.[135,136] In fibromyalgia, self-efficacy and perceived effectiveness of exercise strongly predict adherence over extended periods, whereas pain catastrophizing and depression are associated with poorer adherence and diminished maintenance of treatment gains.[137–139] Despite awareness of exercise benefits, adults with chronic pain report greater barriers to participation, such as pain, fatigue, fear of injury, and comorbidities, compared to those without pain.[137,140–142]

Mind-body therapies similarly demonstrate belief-dependent adherence patterns. Adherence to yoga is influenced by depressive symptoms, whereas adherence to acupuncture is more closely tied to belief in its efficacy.[143,144] Yoga has demonstrated modest improvements in pain and function with relatively low adverse event rates compared to other exercise modalities.[145–147] Patient preference further shapes adherence, as mind-body practices such as yoga, tai chi, and Pilates may differentially influence psychosocial factors and quality of life.[148]

Manual therapies and physical rehabilitation also rely on belief-driven adherence mechanisms. Engagement with physical therapy is higher among individuals reporting greater self-efficacy and perceived benefit, particularly when combined with supportive therapeutic relationships.[149–151] Across home-based and supervised rehabilitation programs, self-efficacy, motivation, intention to engage, prior adherence, and social support consistently predict treatment compliance.[152,153] These findings highlight the importance of reinforcing adaptive beliefs and addressing fear-avoidance during rehabilitation. Although direct measures of pain beliefs in osteopathic manipulative treatment (OMT) studies are limited, clinical research demonstrates that OMT is associated with reductions in pain, anxiety, and sleep disturbance in chronic low back pain, and pain relief in geriatric oncology and other populations.[154,155] These contextual effects mirror findings from the broader manual therapy literature, where patient expectations, mood, and adjunct psychosocial elements enhance treatment outcomes, implicating belief-related mechanisms in engagement and coping with hands-on interventions.[156] In some OMT research, treatment credibility and expectancy have been considered explicitly, reflecting the importance of belief constructs in interpreting clinical responses.[157]

A personalized, multidisciplinary approach that targets unhelpful pain beliefs and behaviors is increasingly being suggested to improve treatment adherence and more effectively manage chronic pain.[148,158,159] Multidisciplinary rehabilitation, such as coordinated programs integrating physical and psychological components delivered by professionals across specialties, has demonstrated small but significant benefits in pain and disability compared with usual medical care. The American Psychological Association and the American Academy of Pain Medicine recommend multidisciplinary care, given its ability to address biological, psychological, and social aspects of pain, with improvements most notable in the long term.[112,160–162] Older adults' willingness to engage in such programs is also shaped by beliefs, with negative or fatalistic views reducing adherence.[163]

Importantly, psychological constructs can be leveraged to improve adherence. Reducing catastrophizing and fear-avoidance and enhancing self-efficacy through multidisciplinary approaches may reduce disability more effectively than pain relief alone.[164,165] Thus, a low baseline self-efficacy with high pain catastrophizing predicts greater disability and pain six months after treatment, further emphasizing the importance of early intervention.[133] Setting realistic, patient-driven goals increases adherence.[166] Structured strategies such as CBT, reminders, and booster sessions also improve long-term compliance.[167] Nevertheless, adherence rates remain suboptimal, suggesting that targeting belief systems and coping strategies may ultimately prove effective.[168–170]

Social and Demographic Determinants

Consistent with the CSM, pain beliefs and coping behaviors are shaped not only by symptom experiences but also by broader social context. While not exhaustive, this section summarizes how factors such as race and ethnicity, age, sex/gender-related factors, socioeconomic status, education/health literacy, and faith traditions influence pain beliefs, coping strategies, and downstream outcomes.

Race and Ethnicity

Race and ethnicity are associated with differences in reported pain intensity, pain-related interference, and coping patterns, reflecting an interaction between lived experience, healthcare access, structural factors, and cultural context. Hispanic Americans (HAs) and non-Hispanic Blacks (NHBs) report higher pain intensity and interference than non-Hispanic Whites (NHWs), with NHBs showing the greatest interference even after adjustment for sociodemographic and clinical factors.[171–173] Despite elevated pain severity, HAs often report fewer mobility and functional limitations and fewer missed work hours than NHBs, suggesting meaningful differences in coping styles, resources, and behavioral adaptation.[171,174,175]

Coping tendencies also vary across groups. NHBs report lower perceived control over pain, greater reliance on coping strategies, stronger catastrophizing, and higher expectations of interpersonal interaction with others.[109,176,177] In addition, they more frequently use praying/hoping, distraction, and catastrophizing, whereas NHWs more often report ignoring pain and task persistence.[176,178–180] HAs commonly report religious coping and at-home remedies such as teas, herbal products, and topical treatments.[181] NHBs also show higher baseline catastrophizing and lower pain self-efficacy that

may contribute to heightened pain sensitivity, whereas NHWs typically exhibit higher self-efficacy, a factor generally protective for pain outcomes.[182] However, this protective effect appears diminished in NHBs.[183]

Importantly, pain and physical functioning reflect the intersection of race/ethnicity with structural and clinical factors.[177] Provider misconceptions that lead to undertreatment, as well as limited insurance coverage restricting access to effective pain care, can heighten both pain severity and functional impairment.[174,184–186] In addition, HAs may also experience a lack of Spanish-speaking physicians and difficulties with interpretation, which limit critical communication and increase distrust of the healthcare community.[187,188] These disparities contribute to the higher prevalence of anxiety among this population and subsequent avoidance of healthcare experiences and worse clinical outcomes.[189,190] Cultural beliefs and contextual factors, including norms surrounding health, activity, and body ideals, as well as structural barriers to access, shape pain-related beliefs and influence adherence to recommended pain treatments.[191–193] Given heterogeneity within and across groups, culturally responsive assessment and communication remain essential for optimal care.[194,195]

Age

The literature identified in this review primarily reflects adult populations; however, available evidence suggests meaningful differences in pain beliefs and coping across adulthood. Chronic pain is highly prevalent in older adults and contributes to considerable suffering and disability.[196,197] For instance, older patients are more likely to have severe and disabling low back pain than younger individuals with back pain.[198] However, older adults tend to report less pain-related suffering and greater perceived control over their pain than middle-aged or younger adults.[199] They also demonstrate lower levels of pain catastrophizing and depression, with higher levels of pain self-efficacy and pain acceptance compared to these younger age groups.[200] These patterns may stem from the association between aging and psychological resiliency and accumulated coping experience.[201] Similarly, pain-related beliefs play an important role in functioning in youth with physical disabilities, with stronger emotion-related pain beliefs linked to poorer physical and psychosocial outcomes. Interventions in younger individuals that target maladaptive beliefs, enhance perceived pain control, and build skills for managing the emotional impact on pain can improve quality of life.[202]

Older adults may also possess a stronger belief in their ability to cope with pain and pain-related disability because they face fewer work and family responsibilities than middle-aged and younger adults.[203] In older adulthood, beliefs that chronic pain is a "normal" part of aging may promote acceptance and reduce emotional distress.[200,204,205] However, the development of a belief regarding the normality of pain with aging can lead to entrenched pain beliefs that result in ineffective pain management and greater cognitive decline.[196,204] Clinicians can respond to this and leverage positive control beliefs to increase compliance with therapeutics and physical therapy in elderly patients.[200,206,207]

Sexes and Genders

Differences in pain perception and coping have been reported across sex- and gender-based categories in the literature. Biological sex (eg male, female) and gender (eg men, women) represent distinct but related constructs, with sex referring to biological classification and gender reflecting social and cultural roles and expectations. Sex-based differences have been observed, with female patients often reporting more intense pain, longer and more frequent episodes of pain, and lower pain tolerance than their male counterparts, patterns that may contribute to greater use of catastrophizing in some samples.[172,208,209] At the group level, female-classified participants more frequently report emotion-focused coping strategies, including seeking social support and internalizing or catastrophizing pain, whereas male-classified participants more often report behavioral distraction or problem-focused coping.[210] Perhaps because of this, men were found to have higher self-efficacy, while women had more robust emotional and social support.[211] These differences are commonly interpreted in relation to gendered social expectations, including pressures for men to minimize pain expression.[210,212] Women seek medical care for pain more frequently; however, they continue to experience inequitable assessment and management.[213] Sex and gender-based stereotypes may lead providers to attribute pain to psychosomatic causes,[214,215] resulting in underestimation of pain severity, reduced likelihood of receiving analgesics despite comparable pain scores, and greater prescription of psychotropic medications.[216–220] Sociodemographic factors such as lower educational attainment, shift work, low baseline fitness, and physical activity-related limitations have been associated with lower

adherence among female healthcare workers.[221] However, overall adherence rates appear similar across gender categories, with time constraints and health-related barriers commonly reported across groups.[222] Collectively, these patterns highlight how pain beliefs, coping strategies, and healthcare interactions jointly contribute to observed differences in pain outcomes across sex- and gender- based groups.

Socioeconomic Status

Individuals with disadvantageous early life conditions, such as low socioeconomic status (SES), are at risk for increased pain catastrophizing, higher perceived sensitivity to pain, and higher levels of pain-related fear.[223,224] These findings suggest that without consistent access to basic needs, individuals become predisposed to increased pain sensitivity and intensify affective and fear-related processing of pain. Individuals with a higher income also can be more self-efficacious in seeking and receiving care as they do not suffer from difficulties accessing or affording care that those with a lower socioeconomic status might. Indeed, high-income individuals with chronic back pain were more likely to score higher on surveys assessing both their self-efficacy and ability to cope, suggesting that monetary stability correlates with the perception of being able to manage pain.[225] Similarly, higher SES was also associated with lower pain scores, higher function, and less pain catastrophizing after post-total knee arthroplasty.[226] Socioeconomic disadvantage has emerged as a consistent contributor to heightened pain burden and functional impairment, in part through its influence on pain-related beliefs, perceived control, and access to effective coping resources.[174,175,178]

Education and Health Literacy

Health literacy is associated with lower pain intensity and greater perceived pain control.[227] Individuals with higher health literacy may better interpret pain-related information, communicate effectively with healthcare providers, and engage in self-management behaviors that promote functional improvement. Several studies emphasize the importance of health literacy for designing effective patient education interventions and supporting sustainable self-management strategies for individuals with chronic pain.[228,229] Enhanced health literacy can lead to more positive pain beliefs, reduced fear-avoidance behaviors, and improved adherence to multidisciplinary treatment plans.[230] Accordingly, health literacy is an important target within integrated care models and supports patient empowerment, shared decision-making, and quality of life.[231]

Faith Traditions and Spiritual Practices

Spiritual and religious coping may influence pain beliefs and perceived pain control for some individuals, including the use of prayer and other meaning-based coping strategies.[8,232] In burn care, spiritual care interventions have been associated with reduced pain intensity during dressing changes, suggesting that addressing spiritual needs may affect pain experiences in severe acute pain contexts.[233] In perioperative settings, intrinsic coping (eg, self-distraction) and extrinsic support (including religious-based coping and emotional support) have been associated with lower pain and reduced morphine consumption in women undergoing major gynecologic surgery.[234] Evidence from chronic musculoskeletal pain populations suggests that religiosity and spiritual beliefs may be associated with aspects of pain-related emotion, beliefs, and coping, but the existing literature is limited and inconsistent, indicating the need for further research to clarify these relationships.[235]

These findings collectively highlight how contextual factors systematically shape pain interpretation and the coping strategies individuals employ. Across populations, these influences contribute to consistent patterns in belief formation and behavioral response, which, in turn, help explain variability in treatment engagement and clinical outcomes. Importantly, these factors often interact rather than act independently, reinforcing the need to consider patients within their broader social and environmental contexts when evaluating pain beliefs and designing interventions.

Clinical Tools and Gaps in Quality of Care

Throughout this review, pain beliefs have been framed as central determinants of pain-related behavior, coping, and outcomes, consistent with the CSM. Within this framework, individuals' representations of pain, including beliefs about its cause, controllability, consequences, and duration, guide coping behaviors and influence recovery trajectories. Despite

this, clinical assessment tools and care pathways continue to emphasize pain intensity and functional outcomes while underrepresenting the belief systems that drive these processes.

One effort to standardize pain assessment is the American Pain Society Outcome Questionnaire–Revised (APS-POQ-R), which evaluates activity, emotional distress, pain severity, satisfaction, and safety.[236] While such tools provide useful information regarding pain impact, they do not assess the cognitive representations or coping appraisals that the CSM identifies as central drivers of behavior. Moreover, quantitative pain ratings have inherent limitations. For example, it has been demonstrated that patients often incorporate non-pain sensations into ratings and approach pain scoring as a comparative rather than linear task, raising concerns about the validity of numeric pain scales as stand-alone measures of pain experience.[237]

Several instruments have attempted to address components of pain beliefs (Table 1). The Pain Self-Efficacy Questionnaire, for instance, demonstrates excellent validity, reliability, and responsiveness, though it has primarily

Table 1 Validated Instruments for Quantifying Pain Beliefs and Coping Strategies

Instrument	Validated Population	Measurements	Scale	Number of Items
Pain-Related Cognitive & Belief Constructs				
Pain Beliefs Questionnaire (PBQ)[239]	Adults	Beliefs about the cause and treatment of pain (organic vs psychological beliefs)	6-point Likert agreement	20
Pain Beliefs & Perceptions Inventory (PBPI)[240]	Adults with chronic pain	Four belief dimensions: Mystery, Self-Blame, Pain Permanence, Pain Constancy	5-point Likert agreement	16
Survey of Pain Attitudes (SOPA)[241]	Adults with chronic pain	Multi-domain pain attitudes (Control, Emotion, Disability, Harm, Medication, Solicitude, Medical Cure)	5-point Likert agreement	SOPA-57 SOPA-35 SOPA-30 SOPA-14
Biobehavioral Pain Profile (BPP)[242]	Adults with chronic pain	Factors: Environmental Influences, Loss of Control, Health Care Avoidance, Past and Current Experience, Physiological Responsivity, and Thoughts of Disease Progression	Likert-type agreement	41
The Inventory of Negative Thoughts in Response to Pain (INTRP)[243]	Undergraduate college students	Negative automatic thoughts and cognitive responses elicited by pain	Likert-type frequency	14
Illness Perception Questionnaire (IPQ)[244]	General illness populations	Cognitive/emotional illness representations	10-point numerical	IPQ-80 IPQ-R-64 Brief-IPQ-9
Pain Catastrophizing Scale (PCS)[245]	Adults and adolescents	Catastrophizing: Rumination, Magnification, Helplessness	5-point Likert frequency	13
Fear-Avoidance Beliefs Questionnaire (FABQ)[246]	Adults with MSK/low back pain	Fear-avoidance beliefs about physical activity and work	7-point Likert agreement	16
Tampa Scale of Kinesiophobia (TSK)[247,248]	Adults with MSK pain	Fear of movement/reinjury	4-point Likert agreement	TSK-17 TSK-11
Beliefs about Pain Control Questionnaire (BPCQ)[249]	Adults with chronic pain	Pain locus of control: Internal, Powerful Others, Chance	6-point Likert agreement	39
Pain Locus of Control Scale (PLOC)[250]	Adults with chronic pain	Pain locus of control: Internal, Powerful Others, Chance	6-point Likert agreement	36
Pain Self-Efficacy Questionnaire (PSEQ)[251]	Adults with chronic pain	Self-efficacy for functioning despite pain (general confidence to perform activities despite pain)	7-point Likert confidence	PSEQ-10 PSEQ-2
Chronic Pain Self-Efficacy Scale (CPSS)[252]	Adults with chronic pain	Self-efficacy for pain management, coping, and functional tasks	10-point confidence	22
Pain-Related Control Scale (PRCS)[253]	Adults with chronic pain	Helplessness and resourcefulness	6-point Likert	15; Often reported with PRSS

(*Continued*)

https://doi.org/10.2147/JPR.S603074

Table 1 (Continued).

Instrument	Validated Population	Measurements	Scale	Number of Items
Pain-Related Self-Statements Scale (PRSS)[253]	Adults with chronic pain and related conditions	Catastrophizing and coping	6-point Likert frequency	35
Cognitive Risk Profile for Pain (CRPP)[254]	Adults	Cognitive-affective risk factors for poor outcomes	Likert (item anchors vary)	53
Health Care Providers Pain and Impairment Relationship Scale (HC-PAIRS)[255]	Health care providers	Beliefs regarding the relationship between pain and impairment (functional expectations, social expectations, need for cure, projected cognition)	7-point Likert agreement	15
Pain Anxiety Symptoms Scale (PASS)[256]	Adults with chronic pain	Pain-related anxiety. (cognitive, escape/avoidance, fear, psychological)	6-point Likert	PASS-40 PASS-20
Pain-Related Beliefs and Attitudes about Sleep (PBAS)[257]	Adults with chronic pain	Intersection of sleep quality and pain experience	10-point numerical	10
Pain Metacognitions Questionnaire (PMQ)[258]	Adults with chronic pain	Perceived benefits and harms of pain-related thoughts	4–5-point Likert (agreement)	21
Population-Specific Questionnaires				
Back Beliefs Questionnaire (BBQ)[259]	Lower back pain-specific	Beliefs about consequences of low back pain	5-point Likert agreement	14
Modified Somatic Perception Questionnaire (MSPQ)[260]	Adults with somatization/ chronic pain	Somatic amplification and autonomic arousal	4-point Likert (0–3)	13
Arthritis Self-Efficacy Scale (ASES)[261]	Arthritis sufferers	Self-efficacy for functioning and managing arthritis pain	10-point numerical	ASES-20 ASES-SF-8
Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT)[262]	Clinicians (primarily physiotherapists)	Biomedical versus biopsychosocial orientations	6-point Likert	36
Parent Fear of Pain Questionnaire (PFOPQ)[263]	Parents of children with pain conditions	Parental fear-related responses to child pain (Fear of Pain, Avoidance, Fear of Movement, Fear of School)	5-point Likert agreement	21
Pain Perception Questionnaire for Young People (PPQ-YP/PPQ-YP)[264]	Adolescents with juvenile idiopathic arthritis	Pain-related illness perceptions (adapted from IPQ-R)	Likert and numerical (varies)	12-14
Parent Pain Acceptance Questionnaire (PPAQ)[265]	Parents of youth with chronic pain	Parental acceptance of and responses to child pain	Likert agreement (varies)	37
The Chronic Pain Acceptance Questionnaire for Parents (CPAQ-P)[266]	Parents of youth with chronic pain	Parental acceptance and coping response to child pain	7-point Likert	20
The Pediatric Pain Screen Tool (PPST)[267]	Youth with pain	Brief psychosocial and functional risk screening for persistent pain	Yes/No and Likert	8-9
Temporally Dependent Questionnaires				
Chronic Pain Values Inventory (CPVI)[268]	Adults with chronic pain	Adults with chronic pain; gap between what is valued versus achievable	6-point Likert importance and successfulness	12
Chronic Pain Myth Scale (CPMS)[269]	General public/ trainees	Stigmas, biases, and community myths about chronic pain	5-point Likert agreement	44
PrePain Questionnaire[270]	Adults	Predicting pain. Subscales: Sensitivity, Avoidance, Unpleasantness, Pain relief, Body focus, Anxiety	Visual analog scale and yes/no questions	11
Pain Disability Index (PDI)[271]	Adults with chronic pain	Pain-related interference across life domains	10-point numerical	7

(*Continued*)

Table 1 (Continued).

Instrument	Validated Population	Measurements	Scale	Number of Items
Coping-Focused Questionnaires				
Pain Behavior Checklist (PBC)[272]	Adults with chronic pain	Frequency of overt pain behaviors	5-point Likert frequency	17
Pain Anxiety Symptoms Scale (PASS)[256]	Adults with chronic pain	Pain-related anxiety. (Cognitive, escape/avoidance, fear, psychological)	6-point Likert agreement	PASS-40 PASS-20
Pain Coping Questionnaire (PCQ)[273]	Children and adolescents with chronic or recurrent pain	Pain coping strategies (active, passive, accommodative coping)	5-point Likert frequency	PCQ-39 PCQ-SF: 16

Notes: While not exhaustive, this table outlines validated instruments that are either entirely focused on or partially inclusive of pain beliefs and coping. These instruments range from foundational and widely used to more recent and emerging measures. Columns include "Instrument" (name of the measure), "Validated Population" (population in which the instrument has been validated), "Measurements" (constructs or domains assessed), "Scale" (response format or scoring system), and "Number of Items" (total number of questions). Instruments are grouped into the following categories: "Pain-Related Cognitive and Belief Constructs" (measures assessing perceptions and interpretations of pain), "Population-Specific Questionnaires" (measures developed for specific clinical or demographic groups), "Temporally Dependent Questionnaires" (measures assessing pain beliefs or coping over defined timeframes), and "Coping-Focused Questionnaires" (measures emphasizing behavioral and cognitive coping strategies).

been evaluated in individuals with chronic back pain. To expand its utility, it should be validated across broader populations.[238] Even when belief-focused instruments are used, they tend to isolate single constructs, such as self-efficacy, rather than capturing the multidimensional illness representations described by the CSM. As a result, commonly used assessment batteries provide an incomplete picture of how patients understand and respond to their pain.

This gap extends to pain treatment research and clinical practice. Many studies employ psychological and non-pharmacological interventions, such as CBT, eye movement desensitization and reprocessing, exercise-based self-management, and mindfulness-based approaches, without routinely measuring changes in pain beliefs or coping strategies that are presumed to mediate treatment effects.[74,274] Consequently, improvements in pain or function are often reported without clarity regarding which belief-driven mechanisms contributed to these outcomes, limiting both mechanistic understanding and treatment personalization.

Clinical frameworks for integrated pain management emphasize the importance of assessing pain-related beliefs, coping strategies, expectations, and emotional responses alongside symptom severity; however, these domains remain inconsistently measured in routine practice.[275] Recent shifts toward multidisciplinary pain management align more closely with the CSM by addressing biological, psychological, and social contributors to pain simultaneously. Such models may promote adaptive illness representations, greater perceived control, and engagement in active coping, and have demonstrated benefits compared with opioid-centered approaches,[130] underscoring the limitations of treatment models that do not adequately address belief-driven contributors to pain and recovery. Although harm-reduction strategies such as naloxone distribution have reduced mortality,[276] persistent pain-related disability highlights the need for assessment and treatment frameworks that systematically integrate pain beliefs and coping processes into routine care.[277]

Discussion

This narrative review highlights the central role of pain beliefs and coping strategies in shaping how individuals experience, interpret, and manage pain across conditions. Negative pain beliefs, including catastrophizing, fear-related expectations, and low self-efficacy, are consistently associated with poorer outcomes, such as greater pain severity, increased analgesic use, reduced functional recovery, and lower adherence to treatment. In contrast, positive pain beliefs, such as stronger self-efficacy, perceived control, and optimism regarding recovery, are associated with greater resilience, engagement in care, and more favorable recovery trajectories. These findings reinforce that pain is not solely a sensory or physiological phenomenon, but one shaped by cognitive and emotional processes that meaningfully influence recovery.

These observations align closely with the CSM, which posits that individuals' representations of illness, including beliefs about cause, duration, controllability, and consequences, guide subsequent coping behaviors and health outcomes. Contemporary extensions of the CSM further emphasize the influence of contextual and sociocultural factors, including social support, cultural norms, and belief systems such as spirituality, in shaping illness representations. This expanded framework offers a more integrative understanding of pain, moving beyond a narrow biomedical or traditional biopsychosocial approach to account for how meaning-making and context influence coping responses and outcomes. Importantly, the findings synthesized in this review suggest that these contextual influences are not secondary modifiers, but central drivers in the formation and reinforcement of pain beliefs. Across populations, factors such as socioeconomic conditions, cultural expectations, and access to care shape perceptions of control, anticipated outcomes, and engagement with treatment, thereby contributing to variability in coping behaviors and recovery trajectories. Recognizing these influences within a unified conceptual framework may help to explain why similar pain conditions may result in markedly different experiences and outcomes across individuals. As such, integrating contextual factors into both assessment and intervention is essential for advancing more personalized, equitable, and effective approaches to pain management.

From a clinical perspective, interventions that target negative pain beliefs and promote positive pain beliefs, particularly cognitive-behavioral therapies and structured pain education, have demonstrated effectiveness in reducing suffering, enhancing self-efficacy, and supporting adaptive coping strategies. Multidisciplinary pain management programs that integrate psychological, physical, and educational components are especially well-suited to address belief-driven mechanisms underlying pain-related behavior. However, despite these advances, substantial gaps remain in clinical implementation, particularly in addressing disparities related to race, socioeconomic status, and cultural background. In addition, individuals with rare or under-recognized conditions may experience unique and underexplored challenges related to pain beliefs and coping. Diagnostic uncertainty, limited access to disease-specific information, and fragmented care may contribute to more negative illness perceptions and reduced perceived control.[278] These factors may increase psychological distress and reinforce maladaptive beliefs, including feelings of helplessness commonly associated with pain catastrophizing.[279] Evidence from such complex conditions suggests that belief patterns are associated with poorer coping and reduced quality of life, highlighting the potential importance of belief-informed approaches in these populations. Addressing these gaps will require larger, longitudinal studies that explicitly examine how belief-focused interventions influence coping and outcomes across diverse populations.

The literature demonstrates contradictions in the relationship between pain beliefs and outcomes, highlighting important limitations related to measurement context and timing. One study reports no association between pain beliefs and postoperative outcomes following total knee or hip arthroplasty,[224] while others using similar belief measures identify predictive relationships in spinal surgery populations.[280] Likewise, pain catastrophizing has not consistently predicted outcomes after foot and ankle surgery, while other negative pain beliefs, such as magnification and helplessness, have shown associations with postoperative outcomes at three months.[281] Evidence suggests that timing of assessment may partially account for these discrepancies, as preoperative catastrophizing does not reliably predict outcomes following anterior cruciate ligament reconstruction, whereas catastrophizing assessed during recovery more closely reflects concurrent pain and function.[282] Despite these inconsistencies, the findings discussed extensively throughout this review strongly support the value of psychological, educational, and social interventions in modifying negative pain beliefs, strengthening positive pain beliefs, and promoting adaptive coping strategies that improve adherence and functional outcomes. The biopsychosocial model, when operationalized through belief-informed assessment and intervention, remains an effective framework for reducing disability and improving quality of life in individuals with pain.

While the discussed psychosocial and belief-informed interventions demonstrate promise, the degree of their impact has been variable across studies, with some evidence suggesting modest effect sizes depending on the clinical context and timing of intervention. Additionally, implementation at scale presents practical challenges, including limited access to trained providers, variability in healthcare infrastructure, and associated costs. Reliance on self-reported measures also introduces limitations, including response bias and variability in interpretation, while repeated assessment may contribute to survey fatigue and reduced engagement over time. These factors may limit the feasibility of widespread adoption in certain settings. As such, although psychosocial factors are clearly associated with pain experience and outcomes, further work is needed to determine how best to integrate these approaches in a manner that is both effective and sustainable across diverse clinical environments.

Given these considerations, future research should prioritize the integration of belief-informed approaches into standard clinical pathways. First, early screening for negative pain beliefs during initial assessments may help identify individuals at risk for poor outcomes and facilitate timely intervention. Second, there is a need to develop and validate multidimensional assessment tools that capture illness representations consistent with the CSM, rather than relying on isolated constructs. Third, expanding multidisciplinary care models that integrate psychological, educational, and social components alongside biomedical treatment may more effectively address belief-driven mechanisms underlying pain-related behavior. Fourth, training clinicians to recognize and address belief-driven contributors to pain through communication and targeted intervention remains essential for improving patient engagement and treatment adherence. Finally, future work should more systematically incorporate contextual and sociocultural factors, such as socioeconomic status, health literacy, and cultural influences, into both research and clinical practice to better understand variability in outcomes and support more equitable care. By systematically incorporating pain beliefs and coping strategies into assessment and treatment, pain management can move toward more effective, individualized, and sustainable models of care that reduce reliance on opioids and promote long-term recovery.

Conclusion

Pain beliefs and coping strategies are central to how individuals experience, interpret, and respond to pain. Within the framework of the CSM, these pain beliefs are shaped by cognitive, emotional, and contextual inputs, guiding coping behaviors that ultimately influence health outcomes and subsequent belief updating. Across neuropathic, nociplastic, and nociceptive conditions, positive and negative pain beliefs shape recovery trajectories, psychological well-being, and healthcare decision-making, in part through their influence on adaptive and maladaptive coping behaviors. Future work should prioritize integrated pain assessments, early identification of negative pain beliefs, and clinician training focused on belief-informed communication and intervention. Embedding pain belief assessment within routine care may support more adaptive coping, improve adherence, and reduce suffering across diverse patient populations.

Generative Artificial Intelligence

ChatGPT v5.2 was used to review the manuscript after initial writing and literature search was completed by the authors. This was done to condense the paper and review interpretations made by the authors.

Acknowledgments

We would like to thank Mr. Hiram Rogers for contributing to the initial literature search for this project, as well as Drs. William G. Pearson Jr. and Jody Brewer for their helpful comments in the final stages of editing this review.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

No external funding was provided for this project.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Raja SN, Carr DB, Cohen M, et al. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. *Pain*. 2020;161:1976–1982. doi:10.1097/j.pain.0000000000001939
2. Chapman WP, Jones CM. Variations in cutaneous and visceral pain sensitivity in normal subjects. *J Clin Invest*. 1944;23:81–91. doi:10.1172/JCI101475

3. Ferreira-Valente A, Sharma S, Chan J, Bernardes SF, Pais-Ribeiro J, Jensen MP. Pain-Related beliefs, coping, and function: an observational study on the moderating influence of country of origin. *J Pain*. 2023;24:1645–1663. doi:10.1016/j.jpain.2023.04.012
4. Quartana PJ, Campbell CM, Edwards RR. Pain catastrophizing: a critical review. *Expert Rev Neurother*. 2009;9:745–758. doi:10.1586/ern.09.34
5. Darnall BD. Pain psychology and pain catastrophizing in the perioperative setting: a review of impacts, interventions, and unmet needs. *Hand Clin*. 2016;32:33–39. doi:10.1016/j.hcl.2015.08.005
6. Skinner EA, Edge K, Altman J, Sherwood H. Searching for the structure of coping: a review and critique of category systems for classifying ways of coping. *Psychol Bull*. 2003;129:216–269. doi:10.1037/0033-2909.129.2.216
7. Zhu Y, Xu BY, Low SG, Low LL. Association of social support with rehabilitation outcome among older adults with hip fracture surgery: a prospective cohort study at post-acute care facility in Asia. *J Am Med Dir Assoc*. 2023;24:1490–1496. doi:10.1016/j.jamda.2023.03.034
8. De-Diego-Cordero R, Velasco-Domínguez C, Aranda-Jerez A, Vega-Escaño J. The spiritual aspect of pain: an integrative review. *J Religion Health*. 2024;63:159–184. doi:10.1007/s10943-023-01890-9
9. Becker S, Navratilova E, Nees F, Van Damme S. Emotional and motivational pain processing: current state of knowledge and perspectives in translational research. *Pain Res Manag*. 2018;2018:1–12. doi:10.1155/2018/5457870
10. Tosato S, Bonetto C, Zanini A, et al. Clinical and psychological characteristics associated with negative beliefs and concerns about treatment necessity in rheumatic diseases. *Sci Rep*. 2022;12:12. doi:10.1038/s41598-021-02978-6
11. Lintonl SJ, Nicholasl MK, MacDonaldl S, et al. The role of depression and catastrophizing in musculoskeletal pain. *Eur J Pain*. 2011;15:416–422. doi:10.1016/j.ejpain.2010.08.009
12. Ghasemi M, Behnaz F, Hassanzad N, Taheri F. Evaluating the relationship between depression and pain anxiety with pain catastrophizing in patients with COVID-19. *Anesthesiol Pain Med*. 2022;12. doi:10.5812/aapm.119354
13. Simic K, Savic B, Knezevic NN. Pain catastrophizing: how far have we come. *Neurol Int*. 2024;16:483–501. doi:10.3390/neurolint16030036
14. Baagil H, Baagil H, Gerbershagen MU. Preoperative anxiety impact on anesthetic and analgesic use. *Medicina*. 2023;59:2069. doi:10.3390/medicina59122069
15. Doering LV, McGuire A, Eastwood J-A, et al. Cognitive behavioral therapy for depression improves pain and perceived control in cardiac surgery patients. *Eur J Cardiovasc Nurs*. 2016;15:417–424. doi:10.1177/1474515115592292
16. Feldner MT, Hekmat H. Perceived control over anxiety-related events as a predictor of pain behaviors in a cold pressor task. *J Behav Ther Experi Psych*. 2001;32:191–202. doi:10.1016/S0005-7916(01)00034-9
17. Fürtjes S, Voss C, Rückert F, et al. Self-efficacy, stress, and symptoms of depression and anxiety in adolescents: an epidemiological cohort study with ecological momentary assessment. *J Mood Anxiety Disord*. 2023;4:100039. doi:10.1016/j.xjmad.2023.100039
18. Kneeland ET, Goodman FR, Dovidio JF. Emotion beliefs, emotion regulation, and emotional experiences in daily life. *Behavior Therapy*. 2020;51:728–738. doi:10.1016/j.beth.2019.10.007
19. Al-Ruwaili MA, Al-Turki YA, Alardan A. Social anxiety and its effect on self-efficacy among family medicine residents in Riyadh. *J Family Med Prim Care*. 2018;7:389–393. doi:10.4103/jfmpc.jfmpc_360_17
20. Leventhal H, Diefenbach M, Leventhal EA. Illness cognition: using common sense to understand treatment adherence and affect cognition interactions. *Cognitive Ther Res*. 1992;16:143–163. doi:10.1007/BF01173486
21. McAndrew LM, Musumeci-Szabo TJ, Mora PA, et al. Using the common sense model to design interventions for the prevention and management of chronic illness threats: from description to process. *Br J Health Psychol*. 2008;13:195–204. doi:10.1348/135910708X295604
22. Richardson EM, Schuz N, Sanderson K, Scott JL, Schuz B. Illness representations, coping, and illness outcomes in people with cancer: a systematic review and meta-analysis. *Psychooncology*. 2017;26:724–737. doi:10.1002/pon.4213
23. Gracely RH, Geisser ME, Giesecke T, et al. Pain catastrophizing and neural responses to pain among persons with fibromyalgia. *Brain*. 2004;127:835–843. doi:10.1093/brain/awh098
24. Winston JS, Vlaev I, Seymour B, Chater N, Dolan RJ. Relative valuation of pain in human orbitofrontal cortex. *J Neurosci*. 2014;34:14526–14535. doi:10.1523/JNEUROSCI.1706-14.2014
25. Baliki MN, Petre B, Torbey S, et al. Corticostriatal functional connectivity predicts transition to chronic back pain. *Nat Neurosci*. 2012;15:1117–1119. doi:10.1038/nn.3153
26. Vlaeyen JWS, Linton SJ. Fear-avoidance model of chronic musculoskeletal pain: 12 years on. *Pain*. 2012;153:1144–1147. doi:10.1016/j.pain.2011.12.009
27. Henderson LA, Di Pietro F, Youssef AM, et al. Effect of expectation on pain processing: a psychophysics and functional MRI analysis. *Front Neurosci*. 2020;14:6. doi:10.3389/fnins.2020.00006
28. Eippert F, Bingel U, Schoell ED, et al. Activation of the opioidergic descending pain control system underlies placebo analgesia. *Neuron*. 2009;63:533–543. doi:10.1016/j.neuron.2009.07.014
29. Woo CW, Roy M, Buhle JT, Wager TD. Distinct brain systems mediate the effects of nociceptive input and self-regulation on pain. *PLoS Biol*. 2015;13:e1002036. doi:10.1371/journal.pbio.1002036
30. Nejati V, Majdi R, Salehinejad MA, Nitsche MA. The role of dorsolateral and ventromedial prefrontal cortex in the processing of emotional dimensions. *Sci Rep*. 2021;11:1971. doi:10.1038/s41598-021-81454-7
31. Rudebeck PH, Saunders RC, Prescott AT, Chau LS, Murray EA. Prefrontal mechanisms of behavioral flexibility, emotion regulation and value updating. *Nat Neurosci*. 2013;16:1140–1145. doi:10.1038/nn.3440
32. Massaly N, Copits BA, Wilson-Poe AR, et al. Pain-Induced negative affect is mediated via recruitment of the nucleus accumbens kappa opioid system. *Neuron*. 2019;102:564–573.e566. doi:10.1016/j.neuron.2019.02.029
33. Xiao X, Ding M, Zhang YQ. Role of the anterior cingulate cortex in translational pain research. *Neurosci Bull*. 2021;37:405–422. doi:10.1007/s12264-020-00615-2
34. Motzkin JC, Hiser J, Carroll I, et al. Human ventromedial prefrontal cortex lesions enhance the effect of expectations on pain perception. *Cortex*. 2023;166:188–206. doi:10.1016/j.cortex.2023.04.017
35. Stolz DS, Muller-Pinzler L, Krach S, Paulus FM. Internal control beliefs shape positive affect and associated neural dynamics during outcome valuation. *Nat Commun*. 2020;11:1230. doi:10.1038/s41467-020-14800-4
36. Wiech K, Kalisch R, Weiskopf N, Pleger B, Stephan KE, Dolan RJ. Anterolateral prefrontal cortex mediates the analgesic effect of expected and perceived control over pain. *J Neurosci*. 2006;26:11501–11509. doi:10.1523/JNEUROSCI.2568-06.2006

37. Fauchon C, Faillenot I, Quesada C, et al. Brain activity sustaining the modulation of pain by empathetic comments. *Sci Rep*. 2019;9:8398. doi:10.1038/s41598-019-44879-9
38. Yang YY, Delgado MR. The integration of self-efficacy and response-efficacy in decision making. *Sci Rep*. 2025;15:1789. doi:10.1038/s41598-025-85577-z
39. Tsai HY, Lapanan K, Lin YH, et al. Integration of prior expectations and suppression of prediction errors during expectancy-induced pain modulation: the influence of anxiety and pleasantness. *J Neurosci*. 2024;44. doi:10.1523/JNEUROSCI.1627-23.2024
40. Finnerup NB, Kuner R, Jensen TS. Neuropathic pain: from mechanisms to treatment. *Physiol Rev*. 2021;101:259–301. doi:10.1152/physrev.00045.2019
41. Qiu R, Bai X, Li Y, Shi X, Song D, Zhang Y. Factors associated with pain catastrophizing in patients with chronic neuropathic pain: a cross-sectional study. *Pain Manag Nurs*. 2024;25:e279–e286. doi:10.1016/j.pmn.2024.04.004
42. Alkandari M, Hollywood A. People's experiences living with peripheral neuropathy: a qualitative study. *Front Pain Res*. 2023;4:1162405. doi:10.3389/fpain.2023.1162405
43. Davoudi M, Rezaei P, Rajaeiramsheh F, Ahmadi SM, Taheri AA. Predicting the quality of life based on pain dimensions and psychiatric symptoms in patients with Painful diabetic neuropathy: a cross-sectional prevalence study in Iranian patients. *Health Qual Life Outcomes*. 2021;19:49. doi:10.1186/s12955-021-01697-w
44. Geelen CC, Kindermans HP, van den Bergh JP, Verbunt JA. Perceived physical activity decline as a mediator in the relationship between pain catastrophizing, disability, and quality of life in patients with painful diabetic neuropathy. *Pain Pract*. 2017;17:320–328. doi:10.1111/papr.12449
45. Kanera IM, Van laake-geelen CCM, Ruijgrok JM, et al. Living with painful diabetic neuropathy: insights from focus groups into fears and coping strategies. *Psychol Health*. 2019;34:84–105. doi:10.1080/08870446.2018.1518526
46. Selvarajah D, Cash T, Sankar A, et al. The contributors of emotional distress in painful diabetic neuropathy. *Diab Vasc Dis Res*. 2014;11:218–225. doi:10.1177/1479164114522135
47. Haythornthwaite JA, Clark MR, Pappagallo M, Raja SN. Pain coping strategies play a role in the persistence of pain in post-herpetic neuralgia. *Pain*. 2003;106:453–460. doi:10.1016/j.pain.2003.09.009
48. Katz J, McDermott MP, Cooper EM, Walther RR, Sweeney EW, Dworkin RH. Psychosocial risk factors for postherpetic neuralgia: a prospective study of patients with herpes zoster. *J Pain*. 2005;6:782–790. doi:10.1016/j.jpain.2005.07.006
49. Fujiwara A, Watanabe K, Yoshimura K, Yamamura Y, Ida M, Kawaguchi M. Correlation between pain catastrophizing in acute herpes zoster and postherpetic neuralgia: a retrospective analysis. *J Anesth*. 2023;37:589–595. doi:10.1007/s00540-023-03208-1
50. Koga R, Yamada K, Ishikawa R, Kubota Y, Yamaguchi K, Iseki M. Association between treatment-related early changes in psychological factors and development of postherpetic neuralgia. *J Anesth*. 2019;33:636–641. doi:10.1007/s00540-019-02679-5
51. Mankovsky T, Lynch M, Clark A, Sawynok J, Sullivan MJ. Pain catastrophizing predicts poor response to topical analgesics in patients with neuropathic pain. *Pain Res Manag*. 2012;17:10–14. doi:10.1155/2012/970423
52. Aziz-Donnelly A, Harrison TB. Update of HIV-Associated sensory neuropathies. *Curr Treat Options Neurol*. 2017;19. doi:10.1007/s11940-017-0472-3
53. Cherry CL, Wesselingh SL, Lal L, McArthur JC. Evaluation of a clinical screening tool for HIV-associated sensory neuropathies. *Neurology*. 2005;65:1778–1781. doi:10.1212/01.wnl.0000187119.33075.41
54. Berg KM, Cooperman NA, Newville H, Arnsten JH. Self-efficacy and depression as mediators of the relationship between pain and antiretroviral adherence. *AIDS Care*. 2009;21:244–248. doi:10.1080/09540120802001697
55. Scott W, Arkuter C, Kioskli K, et al. Psychosocial factors associated with persistent pain in people with HIV: a systematic review with meta-analysis. *Pain*. 2018;159:2461–2476. doi:10.1097/j.pain.0000000000001369
56. Ellis RJ, Diaz M, Sacktor N, et al. Predictors of worsening neuropathy and neuropathic pain after 12 years in people with HIV. *Ann Clin Transl Neurol*. 2020;7:1166–1173. doi:10.1002/acn3.51097
57. Evans S, Fishman B, Spielman L, Haley A. Randomized trial of cognitive behavior therapy versus supportive psychotherapy for HIV-related peripheral neuropathic pain. *Psychosomatics*. 2003;44:44–50. doi:10.1176/appi.psy.44.1.44
58. Trafton JA, Sorrell JT, Holodniy M, et al. Outcomes associated with a cognitive-behavioral chronic pain management program implemented in three public HIV primary care clinics. *J Behav Health Serv Res*. 2012;39:158–173. doi:10.1007/s11414-011-9254-y
59. Douglas C, Wollin JA, Windsor C. Biopsychosocial correlates of adjustment to pain among people with multiple sclerosis. *Clin J Pain*. 2008;24:559–567. doi:10.1097/AJP.0b013e318171cdf1
60. Harrison AM, Silber E, McCracken LM, Moss-Morris R. Beyond a physical symptom: the importance of psychosocial factors in multiple sclerosis pain. *Eur J Neurol*. 2015;22:1443–1452. doi:10.1111/ene.12763
61. Wilski M, Gabryelski J, Brola W, Tomasz T. Health-related quality of life in multiple sclerosis: links to acceptance, coping strategies and disease severity. *Disabil Health J*. 2019;12:608–614. doi:10.1016/j.dhjo.2019.06.003
62. Culicetto L, Lo Buono V, Donato S, et al. Importance of coping strategies on quality of life in people with multiple sclerosis: a systematic review. *J Clin Med*. 2024;14:13. doi:10.3390/jcm14010013
63. Kasser SL, Kosma M. Health beliefs and physical activity behavior in adults with multiple sclerosis. *Disabil Health J*. 2012;5:261–268. doi:10.1016/j.dhjo.2012.07.001
64. Heffer-Rahn P, Fisher PL. The clinical utility of metacognitive beliefs and processes in emotional distress in people with multiple sclerosis. *J Psychosom Res*. 2018;104:88–94. doi:10.1016/j.jpsychores.2017.11.014
65. Wilski M, Kocur P, Gorny M, et al. Perception of multiple sclerosis impact and treatment efficacy beliefs: mediating effect of patient's illness and self-appraisals. *J Pain Symptom Manage*. 2019;58:437–444. doi:10.1016/j.jpainsymman.2019.06.013
66. Miller KK, Combs SA, Van Puymbroeck M, et al. Fatigue and pain: relationships with physical performance and patient beliefs after stroke. *Top Stroke Rehabil*. 2013;20:347–355. doi:10.1310/tsr2004-347
67. Gandolfi M, Donisi V, Battista S, et al. Health-Related quality of life and psychological features in post-stroke patients with chronic pain: a cross-sectional study in the neuro-rehabilitation context of care. *Int J Environ Res Public Health*. 2021;19:18. doi:10.3390/ijerph19010018
68. Haslam BS, Butler DS, Carey LM. Novel insights into stroke pain beliefs and perceptions. *Top Stroke Rehabil*. 2020;27:344–353. doi:10.1080/10749357.2019.1701177

69. Payton H, Soundy A. The experience of post-stroke pain and the impact on quality of life: an integrative review. *Behav Sci*. 2020;10. doi:10.3390/bs10080128
70. Korpershoek C, van der Bijl J, Hafsteinsdottir TB. Self-efficacy and its influence on recovery of patients with stroke: a systematic review. *J Adv Nurs*. 2011;67:1876–1894. doi:10.1111/j.1365-2648.2011.05659.x
71. Lewin A, Jobges M, Werheid K. The influence of self-efficacy, pre-stroke depression and perceived social support on self-reported depressive symptoms during stroke rehabilitation. *Neuropsychol Rehabil*. 2013;23:546–562. doi:10.1080/09602011.2013.794742
72. Nahari A, Alsaleh AM. Impact of social support and self-efficacy on activity of daily living among post-stroke patients in Saudi Arabia: a cross-sectional study. *Healthcare*. 2024;13:12. doi:10.3390/healthcare13010012
73. Szczepanska-Gieracha J, Mazurek J. The role of self-efficacy in the recovery process of stroke survivors. *Psychol Res Behav Manag*. 2020;13:897–906. doi:10.2147/PRBM.S273009
74. Hamblen JL, Norman SB, Sonis JH, et al. A guide to guidelines for the treatment of posttraumatic stress disorder in adults: an update. *Psychotherapy*. 2019;56:359–373. doi:10.1037/pst0000231
75. Yoo YM, Kim KH. Current understanding of nociplastic pain. *Korean J Pain*. 2024;37:107–118. doi:10.3344/kjp.23326
76. Clauw DJ. Fibromyalgia: a clinical review. *JAMA*. 2014;311:1547. doi:10.1001/jama.2014.3266
77. Schmidt-Wilcke T, Clauw DJ. Fibromyalgia: from pathophysiology to therapy. *Nat Rev Rheumatol*. 2011;7:518–527. doi:10.1038/nrrheum.2011.98
78. Arnold LM, Hudson JI, Keck PE, Auchenbach MB, Javaras KN, Hess EV. Comorbidity of fibromyalgia and psychiatric disorders. *J Clini Psych*. 2006;67:1219–1225. doi:10.4088/JCP.v67n0807
79. Ribeiro H, Sarmento-Ribeiro AB, Andrade JP, Dourado M. Apoptosis and (in) pain—potential clinical implications. *Biomedicines*. 2022;10:1255. doi:10.3390/biomedicines10061255
80. Lavín-Pérez AM, Collado-Mateo D, Gil Arias A, et al. The role of self-efficacy and activity patterns in the physical activity levels of women with fibromyalgia. *Biology*. 2023;12:85. doi:10.3390/biology12010085
81. Apriliyasari RW, Chou C-W, Tsai P-S. Pain catastrophizing as a mediator between pain self-efficacy and disease severity in patients with fibromyalgia. *Pain Manage Nurs*. 2023;24:622–626. doi:10.1016/j.pmn.2023.05.003
82. Crombez G, Eccleston C, Van Damme S, Vlaeyen JWS, Karoly P. Fear-Avoidance model of chronic pain: the next generation. *Clin J Pain*. 2012;28:475–483. doi:10.1097/AJP.0b013e3182385392
83. Bernardy K, Klose P, Welsch P, Häuser W. Efficacy, acceptability and safety of cognitive behavioural therapies in fibromyalgia syndrome – a systematic review and meta-analysis of randomized controlled trials. *Eur J Pain*. 2018;22:242–260. doi:10.1002/ejp.1121
84. Onan D, Younis S, Wellsgatnik WD, et al. Debate: differences and similarities between tension-type headache and migraine. *J Headache Pain*. 2023;24:92. doi:10.1186/s10194-023-01614-0
85. Espanioli A, van den Hoogen NJ, Kuziek J, Sjonnesen K, Noel M, Orr SL. Exploring the relationship between pain catastrophizing and migraine in youth: a longitudinal clinical cohort study. *Headache*. 2025;65:1369–1380. doi:10.1111/head.15039
86. Filzmoser N, Webber I, Kerr G, et al. Exploring the link between self-management of migraine and emotional wellbeing: a cross-sectional study of community-dwelling migraine sufferers. *BMC Neurol*. 2024;24:47. doi:10.1186/s12883-024-03535-0
87. Giannini G, Zanigni S, Grimaldi D, et al. Cephalalgiaphobia as a feature of high-frequency migraine: a pilot study. *J Headache Pain*. 2013;14:49. doi:10.1186/1129-2377-14-49
88. Grinberg AS, Seng EK. Headache-Specific locus of control and migraine-related quality of life: understanding the role of anxiety. *Int J Behav Med*. 2017;24:136–143. doi:10.1007/s12529-016-9587-2
89. Heath RL, Saliba M, Mahmassani O, Major SC, Khoury BA. Locus of control moderates the relationship between headache pain and depression. *J Headache Pain*. 2008;9:301–308. doi:10.1007/s10194-008-0055-5
90. French DJ, Holroyd KA, Pinell C, Malinoski PT, O'Donnell F, Hill KR. Perceived self-efficacy and headache-related disability. *Headache*. 2000;40:647–656. doi:10.1046/j.1526-4610.2000.040008647.x
91. Rogers DG, Protti TA, Smitherman TA. Fear, avoidance, and disability in headache disorders. *Curr Pain Headache Rep*. 2020;24:33. doi:10.1007/s11916-020-00865-9
92. Turner DP, Houle TT. Influences on headache trigger beliefs and perceptions. *Cephalalgia*. 2018;38:1545–1553. doi:10.1177/0333102417739310
93. Bae JY, Sung HK, Kwon NY, et al. Cognitive Behavioral therapy for migraine headache: a systematic review and meta-analysis. *Medicina*. 2021;58. doi:10.3390/medicina58010044
94. Holroyd KA, O'Donnell FJ, Stensland M, Lipchik GL, Cordingley GE, Carlson BW. Management of chronic tension-type headache with tricyclic antidepressant medication, stress management therapy, and their combination: a randomized controlled trial. *JAMA*. 2001;285:2208–2215. doi:10.1001/jama.285.17.2208
95. Matsuzawa Y, Lee YSC, Fraser F, et al. Barriers to behavioral treatment adherence for headache: an examination of attitudes, beliefs, and psychiatric factors. *Headache*. 2019;59:19–31. doi:10.1111/head.13429
96. Paudel P, Sah A. Efficacy of biofeedback for migraine: a systematic review and meta-analysis. *Complement Ther Med*. 2025;90:103153. doi:10.1016/j.ctim.2025.103153
97. Foster NE, Anema JR, Cherkin D, et al. Prevention and treatment of low back pain: evidence, challenges, and promising directions. *Lancet*. 2018;391:2368–2383. doi:10.1016/S0140-6736(18)30489-6
98. Pincus T, Burton AK, Vogel S, Field AP. A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. *Spine*. 2002;27:E109–120. doi:10.1097/00007632-200203010-00017
99. El-Tallawy SN, Nalamasu R, Salem GI, LeQuang JAK, Pergolizzi JV, Christo PJ. Management of musculoskeletal pain: an update with emphasis on chronic musculoskeletal pain. *Pain Ther*. 2021;10:181–209. doi:10.1007/s40122-021-00235-2
100. Flynn DM. Chronic musculoskeletal pain: nonpharmacologic, noninvasive treatments. *Am Fam Physician*. 2020;102:465–477.
101. Kaplan CM, Kelleher E, Irani A, Schrepf A, Clauw DJ, Harte SE. Deciphering nociplastic pain: clinical features, risk factors and potential mechanisms. *Nat Rev Neurol*. 2024;20:347–363. doi:10.1038/s41582-024-00966-8
102. Bunzli S, Smith A, Schutze R, O'Sullivan P. Beliefs underlying pain-related fear and how they evolve: a qualitative investigation in people with chronic back pain and high pain-related fear. *BMJ Open*. 2015;5:e008847. doi:10.1136/bmjopen-2015-008847

103. Alaiti RK, Reis FJJ, Arruda-Sanchez T, Caneiro JP, Meulders A. Unraveling the role of fear and avoidance behavior in chronic musculoskeletal pain: from theory to physical therapy clinical practice. *Braz J Phys Ther*. 2025;29:101197. doi:10.1016/j.bjpt.2025.101197
104. Foster NE, Thomas E, Bishop A, Dunn KM, Main CJ. Distinctiveness of psychological obstacles to recovery in low back pain patients in primary care. *Pain*. 2010;148:398–406. doi:10.1016/j.pain.2009.11.002
105. Martinez-Calderon J, Zamora-Campos C, Navarro-Ledesma S, Luque-Suarez A. The role of self-efficacy on the prognosis of chronic musculoskeletal pain: a systematic review. *J Pain*. 2018;19:10–34. doi:10.1016/j.jpain.2017.08.008
106. Sugano R, Ikegami K, Ando H, et al. The relationship between fear-avoidance beliefs in employees with chronic musculoskeletal pain and work productivity: a longitudinal study. *J UOEH*. 2020;42:13–26. doi:10.7888/juoeh.42.13
107. Maier CDR, de Avila CS, de Souza J, Meziat-Filho N, Koerich M. Posture and pain: beliefs and attitudes of patients with chronic low back pain. *Musculoskeletal Care*. 2024;22:e70016. doi:10.1002/msc.70016
108. Guite JW, Kim S, Chen CP, et al. Pain beliefs and readiness to change among adolescents with chronic musculoskeletal pain and their parents before an initial pain clinic evaluation. *Clin J Pain*. 2014;30:27–35. doi:10.1097/AJP.0b013e31828518e9
109. Orhan C, Van Looveren E, Cagnie B, Mukhtar NB, Lenoir D, Meeus M. Are pain beliefs, cognitions, and behaviors influenced by race, ethnicity, and culture in patients with chronic musculoskeletal pain: a systematic review. *Pain Physician*. 2018;21:541–558.
110. Curtin KB, Norris D. The relationship between chronic musculoskeletal pain, anxiety and mindfulness: adjustments to the fear-avoidance model of chronic pain. *Scand J Pain*. 2017;17:156–166. doi:10.1016/j.sjpain.2017.08.006
111. Guck TP, Burke RV, Rainville C, Hill-Taylor D, Wallace DP. A brief primary care intervention to reduce fear of movement in chronic low back pain patients. *Transl Behav Med*. 2015;5:113–121. doi:10.1007/s13142-014-0292-x
112. American Psychological Association. 2024. Available from: https://www.apa.org/practice/guidelines/nonpharmacological-treatment-chronic-musculoskeletal-pain.pdf. Accessed April 21, 2026.
113. Rb N, Sk J, A J, Ts P, C A, Ms R. Integrating physiotherapists, occupational therapists, and psychologists in the management of chronic and complex musculoskeletal pain in the municipality - a workshop study. *Musculoskelet Sci Pract*. 2025;78:103336. doi:10.1016/j.msksp.2025.103336
114. Wylde V, Dennis J, Beswick AD, et al. Systematic review of management of chronic pain after surgery. *Br J Surg*. 2017;104:1293–1306. doi:10.1002/bjs.10601
115. Jain NB, Ayers GD, Fan R, et al. Predictors of pain and functional outcomes after operative treatment for rotator cuff tears. *J Shoulder Elbow Surg*. 2018;27:1393–1400. doi:10.1016/j.jse.2018.04.016
116. Riddle DL, Jensen MP, Ang D, Slover J, Perera R, Dumenci L. Do pain coping and pain beliefs associate with outcome measures before knee arthroplasty in patients who catastrophize about pain? A cross-sectional analysis from a randomized clinical trial. *Clin Orthopaedics Related Res*. 2018;476:778–786. doi:10.1007/s11999.0000000000000001
117. Tokgöz MA. The effect of pain catastrophizing and kinesiophobia on the result of shoulder arthroscopy. *Agri J Turkish Soc Algol*. 2021. doi:10.14744/agri.2021.56873
118. Giordano R, Ghafouri B, Arendt-Nielsen L, Petersen KK-S. Inflammatory biomarkers in patients with painful knee osteoarthritis: exploring the potential link to chronic postoperative pain after total knee arthroplasty—a secondary analysis. *Pain*. 2024;165:337–346. doi:10.1097/j.pain.0000000000003042
119. Wood TJ, Gazendam AM, Kabali CB, et al. Postoperative outcomes following total hip and knee arthroplasty in patients with pain catastrophizing, anxiety, or depression. *J Arthroplasty*. 2021;36:1908–1914. doi:10.1016/j.arth.2021.02.018
120. Wood TJ, Thornley P, Petruccelli D, Kabali C, Winemaker M, De Beer J. Preoperative predictors of pain catastrophizing, anxiety, and depression in patients undergoing total joint arthroplasty. *J Arthroplasty*. 2016;31:2750–2756. doi:10.1016/j.arth.2016.05.056
121. Klement MR, Nickel BT, Penrose CT, et al. Psychiatric disorders increase complication rate after primary total knee arthroplasty. *Knee*. 2016;23:883–886. doi:10.1016/j.knee.2016.05.007
122. Hardy A, Sandiford M-H, Menigaux C, Bauer T, Klouche S, Hardy P. Pain catastrophizing and pre-operative psychological state are predictive of chronic pain after joint arthroplasty of the Hip,knee or shoulder: results of a prospective,comparative study at one year follow-up. *Int Orthopaedics*. 2022;46:2461–2469. doi:10.1007/s00264-022-05542-7
123. Ardern CL, Taylor NF, Feller JA, Whitehead TS, Webster KE. Psychological responses matter in returning to preinjury level of sport after anterior cruciate ligament reconstruction surgery. *Am J Sports Med*. 2013;41:1549–1558. doi:10.1177/0363546513489284
124. Piussi R, Beischer S, Thomeé R, Hamrin Senorski E. Superior knee self-efficacy and quality of life throughout the first year in patients who recover symmetrical muscle function after ACL reconstruction. *Knee Surg Sports Traumatol Arthrosc*. 2020;28:555–567. doi:10.1007/s00167-019-05703-z
125. Thomeé P, Währborg P, Börjesson M, Thomeé R, Eriksson BI, Karlsson J. Self-efficacy of knee function as a pre-operative predictor of outcome 1 year after anterior cruciate ligament reconstruction. *Knee Surg Sports Traumatol Arthrosc*. 2008;16:118–127. doi:10.1007/s00167-007-0433-6
126. Drayer NJ, Wallace CS, Yu HH, et al. High resiliency linked to short-term patient reported outcomes and return to duty following arthroscopic knee surgery. *Mil Med*. 2019. doi:10.1093/milmed/usz180
127. Nwankwo VC, Jiranek WA, Green CL, Allen KD, George SZ, Bettger JP. Resilience and pain catastrophizing among patients with total knee arthroplasty: a cohort study to examine psychological constructs as predictors of post-operative outcomes. *Health Qual Life Outcomes*. 2021;19. doi:10.1186/s12955-021-01772-2
128. Porter A, Hill MA, Harm R, Greiwe RM. Resiliency influences postoperative outcomes following rotator cuff repair. *J Shoulder Elbow Surg*. 2021;30:1181–1185. doi:10.1016/j.jse.2020.08.024
129. Tapar H, Özsoy Z, Balta MG, Daşıran F, Tapar GG, Karaman T. Associations between postoperative analgesic consumption and distress tolerance, anxiety, depression, and pain catastrophizing: a prospective observational study. *Braz J Anesthesiol*. 2022;72:567–573. doi:10.1016/j.bjane.2021.07.007
130. Liang SY, Yates P, Edwards H, Tsay SL. Factors influencing opioid-taking self-efficacy and analgesic adherence in Taiwanese outpatients with cancer. *Psycho-Oncology*. 2008;17:1100–1107. doi:10.1002/pon.1326

131. Lucey BP, Clifford DB, Creighton J, Edwards RR, McArthur JC, Haythornthwaite J. Relationship of depression and catastrophizing to pain, disability, and medication adherence in patients with HIV-associated sensory neuropathy. *AIDS Care*. 2011;23:921–928. doi:10.1080/09540121.2010.543883
132. Currado D, Saracino F, Ruscitti P, et al. Pain catastrophizing negatively impacts drug retention rate in patients with psoriatic arthritis and axial spondyloarthritis: results from a 2-years perspective multicenter GIRRCS (Gruppo Italiano di Ricerca in Reumatologia Clinica) study. *Arthritis Res Therapy*. 2024;26. doi:10.1186/s13075-024-03396-5
133. Dobkin PL, Sita A, Sewitch MJ. Predictors of adherence to treatment in women with fibromyalgia. *Clin J Pain*. 2006;22:286–294. doi:10.1097/01.ajp.0000173016.87612.4b
134. Ben-Ami Shor D, Weitzman D, Dahan S, et al. Adherence and persistence with drug therapy among fibromyalgia patients: data from a large health maintenance organization. *J Rheumatol*. 2017;44:1499–1506. doi:10.3899/jrheum.170098
135. Chiarotto A, Koes BW. Nonspecific low back pain. *N Engl J Med*. 2022;386:1732–1740. doi:10.1056/NEJMcp2032396
136. Geneen LJ, Moore RA, Clarke C, Martin D, Colvin LA, Smith BH. Physical activity and exercise for chronic pain in adults: an overview of cochrane reviews. *Cochrane Database Syst Rev*. 2017;4:CD011279. doi:10.1002/14651858.CD011279
137. Connolly ML, Pascoe MC, Bowden SC, Amorim AB, Goonewardena K, Van Dam NT. The mental health-related barriers and benefits to exercise in adults with and without chronic pain. *Int J Clin Health Psychol*. 2024;24:100471. doi:10.1016/j.ijchp.2024.100471
138. Moore E, Thibault P, Adams H, Sullivan MJL. Catastrophizing and pain-related fear predict failure to maintain treatment gains following participation in a pain rehabilitation program. *Pain Rep*. 2016;1:e567. doi:10.1097/PR9.0000000000000567
139. Kaleth AS, Bigatti SM, Slaven JE, Kelly N, Ang DC. Predictors of physical activity in patients with fibromyalgia: a path analysis. *J Clin Rheumatol*. 2022;28:e203–e209. doi:10.1097/RHU.0000000000001684
140. Gilanyi YL, Shah B, Cashin AG, et al. Barriers and enablers to exercise adherence in people with nonspecific chronic low back pain: a systematic review of qualitative evidence. *Pain*. 2024;165:2200–2214. doi:10.1097/j.pain.0000000000003234
141. Joelsson M, Bernhardsson S, Larsson ME. Patients with chronic pain may need extra support when prescribed physical activity in primary care: a qualitative study. *Scand J Prim Health Care*. 2017;35:64–74. doi:10.1080/02813432.2017.1288815
142. Vader K, Doulas T, Patel R, Miller J. Experiences, barriers, and facilitators to participating in physical activity and exercise in adults living with chronic pain: a qualitative study. *Disabil Rehabil*. 2021;43:1829–1837. doi:10.1080/09638288.2019.1676834
143. Bishop FL, Yardley L, Cooper C, Little P, Lewith G. Predicting adherence to acupuncture appointments for low back pain: a prospective observational study. *BMC Complement Altern Med*. 2017;17:5. doi:10.1186/s12906-016-1499-9
144. Flegal KE, Kishiyama S, Zajdel D, Haas M, Oken BS. Adherence to yoga and exercise interventions in a 6-month clinical trial. *BMC Complement Altern Med*. 2007;7:37. doi:10.1186/1472-6882-7-37
145. Gilliam JR, George SZ, Norman KS, Hendren S, Sahu PK, Silfies SP. Mind-Body exercise performed by physical therapists for reducing pain and disability in low back pain: a systematic review with meta-analysis. *Arch Phys Med Rehabil*. 2023;104:776–789. doi:10.1016/j.apmr.2022.10.004
146. Wieland LS, Skoetz N, Pilkington K, Harbin S, Vempati R, Berman BM. Yoga for chronic non-specific low back pain. *Cochrane Database Syst Rev*. 2022;11. CD010671. doi:10.1002/14651858.CD010671.pub2
147. Zhu F, Zhang M, Wang D, Hong Q, Zeng C, Chen W. Yoga compared to non-exercise or physical therapy exercise on pain, disability, and quality of life for patients with chronic low back pain: a systematic review and meta-analysis of randomized controlled trials. *PLoS One*. 2020;15:e0238544. doi:10.1371/journal.pone.0238544
148. Dhondt E, Van Oosterwijck J, Cagnie B, et al. Predicting treatment adherence and outcome to outpatient multimodal rehabilitation in chronic low back pain. *J Back Musculoskelet Rehabil*. 2020;33:277–293. doi:10.3233/BMR-181125
149. Roberts KE, Ho E, Gassen-Fritsch C, Halliday M, Mattinty MM, Ferreira P. Perceived social support impacts on exercise adherence in patients with chronic low back pain. *J Back Musculoskelet Rehabil*. 2024;37(6):1467–1477. doi:10.3233/BMR-230239
150. Oliver K, Cronan T. Predictors of exercise behaviors among fibromyalgia patients. *Prev Med*. 2002;35:383–389. doi:10.1006/pmed.2002.1084
151. Warner LM, Ziegelmann JP, Schuz B, Wurm S, Schwarzer R. Synergistic effect of social support and self-efficacy on physical exercise in older adults. *J Aging Phys Act*. 2011;19:249–261. doi:10.1123/japa.19.3.249
152. Essery R, Geraghty AW, Kirby S, Yardley L. Predictors of adherence to home-based physical therapies: a systematic review. *Disabil Rehabil*. 2017;39:519–534. doi:10.3109/09638288.2016.1153160
153. Skolasky RL, Mackenzie EJ, Wegener ST, Riley LH. 3rd. Patient activation and adherence to physical therapy in persons undergoing spine surgery. *Spine*. 2008;33:E784–791. doi:10.1097/BRS.0b013e31818027f1
154. Arienti C, Bosisio T, Ratti S, Miglioli R, Negrini S. Osteopathic manipulative treatment effect on pain relief and quality of life in oncology geriatric patients: a nonrandomized controlled clinical trial. *Integr Cancer Ther*. 2018;17:1163–1171. doi:10.1177/1534735418796954
155. Popovich JM, Cholewicki J, Reeves NP, et al. The effects of osteopathic manipulative treatment on pain and disability in patients with chronic low back pain: a single-blinded randomized controlled trial. *J Osteopath Med*. 2024;124:219–230. doi:10.1515/jom-2022-0124
156. Coronado RA, Bialosky JE. Manual physical therapy for chronic pain: the complex whole is greater than the sum of its parts. *J Man Manip Ther*. 2017;25:115–117. doi:10.1080/10669817.2017.1309344
157. Licciardone JC, Schultz MJ, Amen B. Osteopathic manipulation in the management of chronic pain: current perspectives. *J Pain Res*. 2020;13:1839–1847. doi:10.2147/JPR.S183170
158. Nijs J, Malfliet A, Roose E, et al. Personalized multimodal lifestyle intervention as the best-evidenced treatment for chronic pain: state-of-the-art clinical perspective. *J Clin Med*. 2024;14:13. doi:10.3390/jcm13030644 Abstract
159. Shi Y, Wu W. Multimodal non-invasive non-pharmacological therapies for chronic pain: mechanisms and progress. *BMC Med*. 2023;21:372. doi:10.1186/s12916-023-03076-2
160. George SZ, Fritz JM, Silfies SP, et al. Interventions for the management of acute and chronic low back pain: revision 2021. *J Orthop Sports Phys Ther*. 2021;51:CPG1–CPG60.
161. Nicholas MK, Asghari A, Corbett M, et al. Is adherence to pain self-management strategies associated with improved pain, depression and disability in those with disabling chronic pain? *Eur J Pain*. 2012;16:93–104. doi:10.1016/j.ejpain.2011.06.005

162. Vega-Retuerta N, Sanchez-Parente S, Segura-Jimenez V. Effectiveness of multidisciplinary approaches including exercise to treat non-specific chronic low back pain: a systematic review and meta-analysis across multiple regions. *Prev Med*. 2025;199:108381. doi:10.1016/j.ypmed.2025.108381
163. Shalev A, Henderson CR, Gutierrez I, Mullen E, Reid MC. The prevalence and potential role of pain beliefs when managing later-life pain. *Clin J Pain*. 2021;37:251–258. doi:10.1097/AJP.0000000000000909
164. Jensen MP, Turner JA, Romano JM. Changes in beliefs, catastrophizing, and coping are associated with improvement in multidisciplinary pain treatment. *J Consult Clin Psychol*. 2001;69:655–662. doi:10.1037/0022-006X.69.4.655
165. Ryum T, Stiles TC. Changes in pain catastrophizing, fear-avoidance beliefs, and pain self-efficacy mediate changes in pain intensity on disability in the treatment of chronic low back pain. *Pain Rep*. 2023;8:e1092. doi:10.1097/PR9.0000000000001092
166. Coppack RJ, Kristensen J, Karageorghis CI. Use of a goal setting intervention to increase adherence to low back pain rehabilitation: a randomized controlled trial. *Clin Rehabil*. 2012;26:1032–1042. doi:10.1177/0269215512436613
167. Pérez-Maletzki J, Domínguez-Navarro F, Roig-Casasús S, Hernández-Guillén D, García-Gomáriz C, Blasco JM. Estrategias orientadas a mejorar la adherencia a la rehabilitación y la actividad física tras cirugía de artroplastia total de rodilla: revisión sistemática con metaanálisis. *Fisioterapia*. 2023;45:341–352. doi:10.1016/j.ft.2023.05.003
168. Jordan JL, Holden MA, Mason EE, Foster NE. Interventions to improve adherence to exercise for chronic musculoskeletal pain in adults. *Cochrane Database Syst Rev*. 2010;2010:CD005956. doi:10.1002/14651858.CD005956.pub2
169. Martinez-Calderon J, Garcia-Munoz C, Rufo-Barbero C, Matias-Soto J, Cano-Garcia FJ. Acceptance and commitment therapy for chronic pain: an overview of systematic reviews with meta-analysis of randomized clinical trials. *J Pain*. 2024;25:595–617. doi:10.1016/j.jpain.2023.09.013
170. McLean SM, Burton M, Bradley L, Littlewood C. Interventions for enhancing adherence with physiotherapy: a systematic review. *Man Ther*. 2010;15:514–521. doi:10.1016/j.math.2010.05.012
171. Carey TS, Freburger JK, Holmes GM, et al. Race, care seeking, and utilization for chronic back and neck pain: population perspectives. *J Pain*. 2010;11:343–350. doi:10.1016/j.jpain.2009.08.003
172. Meints SM, Wang V, Edwards RR. Sex and race differences in pain sensitization among patients with chronic low back pain. *J Pain*. 2018;19:1461–1470. doi:10.1016/j.jpain.2018.07.001
173. Yang Y, Reid MC, Grol-Prokopczyk H, Pillemer K. Racial-ethnic disparities in pain intensity and interference among middle-aged and older U.S. adults. *J Gerontol a Biol Sci Med Sci*. 2022;77:e74–e81. doi:10.1093/gerona/glab207
174. Portenoy RK, Ugarte C, Fuller I, Haas G. Population-based survey of pain in the United States: differences among white, African American, and Hispanic subjects. *J Pain*. 2004;5:317–328. doi:10.1016/j.jpain.2004.05.005
175. Reyes-Gibby CC, Aday LA, Todd KH, Cleeland CS, Anderson KO. Pain in aging community-dwelling adults in the United States: non-hispanic whites, non-hispanic blacks, and hispanics. *J Pain*. 2007;8:75–84. doi:10.1016/j.jpain.2006.06.002
176. Meints SM, Miller MM, Hirsh AT. Differences in pain coping between black and white Americans: a meta-analysis. *J Pain*. 2016;17:642–653. doi:10.1016/j.jpain.2015.12.017
177. Tan G, Jensen MP, Thornby J, Anderson KO. Ethnicity, control appraisal, coping, and adjustment to chronic pain among black and white Americans. *Pain Med*. 2005;6:18–28. doi:10.1111/j.1526-4637.2005.05008.x
178. Cano A, Mayo A, Ventimiglia M. Coping, pain severity, interference, and disability: the potential mediating and moderating roles of race and education. *J Pain*. 2006;7:459–468. doi:10.1016/j.jpain.2006.01.445
179. Jones AC, Kwoh CK, Groeneveld PW, Mor M, Geng M, Ibrahim SA. Investigating racial differences in coping with chronic osteoarthritis pain. *J Cross Cult Gerontol*. 2008;23:339–347. doi:10.1007/s10823-008-9071-9
180. Jordan MS, Lumley MA, Leisen JC. The relationships of cognitive coping and pain control beliefs to pain and adjustment among African-American and Caucasian women with rheumatoid arthritis. *Arthritis Care Res*. 1998;11:80–88. doi:10.1002/art.1790110203
181. Hollingshead NA, Ashburn-Nardo L, Stewart JC, Hirsh AT. The pain experience of hispanic Americans: a critical literature review and conceptual model. *J Pain*. 2016;17:513–528. doi:10.1016/j.jpain.2015.10.022
182. Allen KD, Oddone EZ, Coffman CJ, Keefe FJ, Lindquist JH, Bosworth HB. Racial differences in osteoarthritis pain and function: potential explanatory factors. *Osteoarthritis Cartilage*. 2010;18:160–167. doi:10.1016/j.joca.2009.09.010
183. Lane E, Barnes C, Fritz JM. Differences in pain experience among different racial and ethnic groups. *Phys Ther*. 2024;104. doi:10.1093/ptj/pzae001
184. Goya Arce AB, Richardson PA, Tran ST, Bhandari RP. Comparison of pain and psychosocial correlates among hispanic and non-hispanic white youth with chronic pain. *Pain Rep*. 2022;7:e1020. doi:10.1097/PR9.0000000000001020
185. Ng BW, Nanavaty N, Mathur VA. The influence of Latinx American identity on pain perception and treatment seeking. *J Pain Res*. 2019;12:3025–3035. doi:10.2147/JPR.S217866
186. Hoffman KM, Trawalter S, Axt JR, Oliver MN. Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between blacks and whites. *Proc Natl Acad Sci*. 2016;113:4296–4301. doi:10.1073/pnas.1516047113
187. Escobedo LE, Cervantes L, Havranek E. Barriers in healthcare for latinx patients with limited english proficiency-a narrative review. *J Gen Intern Med*. 2023;38:1264–1271. doi:10.1007/s11606-022-07995-3
188. Schenker Y, Perez-Stable EJ, Nickleach D, Karliner LS. Patterns of interpreter use for hospitalized patients with limited English proficiency. *J Gen Intern Med*. 2011;26:712–717. doi:10.1007/s11606-010-1619-z
189. Stepanikova I, Cook KS. Effects of poverty and lack of insurance on perceptions of racial and ethnic bias in health care. *Health Serv Res*. 2008;43:915–930. doi:10.1111/j.1475-6773.2007.00816.x
190. Zvolensky MJ, Smit T, Rogers AH, et al. Exploring pain experience and anxiety sensitivity among Latinx adults in a federally qualified health center. *J Behav Med*. 2022;45:404–415. doi:10.1007/s10865-022-00325-2
191. Horne M, Skelton DA, Speed S, Todd C. Attitudes and beliefs to the uptake and maintenance of physical activity among community-dwelling South Asians aged 60-70 years: a qualitative study. *Public Health*. 2012;126:417–423. doi:10.1016/j.puhe.2012.02.002
192. Howard SL, Bartholomew JB. Barriers and facilitators to physical activity among Black women: a qualitative systematic review and thematic synthesis. *PLOS Glob Public Health*. 2024;4:e0003202. doi:10.1371/journal.pgph.0003202

193. Ramos AK, Rech JP, Schmeits K, et al. Exploring the benefits, barriers, and facilitators of physical activity and interest in intergenerational physical activity programming within a hispanic/latino community in the midwest. *Health Promot Pract*. 2025;26:271–286. doi:10.1177/15248399231216728
194. Rogger R, Bello C, Romero CS, Urman RD, Luedi MM, Filipovic MG. Cultural framing and the impact on acute pain and pain services. *Curr Pain Headache Rep*. 2023;27:429–436. doi:10.1007/s11916-023-01125-2
195. Sharma S, Ferreira-Valente A, De William AC, Abbott JH, Pais-Ribeiro J, Jensen MP. Group differences between countries and between languages in pain-related beliefs, coping, and catastrophizing in chronic pain: a systematic review. *Pain Med*. 2020;21:1847–1862. doi:10.1093/pm/pnz373
196. Domenichiello AF, Ramsden CE. The silent epidemic of chronic pain in older adults. *Prog Neuropsychopharmacol Biol Psychiatry*. 2019;93:284–290. doi:10.1016/j.pnpbp.2019.04.006
197. Patel KV, Guralnik JM, Dansie EJ, Turk DC. Prevalence and impact of pain among older adults in the United States: findings from the 2011 national health and aging trends study. *Pain*. 2013;154:2649–2657. doi:10.1016/j.pain.2013.07.029
198. Docking RE, Fleming J, Brayne C, Zhao J, Macfarlane GJ, Jones GT. The relationship between back pain and mortality in older adults varies with disability and gender: results from the Cambridge City over-75s Cohort (CC75C) study. *Eur J Pain*. 2015;19:466–472. doi:10.1002/ejp.568
199. Cook AJ, Brawer PA, Vowles KE. The fear-avoidance model of chronic pain: validation and age analysis using structural equation modeling. *Pain*. 2006;121:195–206. doi:10.1016/j.pain.2005.11.018
200. Murray CB, Patel KV, Twiddy H, Sturgeon JA, Palermo TM. Age differences in cognitive–affective processes in adults with chronic pain. *Eur J Pain*. 2021;25:1041–1052. doi:10.1002/ejp.1725
201. Gooding PA, Hurst A, Johnson J, Tarrier N. Psychological resilience in young and older adults. *Int J Geriatr Psychiatry*. 2012;27:262–270. doi:10.1002/gps.2712
202. Miró J, Solé E, Gertz K, Jensen MP, Engel JM. Pain beliefs and quality of life in young people with disabilities and bothersome pain. *Clin J Pain*. 2017;33:998–1005. doi:10.1097/AJP.0000000000000482
203. Lachapelle DL, Hadjistavropoulos T. Age-Related differences among adults coping with pain: evaluation of a developmental life-context model. *Canadian J Behav Sci*. 2005;37:123–137. doi:10.1037/h0087250
204. Miaskowski C. The impact of age on a patient's perception of pain and ways it can be managed. *Pain Manag Nurs*. 2000;1:2–7. doi:10.1053/jpmn.2000.9760
205. Riley JL, Wade JB, Robinson ME, Price DD. The stages of pain processing across the adult lifespan. *J Pain*. 2000;1:162–170. doi:10.1016/S1526-5900(00)90101-9
206. Ekinci M, Şevgin Ö. Investigation of the relationship between pain perceptions and pain beliefs and symptom severity of individuals in different age groups with chronic low back pain. *Inönü Üniversitesi Saglik Hizmetleri Meslek Yüksek Okulu Dergisi*. 2024;12:215–225. doi:10.33715/inonusaglik.1377669
207. Klosowska J, Farley D, Braczyk J, Buglewicz-Przewoznik E, Babel P. Age as a moderator in the interplay among locus of control, coping, and quality of life of people with chronic pain. *Pain Med*. 2023;24:1251–1261. doi:10.1093/pm/pnad079
208. Edwards RR, Haythornthwaite JA, Sullivan MJ, Fillingim RB. Catastrophizing as a mediator of sex differences in pain: differential effects for daily pain versus laboratory-induced pain. *Pain*. 2004;111:335–341. doi:10.1016/j.pain.2004.07.012
209. Le LHL, Brown VAV, mol S, et al. Sex differences in pain catastrophizing and its relation to the transition from acute pain to chronic pain. *BMC Anesthesiology*. 2024;24:24. doi:10.1186/s12871-023-02399-0
210. Keogh E, Eccleston C. Sex differences in adolescent chronic pain and pain-related coping. *Pain*. 2006;123:275–284. doi:10.1016/j.pain.2006.03.004
211. Samulowitz A, Hensing G, Haukenes I, Bergman S, Grimby-Ekman A. General self-efficacy and social support in men and women with pain – irregular sex patterns of cross-sectional and longitudinal associations in a general population sample. *BMC Musculoskeletal Disord*. 2022;23. doi:10.1186/s12891-022-05992-5
212. Samulowitz A, Gremyr I, Eriksson E, Hensing G. "Brave men" and "Emotional women": a theory-guided literature review on gender bias in health care and gendered norms towards patients with chronic pain. *Pain Res Manag*. 2018;2018:6358624. doi:10.1155/2018/6358624
213. Brown VL, James A, Hunleth J, et al. Believing women: a qualitative exploration of provider disbelief and pain dismissal among women with interstitial cystitis/bladder pain syndrome from the MAPP research network. *Int Urogynecol J*. 2024;35:139–148. doi:10.1007/s00192-023-05677-0
214. Heise L, Greene ME, Opper N, et al. Gender inequality and restrictive gender norms: framing the challenges to health. *Lancet*. 2019;393:2440–2454. doi:10.1016/S0140-6736(19)30652-X
215. Hoffmann DE, Tarzian AJ. The girl who cried pain: a bias against women in the treatment of pain. *J Law Med Ethics*. 2001;29:13–27. doi:10.1111/j.1748-720X.2001.tb00037.x
216. Graf J, Simoes E, Kranz A, Weinert K, Abele H. The importance of gender-sensitive health care in the context of pain, emergency and vaccination: a narrative review. *Int J Environ Res Public Health*. 2023;21:21. doi:10.3390/ijerph21010021
217. Hamberg K, Risberg G, Johansson EE, Westman G. Gender bias in physicians' management of neck pain: a study of the answers in a Swedish national examination. *J Womens Health Gend Based Med*. 2002;11:653–666. doi:10.1089/152460902760360595
218. Hirsh AT, Hollingshead NA, Matthias MS, Bair MJ, Kroenke K. The influence of patient sex, provider sex, and sexist attitudes on pain treatment decisions. *J Pain*. 2014;15:551–559. doi:10.1016/j.jpain.2014.02.003
219. Calderone KL. The influence of gender on the frequency of pain and sedative medication administered to postoperative patients. *Sex Roles*. 1990;23:713–725. doi:10.1007/BF00289259
220. Schafer G, Prkachin KM, Kaseweter KA, Williams AC. Health care providers' judgments in chronic pain: the influence of gender and trustworthiness. *Pain*. 2016;157:1618–1625. doi:10.1097/j.pain.0000000000000536
221. Taulaniemi A, Kankaanpaa M, Rinne M, Tokola K, Parkkari J, Suni JH. Fear-avoidance beliefs are associated with exercise adherence: secondary analysis of a randomised controlled trial (RCT) among female healthcare workers with recurrent low back pain. *BMC Sports Sci Med Rehabil*. 2020;12:28. doi:10.1186/s13102-020-00177-w
222. Noon CT, Nwose EU, Breheny L. Evaluation of gender differences in exercise adherence for low back pain: case reviews and survey. *Eur J Physiother*. 2019;21:49–55. doi:10.1080/21679169.2018.1468815

223. Simon E, Zsidó AN, Birkás B, Csathó Á. Pain catastrophizing, pain sensitivity and fear of pain are associated with early life environmental unpredictability: a path model approach. *BMC Psychol*. 2022;10:10. doi:10.1186/s40359-022-00717-8
224. Ursavaş FE, Yaradılmış YU. Relationship between pain beliefs and postoperative pain outcomes after total knee and hip replacement surgery. *J PeriAnesthesia Nurs*. 2021;36:187–193. doi:10.1016/j.jopan.2020.09.014
225. Whitley MD, Herman PM, Aliyev GR, Sherbourne CD, Ryan GW, Coulter ID. Income as a predictor of self-efficacy for managing pain and for coping with symptoms among patients with chronic low back pain. *J ManipulativePhysiol Therapeut*. 2021;44:433–444. doi:10.1016/j.jmpt.2021.05.004
226. Feldman CH, Dong Y, Katz JN, Donnell-Fink LA, Losina E. Association between socioeconomic status and pain, function and pain catastrophizing at presentation for total knee arthroplasty. *BMC Musculoskeletal Disord*. 2015;16. doi:10.1186/s12891-015-0475-8
227. See YKC, Smith HE, Car LT, Protheroe J, Wong WC, Bartlam B. Health literacy and health outcomes in patients with low back pain: a scoping review. *BMC Med Inform Decis Mak*. 2021;21:215. doi:10.1186/s12911-021-01572-0
228. Devraj R, Herndon CM, Griffin J. Pain awareness and medication knowledge: a health literacy evaluation. *J Pain Palliat Care Pharmacother*. 2013;27:19–27. doi:10.3109/15360288.2012.751955
229. Farin E, Ullrich A, Nagl M. Health education literacy in patients with chronic musculoskeletal diseases: development of a new questionnaire and sociodemographic predictors. *Health Educ Res*. 2013;28:1080–1091. doi:10.1093/her/cyt095
230. Kim K, Yang Y, Wang Z, et al. A systematic review of the association between health literacy and pain self-management. *Patient Educ Couns*. 2022;105:1427–1440. doi:10.1016/j.pec.2021.09.037
231. Koppen PJ, Dorner TE, Stein KV, Simon J, Crevenna R. Health literacy, pain intensity and pain perception in patients with chronic pain. *Wien Klin Wochenschr*. 2018;130:23–30. doi:10.1007/s00508-017-1309-5
232. Prastika D, Kitrungrote L, Damkliang J. Pain-management strategies among hospitalized trauma patients: a preliminary study in a teaching hospital in Indonesia. *Enfermería Clínica*. 2018;28:158–161. doi:10.1016/S1130-8621(18)30058-5
233. Keivan N, Daryabeigi R, Alimohammadi N. Effects of religious and spiritual care on burn patients' pain intensity and satisfaction with pain control during dressing changes. *Burns*. 2019;45:1605–1613. doi:10.1016/j.burns.2019.07.001
234. Cohen L, Fouladi RT, Katz J. Preoperative coping strategies and distress predict postoperative pain and morphine consumption in women undergoing abdominal gynecologic surgery. *J Psychosomatic Res*. 2005;58:201–209. doi:10.1016/j.jpsychores.2004.07.007
235. Najem C, Mukhtar NB, Ayoubi F, et al. Religious beliefs and attitudes in relation to pain, pain-related beliefs, function, and coping in chronic musculoskeletal pain: a systematic review. *Pain Physician*. 2021;24(E1176):E1163.
236. Schultz H, Skræp U, Schultz Larsen T, et al. Psychometric evaluation of the Danish version of a modified revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R-D) for patients hospitalized with acute abdominal pain. *Scandinavian J Pain*. 2019;19:117–130. doi:10.1515/sjpain-2018-0106
237. Robinson-Papp J, George MC, Dorfman D, Simpson DM. Barriers to chronic pain measurement: a qualitative study of patient perspectives. *Pain Med*. 2015;16:1256–1264. doi:10.1111/pme.12717
238. Dubé M-O, Langevin P, Roy J-S. Measurement properties of the pain self-efficacy questionnaire in populations with musculoskeletal disorders: a systematic review. *PAIN Rep*. 2021;6:e972. doi:10.1097/PR9.0000000000000972
239. Edwards LC, Pearce SA, Turner-Stokes L, Jones A. The pain beliefs questionnaire: an investigation of beliefs in the causes and consequences of pain. *Pain*. 1992;51:267–272. doi:10.1016/0304-3959(92)90209-T
240. Williams DA, Thorn BE. An empirical assessment of pain beliefs. *Pain*. 1989;36:351–358. doi:10.1016/0304-3959(89)90095-X
241. Jensen MP, Karoly P, Huger R. The development and preliminary validation of an instrument to assess patients' attitudes toward pain. *J Psychosom Res*. 1987;31:393–400. doi:10.1016/0022-3999(87)90060-2
242. Dalton JA, Feuerstein M, Carlson J, Roghman K. Biobehavioral pain profile: development and psychometric properties. *Pain*. 1994;57:95–107. doi:10.1016/0304-3959(94)90113-9
243. Osman A, Bunger S, Osman JR, Fisher L. The inventory of negative thoughts in response to pain: factor structure and psychometric properties in a college sample. *J Behav Med*. 1993;16:219–224. doi:10.1007/BF00844894
244. Weinman J, Petrie KJ, Moss-morris R, Horne R. The illness perception questionnaire: a new method for assessing the cognitive representation of illness. *Psychol Health*. 1996;11:431–445. doi:10.1080/08870449608400270
245. Sullivan MJL, Bishop SR, Pivik J. The pain catastrophizing scale: development and validation. *Psychological Assessment*. 1995;7:524–532. doi:10.1037/1040-3590.7.4.524
246. Waddell G, newton M, Henderson I, Somerville D, Main CJ. A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. *Pain*. 1993;52:157–168. doi:10.1016/0304-3959(93)90127-B
247. Kori S, Miller R, Todd D. Kinesiophobia: a new view of chronic pain behavior. *Pain Management*. 1990;3.
248. Roelofs J, Goubert L, Peters ML, Vlaeyen JW, Crombez G. The Tampa Scale for Kinesiophobia: further examination of psychometric properties in patients with chronic low back pain and fibromyalgia. *Eur J Pain*. 2004;8:495–502. doi:10.1016/j.ejpain.2003.11.016
249. Skevington SM. A standardised scale to measure beliefs about controlling pain (B.P.C.Q.): a preliminary study. *Psychol Health*. 1990;4:221–232. doi:10.1080/08870449008400392
250. DeGood DE, Shutty JMS. Assessment of pain beliefs, coping, and self-efficacy. In: *Handbook of Pain Assessment*. New York, NY, US: The Guilford Press; 1992:214–234.
251. Nicholas MK. The pain self-efficacy questionnaire: taking pain into account. *Eur J Pain*. 2007;11:153–163. doi:10.1016/j.ejpain.2005.12.008
252. Anderson KO, Dowds BN, Pelletz RE, Edwards TW, Peeters-Asdourian C. Development and initial validation of a scale to measure self-efficacy beliefs in patients with chronic pain. *Pain*. 1995;63:77–83. doi:10.1016/0304-3959(95)00021-J
253. Flor H, Behle DJ, Birbaumer N. Assessment of pain-related cognitions in chronic pain patients. *Behav Res Ther*. 1993;31:63–73. doi:10.1016/0005-7967(93)90044-U
254. Cook AJ, Degood DE. The cognitive risk profile for pain: development of a self-report inventory for identifying beliefs and attitudes that interfere with pain management. *Clin J Pain*. 2006;22:332–345. doi:10.1097/01.ajp.0000209801.78043.91
255. Rainville J, Bagnall D, Phalen L. Health care providers' attitudes and beliefs about functional impairments and chronic back pain. *Clin J Pain*. 1995;11:287–295. doi:10.1097/00002508-199512000-00006

256. McCracken LM, Zayfert C, Gross RT. The pain anxiety symptoms scale: development and validation of a scale to measure fear of pain. *Pain*. 1992;50:67–73. doi:10.1016/0304-3959(92)90113-P
257. Afolalu EF, Moore C, Ramlee F, Goodchild CE, Tang NK. Development of the Pain-Related Beliefs and Attitudes about Sleep (PBAS) scale for the assessment and treatment of insomnia comorbid with chronic pain. *J Clin Sleep Med*. 2016;12:1269–1277. doi:10.5664/jcsm.6130
258. Schutze R, Rees C, Smith A, Slater H, Catley M, O'Sullivan P. Assessing beliefs underlying rumination about pain: development and validation of the pain metacognitions questionnaire. *Front Psychol*. 2019;10:910. doi:10.3389/fpsyg.2019.00910
259. Symonds TL, Burton AK, Tillotson KM, Main CJ. Do attitudes and beliefs influence work loss due to low back trouble? *Occup Med*. 1996;46:25–32. doi:10.1093/occmed/46.1.25
260. Main CJ. The Modified Somatic Perception Questionnaire (MSPQ). *J Psychosom Res*. 1983;27:503–514. doi:10.1016/0022-3999(83)90040-5
261. Lorig K, Chastain RL, Ung E, Shoor S, Holman HR. Development and evaluation of a scale to measure perceived self-efficacy in people with arthritis. *Arthritis Rheum*. 1989;32:37–44. doi:10.1002/anr.1780320107
262. Ostelo RWJG, Stomp-Van Den Berg SGM, Vlaeyen JWS, Wolters PMJC, de Vet HCW. Health care provider's attitudes and beliefs towards chronic low back pain: the development of a questionnaire. *Manual Ther*. 2003;8:214–222. doi:10.1016/S1356-689X(03)00013-4
263. Simons LE, Sieberg CB, Carpino E, Logan D, Berde C. The Fear of Pain Questionnaire (FOPQ): assessment of pain-related fear among children and adolescents with chronic pain. *J Pain*. 2011;12:677–686. doi:10.1016/j.jpain.2010.12.008
264. Ghio D, Calam R, Hyrich KL, Thomson W, Cordingley L. Study CAP, 268. validating a pain perception questionnaire for young people with juvenile arthritis. *Rheumatology*. 2015;54:i154–i154. doi:10.1093/rheumatology/kev090.033
265. Smith AM, Sieberg CB, Odell S, Randall E, Simons LE. Living life with my child's pain: the Parent Pain Acceptance Questionnaire (PPAQ). *Clin J Pain*. 2015;31:633–641. doi:10.1097/AJP.0000000000000140
266. Simons LE, Sieberg CB, Kaczynski KJ. Measuring parent beliefs about child acceptance of pain: a preliminary validation of the chronic pain acceptance questionnaire, parent report. *Pain*. 2011;152:2294–2300. doi:10.1016/j.pain.2011.06.018
267. Simons LE, Smith A, Ibagon C, et al. Pediatric pain screening tool: rapid identification of risk in youth with pain complaints. *Pain*. 2015;156:1511–1518. doi:10.1097/j.pain.0000000000000199
268. McCracken LM, Yang SY. The role of values in a contextual cognitive-behavioral approach to chronic pain. *Pain*. 2006;123:137–145. doi:10.1016/j.pain.2006.02.021
269. Lacasse A, Connelly JA, Choiniere M. The chronic pain myth scale: development and validation of a French-Canadian instrument measuring knowledge, beliefs, and attitudes of people in the community towards chronic pain. *Pain Res Manag*. 2016;2016:5940206. doi:10.1155/2016/5940206
270. Gedin F, Hellerstrom A, Blome S, Jensen K, Andreasson A, Lalouni M. Development and validation of the PrePain questionnaire for predicting pain. *Sci Rep*. 2025;15:25112. doi:10.1038/s41598-025-09044-5
271. Pollard CA. Preliminary validity study of the pain disability index. *Percept Mot Skills*. 1984;59:974. doi:10.2466/pms.1984.59.3.974
272. Kerns RD, Haythornthwaite J, Rosenberg R, Southwick S, Giller EL, Jacob MC. The Pain Behavior Check List (PBCL): factor structure and psychometric properties. *J Behav Med*. 1991;14:155–167. doi:10.1007/BF00846177
273. Kohut SA, Stinson J, Chambers CT, Reid GJ, Pillai Riddell RR. The pain coping questionnaire short-form: preliminary reliability and validity. *Pain Rep*. 2022;7:e982. doi:10.1097/PR9.0000000000000982
274. DiRenzo D, Finan P. Self-Efficacy and the role of non-pharmacologic treatment strategies to improve pain and affect in arthritis. *Current Treat Options Rheumatol*. 2019;5:168–178. doi:10.1007/s40674-019-00123-z
275. Jamison RN, Edwards RR. Integrating pain management in clinical practice. *J Clin Psychol Med Settings*. 2012;19:49–64. doi:10.1007/s10880-012-9295-2
276. Lee B, Zhao W, Yang KC, Ahn YY, Perry BL. Systematic evaluation of state policy interventions targeting the US opioid epidemic, 2007-2018. *JAMA Network Open*. 2021;4:e2036687. doi:10.1001/jamanetworkopen.2020.36687
277. Tajerian M, Alvarado S. Pain research and treatment: policy implications. *Policy Insights Behav Brain Sci*. 2024;11:110–117. doi:10.1177/23727322231197368
278. Stanarević Katavić S. Health information behaviour of rare disease patients: seeking, finding and sharing health information. *Health Info Libr J*. 2019;36:341–356. doi:10.1111/hir.12261
279. Rezaei F, Sanagoo A, Peyrovi H, Jouybari L. Persistent suffering: living experiences of patients with rare disease: an interpretative phenomenological study. *J Educ Health Promot*. 2023;12:224. doi:10.4103/jehp.jehp_1010_22
280. Kose G, Sirin K. Effects of pain beliefs on postoperative pain and analgesic consumption in spine surgery patients. *J Neurosci Nurs*. 2023;55:228–234. doi:10.1097/JNN.0000000000000730
281. Hoch C, Pire J, Scott DJ, Gross CE. The influence of pain and resiliency on foot and ankle surgery outcomes. *Foot Ankle Orthopaedics*. 2022;7. doi:10.1177/24730114221108137
282. Jochimsen KN, Pelton MR, Mattacola CG, et al. Relationship between pain catastrophizing and 6-month outcomes following anterior cruciate ligament reconstruction. *J Sport Rehabilitat*. 2020;29:808–812. doi:10.1123/jsr.2018-0431