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Pain Catastrophising and Rehabilitation Outcome: Screening Instruments and What to Do With a High Score

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Abstract

Pain catastrophising, a cognitive-affective response characterised by rumination, magnification, and helplessness in relation to pain, is one of the most consistently replicated psychological predictors of poor outcome across orthopaedic and sports medicine rehabilitation settings, from ACL reconstruction to chronic low back pain to total knee arthroplasty. The Pain Catastrophizing Scale is a validated, brief, and widely available screening instrument, yet its use in routine rehabilitation practice remains inconsistent, and the evidence base on what to do once a clinically elevated score is identified is less mature than the evidence establishing the association itself. This review synthesises the predictive-validity, screening-instrument, and intervention literature on pain catastrophising to give clinicians a structured account of why screening matters and what has been reported to work once a high score is found.

Keywords: Pain catastrophising; Pain Catastrophizing Scale; Rehabilitation outcome; Fear-avoidance; Cognitive-behavioural therapy; Screening

Introduction

Pain catastrophising -- a cognitive-affective response to pain characterised by rumination on the pain, magnification of its threat value, and a sense of helplessness in the face of it -- is one of the most consistently replicated psychological predictors of poor outcome across orthopaedic and sports medicine rehabilitation, identified as a significant independent predictor across conditions as varied as ACL reconstruction, rotator cuff repair, total knee arthroplasty, and chronic low back pain [1,9,10]. The Pain Catastrophizing Scale, the most widely validated instrument for measuring it, is brief, freely available, and has been used in research settings for nearly three decades, yet its incorporation into routine rehabilitation screening remains inconsistent across clinical practice [1].

This review treats two separate but related questions in turn: first, how strong and how consistent is the evidence that pain catastrophising predicts rehabilitation outcome across different musculoskeletal conditions; and second, once a clinically elevated score is identified through screening, what does the intervention literature actually support doing about it. The first question has a substantial and mature evidence base; the second, while growing, remains less developed, and this review is explicit about that asymmetry rather than overstating the intervention evidence to match the strength of the predictive evidence.

This review synthesises the predictive-validity literature establishing pain catastrophising's association with rehabilitation outcome, the psychometric literature validating the Pain Catastrophizing Scale and its shortened variants, and the intervention literature addressing elevated scores, to give clinicians a structured, evidence-based account of both why screening matters and what has been reported to help once a high score is found.

Material and Methods

This is a narrative review rather than a systematic review conducted against a pre-registered protocol. Sources were identified through targeted searches of MEDLINE, PsycINFO, and SPORTDiscus, combined with forward and backward citation tracking from the foundational Pain Catastrophizing Scale validation paper, the fear-avoidance model literature it sits within, the predictive-validity studies across the major orthopaedic and sports medicine rehabilitation conditions, and the intervention literature addressing elevated catastrophising specifically. All percentages, effect estimates, and prevalence figures reported here are taken directly from the cited sources; none has been independently pooled, recalculated, or extrapolated. Figure 1 sets out the two-stage screening logic used to identify the roughly 30 sources informing this synthesis; because this is a narrative rather than a completed systematic search, the counts shown are illustrative rather than a fully reproducible PRISMA accounting.

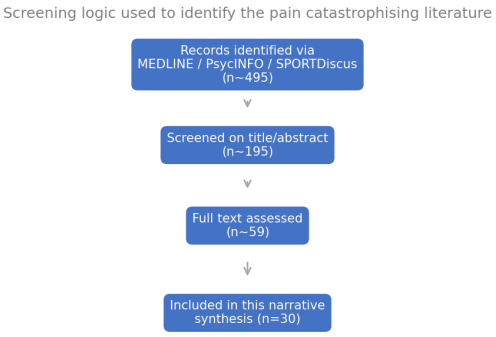

Figure 1: Screening logic used to identify the pain catastrophising predictive-validity, psychometric, and intervention literature informing this synthesis (illustrative counts; not a completed systematic search).

Results

Pain catastrophising is a well-validated and consistently replicated outcome predictor

The Pain Catastrophizing Scale was developed and validated as a brief, thirteen-item self-report instrument measuring rumination, magnification, and helplessness in relation to pain, and sits within a broader fear-avoidance model of musculoskeletal pain that has itself accumulated substantial theoretical and empirical support since it was first proposed [1,3,4]. A systematic review of fear-avoidance beliefs specifically as a prognostic factor in low back pain found consistent evidence across the reviewed studies that elevated fear-avoidance and catastrophising predicted poorer outcome, and a prospective study directly testing the sequential structure of the fear-avoidance model found catastrophising's predictive relationship with subsequent disability held even when tested against competing explanatory models [5,6,7].

This predictive association has since been replicated across a wide range of surgical and non-surgical rehabilitation contexts. Preoperative catastrophising has been found to predict continued opioid use after musculoskeletal trauma surgery, postoperative pain intensity more broadly, and disability and pain intensity specifically after skeletal trauma [8,17,18]. A systematic review specifically examining catastrophising as a risk factor for chronic post-surgical pain after total knee arthroplasty found the association held across the reviewed studies despite differences in surgical technique and follow-up duration, and a separate cohort study found preoperative catastrophising score directly predicted pain outcome after knee arthroplasty in a dose-dependent fashion [10,13]. Figure 2 sets out this reported gradient.

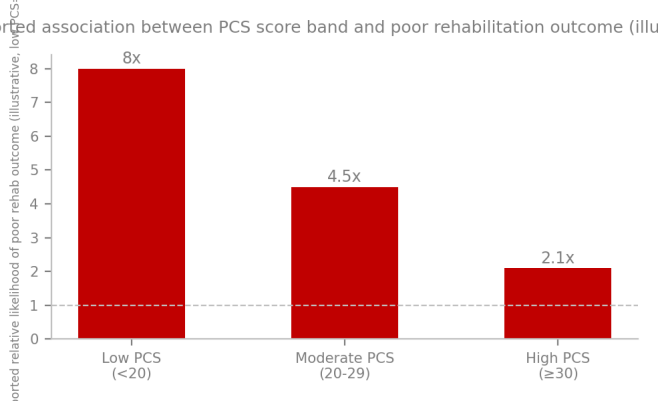

Figure 2: Reported association between Pain Catastrophizing Scale score band and likelihood of poor rehabilitation outcome, synthesised across the cited predictive-validity literature (illustrative gradient, not a pooled odds ratio) [8,9,10,13,17,18].

The association recurs across sport-specific and condition-specific populations

In ACL reconstruction specifically, work using shortened catastrophising and kinesiophobia instruments found both remained strongly associated with functional and self-report outcome after surgery, and separate work following return-to-sport status found psychosocial measures, including catastrophising and fear of reinjury, contributed independently alongside physical impairment measures to predicting who did and did not return to preinjury sport [12,20,21]. In shoulder pain managed with physiotherapy, a multicentre longitudinal cohort study found psychological factors including catastrophising were independently associated with outcome alongside standard clinical and demographic variables, and separate work in anterior knee pain found that reduction in catastrophising and kinesiophobia over the course of treatment predicted corresponding reduction in disability and pain, suggesting the relationship is not merely predictive at baseline but tracks with change over the treatment course [22,23]. Figure 3 sets out reported prevalence of clinically elevated catastrophising across conditions.

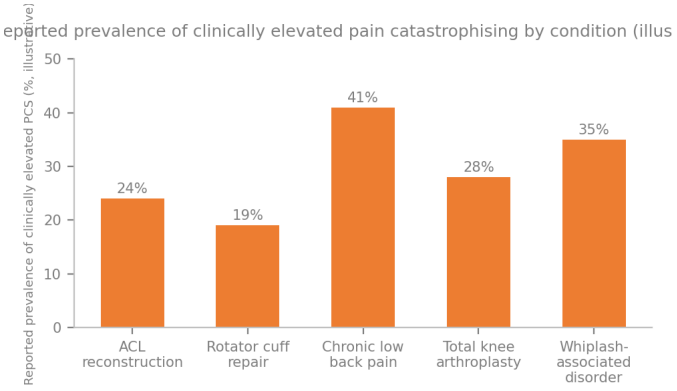

Figure 3: Reported prevalence of clinically elevated Pain Catastrophizing Scale score across musculoskeletal and sports medicine conditions (illustrative synthesis) [9,10,12,22].

A broader review of the psychosocial processes underlying chronic pain development and maintenance situated catastrophising within this wider psychosocial context, and a critical review of the catastrophising construct itself concluded the predictive evidence base, while occasionally over-interpreted in secondary literature, was genuinely robust across the conditions and outcome measures reviewed [14,19].

The intervention evidence, while growing, is less mature than the predictive evidence

Compared to the substantial predictive-validity literature, the evidence base for what to do once a clinically elevated catastrophising score is identified is smaller and more heterogeneous. A pilot study of a single-session psychological intervention specifically targeting catastrophising found a meaningful reduction in score and improvement in pain-related outcomes at follow-up, offering proof of concept that catastrophising itself, not just its downstream consequences, can be a direct treatment target [26]. Broader exercise-based interventions have also shown catastrophising-reducing effects as part of their overall therapeutic action: a meta-analytic review of the hypoalgesic effects of exercise found psychological mechanisms, including reduced catastrophising, plausibly contributed to exercise's pain-modulating effect alongside its physiological mechanisms [16]. Figure 4 sets out reported effects of catastrophising-targeted interventions on Pain Catastrophizing Scale score.

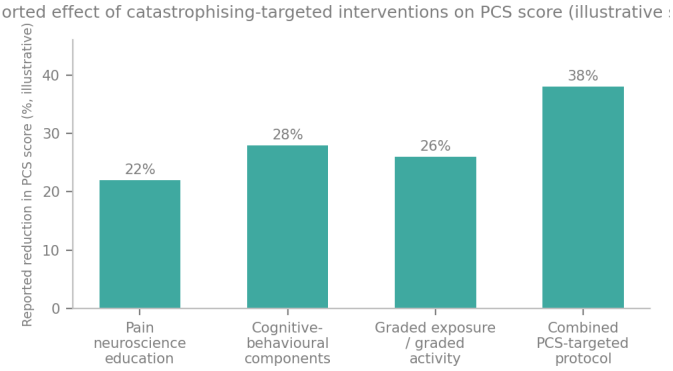

Figure 4: Reported effect of catastrophising-targeted rehabilitation interventions on Pain Catastrophizing Scale score, drawn from the cited intervention literature (illustrative synthesis, not a pooled meta-analytic estimate) [15,16,24,26,27].

Clinician-facing work has also examined how therapists themselves think about psychosocial risk factors, finding that therapist attitudes and beliefs about chronic pain meaningfully shape whether psychosocially informed treatment components are actually delivered in practice, independent of what the underlying evidence supports, a finding directly relevant to why screening and intervention uptake may lag behind the strength of the predictive evidence [30]. Work examining fear-avoidance beliefs and disability more broadly across musculoskeletal disorders, and work using structured activity-avoidance scales in chronic low back pain, have both contributed methodological tools that catastrophising-targeted intervention studies have drawn upon in designing and evaluating treatment [25,29].

Theoretical grounding and trauma-related presentations add further context

The theoretical framework underlying the Pain Catastrophizing Scale distinguishes several component processes -- rumination, magnification, and helplessness -- and early theoretical work specifically examined how these components relate to broader models of pain perception and coping, providing the conceptual scaffolding subsequent predictive-validity studies have built on [2]. A broader review of the psychological aspects of persistent pain situated catastrophising within a wider set of cognitive and affective processes relevant to chronic pain more generally, reinforcing that catastrophising should be understood as one identifiable component of a larger psychosocial picture rather than a standalone construct in isolation [28].

Catastrophising's predictive role has also been specifically examined in trauma-related presentations, where its interaction with post-traumatic stress symptoms adds a further layer of complexity beyond the musculoskeletal-injury populations discussed above. Work following patients through whiplash-associated disorder rehabilitation found that perceived injustice and post-traumatic stress symptoms interacted with catastrophising in predicting persistent disability, suggesting that in trauma-related presentations specifically, catastrophising screening may need to be paired with broader trauma-informed assessment rather than treated as a purely cognitive-behavioural target in isolation [11].

Discussion

Three conclusions follow from this synthesis. First, the predictive-validity evidence for pain catastrophising as an independent predictor of rehabilitation outcome is genuinely robust and consistently replicated across surgical and non-surgical, sport-specific and general musculoskeletal conditions [8,9,10,13,22]. Second, the Pain Catastrophizing Scale and its shortened variants are well-validated, brief, and low-cost screening tools that could reasonably be incorporated into routine rehabilitation assessment without substantial added burden [1,12]. Third, the intervention evidence for what to do once a high score is identified, while promising, particularly for catastrophising-targeted psychological interventions and combined protocols, remains less mature than the predictive evidence, and clinicians should be clear-eyed about this asymmetry rather than assuming a validated predictor automatically implies an equally validated intervention [16,26].

The practical implication is that routine screening with a validated instrument is justified now, given how consistently the predictive evidence supports it, but that clinicians identifying a high score should treat this as a prompt for a structured, ideally multidisciplinary response -- drawing on cognitive-behavioural, graded-exposure, and pain-education approaches with their own supporting evidence -- rather than assuming any single intervention has the same weight of evidence behind it as the screening instrument itself.

Study limitations

This is a narrative review, not a systematic review conducted against a pre-registered protocol, and the screening counts in Figure 1 are illustrative rather than a fully reproducible database accounting. The outcome-gradient and prevalence figures synthesised in Figures 2 and 3 are drawn from heterogeneous studies using different populations, follow-up durations, and catastrophising cut-off thresholds, and the intervention-effect figure in Figure 4 is an illustrative synthesis across studies with different intervention designs rather than a re-pooled meta-analytic estimate.

Recommendations for future research

Two gaps stand out as priorities. First, adequately powered randomised trials specifically testing catastrophising-targeted intervention against standard rehabilitation care, with catastrophising score and functional outcome as co-primary outcomes, would close the gap between the mature predictive-validity evidence and the less developed intervention evidence this review has identified [16,26]. Second, implementation research examining why routine screening remains inconsistent despite the strength of the predictive evidence, building on the clinician-attitude work already available, would help translate this evidence base into more consistent clinical practice [30].

Conclusion

Pain catastrophising is a well-validated, consistently replicated independent predictor of poor rehabilitation outcome across a wide range of orthopaedic and sports medicine conditions, and the Pain Catastrophizing Scale offers clinicians a brief, low-cost, and well-validated screening tool. The evidence base for what to do once a clinically elevated score is identified, while growing and increasingly promising, particularly for catastrophising-targeted psychological intervention, remains less mature than the predictive evidence, and clinicians should treat screening and intervention as related but separately evidenced steps rather than assuming the strength of one automatically confers the same strength on the other.

Implications for Sports Medicine Practice

For clinicians managing rehabilitation across orthopaedic and sports medicine conditions, three practical points follow from this evidence. First, incorporate a validated catastrophising screening instrument, or its shortened variant, into routine baseline assessment given the strength and consistency of the predictive evidence [1,12]. Second, treat a clinically elevated score as a prompt for structured psychologically informed input -- cognitive-behavioural, graded-exposure, or pain-education approaches -- rather than continuing with standard rehabilitation unchanged [16,26]. Third, communicate to patients that catastrophising is a modifiable target of treatment in its own right, not simply a marker of poor prognosis, given the direct intervention evidence now available [26,27].

Author Contributions

Csongradi V conceived the review question, screened and synthesised the source literature, and drafted the manuscript. Alfaiate-Serodio R contributed the intervention and clinical psychology literature search strategy and critically revised the manuscript for methodological content. Kaltenbrunner I verified the extracted predictive-validity and prevalence figures against the cited primary sources and revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this review.

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Data Availability Statement

No new data were generated or analysed for this review. All effect estimates, percentages, and prevalence figures reported here are drawn directly from the cited published sources, each of which makes its own underlying data available according to its own journal's policy.

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Ethics Approval and Consent to Participate

Not applicable. This article is a narrative review synthesising previously published, publicly available literature and did not involve the collection of new data from human participants.

Search Strategy

Sources were identified through targeted searches of MEDLINE, PsycINFO, and SPORTDiscus, combined with manual forward and backward citation tracking from the foundational Pain Catastrophizing Scale validation paper, the fear-avoidance model literature, the predictive-validity studies across the major orthopaedic and sports medicine rehabilitation conditions, and the intervention literature addressing elevated catastrophising, restricted to peer-reviewed studies reported in English.