

Psychology of pain

S. Morley*

Institute of Health Sciences, University of Leeds, 101 Clarendon Road, Leeds LS2 9LJ, UK

**E-mail: s.j.morley@leeds.ac.uk*

This article briefly reviews psychological aspects of pain, paying special attention to chronic pain. The review considers the interruptive and interference effects of pain and its impact on a person's identity. The importance of processes related to interruption, interference, and identity will vary across people and the duration of pain. Although brief phasic pain such as that presented in the laboratory will have marked interruptive effects, it is unlikely to produce interference or impact on a person's identity. Acute clinical pain will have both interruptive and interference effects, albeit of a temporary nature, but it is unlikely to have any impact on a person's identity. Chronic persistent pain or frequent recurrent episodic pain, such as headache, may have profound effects on a person's life. Each of these themes is illustrated with examples drawn from the experimental and clinical literature.

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In the clinic, the professional help of a psychologist is more often than not sought when the patient exhibits extreme distress or behaves in a way that suggests there is a marked discrepancy in their report of pain and the health professional's estimate of what they think is an appropriate level of pain. There is a substantial body of literature supporting the association of chronic pain with high levels of emotional distress, particularly depression¹ and anxiety.³⁴ Historically, attempts have been made to explain persistence of pain by recourse to constructs such as the 'pain prone personality' or as a variant of a primary psychological state such as depression.⁵⁰ Rather than review this extensive literature, this article will outline a contemporary approach to the psychology of pain that seeks to understand the experience of pain with reference to normal psychological processes. It will focus on some basic psychological processes and illustrate how they may shape a variety of responses to the presence of both acute and chronic pain. It is necessarily a rather selective review of a large literature, but it can be organized thematically: I will consider the impact of pain in three interrelated themes: interruption, interference, and identity (see Table 1 for brief definitions).^{35 43}

Interruption, interference, and identity

The importance of processes related to interruption, interference, and identity will vary across people and the duration of pain. Although brief phasic pain such as that presented in the laboratory will have marked interruptive effects, it is

unlikely to produce interference or impact on a person's identity. Acute clinical pain will have both interruptive and interference effects, albeit of a temporary nature, but it is unlikely to have any impact on a person's identity. Chronic persistent pain or frequent recurrent episodic pain, such as headache, may have profound effects on a person's life. The repeated interference with tasks that are essential to achieving various life goals and maintaining a person's status in society will impact on their sense of self, both their current self and perhaps more importantly their plans and ideas for who they might become. In general, the further removed from brief phasic pain the greater the likelihood that a person's experience of pain will be determined by factors other than the sensory intensity and primary affective qualities of the pain⁵⁵ as the opportunities increase for behavioural mechanisms to shape the experience of pain, especially those relating to learning.

Table 1 also indicates the level at which current treatments focus their attention. Treatments that attempt to eliminate or modulate the sensory intensity components of pain including pharmacological and surgical do so in the expectation that once pain intensity is controlled the consequences of pain for interference and identity will be mitigated. As most of us who work in the field of chronic pain know this assumption can be erroneous. Interventions aimed at reducing the interference function of pain, for example, physiotherapy and behavioural rehabilitation, are frequently required in tandem with medically based interventions. Until recently, little attention has been paid to therapeutic interventions that target identity. This is likely to be most important for patients with chronic pain where

Table 1 Interruption, interference, and identity. TNS, transcutaneous nerve stimulation; SCS, spinal cord stimulation

	Brief description	Treatments focused at this level
Interruption	The impact of pain on moment-to-moment attention and behaviour	Any treatment that attempts to modulate the sensory intensity component of pain, for example, pharmacological, TNS, SCS, acupuncture, hypnosis distraction/attention control methods
Interference	Failure to complete tasks effectively. Tasks may be incomplete or performed in a degraded manner which is unacceptable to the person	Treatments aimed at restoring functional capacity (physiotherapy and behavioural management)
Identity	The sense of who you are and perhaps more importantly who you might become. Limitations on future achievement of life goals	Treatments that aim to change the individual's relationship to pain and to restore a person's capacity to live according to their life values (e.g. ACT)

attempts to modulate the sensory intensity quality of pain have been unsuccessful and patients are faced with the problem of living with pain.

Pain as interruption

Painful stimuli have an unrivalled capacity to capture attention and to interrupt ongoing cognitive and behavioural activity. The brief emotional consequences of this are seen in increased ratings of negative mood, particularly frustration.⁴⁴ Attention is a fundamental psychological process that serves two functions. First, it facilitates the control of goal-directed behaviour in an environment where there may be many competing stimuli and where an individual may have multiple goals: it ensures the smooth flow of behaviour. Secondly, although it must protect the individual from responding to less important demands, the attention system must allow interruption by events that signal new more important demands that threaten the integrity and well-being of the individual. The interruptive capacity of pain has been studied extensively both in the laboratory using the primary task experimental paradigm and in clinical populations using correlational methods.

In the primary task paradigm, participants are required to engage in a task, and stimuli associated with pain are concurrently presented.¹² In the simplest task, participants may be required to respond by pressing a button to auditory signals. The experimental set-up allows the manipulation of two other features. Painful stimuli can be delivered with precision at any point in the task and the impact on the performance (response errors or delay in responding) can be observed. Secondly, additional stimuli that may or may not be contingently related to the pain stimulus can be presented. Thus, the influence of environmental cues for pain may be explored. The primary task model has enabled three critical sets of parameters to be explored.

Stimulus characteristics

Unsurprisingly, the novelty, intensity, and unpredictability of pain stimuli influence the interruptive impact of pain stimuli. Cues that predict the likelihood of intense pain are also highly interruptive. It has been argued that the central characteristic of these features is their inherent threat value.^{6 12}

Person characteristics

It is not possible experimentally to manipulate these features, but using well-defined psychometric instruments, it has been possible to demonstrate that certain characteristics such as pain-related fear,^{8 42} catastrophizing,⁷ and health-related anxiety¹⁸ enhance the interruptive consequences of painful stimuli.

Task characteristics

The functional account of attention indicates that pain, because of its threat value will interrupt most ongoing tasks. Exceptions to this will be tasks with even greater priority, for example, those relating to avoiding death, evidence for the influence of the value of primary task is therefore largely anecdotal, such as Beecher's² observations on wounded soldiers. This point is also well made by Wall.⁵⁶ In non-pain states, there is good evidence that the salience of unpleasant bodily sensations, such as fatigue, is greater and that behavioural performance is diminished in impoverished environments.⁴¹ Even when the primary task is not highly valued the degree to which it recruits cognitive resources is related to the interruptive effects of pain. Eccleston¹¹ showed that when a simple perceptual task was relatively easy, chronic pain patients with low and high levels of pain were equally able to perform it. Only when the task was at its most difficult and complex, that is, exerting the greatest demand on attention did patients with high levels of pain exhibit a demand performance. Chronic pain patients often complain of memory deficits and Grisart and colleagues^{16 17} have shown that pain interrupts memory tasks that require attentional resources

for controlled processing of material. In contrast, memory that requires automaticity is unaffected by pain.

Pain as interference

Interference is most likely when pain is chronic when it presents problems to individuals who have to adjust to living with it. A major point to bear in mind is that pain is substantially more than a sensory experience with (usually) a strong spatial discriminative element and a deeply unpleasant affective quality. The aversive nature of pain endows it with powerful reinforcing properties which, when made contingent on a response, act as punisher, the effect of which is to suppress the behaviour. Pain also elicits a range of behavioural responses, for example, facial displays,⁵⁸ postural adjustments, and use of aids,²³ which are observable by others and elicits a variety of responses from them. These responses range from expressions of compassion, sympathy, and behavioural attempts to mitigate the pain to ignoring the person and indifference.¹⁵ The essential feature is that the public expression of pain means that it is subject to environmental, especially social, influences as a result of which the person's behaviour in response to pain is shaped and modified by the environment.¹³ The interference effect of pain on behaviour is therefore not simply a function of the severity of the pain *per se*. The following two examples illustrate different aspects of this.

Spouse solicitousness and behavioural performance

Figure 1 illustrates the influence of the presence of others on both overt behavioural performance and pain report. This study involved chronic pain patients and their partners.²⁹ Pain patients (chronic back pain) were asked to

participate twice on a treadmill test (5 km h^{-1}) in which they were asked to walk until they felt like stopping due to pain or fatigue. On one occasion, their partner was present, whereas on the other occasion they were absent. The data (from Table 4, p.78 of Lousberg and colleagues)²⁹ show the time in seconds spent walking (Fig. 1A) and the pain report on a visual analogue scale (Fig. 1B). It is clear that the presence or absence of the partner makes a difference to both the time spent walking and the patient's report of pain and that the differences are a function of the reported style of interaction between the patient and their partner. Solicitous partners are characterized as being relatively more attentive to their partner's pain state and will act to alleviate their behavioural activity by, for example, taking over household chores. It is hypothesized that under these conditions patients will have learned that the presence of their partner signals the availability of support and that in turn they may 'under perform' on behavioural tasks. Similarly, it is argued that expressions of pain are reinforced by the solicitous partner, and this is reflected in the increased level of pain.

Fear avoidance mechanisms and chronic pain

The fear avoidance model examined a different set of cognitive behavioural processes that influence the relationship between pain experience and behavioural performance or lack of performance. A key component of this is the meaning that a person might place on the experience of pain.⁵¹ If pain is interpreted as a signal of impending harm and danger, then activities which give rise to pain will be feared and the person will tend to avoid engaging in these activities. Persistent avoidance of activities is hypothesized to lead to disuse and acquired disability. The mechanisms underpinning the fear avoidance model as elaborated in pain are exactly the same as that used to understand fears and phobias. Although pain may give rise to many fears about the future,³⁵ the fear avoidance model has been explicitly applied to pain that signals fear of (re) injury. Typically, this is associated with fears of movement that might give rise to injury: a patient may literally fear that their spinal column will break and they will be left paralysed if they engage in particular movements. The fear avoidance model clearly articulates that the relationship between the experience of pain and behavioural activity is mediated by expectation of harm and the anticipation of catastrophic consequences if certain actions are carried out. The behavioural pattern is sustained by sustained avoidance of activity, which is a function of the fear rather than the pain *per se*. Many components of the fear avoidance model have been validated—see Leeuw and colleagues²⁶ for a recent review—and the model has led to a precise and well-validated treatment in which patients are asked to perform the feared activities in a graded manner. Preliminary evidence supports the efficacy of this approach.^{27 53 59}

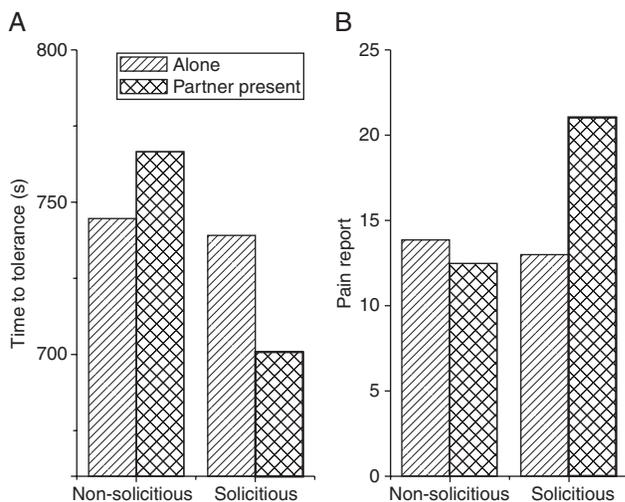


Fig 1 The effect of the presence and absence of a partner on walking performance on a treadmill (A) and ratings of pain (B). See text for commentary and Lousberg and colleagues.²⁹

Pain as a threat to identity

The impact of chronic pain on a person's humanity and sense of self has long been represented in art and literature.⁴⁷ This is a difficult and complex area and it is only recently that social scientists have begun to explore the topic using systematic and replicable methodologies. Qualitative methods have been used to explore patients' experiences of living with chronic pain.^{14 19–21 25 28 30 31 45}

These studies capture patients' conversations about their experiences using semi-structured interviews to ensure that an appropriate range of experiences is obtained. The resulting material is systematically scrutinized using one of several possible methods such as Grounded Theory⁴ or Interpretive Phenomenological Analysis.⁴⁰ These methods vary somewhat in their aims and objectives, but the resultant data are usually summarized as a set of themes with supporting quotations from participants. At present, there is no meta-synthesis of these studies, but consistent themes do emerge and their salient features will be recognized by clinicians who have listened to their patients.

Personal themes

Unsurprisingly, a theme representing the impact of pain on the patient's sense of their body frequently emerges. The content of this varies somewhat but frequently refers to a sense of alienation from the body, that is, the experience that their body is not what they had expected and anticipated for this stage of their development. This is sometimes captured with a phrase such as I am 'old before my time', reflecting slowness, difficulty of movement, and the use of prosthetics. The theme of the self in relation to developmental time emerges in several analyses with a strong sense of disruption to natural lifespan development. Patients may feel as if they have been 'thrown forward' in time—so 45-yr-old patients may report that they feel and act as if they are 70 (but without the privileges of age or the experience of the intervening 25 yr, but with a sense of loss of the intervening 25 yr). This temporal shift is represented as references to experiences of dislocation, disruption, and decline. Paradoxically, patients may also experience a sense of 'suspended identity'⁴⁵ in which they consider that the 'real' them is suspended at an earlier time point, usually before the onset of chronicity. One implication of this is that they use this point of time as a reference for setting goals of recovery. These may be entirely inappropriate with reference to their actual age.

Future possible selves in chronic pain

Another recurrent theme is the feeling of entrapment by the pain (the trapped self). This has been investigated using quantitative methods. For example, we have recently used theories and methods developed by social psychologists to investigate the relationship between pain and entrapment (also called enmeshment)⁴³ of aspects of the

self. Contemporary psychological theory has explored the self in a number of ways, all of which recognize multiple facets of the self. For example, self-discrepancy theory (SDT) considers three aspects of the self: the actual-self (what I am now), ideal-self (what I would like to be), and ought-self (what I think I ought to be). Discrepancies between the actual and other selves have two properties. First, they generate characteristic feeling states proportional to the magnitude of the discrepancy. An actual-ideal discrepancy generates emotions of dejection/depression whereas actual-ought discrepancies generate feelings of agitation/anxiety. Secondly, the discrepancies act as guides, directing behaviour to reduce the discrepancy.²² One would expect chronic pain patients to be subject to the same phenomenon, and indeed there is evidence for this.⁵⁷ The self-pain enmeshment model suggests that in addition to discrepancy, the extent to which aspects of the self are trapped by pain will also be related to emotional experience. In two studies, we asked chronic pain patients to provide descriptions of their actual-self and what they hope to become (the hoped-for self: this is very similar to the ideal self).^{39 48} As predicted by SDT, the magnitude of discrepancy between the actual and hoped-for selves is associated with depression, even after statistical adjustment for differences in patients characteristics, pain, and disability measures. Both of our studies also showed that the degree to which a person regarded themselves as trapped by pain was also statistically predictive of depression. In our second study,⁴⁸ we also showed that if a highly valued aspect of the self is trapped by pain, this was associated with greater emotional distress. Thus, in patients who valued their personal autonomy enmeshment of characteristics representing autonomy led to greater distress at lower level of enmeshment. A similar finding was observed for patients who valued social interaction: if characteristics representing the social aspects of their self were enmeshed, they were more distressed at a lower level of enmeshment. These findings were quite specific for each valued motivational state (autonomy and sociotropy).

Persistent attempts to solve the problem of pain

The problem faced by a patient whose future is blocked by persistent pain is considerable. In our studies, we explicitly asked participants whether they thought they could achieve their hoped-for futures with the continued presence of pain. One would expect that those answering 'no' would be expected to invest time in trying to solve the problem of pain. For many, this will be an unsolvable problem, and relentless pursuit of this goal may have profound emotional and personal consequences. Faced with failure in their attempt, they will persist with the same strategy; this can be observed when patients engage in 'doctor shopping' resulting in multiple medical interventions with the attendant increasing risks of iatrogenic

complications.^{9 10} Repeated failure heightens the sense of frustration and distress and anger towards health professionals. This approach to problem solving has been called assimilative coping.³ The alternative problem solving strategy 'accommodative coping' involves a subtle but significant shift in a person's orientation towards the problem of continuing pain. Here, the person relinquishes the pain relief as their primary goal and begins to consider alternative ways of achieving their hoped-for futures, by either developing new aspects of their hoped-for selves that match their values or finding new ways in which they can express their hoped-for self.

Acceptance of pain and acceptance and commitment therapy

The challenge chronic pain presents to the person's sense of identity—their sense of self—is considerable and can have profound consequences, especially when a technological fix is either not available or simply not successful. A contemporary development in psychological therapy explicitly recognizes this. Acceptance and commitment therapy (ACT) aims to help patients learn new ways to live with pain.³³ The term acceptance can be misleading: it does not mean 'putting up with it'. ACT 'focuses on acceptance of thoughts and feelings that have been occasions for unhelpful responses in the past. Acceptance methods are combined with work on personal values, behavioural commitments, and traditional behaviour change strategies to help patients live a fuller life'.³² Acceptance therefore aims to help the sufferer disengage from old, ineffective ways of solving the problem of pain and to begin to construct a valued life with the continued presence of pain: it aims to 'decentre' the position of pain in the person's sense of self. In the two studies of hoped-for selves, a measure of acceptance was strongly related to lower levels of pain-self enmeshment.^{39 48}

The social impact of chronic pain on identity

Qualitative studies also reveal the impact that pain has on the social components of a person's identity—the way they construe their relationship to others—and how they present themselves in social contexts.^{5 25} Several themes consistently emerge, one of which is the challenge of 'negotiating the invisibility of chronic pain'. The presence of a symptom that is essentially unseen by others presents pain sufferers with the problem of being believed; of having to give an account of their behaviour that may appear to others to vary for inexplicable and invisible reasons. Chronic pain patients may expend considerable effort in avoiding displaying pain behaviour in an attempt to sustain an appearance of normality to others and to preserve their own sense of efficacy and social competence. Within the family and their close social groups, the need to avoid being seen as a burden appears to be a strong

motivation for concealment. It is, however, clear that the social contexts in which sufferers find themselves is important, insofar that there are some settings where displays of pain behaviour and reports of pain are not inhibited, for example, hospital and clinical settings.^{15 37}

Conclusions

Pain is a complex psychological phenomenon and this review has only touched briefly on some of its facets. I have tried to show that psychological influences are pervasive and shape a person's response to pain whether it is a brief phasic experimental pain or more persistent chronic pain. Psychological interventions reflect this complexity. Treatments for chronic pain are generally multimodal and include elements that specifically address the interruption and interference components. Techniques for helping patients manage their attentional system are widely used in cognitive behavioural programmes^{38 49} and programmes nearly always incorporate components of behavioural activation and operant reinforcement principles to help patients change the relationship between pain and activity (addressing the interference component).^{24 46} More recently, the focus has been to develop better specified treatments to focus on specific subgroups of patients with, for example, marked problems of fear avoidance.^{52 54} The evidence for the efficacy of psychological treatments is supported by many randomized controlled trials.³⁶

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