

In Review

# New Developments in the Psychological Management of Chronic Pain

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Nous célébrons 60 ans

After reviewing how psychological treatment for chronic pain comes to have its current form, and summarizing treatment effectiveness, we explore several areas of development. We describe third wave therapies, such as mindfulness; we discuss what the research literature aggregated can tell us about what trials are more useful to conduct; and we outline some areas of promise and some failures to deliver on promise. The article is drawn together using the framework of the normal psychology of pain, identifying some of its most important implications for improving life for people with chronic pain.



## Nouveaux développements de la prise en charge psychologique de la douleur chronique

Après avoir étudié comment le traitement psychologique de la douleur chronique en est venu à sa forme actuelle, et résumé l'efficacité des traitements, nous explorons plusieurs domaines du développement. Nous décrivons les thérapies de troisième vague comme la pleine conscience, nous discutons de ce que peut nous apprendre la littérature de recherche regroupée à propos des essais les plus utiles à mener, nous présentons des domaines prometteurs et d'autres qui n'ont pas tenu leur promesse. La structure de l'article est le cadre de la psychologie normale de la douleur, qui identifie certaines des implications les plus importantes pour améliorer la vie des personnes souffrant de douleur chronique.

Psychological treatments for chronic pain have been in continuous development since the 1960s, broadly parallel to changes in mainstream psychological treatments, especially within the ambit of CBT. There are several conceptual threads that can be discerned in the current state.<sup>1</sup>

### Behavioural

Behavioural methods apply operant learning theory to the analysis of pain. The primary objective is to modify a range of pain-related behaviours, such as activity, medication use, and social interactions, by changing environmental contingencies and the settings in which pain-related behaviour occurs. The cardinal feature of the original behavioural approach was that it explicitly eschewed direct attempts to modify the sensory-intensity component of the pain experience.<sup>2</sup>

### Cognitive

Cognitive components were added to treatment protocols during the 1970s, starting with the application of Meichenbaum's stress inoculation training (see Turk et al<sup>3</sup>),

where the focus was on teaching people with pain to modify their responses to it by changing their appraisal and response options through self-instruction. Perhaps the most systematic application of this approach has been Keefe's Coping Skills Training protocol (see Keefe et al<sup>4</sup>), incorporating aspects of Fordyce's behavioural model<sup>5</sup> and insights from Beck's cognitive therapy (see Beck et al<sup>6</sup>); detection of automatic thoughts, classification of thinking (overgeneralizing), and behavioural experiments to test specific predictions about the relation between thoughts, behaviour, and pain.<sup>7</sup> By 2000, it was clear that there was no single definitive cognitive-behavioural protocol, and treatment programs usually comprised multiple components (Table 1). Nevertheless, behavioural methods continue to develop, notably a highly specific form of graded exposure in vivo to threatening pain-related movements. This treatment was developed by Vlaeyen (see Vlaeyen et al<sup>8</sup>) following initial work by Philips<sup>9,10</sup> and others. It is derived from learning theory to treat pain-related behaviour that is governed by fear and avoidance contingencies.

## Third Wave Treatments

In addition to the 2 main strands in CBT, psychologists working in chronic pain have developed what have become collectively known as third wave treatments, the wave referring to the philosophy of the treatment. The 2 developments most researched in chronic pain are ACT and mindfulness.<sup>11</sup> ACT is rooted in a radical-behaviourist analysis of the function of language and supported by psychological science. By contrast, mindfulness is based in millennia of Buddhist practice. It was initially used to treat chronic pain by Kabat-Zinn in the 1980s<sup>12</sup> but was only disseminated later after its introduction in adult mental health,<sup>13</sup> particularly depression. In addition, the application of related traditional medicine methods, such as Qigong,<sup>14</sup> yoga,<sup>15</sup> and variants of mindfulness,<sup>16</sup> have been provided with rationales reworked to map onto contemporary psychological thinking.

## Summary

Although one can find examples of stand-alone treatments, such as graded exposure, most treatment protocols blend several CBT components. While the intention may be to boost the active ingredients in treatment, the truth is that we have little evidence to support the merits of one combination of components over another. Thus it is not uncommon to find a clinical program with multiple components: pacing (operant), graded exercise, mindfulness meditation, and coping skills. As a consequence, there are many complex interventions, but the inclusion of particular components is not always well explained, thus we have no standardized and agreed protocols.

## Evidence of Effectiveness

There are several meta-analyses of psychological interventions for chronic pain.<sup>17–27</sup> They reveal that CBT has a beneficial effect for the average patient, on a broad range of outcomes. Table 2 lists the outcome domains typically used. In the first substantive meta-analysis,<sup>22</sup> CBT was more effective than no-treatment or TAU, with a median Cohen *d* ES of around 0.5. In later analyses, CBT remained superior to no-treatment or TAU, but the magnitude of *d* was diminished to around 0.2,<sup>23</sup> similar to the estimates obtained in other meta-analyses for mixed chronic pain, low back pain,<sup>21</sup> fibromyalgia,<sup>19,24,28,29</sup> and arthritis.<sup>30</sup> While these data are encouraging, it is salutary to note that a between-group Cohen *d* ES of 0.2 means that the average person in the treated group is at the 58th percentile of the untreated group, or the 69th percentile when the ES equals 0.5. As most trials report statistical rather than clinical significance, estimating the true clinical effectiveness of treatment in a user-friendly manner is problematic.

## Abbreviations

ACT	acceptance and commitment therapy
CBT	cognitive-behavioural therapy
ES	effect size
TAU	treatment as usual

## Highlights

- Psychological treatments for chronic pain are well established and there is good evidence for their effectiveness, but there are significant challenges to be met if the field of psychological treatment for chronic pain is to advance.
- These challenges include the following: enhancing the overall magnitude of the treatment effect; identifying the effects of the different components of the complex intervention by studying them individually; improving measurement; and developing agreed on clinically appropriate criteria for assessing therapeutic gain.
- Implementing treatment using rapidly developing information technology remains promising but robust evidence of its clinical utility is not yet available.
- After 50 years of treatment development, we suggest that reconsideration and reconceptualizing of a psychology of chronic pain that highlights normal processes would be beneficial.

Why does it appear that treatments have become less effective in the last 40 years? There is no single reason, but we offer some explanations as to why the research data have led to this conclusion. More rigorous meta-analyses either remove or appropriately weight trials that are likely to be biased. For example, early trials, with very small samples, may be excluded a priori from analysis or their influence diminished by many larger, appropriately powered trials. There is also evidence that more recently designed trials are of better quality. Scales for assessing design quality of complex interventions that cannot be double blind<sup>31</sup> indicate an improvement in controlling various biases, such as blinding of assessors, better randomization, better data analysis protocols, and equivalence of treatment expectations.

In a recent revision of a meta-analysis (see Williams et al<sup>23</sup>) and a subsequent review (see Morley et al<sup>32</sup>), we raised concern that the apparent reduction in the effectiveness of CBT treatments may also be influenced by reduction in both the amount of treatment given and the skill level of therapists. Pressure on service delivery is such that the driving force to disseminate an apparently effective treatment has been greater than our knowledge of the factors that determine the effective delivery. Although it is clear that there are differences between therapists in their effectiveness,<sup>33</sup> as Ehde et al<sup>34</sup> note, “The degree to which the training, experience and interpersonal qualities of the CBT interventionist, affect CBT outcomes is unclear.”<sup>35</sup>

Related to the issue of therapist competence is the real possibility that many current implementations of CBT may be relatively weak. As noted earlier, there is significant variation in the content, duration, and format of treatments delivered under the rubric of CBT, and many authors provide only brief details of interventions. This situation is in marked contrast to the early behavioural model in which specific interventions were designed to obtain specific

**Table 1 Some of the components of cognitive behavioural treatment of chronic pain**

Education	Teaching about pain and the importance of psychological and behavioural factors is essential as part of a program's strategy to engage patients.
Goal setting	This may encompass targeting particular areas for all patients, for example, work or domestic duties, to individualized and iterative goal setting.
Relaxation and (or) biofeedback	These may be taught using a single technique, such as diaphragmatic breathing or progressive muscular relaxation or a set of different techniques to be applied across different settings.
Graded activity, exercise and fitness training, and activity pacing	This may range from written or verbal advice on posture, body mechanics, ergonomics, and recommended exercise routines through to specific exercises and techniques targeted at movement and exercise integrated with the patient's physical strength and deficits and with their personal goals.
Operant principles	This requires a detailed functional analysis of the problem to identify the antecedents, for example, presence of others, type of social interaction, and place, where the behaviour is most likely to occur, and the identification of likely reinforcers.
Behavioural experiments	These are an integral part of mainstream cognitive therapy and the main vehicle for producing cognitive and behavioural change. Behavioural experiments are developed to test an individual's beliefs about the consequences (emotional, behavioural, and cognitive) of either engaging or not engaging in particular behaviours.
Attention management	At the simplest level this consists of provision of advice on one or more methods, such as the use of distraction or imagery control techniques. Experiential methods should be used to teach the techniques.
Cognitive restructuring	This includes various methods aimed at changing both content and process of thinking.
Problem solving	This involves identification of the problem, generation of a range of possible solutions, prioritizing among those solutions according to opportunities, resources, and risks, and then attempting them.
Generalization and maintenance strategies	A thorough program will pay attention to generalizing treatment gains and developing maintenance strategies.

behavioural outcomes: increasing activity; increasing well behaviour, such as return to work; and decreasing health care use.<sup>2</sup> This allowed researchers to specify and measure, with some precision, both the intervention and behavioural changes that should be observed as treatment is implemented; the link between treatment process and outcome was under constant scrutiny. The same precision is also observed in graded exposure treatment derived from the fear-avoidance model.<sup>8</sup> The conduct of behavioural experiments lies at the heart of effective CBT, and at the centre of this approach is a careful analysis of the individual and specific interventions designed to modify particular cognitive appraisals, behaviour, and emotional responses. Does the contemporary treatment of chronic pain follow this protocol? Changing behaviour is difficult, especially when it involves increased pain, albeit for a limited period. We suggest that more attention should be given to documenting effects of various components<sup>35</sup> that comprise CBT rather than simply adding components to existing packages.

Finally, might measurement imprecision and methodology mislead us on the effectiveness of treatments for chronic pain? Paradoxically using highly reliable well-developed scales (sometimes developed for other purposes, for example, Short Form-36) may limit sensitivity to detect changes. In scale development, items are excluded on psychometric grounds rather than relevance, thus an individual is scaled with reference to the inherent variability in the scale, not by performance in their unique behavioural world. While this allows us to measure differences in common items, it is insensitive to difference in meaningful behaviour within an individual across settings and (or) time; both are important in evaluating treatment. For the most part, scales do not sample the function of the behaviour or the context in which it occurs or its effectiveness in relation to goals. Most often, items sample frequency of the behaviour in relative terms, sacrificing precision for psychometric gain.

The second issue in evaluating treatment effectiveness is the nature of the criterion used for success. Most scales used in trials and in clinical settings are continuously distributed; change is evaluated by mean differences, whose significance is judged by statistical criteria, a *P* value or an ES, dependent on sample parameters (for example, *n*, variance, and mean difference). There is nothing inherent in this approach that relates the evaluation to meaningful clinical criteria.<sup>36</sup> Clinical criteria can be derived from continuous measures<sup>37,38</sup> but are rarely used in studies of psychological treatments for chronic pain.<sup>32</sup> Thus we still do not know what proportion of people will make a meaningful clinical gain as a result of treatment, only that some will.

In summary, there are 2 significant challenges for future research: first, to improve the overall magnitude of treatment gain, and, second, to develop an agreed measurement protocol that is based on clinical and not just statistical criteria. The work of the IMMPACT (Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials)<sup>39</sup> group has made significant progress in this area.

**Table 2 Outcome domains and sample measures used in randomized controlled trials**

Domain	Sample measures
Coping and cognitive appraisal	Cognitive strategies and appraisals used to manage pain; Coping Strategies Questionnaire; general and specific self-efficacy or catastrophizing scales; Chronic Pain Acceptance Questionnaire
Disability	Activities of daily living; impact on health and lifestyle; Arthritis Impact Measurement Scale; Oswestry Disability Index; Sickness Impact Profile; activities of daily living and physical disability subscales
Mood	Depression, anxiety, and other states; Hospital Anxiety and Depression Scale; Beck Anxiety Inventory; Beck Depression; anger scales
Pain behaviour or activity	Behavioural acts associated with pain, including walking distance; Pain Behaviour checklist; direct observation of pain behaviours; number of medications and visits to health care professionals
Pain experience	Ratings of pain intensity, sensation, and unpleasantness; Brief Pain Inventory; relevant subscales of McGill Pain Rating Index; numerical, verbal, or visual analogue pain rating scales
Physiology or fitness	Assessments of biological functioning and physical fitness
Social role functioning	Assessments of the ability of the person to function in various social roles, including familial, leisure, and employment

### What Drives the Development of Treatment?

Historically, psychological treatments have been delivered primarily in specialist care to a highly disabled subsample of patients. Over the years, forms of treatment have been disseminated to primary care and to occupational environments; incorporated into treatments based in other disciplines (for example, physiotherapy<sup>40,41</sup>); and applied as a secondary prevention strategy.<sup>42</sup> What has driven the proliferation of treatments and what does it signify? Disregarding therapist whim and fashions in therapy, answering these questions may help us direct research in the future. Is it that each new development has incrementally improved the effectiveness of treatment or engaged a section of the treatment population previously untouched by treatment? That is certainly a commonly expressed belief. Has the change in treatment content meant that more patient groups can be helped? The pessimistic answer to these questions is, probably not. The preceding précis of meta-analysis suggests that there is little evidence of incremental improvement in efficacy, quite the reverse. The drive to make treatment briefer, cheaper, and better is likely to founder on at least one of these aims in achieving the others.

Our guess is that future trials will be driven by 2 main features. First, funders, often branches of government responsible for health services research, will commission new trials to test the efficacy of CBT or other treatments in various forms, for a range of disorders. This thinking is grounded in the model of testing drug therapies and is wedded to the dominance of a diagnostic framework essentially based on biological characteristics of the phenomenon: location, pain characteristics, presumed cause (nociceptive, compared with neurogenic), risk factors, and comorbidities. This is apparent in various proposals for classifying pain conditions.<sup>43–45</sup> We suspect that we will continue to see trials of specific protocols, delivery formats, diagnostic groups, and outcomes. If we express this as a general question, Are treatment protocols X, Y, and Z effective for disorders A, B, and C for outcomes P, Q, R, and S?—it is apparent that

there are many combinations of Treatment × Disorder × Outcome. This approach is facilitated by the sophisticated plug-in-and-play health services research methodology in which large trials of high-quality and sophisticated analyses are performed. Considering the need for replication, the evolving and changing nature of diagnosis and the poor previous track record of demonstrating superiority of a treatment when pitched against a genuine well-matched comparator, this strategy is financially unsustainable, irrespective of its debatable scientific rationale. This position is analogous to an analysis of psychotherapy research some 25 years ago.<sup>46</sup> Nevertheless, we suspect that the funding ecosystem will sustain the present strategy of clinical research for the foreseeable future. Undoubtedly, patients will benefit from it. The questions are as follows: Will enough of them gain adequate benefit? And, could those funds be spent to greater benefit? We suspect that the answer to the latter question is, probably, yes.

The second impetus for further trials is that no therapeutic modality yet has had a definitive answer for chronic pain and the limitations of our current psychological (see comments, *supra*) and pharmacological approaches are evident.<sup>47</sup> Quite understandably, people remain open to new treatments and treatment variations that promise the reduction or elimination of pain or address the distress associated with chronic pain, for example, the applications of Qigong<sup>14</sup> and loving-kindness meditation.<sup>16</sup> Such interventions are often driven by enthusiasts and represented by small trials from which it is hard to generalize with any confidence. In response to suffering, patients and therapists will continue to look for solutions.

### Self-Management

Resources to help and support people with chronic pain fall several orders of magnitude short of the numbers of people with chronic pain. This has led to both honest and opportunist use of self-management terminology to persuade funders to invest in programs designed to enable patients to become more independent in managing their pain and, in particular,

to draw less on health service resources. Nevertheless, the self-management offered incorporates everything from extensive CBT or other therapeutic interventions as described above, to supportive patient-led groups with minimal evidence that they improve function or even mood; there are many varieties in between. Ideally, self-management is effectively an outcome of any successful treatment, whether surgical, pharmacotherapeutic, or rehabilitative. It may be conceptualized as incorporating

- 1) personalized explanation of pain and prognosis, so that the patient better understands what pain does and does not mean;
- 2) a plan for dealing with exacerbations of pain and knowing when to re-consult;
- 3) a plan for return towards more normal or desired activities by gradual, steady increments;
- 4) when appropriate, plans to bolster current support networks at home, work, or elsewhere; and
- 5) plans for analgesic maintenance or reduction.

The aim should be to improve pain experience where possible, but with quality of life—incorporating distress and disability—as the major outcome. It is clear that interventions that fall short of this are unlikely to offer patients much, and most unlikely to reduce health care use.

### **Likely Developments and Challenges**

CBT is, for the most part, the de facto treatment framework for a wide range of disorders the most extensively researched in recent decades. There is no reason why it cannot be effectively applied to a wide variety of populations. The changes that occur in chronic pain to the entire central nervous system and brain do not differentiate in any way between, for instance, the individual with diagnosed osteoarthritis or the individual with joint pain but no X-ray findings, nor between the individual with celiac disease and another with irritable bowel syndrome.<sup>48</sup> Although much research and clinical effort have focused on adults of working age with chronic pain, CBT has been applied to help children<sup>18,49</sup> and older adults,<sup>50</sup> and to those with pain at the end of life.<sup>51–54</sup> We suspect that clinicians and researchers will continue to apply the general principles of CBT to a wide range of pain-related disorders. We suggest several specific areas that are particularly challenging.

### ***Personalizing or Tailoring Treatment***

There are far fewer attempts to tailor treatment than there are published exhortations to do so,<sup>55</sup> but evidence for improved outcomes is still lacking. Recent trials<sup>56,57</sup> are disappointing, with significant issues relating to the accurate pretreatment profiling required.<sup>58</sup> In some trials, individual preference was used rather than individual need, but the 2 may not correspond.<sup>59</sup> As with dismantling trials, unless component–outcome relations are assumed to be specific and unique, which the evidence demonstrates is not so, these studies will not enable us to better suit treatment to patients.

### ***Implementing Technology***

The development of technology-assisted programs includes sophisticated interactive telephone-based systems to enhance the generalization of treatment gains over time,<sup>60,61</sup> Internet-delivered treatment protocols<sup>62–64</sup> (in which the Internet is used to provide the treatment material, under supervision, to a preselected targeted group), and well-curated websites<sup>65</sup> that provide structured self-help treatment modules based on CBT. More recently, the widespread dissemination of mobile phones with efficient Internet connectivity permits the collection of clinical data cost-effectively and in real time. Currently, such applications do little more than collect, integrate, and display data, assuming that the information is useful to the individual, clinician, or both, but evidence for clinical utility is lacking.<sup>66–68</sup> Applications that can simulate interaction with a therapist are in development.

Undoubtedly, the next generation of people with chronic pain will be much more familiar and comfortable using information technology, especially mobile and social media, as coaches and sources of help. This raises complex issues of how to provide high-quality content that is delivered in a timely manner and in a way that engages and motivates and supports behavioural change. At present, this appears to be merely promissory.

### ***Management of Iatrogenic Problems***

The issue of the use of opioids in the management of noncancer pain remains a challenge. In Canada, the National Opioid Use Guideline Group<sup>69,70</sup> has developed the Canadian Guideline for Safe and Effective Use of Opioids for Chronic Non-Cancer Pain to assist with appropriate use of opioids in patients whom physicians think may benefit from an opioid trial. Opioids are associated with physiological dependence and, in people at risk, may also be associated with substance misuse as evidenced in rising overdose figures<sup>71</sup>; this, combined with increasing appreciation of long-term risks, particularly hyperalgesia and endocrine problems,<sup>72,73</sup> means that if there is an absence of demonstrable benefit in pain or function in a particular patient, they should be encouraged to reduce or discontinue the opioid. While this would ideally be done with support and supervision, and while building alternative skills in pain management,<sup>74</sup> many treatment programs exclude opioid users, or accept them but do not address opioid reduction as a goal.<sup>75</sup> That is a regrettable gap in provision, as addiction services are rarely able to provide the combined drug withdrawal and pain management that patients need.<sup>76</sup>

### ***Trauma-Related Pain***

People with chronic pain from military veteran or civilian populations may have posttraumatic stress symptoms from accidents or assaults. These symptoms may include complex patterns of avoidance and distress that need to be addressed alongside pain management, but there are few published accounts of such work.

## Language and Culture

Face-to-face therapy requires a common language or an interpreter; technology-based programs are more easily delivered in multiple languages. But problems go beyond language, in that cultural norms may conceptualize pain entirely as a medical problem to be subjected to specialist treatments, while the associated suffering is in the private domain, shared only with close family. We need to improve our explanations of psychologically informed models of pain and pain management, and to increase low rates of take-up of services in certain ethnic groups.

## Rethinking Pain From a Psychological Perspective

Perhaps the biggest challenge is how to conceptualize chronic pain in a way that advances the development of treatment effectiveness. In contrast with recent attempts to systematize by advancing diagnostic classification,<sup>45</sup> we suspect that the development of a psychology of pain based on a thorough understanding of a normal process would be more beneficial. What Eccleston<sup>77</sup> has called the normal psychology of pain seeks to understand how the experience of pain impacts on normal processes and the subsequent range of adaptations people make as a result of the challenges that arise. Examples of developing this approach is work on attention and memory<sup>78–80</sup> and social interaction.<sup>81,82</sup> Morley<sup>83</sup> suggested that the various processes can be encompassed within 3 broad categories: the relatively interruptive consequences of pain (attention processes); interference, the impact of pain on the behavioural performance of tasks and roles; and the challenge that pain presents to maintaining and developing personal and social identity.<sup>84</sup>

This approach focuses on understanding process rather than the aggregation of symptoms into diagnostic descriptive categories. Therefore, it identifies the anxiety and distress associated with pain not as comorbidities but common outcomes of worry, frustration, losses of roles and pleasures, and fears about the future. The project of developing a normal psychology of pain has various implications of relevance here. One is that distress and psychological disturbance is understood first in the context of the meaning of pain for the individual, not in psychiatric or characterological terms. It alerts us to the role of the researcher or clinician as observer, and to his or her moral and cultural biases (for example, see Encandela<sup>85</sup>). It is entirely consistent with the rapidly expanding field of neuroscience, in which excitatory pain pathways become active, and inhibitory pathways are quiet, in the presence of anxiety,<sup>86</sup> depression,<sup>87</sup> threat,<sup>88</sup> and catastrophic thoughts about pain,<sup>89</sup> and the opposite happens as people with pain learn to regain control by various methods, such as CBT or mindfulness.<sup>90</sup> This opens up the possibility that, in future, rather than aiming to use psychological methods only to rehabilitate people despite ongoing pain, we will start to target their pain as well.

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