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Sullivan, M. D., & Vowles, K. E. (2017). Patient action: As means and end for chronic pain care. *Pain*, 158(8), 1405-1407. <https://doi.org/10.1097/j.pain.0000000000000921>

**Published in:**  
Pain

**Document Version:**  
Peer reviewed version

**Queen's University Belfast - Research Portal:**  
[Link to publication record in Queen's University Belfast Research Portal](#)

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Please cite as: Sullivan, M. D., & Vowles, K. E. (2017). Patient action: As a means and end for chronic pain care. *Pain*, 158, 1405-1407.

Topical Review

Patient action: as means and end for chronic pain care

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Number of text pages: 7

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### Introduction: the limitations of approaching chronic pain as a sensorimotor problem

Historically, pain has been understood as a sensory problem. Even the IASP defines pain as “an unpleasant sensory and emotional experience...” This aversive sensory experience then prompts a protective motor response, which may include reflexive withdrawal, splinting and resting of the painful body part, and avoidance of activities that may increase pain. This sensory understanding of pain implies that the pain experience must be reduced to reduce motor reactions.

However, a simple linear interpretation of the relationship between sensory and motor components of chronic pain is inadequate. For example, Butera et al recently argued that “...early theories on the relationship between pain and movement largely described reflexive and uniform motor responses to a painful stimulus.... More recent theories and research suggest a dynamic relationship— motor responses to pain are variable within and between individuals. Protective pain responses may vary based on the context, such as the pain location, state of chronicity, or type of activity.”[4] Finding the proper understanding of the relationship between the sensory and motor components of chronic pain is important because physical therapies addressing only the motor component have achieved modest and variable effects. [15] No specific exercises are most effective for specific pain problems.[23] The positive effects of aerobic exercise and muscle strengthening have often been shown to be mediated by reduced catastrophizing and increased self-efficacy rather than increased fitness, strength, or re-conditioning.

To explain the effect of pain on motor function we must look beyond sensation. This argument is not a new one – for example, Fordyce offered an operant behavioral analysis of pain behavior, arguing that not only the antecedents (eg., injury, nociception), but the consequences (e.g., attention, compensation) of pain behavior are important determinants of subsequent suffering and disability.[24] These behavioral insights justified an effort to restore

patient action as a means to reduce the impact of chronic pain in chronic pain rehabilitation programs, but have not justified making restoring patient action the primary goal of chronic pain care. Fordyce has often been misquoted as saying “people who have something better to do don’t hurt as much”, but what he actually wrote was that “people who have something better to do don’t suffer as much.”[10] In the difference between these quotes lies the issue we are trying to highlight. Fordyce’s therapeutic focus was on reducing pain behavior, suffering and disability. He never claimed to reduce pain through operant treatment, which is one reason his approach to pain in the workplace was so controversial.[11; 26] In this paper, we argue that chronic pain encompasses both experience and behavior and that changing patient action in the presence of pain is both an essential means and essential end for chronic pain care.

## 2. Patient action as a means in chronic pain care

The importance of self-management of chronic pain has been noted in the US Institute of Medicine 2011 report, *Relieving Pain in America*, which states, “Self-management is almost always the first step in a person’s journey to relieving pain, and is one that is returned to repeatedly.”[17] Under the Prevention and Care section of the US National Pain Strategy issued in 2016, objective #2 is to develop nation-wide pain self-management programs[33]: “Despite evidence to support team-based, pain self-management programs for pain, their implementation has lagged, which represents an unmet opportunity to provide people with pain the appropriate skills, education, and resources to play an active role in managing their pain.” Self-management programs aim to improve function and quality of life, so these programs emphasize improved participation in meaningful activity *with pain*. Social and physical activation are used as an active tool within treatment to facilitate improvement in these same areas outside of treatment. In contrast to analgesics and some procedures that pursue change in pain first, rehabilitation pursues adaptive changes in physical and emotional functioning first.

In order to achieve patient activation, rehabilitative programs draw upon behavioral theories. For example, Cognitive Behavior Therapy posits that unhelpful pain avoidance behaviors will be reduced if dysfunctional or illogical cognitions are altered.[31] Behavioral Activation, initially used to treat depression, posits that responses to aversive experiences will become more adaptive if one is more engaged in naturally rewarding activities and less engaged in avoiding aversive experiences.[8; 9] Acceptance and Commitment Therapy posits that responses to pain will become more effective as they aim towards a desired outcome or engagement in desired and meaningful activity.[25] Although many patients and providers hope that rehabilitation will achieve pain reduction, rehabilitation does not necessarily include efforts to decrease pain, nor does it appear necessary that pain decrease for rehabilitation to be successful.[35]

#### Patient action as an end in itself in chronic pain care

The burden of chronic pain for the person with pain goes beyond sensory experience to the inability to function in important areas of life. Assessment and treatment guidelines for chronic pain commonly aim for not only pain reduction but improved physical function. [28][30] But the role of this “physical function” in chronic pain problems and its relationship to experienced pain is not clear: how does pain cause deficits in purposive action?, and how does purposive action shape pain experience? At the most fundamental level, we need to ask: is chronic pain primarily a sensory problem (e.g., experience of an aversive sensation) or equally a motor problem (e.g., an inhibition of purposive action)?[16]

Some hints about the importance of patient action in chronic pain pathogenesis and treatment can be found in literature about: 1) the role of fear-avoidance beliefs in chronic pain and how to extinguish them, 2) the role of movement in the treatment of complex regional pain syndrome (CPRS), 3) the failure of opioid therapy to promote rehabilitation among injured

workers, 4) revising the notion of the brain pain matrix from one that encodes pain intensity to one that encodes the salience of multisensory input in terms of the threat it poses to survival.

For over 30 years, the Fear-Avoidance Model (FAM) has been used to explain the development and persistence of disabling pain.[5; 22; 34] While doubts have been expressed recently about the exact sequence and direction of the relationships proposed among pain catastrophizing, avoidance, disuse and disability[37], there is broad cross-sectional and longitudinal support for the model itself.[19; 32; 38] Laboratory and clinical studies have suggested that reducing avoidance behaviors through voluntary movement that addresses patient fears is the most effective means to extinguish fear-avoidance beliefs and related disability.[27]

Complex Regional Pain Syndrome (CRPS) is an exquisitely painful disorder, that involves a loss of sensory-motor integration with a distorted body representation and a learned neglect and disuse of affected limbs.[2] Although pharmacological and psychological treatment of CRPS is recommended in treatment guidelines, it appears to be effective only in so far as it promotes use of the affected limb for intentional action. Expert panels have called for “making functional restoration the pivotal treatment algorithm in the management of CRPS, around which all other treatments, such as psychotherapy, drugs, and interventions, revolve.”[13; 14] Movement representation techniques such as graded motor imagery and mirror therapy also appear to be effective in so far as they promote intentional use of the affected body part. [6; 29]

Clinicians have hoped that reducing the pain experienced by injured workers with opioid therapy would promote activity, rehabilitation, and return to work. Unfortunately, multiple prospective cohort studies have demonstrated that early opioid therapy *decreases* the likelihood of an injured worker with back pain returning to work.[12] A national study of early opioid therapy that adjusted for injury severity, demographic characteristics, and job tenure, found an

opioid dose-related increase in the duration of job disability.[36] These studies prompted the authors of a recent review to conclude, “It may be that opioids worsen outcomes—for example, by promoting physical deactivation and apathetic mood.”[7] Even if opioids lower pain levels, the deactivating property of opioids appear to produce a net negative effect on the course of chronic pain.

Further evidence for the importance of patient action in chronic pain comes from recent research suggesting that what was formerly called the “pain matrix” of brain centers active in pain perception are more properly considered a multisensory “salience network” that is activated by events that threaten the body’s integrity, regardless of the sensory modality. This salience network is activated by not only nociceptive stimuli but also non-nociceptive stimuli that provide the context within which the salience or relevance of nociception to organismic survival is determined. The activity in this brain network is not a simple representation of pain intensity, but of pain salience.

This is a new understanding, not only of the role of the brain in pain experience, but of the nature of pain itself. As Borsook et al state, “pain is not a purely sensory experience.”[3] Legrain et al explain “...what has been previously labeled as the “pain matrix” would no longer constitute a sensory-specific cortical network, but, instead, it would constitute an action-specific cortical network, representing the activity by which the individual is able to identify and respond adequately to an immediate threat.”[20] They summarize the broad implications of this new understanding: “Under the assumption that this (salience) network acts as a defensive system signaling potentially damaging threats for the body, **emphasis is no longer on the quality of the sensation elicited by noxious stimuli but on the action prompted by the occurrence of potential threats**”[20] (emphasis added). In this salience-focused approach, the purpose of the network is not to produce a sensation of some specific intensity, but to produce effective threat-defusing action.

Each of these examples supports the argument that changing patient action in the presence of pain is a viable end goal for chronic pain treatment. Contrary to the expectation of many patients and providers, pain intensity is often the last component of pain that improves in successful chronic pain treatment.[35] The highly fearful individual engages with the feared stimulus in a flexible and persistent manner; the CRPS patient makes use of the affected limb intentionally and in a purposive manner; the injured worker decreases opioid use to effectively re-engage with occupational activities; and activation of the salience network may decrease as new options for effective action are discovered and enacted.

### Conclusion

Expanding opportunities for purposive action by patients may be potent means for altering pain salience and enhancing effective response to it. Pain intensity certainly helps determine pain salience, but pain salience also helps determine pain intensity.[18] It is not true that the sensory aspects of pain invariably precede and determine the motor aspects of pain. The repertoire of actions available to a patient help determine pain salience and therefore pain intensity, as well as pain-related disability and suffering.[21] Now we have a theory and a mechanism to allow us to advance beyond Fordyce's original assertion about suffering to an assertion about pain itself: "People who have something better to do don't hurt as much."

Therefore, patient action can serve as the goal for chronic pain care and not simply as the means by which other goals are achieved. Patient action does not simply occur in the face of pain of specific intensity, but this action may itself reduce pain salience and the pain-related disruption of the patient's life. By making the patient's investment in life stronger and by directing our treatment efforts towards the facilitation of this investment, we can make the disruptive effect of pain weaker. When patient action is the central goal of treatment, clinical interactions and interventions are directed at the restoration of patients' capacity to define and

achieve life goals through action. Providers need to elicit and promote patients' life goals, as they provide the energy for patient action and are the proper goal for treatment. Penney Cowan and the American Chronic Pain Association identify one of the crucial challenges in chronic pain management as "making the journey from patient to person." [1] Restoring the capacity for meaningful action is what transforms someone with chronic pain from a patient into a person.

### Acknowledgements

We thank John Loeser and David Tauben for review of an earlier draft of this manuscript. Dr. Sullivan has consulted with Chrono Therapeutics concerning testing of an opioid taper device. Dr. Vowles reports no conflicts of interest.

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