

Comment

## Clinical, Theoretical and Conceptual Issues in Chronic Pain and Their Application in a Hypnosis Practice

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Hypnosis interventions consistently produce significant decreases in pain associated with a variety of chronic-pain problems [1], while neurophysiological studies have shown that specific hypnotic suggestions have clear effects on the brain and spinal cord functioning [2, 3]. Thus, it is useful for clinicians who practise hypnotherapy to understand pain paradigms.

### 1. Theories and Conceptual Models of Pain

Pain is a complex phenomenon and several authorities have proposed theories to help explain how pain is experienced. Many of these theories of pain were initially based on biomedical conceptualisations of pain. Moayedi and Davis [4] identified several of the influential biomedical models in the literature, such as Specificity Theory, Intensity Theory and Pattern Theory. In their paper, Moayedi and Davis [4] described each of the theories, working from the current definition of pain outlined by the International Association for the Study of Pain (IASP) which describes pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of tissue damage, or both.” The authors cautioned that while each



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of the theoretical frameworks contributes to the understanding of the physiological basis of pain, none yet accounts for a full explanation of pain perception.

## **2. Biomedical Models of Pain**

The Specificity Theory suggests there is a specific pathway in the nervous system to communicate messages about pain and that these pathways carry signals via specific pain receptors in the periphery and spinal cord to the sensory region of the brain [5]. However, several researchers have pointed out that this model assumes a direct link between tissue damage and pain experience, yet the experience of pain does not provide a reliable indication of the presence of tissue damage. Phantom limb pain is an example of this – pain can be perceived as being within the missing limb, yet the limb is no longer present. Indeed, it is not uncommon for people reporting pain not to have evidence of there being damage to that part of the body. Similarly, the presence of tissue damage is not always associated with the presence of pain.

Another biomedical theory described by Moayedi and Davis is the Intensity Theory of Pain [4]. This theory evolved from experiments which involved tactile stimulation, below the threshold for tactile perception, being repeated between 60 and 600 times in patients who quickly reported the pain as being unbearable. These findings led a conclusion that some type of summation of stimuli must be occurring for subthreshold stimuli to become very painful and that pain was an emotion which occurred when a stimulus was stronger than normal, as opposed to pain being a unique sensory experience [4]. The Intensity Theory as it is understood today, developed from these earlier theories that weak stimuli produce non-painful sensations while strong stimuli trigger a greater activation of nerve fibres resulting in pain. No differentiation of variations in response to different stimuli was made by the proponents of this theory, thus, all stimuli were considered to have the same effect on neural activity. This theory considered stimulus intensity and central summation to be the critical determinants of pain [6]. The Intensity model, like the specificity model was concerned with acute pain and did not address persistent pain or chronification of pain, which may as Moayedi and Davis explained [4], be due to the belief at this time that the nervous system was 'hard wired'. Furthermore, when different patterns of neural activity were identified in response to different stimulus modalities, for example, mechanical, chemical and thermal the Intensity Theory lost support [7]. At the very beginning of the 20th century it was determined that there were two classes of somatic sensory pathways subserving discriminating sensations such as touch and pressure and crude sensations such as pain and the Pattern Theory emerged [7].

The Pattern Theory was based on the belief that signals travelling along large diameter nerve fibres may inhibit signals being carried by thinner pain fibres and thereby were able to modify pain intensity. However, the theory assumed the presence of tissue damage and as Chen pointed out [7], the Pattern Theory has been found to be 'a great simplification for the central nervous system or even plainly wrong for the organization of the peripheral input to the spinal cord' (p.347). Other aspects of the theory such as the dorsal horn organisation of presynaptic links between A and C fibres have also been shown to be incorrect [7].

These early biomedical theories of pain suggested that pain arose specifically from a physiological anomaly or pathology. However, modern conceptualisations of pain recognise that pain experience is more complex and is influenced by psychological (affective, cognitive, behavioural) and social factors, leading to the adoption of biopsychosocial models of pain.

### **3. The Biopsychosocial Model of Pain**

The current IASP definition of pain can be considered to reflect a biopsychosocial model. This conceptualisation of pain has implications for how pain is treated, meaning that due consideration in treatment be given to addressing the psychological and social factors in addition to addressing the physiological factors.

The earliest biopsychosocial theory of pain was the Gate Control Theory by Melzack and Wall [8]. The GCT proposed that there is a 'gate' in the dorsal horn of the spinal cord which closes and opens in response to different factors. When the gate is 'open' pain messages are permitted to travel to the brain while when the gate is 'closed' pain messages are inhibited from reaching the brain. The concept includes the notion that there is a flow of information both to and from the brain so that the brain also has the ability to 'open' and 'close' the gating mechanism. Three types of sensory nerves have been identified as being involved in transmission of noxious stimuli, namely a-Beta fibres, a-Delta fibres and C fibres. Of interest from a psychological perspective, the Gate Control Theory suggested that mood and thoughts had an impact on whether the 'gate' remained open or closed. It incorporated the notion of sensory-discriminative, motivational-affective and cognitive-evaluative factors [8].

While the GCT is one of the more comprehensive models of pain perception, it has been shown to have limitations, for example, no actual 'gating mechanism' has yet been identified [9]. The GCT reflects the current IASP conceptualisation of pain by as having an emotional component and referring to both 'actual' and 'potential' tissue damage.

Moseley [10] argued that clinical approaches to the treatment of pain require consideration of somatic, psychological and social factors. Moseley pointed out that (1) the presence of pain does not provide an assessment of the state of the tissues (2) that biological, somatic, psychological, and social factors modulate pain (3) that when pain is persistent, the relationship between the perception of pain and the condition of the tissues becomes less clear and (4) that pain can partially be interpreted as being dependent on the degree to which there is a perception of threat to the body tissues. Moseley explained that attention, anxiety and expectation of pain seem to be underpinned by a shared context, that is, the meaning of pain. This, he stated, has been demonstrated by studies investigating pain catastrophizing (a particular way of thinking about pain). He noted that higher catastrophic interpretations of pain were associated with higher pain ratings.

If we then apply the biopsychosocial model of pain to the application of hypnosis in the treatment of pain, hypnotherapists can develop a more systematic approach. Virtually all of the brain areas involved in the processing of pain have been shown to be impacted by hypnosis and hypnotic analgesia [11]. Jensen et al. outlined four key areas which an experienced therapist who wishes to obtain optimal results with their pain patients/clients should include in their treatment approach [11]. These include managing outcome expectancies and inspiring a level of hope, developing a positive rapport, encouraging motivation and creating a 'hypnotic environment' for the treatment.

Given the complexity of pain, before using hypnosis with pain patients/clients it is essential to first develop a detailed understanding of the way in which pain affects their life socially, personally, professionally and physically. Words and suggestions delivered in an hypnotic state are more powerful in alleviating pain than those delivered in the normal waking state as illustrated in a

study by Nusbaum et al. [12]. The researchers examined the parts of the brain that were activated by analgesic suggestions in trance and in a state of normal alertness. The cognitive network was activated in those who were not hypnotized while the emotional network was activated in those who were in a state of trance. In this same study, it was observed that in a state of trance, both direct and indirect suggestions are effective in alleviating pain. An example of a direct analgesic suggestion would be 'your shoulder feels numb'. Metaphors are good examples of indirect suggestions. Similarly, simple phrases which refer to a benefit which occurs as the result of an increased level of comfort, for example, 'You find it easier now to do more work every day'. In a randomized controlled trial [13], examined the efficacy of hypnosis delivered online for migraine sufferers and used a combination of direct and indirect suggestions in the mp3s. There was a 48% decrease in headache disability and a 60% decrease in pain catastrophizing in the treatment group who listened to the mp3s three times a week over a period of ten weeks.

Given that all areas of the brain involved in the processing of pain have been shown to be influenced by hypnotic suggestions, and that there is copious evidence to support the efficacy of hypnosis in the treatment of a variety of chronic and acute pain conditions, there is scope to introduce hypnosis as a mainstream treatment option for pain patients.

Biopsychosocial models emphasise the important contribution of psychological processes in the physical experience of pain. Arising from a greater understanding of how psychological processes influence pain perception, theoretical models have emerged that aim to explain how pain-related disability develops and indicating potential targets for psychological intervention. One such model that has received a good deal of attention is the Fear-Avoidance Model [14].

#### **4. Fear Avoidance (FA) Model of Pain**

The FA model of pain is a cognitive behavioural account of how patients develop chronic musculoskeletal pain as a consequence of avoiding activity [15]. The FA model explains how avoidant behaviour is useful when a patient injury is still healing but becomes counter productive in the context of a chronic pain condition because reduced physical activity leads to physical deconditioning and this in turn leads to more pain when activity is undertaken. Increased pain leads to hypervigilance and increased fear of movement and activity, leading to worsening disability. The FA model has been used to explain the transition of acute pain to chronic pain.

A meta-analysis conducted by Zale, Lange, Fields and Ditre synthesised the findings of 41 studies and found a positive relation between pain-related fear and disability which was moderate to large in magnitude [16]. The authors suggested the findings indicate that pain-related fear may be considered an important risk factor for pain-related disability with related implications for the treatments designed to treat pain.

While the fear avoidance model literature has focused on musculoskeletal pain, the key constructs of catastrophizing and pain-related fear which underlie the contemporary fear avoidance model have also been investigated in the migraine literature [17]. One study by Black, Fulwiler and Smitherman [18], which examined fear of pain (FOP) in headache patients looked at how FOP differed between headache sufferers and those who do not suffer with headaches. They defined FOP as the fear of physical movement because of its assumed threat of pain. Like FA, FOP, they affirmed, has the ability to restrict physical ability and can lead to over-prediction of pain. Black et al. examined FOP differences across headache categories, the degree to which FOP could

predict headache severity, frequency and disability and also whether FOP had an effect on the relationship between pain severity and headache disability [18]. They found that FOP was higher in migraineurs than in individuals with tension type headache (TTH) and that FOP partially mediated the relationship between pain severity and disability. They concluded by stating that knowledge of FOP and its various associations could have a therapeutic benefit in decreasing disability and improving functioning.

While the pain paradigm continues to evolve, hypnotherapists can benefit from a current comprehension of how pain models have developed more recently to include psychological and social factors. An understanding of these theories will empower clinicians practicing hypnotherapy to tailor suggestions specifically to their pain patients so that optimal results are achievable.

### **Author Contributions**

Niamh Flynn is the author of this paper.

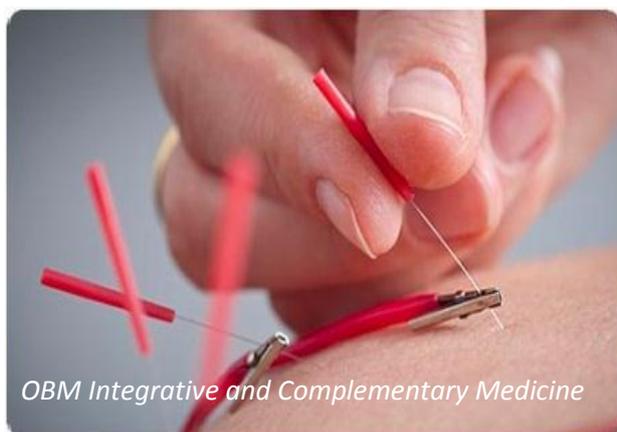
### **Competing Interests**

The authors have declared that no competing interests exist.

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