

The Effect of Pain Neuroscience Education on Fear-Avoidance Behaviours in Chronic Pain Populations

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What is pain?

'An unpleasant sensory and emotional experience associated with actual or potential tissue damage' – IASP (1994)

- A reaction to danger signals received from sensors throughout the body.
- These nociceptive stimuli can be mechanical, temperature or chemical.
- Pain is highly subjective – also influenced by emotions and past experiences.
- Pain can be a useful adaptive response to protect the body and promote healing.

Acute or chronic?

Chronic pain = pain that persists beyond the normal tissue healing time of 3 months.

Increased sensitivity of the nervous system leads to longer-lasting, maladaptive changes:

- **Hyperalgesia** – where noxious stimuli cause higher levels of pain
- **Allodynia** – where a usually non-noxious stimulus such as light touch may become painful
- Areas unrelated to the original site of damage may become involved
- Pain experience persists despite initial injury having healed

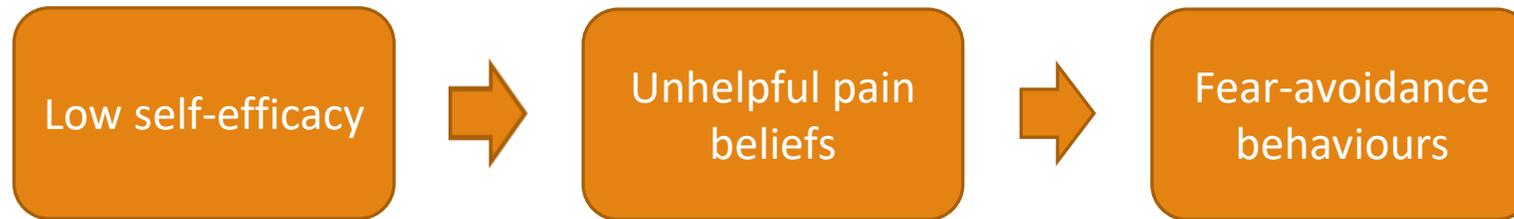
Repeated nociceptive stimulation can cause these changes to become more permanent within the central nervous system.

Risk factors

- socioeconomic background
- employment status
- health-related behaviours
- clinical factors – acute pain, multimorbidity, mental health, genetics
- personal attitudes and beliefs
- passive coping strategies e.g. taking medication
- low pain self-efficacy

Links to fear avoidance

Self-efficacy acts as a mediator between pain and disability.



Beliefs:

- Catastrophizing about pain-provoking situations
- Pain is causing further tissue damage

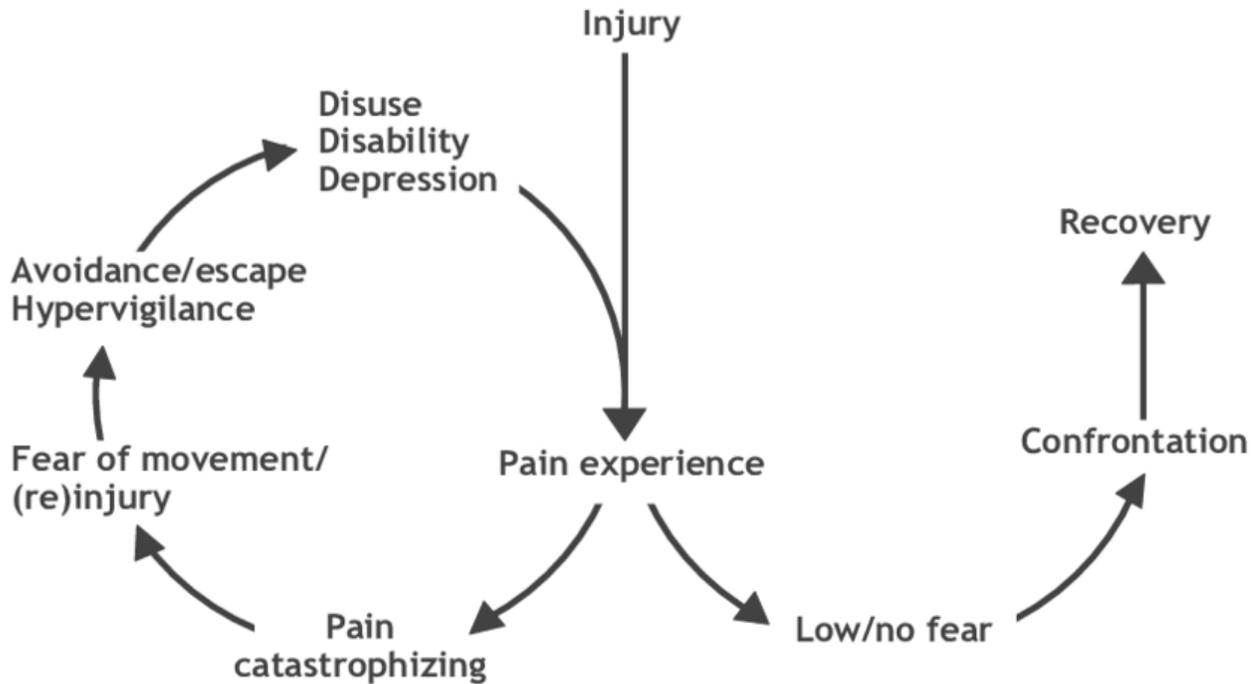
Behaviours:

- Kinesiophobia
- Hypervigilance

Downward spiral → reduced physical activity, deconditioning, lowered mood, increased pain-related disability.

Result is a worsened pain experience, less participation and reduced quality of life.

Vlaeyen's Fear Avoidance Model of Pain



- Incorporates physical, psychological and social components
- Fear is made worse by catastrophizing
- Fear can be reduced by confrontation
- Potential area of intervention – support people to avoid negative spiral of fear avoidance and pain by improving understanding

(Vlaeyen and Linton, 2000)

Measuring fear avoidance

Tampa Scale of Kinesiophobia (TSK)

Fear-Avoidance Beliefs Questionnaire (FABQ)

- Neither relates fear avoidance to fear of pain specifically

The Fear-Avoidance Components Scale (FACS):

- More recently developed to address this shortcoming
- Clinically relevant levels to support assessment and treatment of fear avoidance and disability

Important to measure fear avoidance as a potential area for intervention.

Scales can be used as outcome measures to show improvements.

Previous chronic pain treatments

Often passive, focus on physical structures:

- joint manipulation
- acupuncture
- general exercise
- pharmacology

Small effect sizes

Neglect important aspects of chronic pain conditions:

- including pain cognition, behaviours and understanding

Biomedical approach

Current guidelines

Recommend multimodal approach to management.

*Person-centred approach improves the chance of successful outcomes and the patient experience
– SIGN (2019)*

- Multidisciplinary pain management programmes
- Psychological intervention
- Other forms of physical therapy
- Potential pharmacological treatment
- Education (though currently limited clinically significant evidence to support improvements in pain intensity and disability)

(NICE, 2021; SIGN, 2019)

Pain Neuroscience Education

Cognition-based education intervention.

Particularly important for fear-avoidant populations.

Focuses on **neurophysiology** and **neurobiology** of pain along with contextual factors.

Aims to help patients view their pain as less threatening and develop more effective management strategies.

Differs from previous educational approaches using biomechanical models to explain pain

- E.g. the back school approach – links pain to pathology
- Fails to address psychosocial aspects of pain

Differs from other psychological therapies

- Cognitive Behavioural Therapy – focuses on coping with the emotional response to pain
- Motivational Interviewing – communicative approach encouraging patients to change behaviours, provides info and support
- Both are widely accepted chronic pain interventions – potential for PNE to be used in conjunction effectively

“Explaining Pain”

First described by Moseley (2002) in a study investigating the effects of combined physiotherapy and education on lower back pain.

Further investigated by Moseley *et al.* (2004) by isolating the neurophysiology component of education.

Content of the education sessions in this study was based on knowledge of pain neurophysiology from Wall and Melzack’s *Textbook of Pain*.

Led to development of more robust, structured intervention known as PNE.

The book *Explain Pain* was written by Butler and Moseley as a resource for both clinicians and patients.



Butler & Moseley (2013)

PNE content

- pain neurophysiology
- nociception and nociceptive pathways
- neurons
- synapses
- action potential
- spinal inhibition and facilitation
- peripheral sensitisation
- central sensitisation
- neuroplasticity

No reference to anatomic models

Little discussion of emotional or behavioural aspects

Some studies report using content from *Explain Pain* to direct sessions

PNE using metaphors to help patients understand the pain process and reconceptualise their pain

! Common misconception – an individual’s pain is “all in their head”

! Reassure patients that their experience of pain is real, even though the risk of tissue damage is not

Benefits of PNE

Addresses inaccurate knowledge and improve understanding of pain

- → strong links to reduced fear-avoidance beliefs and behaviours (catastrophizing, kinesiophobia...)
- Less clear re. pain and pain-related disability

Targeting beliefs has potential to influence behaviours.

PNE does not focus on pain reduction directly

- May occur following increased participation in other pain-influencing activities...

Main focus on improvements to **quality of life**.

Reductions in disability more significant over medium compared to short-term:

- Patients may take time to change their behaviour
- Engage more successfully with meaningful activities as they get better at managing their symptoms

Improved acceptance of active treatments that promote recovery.

Effectiveness – PNE alone

Varying results from studies of PNE as standalone intervention:

- Some suggest improvements to pain-related disability, others found no clinical significance.
- Benefits limited to altered beliefs and understanding, some improvements to participation.

PNE alone is not harmful, potentially leads to:

- Improved knowledge and understanding
- Reductions in catastrophizing and kinesiophobia
- Improved participation

All are beneficial for someone showing maladaptive behaviours due to their pain experience.

“Explaining pain” was not initially intended as a standalone treatment.

- clinically significant reductions in pain and disability when combined with other biopsychosocial treatments.

Effectiveness – combined intervention

PNE and Cognition-targeted motor control training:

- Superior to traditional back and neck education and general exercise therapy
- Improves pain cognition and function, reduces pain

PNE and Motivational Interviewing:

- Provide complementary components to education sessions (potentially improves outcomes)
- Strong base to progress to more active pain management strategies

PNE and traditional physiotherapy:

- Superior to physiotherapy alone at reducing pain and pain-related disability
- Uncertain if it is more effective than combined CBT and physiotherapy

In line with current best-practice guidance for multimodal management.

May indicate important role for physiotherapists – professionals with both knowledge of pain neurophysiology and movement-based approach to interventions.

Delivery of PNE

Effective delivery is important! But varied evidence-base for best method of delivery...

Comparison of two studies of PNE based on “Explain Pain”

- Benefits for pain and disability when delivered face-to-face
- Largely ineffective when only written material

Contrasting study found that using a metaphor-based storybook as an educational tool improved pain catastrophizing and could be an effective precursor to active rehabilitation.

Suggests written material can be useful but presentation is important:

- A book of metaphors explaining pain concepts is more engaging than a book providing behavioural advice

One suggested process – initial education session, homework with an educational booklet, then a second follow-up session to consolidate and begin exploring more active patient management.

Literature also describes group and individual delivery format

- Little evidence for one being superior
- Often used in combination

Readiness of the individual

Effectiveness of PNE can be influenced by how ready an individual is to

1. receive and accept the information
2. change their beliefs or behaviours as a result

The **transtheoretical model of behaviour change** can describe this process of changing maladaptive behaviours.

Those in different stages may respond better to different interventions.

Determining where a patient lies in this model can help direct their treatment to what is most appropriate and useful for them.



Transtheoretical model of behaviour change

Future potential

Clear links between chronic pain, fear-avoidance beliefs and behaviours and pain-related disability.

Stronger evidence is emerging to support the use of PNE.

Areas for future research:

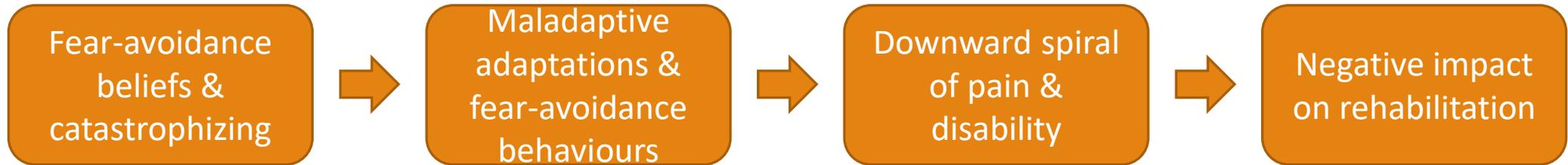
- Most effective delivery processes of PNE – currently little evidence to support individual vs group approach.
- Evaluate blended learning approach to PNE delivery (incorporating online and face-to-face learning) including benefits to time and cost-effectiveness.
- Determine long-term effectiveness, whether benefits of intervention are retained, and factors that influence this.
- Compare PNE combined with other interventions to guide development of optimal interventions and dosage.

Integrate current and emerging research into current guidelines.

Conclusions

Chronic pain is widespread, complex and significantly impacts quality of life.

Influenced by a range of biopsychosocial factors, can lead to:



Interventions must target fear avoidance and misconceptions about pain.

PNE does so by explaining pain mechanisms to improve understanding and relating to the individual.

Further PNE research is needed to determine most effective approaches.

PNE has potential as a successful intervention to approach chronic pain management.

Thank You

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