Smooth Talker: Nonthreatening PRI Patient Education
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I. **Objectives**
   a. Explore modern pain neurobiology
   b. Compare/contrast biomechanical vs. biopsychosocial educational constructs
   c. Implement a nonthreatening educational model

II. **Pain Models**
   a. Cartesian – pain is a sensation produced by tissue pathology[1-2]
      i. Does not explain
         1. Phantom limb pain
         2. Emotional pain
         3. Pain persisting past normal healing times

   b. Modern – Pain is a multiple system output activated by the brain based on perceived threat.[3]
      i. Components

         1. Inputs – Tissues and environment
         2. Processing – Brain samples itself and inputs to determine course of action
         3. Output = result of input + processing
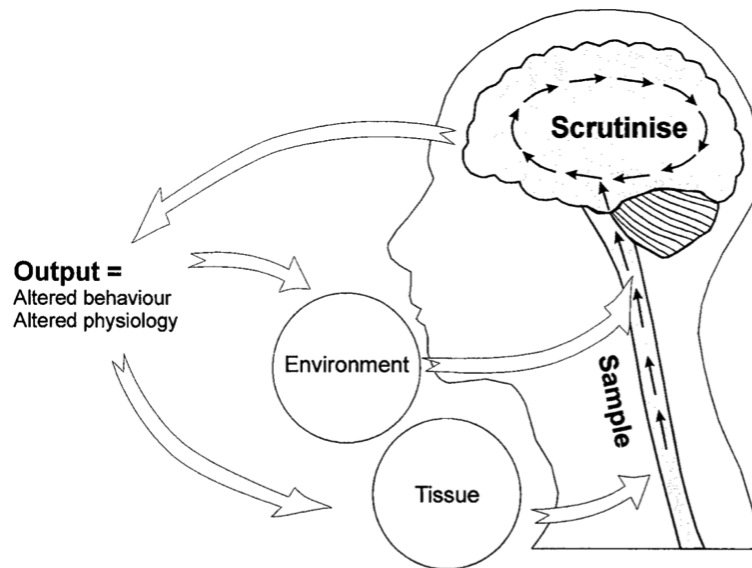

Figure 1 - Cartesian Pain Model

Figure 2 - Mature Organism Model

      ii. Pain Classifications[3]

1. Nociception – Sensory information about noxious stimuli in tissues[1]
    a. Pain proportionate to anatomical nature.[4]
    b. Neither necessary nor sufficient for pain.

2. Peripheral Neuropathic – Pain secondary to issue in peripheral nervous system.[5]
    a. Nociceptors in neural connective tissue and adjacent nerves sensitized.
    b. Ectopic impulses (AIGS).
    c. Matches dermatome/cutaneous nerve.

3. Central Sensitization – amplification of neural signaling within CNS.[6]
    a. 4 types[7]
        i. Input = output (typical injury)
        ii. Input > output (athlete who keeps playing)
        iii. Input < output (Allodynia)
        iv. Input <<<<output (fibromyalgia, CRPS)
    b. Does not fit a common pattern.
    c. Strong association with maladaptive psychosocial factors.[8]

iii. Multi-system output for pain neuromatrix
    1. Multiple brain areas.[9]
    2. Immune system
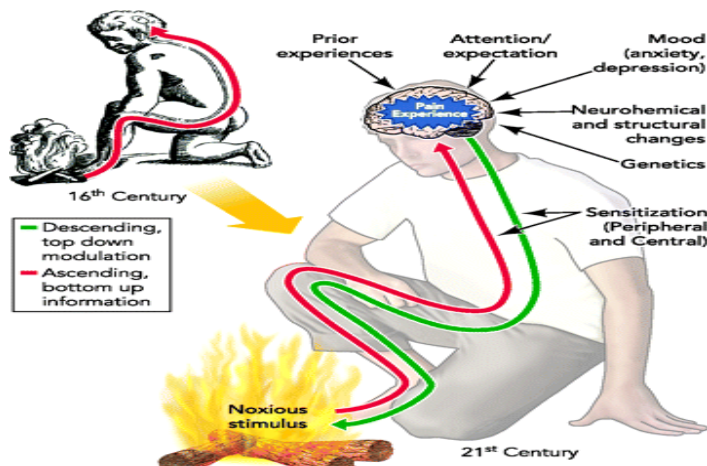   3. HPA
    4. ANS
    5. Motor system
    6. Etc.[3]

Figure 3 - Pain neuromatrix

c. Threat Matrix [1, 10]

i. Manages all actual and potential threats to tissues and environment.
ii. Various outputs produced to combat threat.
iii. Responds to salient (i.e. novel) inputs that change body-spatial representations.[11]
iv. Treatments must redirect attention first, rebuild new strategies second, and then take over the world third.
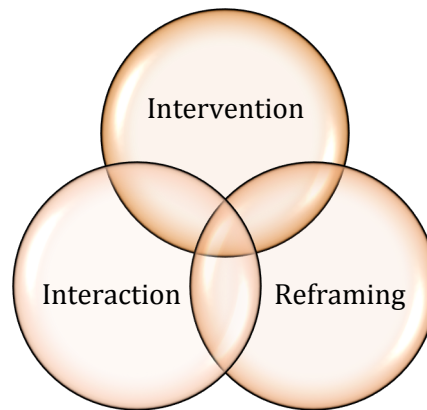
III. Therapeutic Inputs

Figure 4 - Therapeutic Inputs Model

a. Intervention – Input through tissue-based receptors.
   i. Physical therapy
   ii. Exercise
   iii. Biomedical interventions

b. Interaction – Input through environmental change.
   i. Clinic setup
   ii. (Non)verbal communication
   iii. Changing one's environment

c. Reframing – Input intending to change thought processes
   i. Patient education
   ii. Psychology
   iii. Learning

IV. Threatening Inputs
a. Fear, anxiety, and catastrophization strongly correlate to pain and disability.[12-14]
b. "The fear of ___ is worse than ___ itself." – How is fear addressed?
c. Threatening beliefs are to be addressed by therapeutic reframing.

V. Educational Models
a. Biomedical
   i. Correct anatomy/biomechanics at fault and all is well.
   ii. Not shown to be effective in acute or chronic conditions.[15-18]

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      iii. Do not help with decreasing pain and disability.

      iv. Increase fear, anxiety, and stress in patients, which may increase pain.[19-20]

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Table 3: summarising the responses of members of the public to terms discussed in the focus groups.

Speaking a different language - terms that could lead to problematic misunderstandings	Speaking a different language - terms with unintended meanings but few negative repercussions	Speaking a common language - terms which the public appeared to understand as intended
Acute	(low) back pain/ache	Muscle spasm
Chronic	Mechanical back pain/ache	Sensation
Recurrent	Muscle sprain	Manipulation
Muscle Weakness	Muscle strain	Mobilisation
Instability	Sciatica	Soft tissue technique
Non-specific back pain	Radiated	Rehabilitation
Neurological involvement	Muscle imbalance	
Trapped nerve	Nerve root pain	
Paraesthesia	Disc - prolapsed, slipped,	
Managing your back pain	Herniated, ruptured	
Coping	Facet Joint	
Psychological pain	Alignment	
Wear and Tear	Posture	
Arthritis	Spondylitis	
Exercise	Stenosis	
Activity		
Disability		

Figure 5 - The consequences of our words (21)

   b. Need for Change

      i. Patient's beliefs/coping strategies have a direct effect on outcome and chronicity.

      ii. Perpetuating pathological beliefs could keep healthcare costs up.[22-23]

      iii. "A number of factors influenced the participants' beliefs, but clinicians appeared to be the most important."[24]

      iv. Explanatory models clinicians give are used to reference future symptoms.[24]

   c. Therapeutic Neuroscience Education

      i. Focuses on pain neurobiology.[3]

      ii. Improves pain and disability levels

      iii. Loses efficacy after 3 months.[19]

      iv. Discussing neuroscience will enhance explanatory satisfaction regardless of quality.[25]

VI. **The System Sensitivity Model: Reframing PRI Intervention Education**

   a. Intent

      i. Goal is to switch patterns from dysfunction to defensive.

      ii. LAIC/RBC/RTMCC/PEC is the brain's best guess to cope with an individual's current status.

   b. Steps

      i. Draw graph showing neuronal resting potential and activation threshold (nerves have electricity).

      ii. Provide examples of what could make nerves fire (shin kick).

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iii. Explain the pathway to the brain.
iv. Explain outputs brain produces (pain, motor, Zac's a jerk).
v. Provide a contrasting scenario in which outputs like pain may not be produced (bus)
vi. Relate to the patient's story and use his or her outputs.
vii. Explain how the nervous system becomes more sensitive (goal = keep you safe and alive)
viii. Discuss how movement, space, and bloodflow reduce the nervous system's sensitivity.

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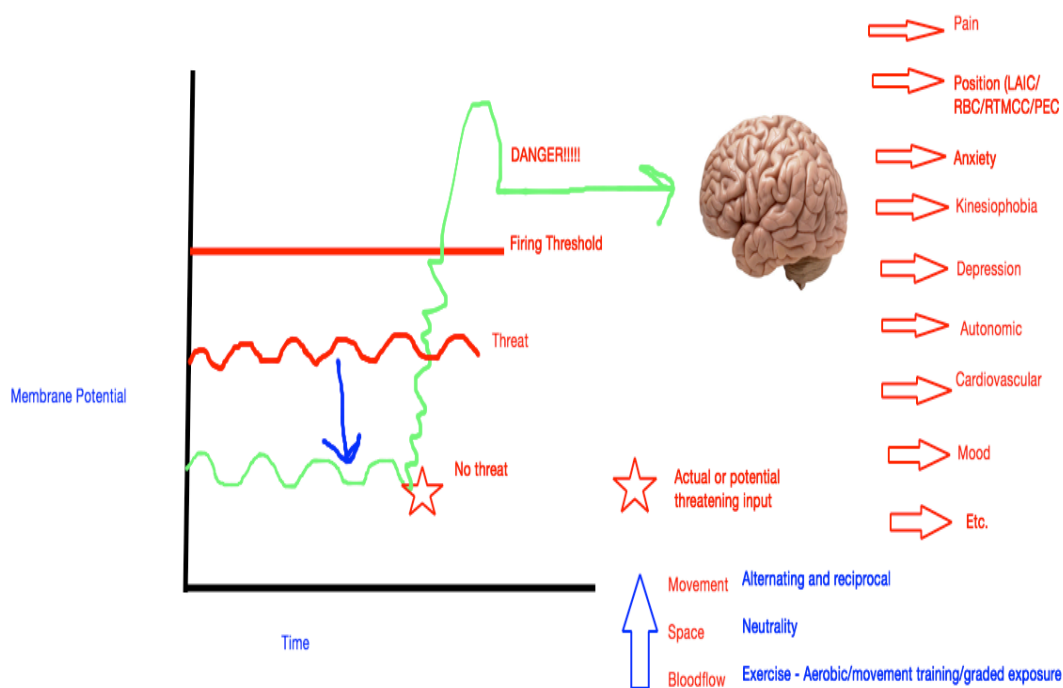
References

1. Iannetti & Mouraux. From the neuromatrix the the pain matrix (and back). *Exp Brain Res*. 2010;205(1):1-12.
2. Melzack. Pain and the neuromatrix in the brain. 2001. *J Dent Educ;* 65(12):1378-82.
3. Moseley. A pain neuromatrix approach to patients with chronic pain. 2003. *Man Ther, 8(30);130-140.*
4. Smart et al. Mechanisms-based classification of musculoskeletal pain: part 3 of 3: symptoms and signs of nociceptive pain in patients with low back +/- leg pain. 2012. *Man Ther*;17(4):345-51
5. Smart et al. Mechanisms-based classification of musculoskeletal pain: part 2 of 3: symptoms and signs of peripheral neuropathic pain in patients with low back +/- leg pain. 2012. *Man Ther*;17(4):345-51.

6.   Smart et al. Mechanisms-based classification of musculoskeletal pain: part 1 of 3: symptoms and signs of central sensitization in patients with low back +/- leg pain. 2012. *Man Ther*;17(4):336-44.
7.   Butler. The sensitive nervous system. 2000; *NOI Group Publications.*
8.   Smart et al. Mechanisms-based classification of musculoskeletal pain: part 1 of 3: symptoms and signs of central sensitization in patients with low back +/- leg pain. 2012. *Man Ther*;17(4):336-44.
9.   Louw & Puentedura. Therapeutic neuroscience education: teaching patients about pain. 2013. *International Spine and Pain Institute.*
10.   Visser & Davies. Expanding melzack's pain neuromatrix. The threat matrix: a super-system for managing polymodal threats
11.   Legrain et al. The pain matrix reloaded: a salience detection system for the body. 2011. *Prog Neurobiol;* 93(1):111-24.
12.   Meeus et al. Pain physiology education improves pain beliefs in patients with chronic fatigue sydrome compared with pacing and self-management education: A double Blind Randomized Controlled Trial. 2010. *Arch Phys Med Rehabil.* 91(8);1153-1159.
13.   Moselely 2004. Evidence for a direct relationship between cognitive and physical change during an education intervention in people with chronic low back pain. 2004. *Eur J Pain, 20(5);39-45.*
14.   Vlaeyen et al. Fear of movement/(re)injury in chronic low back pain and its relation to behavorial performance. 1995. *Pain,* 62(3); 363-372.
15.   Engers et al*. Individual patient education for low back pain. 2008.* Cochrane Database Syst Rev.
16.   *Gross* et al. Patient education for mechanical neck pain. 2012. *Cochrane Database Syst Rev.*
17.   *Haines et al. Patient education for neck pain with or without radiculopathy. 2008.* Cochrane Database Syst Rev(4).
18.   *McDonald et al. Pre-operative education for hip or knee replacement. 2004.* Cochrane Database Syst Rev(1).
19.   Low et al. 2011. The effect of neuroscience education on pain, disability, anxiety, and stress in chronic musculoskeletal pain. 2011. *Arch Phys Med Rehabil*; 92(12): 2041-2056.
20.   *Wertli et al. Fear-avoidance beliefs-a moderator of treatment efficacy in patients with low back pain: a systematic review. 2014. Spine J.* 14(11):2658-78
21.   Barker et al. Divided by a lack of common language? – a qualitative study exploring the use of language by health professionals treating back pain. 2009. BMC Musculo Disorders; *10(123).*
22.   Zusman. Belief reinforcement: one reason why costs for low back pain have not decreased. 2013. *J Multidiscip Healtc; 16(6):197-204.*
23.   *Wertli etl al. Catastrophizing-a prognositc factor for outcome in patients with low back pain: a systematic review. 2014.* Spine J*. 14(11):2639-57.*
24.   Darlow et al. The enduring impact of what clinicians say to people with low back pain. 2013. *Ann Fam Med*;11(6):527-34.
25.   Weisberg et al. The seductive allure of neuroscience explanations. 2008. *J Cogn Neurosci*; 20(3): 470-477.