The Efficacy of Cognitive Therapy on Lumbar Pain

Adriaan Louw, PT, PhD (c), M.App.Sc (physio), CSMT

The Ultimate Goal of LBP Treatment

• Decreased and/or loss of pain
• Increased function
• Increased ROM

If the main reason for pain is joint or soft tissue related...


But what if the pain and disability is due to faulty cognitions?

- My pain is due to the bulging disc
- Movement will damage tissue and increase pain
- Pain means something is wrong
- I am not doing anything until all pain is gone
- I am afraid my pain will get worse
- I have a very rare case of LBP
It is well established that cognitions are correlated to LBP

- Fear
- Catastrophization
- Knowledge
- Anticipation and consequence of pain


Cognitive Processing

- Afraid; poorly understood; movement = pain due to tissues being damaged

High Threat

FEAR

PAIN to defend
Re-examining our Paradigms in Lumbar Manual Therapy

Modern definition of LBP

LBP is a multiple system output, activated by an individual’s pain neuromatrix in response to perceived threat

Representation of Pain in the Brain

• Common areas are frequently “ignited”
• Via connections, backfiring neurons, and neurotransmitters, pain is perceived – the pain neural signature


A TYPICAL PAIN NEUROTAG

1. PREMOTOR/ MOTOR CORTEX
   organize and prepare movements
2. CINGULATE CORTEX
   concentration, focusing
3. PREFRONTAL CORTEX
   problem solving, memory
4. AMYGDALA
   fear, fear conditioning, addiction
5. SENSORY CORTEX
   sensory discrimination
6. HYPOTHALAMUS/ THALAMUS
   stress responses, autonomic regulation, motivation
7. CEREBELLUM
   movement and cognition
8. HIPPOCAMPUS
   memory, spatial recognition, fear conditioning
9. SPINAL CORD
   gating from the periphery

Image adapted from Explain Pain – Butler and Moseley 2003

A neuroscience approach to managing athletes with low back pain
Emilio I. Puertedura a,b,*, Adriaan Louw b

More Complexity

Denotes synaptic modulation

Beliefs
Knowledge, logic
Social context
Anticipated consequences
Other sensory cues

Physical Therapy in Sport

A neuroscience approach to managing athletes with low back pain
Emilio I. Puertedura a,b,*, Adriaan Louw b
LBP as an output...crossing the road

Low Back Pain as Perception
LBP is a
• multiple system
• output
• activated by an individual’s pain
• neuromatrix
• in response to
• perceived
• threat
Degenerative terms

• “Wear and tear”
• “Deterioration”
• “Disc space loss”
• “Crumbling”
• “Collapsing”

Research into anatomy, biomechanical and patho-anatomy models

Explanatory and Diagnostic Labels and Perceived Prognosis in Chronic Low Back Pain

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Tim John Sloan, BMBS, BMedSci(Hons),* and David Andrew Walsh, FRCP, PhD†

Results. Two major categories representing the predominant themes emerging from the content analysis were “Degeneration” and “Mechanical.” Degenerative terms such as “wear and tear” and “disc space loss” indicated progressive loss of structural integrity. Examples of phrases used by patients included “deterioration [...] spine is crumbling” and “collapsing [...] discs wearing out.” The use of degenerative terms by patients was associated with a poor perceived prognosis (P < 0.01). Degenerative and mechanical terms were more commonly used by patients when they were documented in correspondence from secondary care specialists (P = 0.03 and 0.01, respectively).

Conclusion. A common language is shared between professionals and patients that may encourage unhelpful beliefs. The use of degenerative terms such as wear and tear by patients is associated with a poor perceived prognosis. The explanation of radiological findings to patients presents an opportunity to challenge unhelpful beliefs, thus facilitating uptake of active treatment strategies.
Making lions become lion cubs

Emerging research shows that explaining to patients their pain experience from a biological and physiological perspective of how the nervous system/brain’s processes pain allow patients to move better, exercise better, think different about pain, push further into pain, etc.


Therapeutic Neuroscience Education

- Decrease fear and positively change a patient’s perception of their pain (Moseley 2003)
- Immediate effect on improvements in patients’ attitudes about pain (Moseley 2003)
- Improvements in pain, cognition and physical performance (Moseley 2004)
- Increased pain thresholds during physical tasks (Moseley, Hodges et al. 2004)
- Improved outcomes of therapeutic exercises (Moseley 2002)
- Reduction in widespread brain activity characteristic of a pain experience (Moseley 2005)
Efficacy Neuroscience Education

Conclusions: For chronic MSK pain disorders, there is compelling evidence that an educational strategy addressing neurophysiology and neurobiology of pain can have a positive effect on pain, disability, catastrophization, and physical performance.
Content: Louw, et al 2011

1. Neurophysiology of pain
2. No reference to anatomical or patho-anatomical models
3. No discussion of emotional or behavioural aspects to pain
4. Nociception and nociceptive pathways
5. Neurones
6. Synapses

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Content: Louw, et al 2011

- Action potential
- Spinal inhibition and facilitation
- Peripheral sensitization
- Central sensitization
- Plasticity of the nervous system
• 36 year-old female
• 4.5 years of pain
• Started as LBP, then spread to her buttocks and now into both legs
• Pain would flare up with stress at work
• First child 2.5 years ago – “horrible” labor, delivery and pain
• Now constant LBP
• Not able to return to work
• Now severe spasms in both legs
• CT, MRI and X-Ray WNL
• Meds: High doses of pain killers and narcotics


• Segmental Spinal Stabilization Exercises*:
  – 1 week practice
  – 5 minutes each waking hour

* Myth
What about my recent patient?

- Years of “chronic LBP”
- Numerous different treatments
  - Latest = ESI, RF, PT
  - ODI = 3675940.1
- Docs mentioned FM
- “Surgeons won’t touch her”
- MRI – severe DDD
1st Session (75 minutes)

• Thorough subjective examination
• Thorough physical examination
• Therapeutic neuroscience education
After the 1st session (75 minutes later)
No physical treatment

Outcome measures...

Before PT
Immediate after NS Education
7-Month follow-up

NRS  ODI  FABQ  Zung  Active Flexion
Redefine pain and thus change cognitions regarding pain
Pain and Tissue injury are two different things
Reduce threat

Evidence for a direct relationship between cognitive and physical change during an education intervention in people with chronic low back pain

The Neuromatrix, Brain & Processing

- After: Tissues heal; tissues sensitive; sore and deconditioned
- Threat smaller
- Won’t hurt tissues
To date...

- **Chronic LBP** (Moseley 2002; Moseley 2003; Moseley 2004; Moseley, Hodges et al. 2004; Moseley 2005; Ryan, Gray et al. 2010; Louw, Puentedura et al. 2012)
- **Chronic Whiplash** (Van Oosterwijck, Nijs et al. 2011)
- **Chronic Fatigue Syndrome** (Meeus, Nijs et al. 2010)
- **Fibromyalgia** (Meeus, et al – in preparation)

What about acute conditions? Prevention?

Development and Implementation of a Preoperative Neuroscience Education Program for Lumbar Radiculopathy

Adriaan Louw, PT, PhD (c), M.App.Sc (physio)
Ina Diener, PT, PhD
David Butler, PT, M.App.Sc (physio), EdD
Louie Puentedura, PT, DPT, PhD, OCS, FAAOMPT
Current Landscape of US Spine Surgery

1. Spinal surgery is prevalent and increasing
2. At least 1 in 3 people will have persistent pain and disability following lumbar surgery
3. Postoperative rehabilitation has not shown significant ability to decrease postoperative pain and disability
4. Surgeons do not readily send patients to rehabilitation following lumbar surgery

Preoperative Education for Lumbar Surgery


• Focus:
  – Procedural information
  – Informed consent

• Little added benefit regarding post-surgical outcomes
Preoperative education for lumbar radiculopathy: a survey of US spine surgeons*  

- Adriaan Louw, PT, M.App.Sc (physio), CSMT  
- Dr. Ina Diener, PT, PhD  
- Dr. David Butler, PT, M.App.Sc (physio), GDAMT, EdD  
- Louie Puenteledra, PT, DPT, OCS, GDAMT, CSMT, FAAOMPT

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The general population’s beliefs about spine surgery – submitted for publication

- Our results show that the general population has a somewhat negative bias towards LS with the general view that LS will result in a poor outcome, side effects, and lengthy recovery.
Development of a Preoperative Neuroscience Education Program...

By the way...

- 70% fewer provocative terms
- Expert panel review
- Submitted for publication
Immediate Effect of Preoperative Neuroscience Education for Lumbar Radiculopathy (submitted for publication)

• Case series of 10 Patients scheduled for Surgery for L-Radiculopathy
  – Ave. age 47 years
  – Ave. duration of leg pain 7 months
  – Ave. LBP rating 5/10
  – Ave. leg pain 4.5/10
  – Ave. Oswestry 43% (severe disability)
  – Fear Avoidance Beliefs – High risk for CLBP

• Immediate post-education session measurements:
  Statistically significant change in:
  – Straight Leg Raise (Ave. 9 degree increase)
  – Forward Flexion (5 cm)
  – Fear Avoidance Scores decrease (especially work)
  – Pain Catastrophization
  – Knowledge of pain
  – Positive changes in regard to beliefs and a expectations of lumbar surgery
Preoperative Neuroscience Education: Single fMRI case

Adriaan Louw, PT, PhD (c). M.App.Sc (physio),
Next step – in progress…

- Multi-center
- Multi-clinician
- NS Education vs. usual care
- 40% patients enrolled

Some preliminary data (NE vs. usual care) – 1 month post-op data

- NE program superior to UC
  - LBP ratings after surgery
  - Fear Avoidance
  - Oswestry
  - Pain Knowledge
  - Catastrophization
- Same decrease in leg pain NE vs. UC
Physical Therapists are Ideal to Treat Pain

- Biology
- Hands-on
- Psychology
- Numbers
- Cheap
- Fitness-Wellness
- Movement
- Pain Science