

PAIN

23 July 2021
PSYC706 Health Psychology

What is pain?

- **Pain** – the sensory and emotional experience of discomfort, which is usually associated with actual or threatened tissue damage or irritation.
- Plays an important protective feedback function
- Most common medical complaint
- More than 80% of all visits to physicians

Qualities of pain

- ☐ Sharp
- ☐ Dull
- ☐ Burning
- ☐ Cramping
- ☐ Itching
- ☐ Aching
- ☐ Shooting
- ☐ Throbbing

How long does it last?

How did it originate?

Organic vs. psychogenic pain

- ☐ **Organic pain** – discomfort from tissue damage (e.g., stubbed toe, scraped knee)
- ☐ **Psychogenic pain** – discomfort without clear organic basis (e.g., pain disorder – a somatoform disorder)
- ☐ **In the past:**
 - ☐ Physicians and researchers thought organic and psychogenic pain were completely separate.
- ☐ **Today:**
 - ☐ Physicians acknowledge that both physical and psychological factors influence the pain experience.

Acute vs. chronic pain

- **Acute pain** – temporary, lasts less than 6 months
 - ▣ Typically has a definable cause; treated with painkillers
 - ▣ Associated with an increase in anxiety levels
- **Chronic pain** – lasts longer than 6 months
 - ▣ E.g. from rheumatoid arthritis
 - ▣ Associated with high anxiety levels, hopelessness, helplessness
 - ▣ Influences other behaviours – e.g., sleep
 - sleep deprivation then increases sensitivity to pain

Types of chronic pain

- **Chronic recurrent pain:**
 - ▣ Stems from benign causes
 - ▣ Repeated episodes of pain and episodes of no pain
 - ▣ e.g., myofascial pain syndrome
- **Chronic intractable benign pain:**
 - ▣ Discomfort that is present all the time
 - ▣ Not related to a malignant condition
 - ▣ E.g., chronic back pain

Types of chronic pain (cont'd)

□ **Chronic progressive pain:**

- Continuous discomfort
- Associated with a malignant condition
- Increases in intensity as condition worsens
- e.g., rheumatoid arthritis, cancer



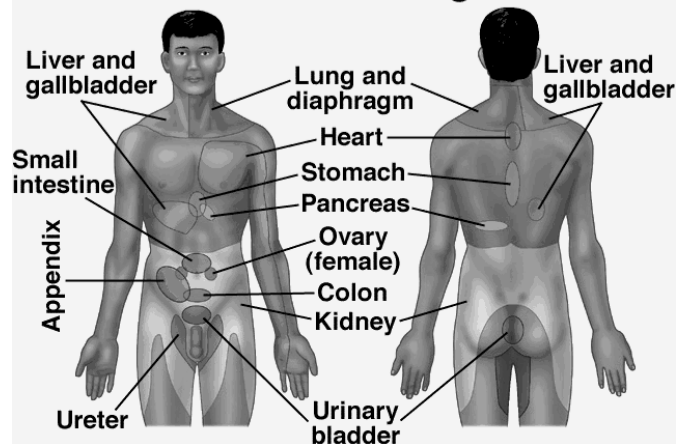
Types of pain

□ **Referred pain:**

- Pain originating from internal organs perceived as coming from other parts of the body
- E.g. heart attack
 - Internal organs and skin use same pathway in the spinal cord
 - Due to not being used to pain originating from internal organs



Referred Pain Regions



Pain signals

- **Nociceptors** – nerve endings that respond to pain stimuli and signal injury to the brain
 - Found in: skin, blood vessels, muscles, joints, etc.
- **Types of Afferent Peripheral Fibres:**
 - A-delta fibres – coated with myelin, quick transmission
 - C fibres – slower impulse – dull, burning, aching pain

Pain without detectable damage

- **Neuralgia**
 - ▣ Recurrent shooting/stabbing pain along course of nerve
- **Causalgia**
 - ▣ Renamed “Complex regional pain syndrome”
 - ▣ Severe burning pain triggered by minor stimuli (e.g., clothing, puff of air), can occur spontaneously
 - ▣ Sometimes where body has healed – e.g., gunshot, stabbing
- **Fibromyalgia**
 - ▣ Chronic widespread pain with unknown (probably multiple) causes
- **Phantom Limb Pain**
 - ▣ Pain in limb no longer there
 - ▣ Can persist for months and even years

Theories of pain

Early theories of pain:

- **Specificity theory:**
 - ▣ Pain receptors, nerves, brain region; direct and automatic link between cause of pain and brain
- **Pattern theory:**
 - ▣ Similar; level of pain determined by nerve impulses from damaged tissue
- **Commonalities of these theories:**
 - ▣ Pain caused by damaged tissue
 - ▣ Psychological consequences only
 - ▣ Pain as an automatic response with a single cause
 - ▣ Psychogenic pain acknowledged but only when no organic cause can be found



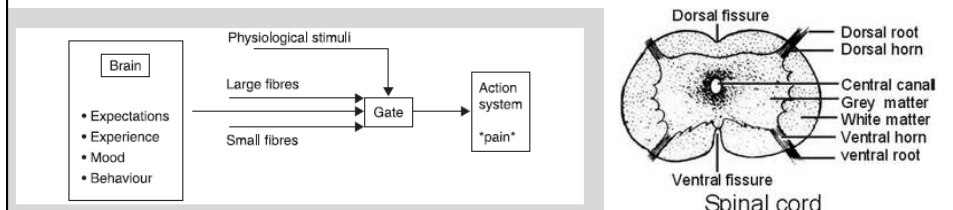
René Descartes –
Pain Theory

Problems with early theories of pain

- Medical treatments (drugs and surgery) tend to work for acute pain only.
- Degree of tissue damage and reports of painful sensations differ (e.g. soldiers requesting less pain relief than civilians).
- Phantom limb phenomenon; pain felt as coming from the place where the amputated limb used to be.

Gate-Control Theory of Pain

- Developed in 1960s by Melzack and Wall
 - ▣ Integrated physiology with psychology and improved preceding theories; complex pathway mediated by a network of interacting processes.
- **The Basics of Gate-Control Theory of Pain**
 - ▣ There is a “gating mechanism” located in the spinal cord (substantia gelatinosa of the dorsal horn)



Gate-Control Theory of Pain

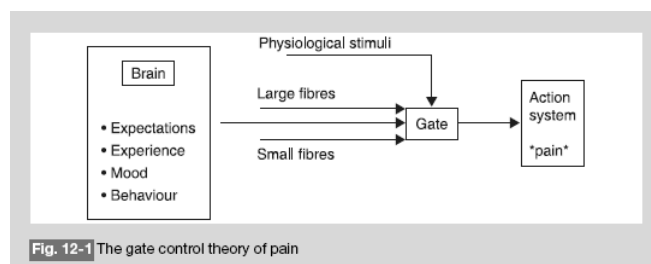
Travelling through the gate:

1. Signals of noxious stimulation from nerve fibres at injury site enter gating mechanism.
2. Brain also sends information about the psychological state of the individual (e.g. attention, anxiety, memory of previous experience).
3. If signals pass through gating mechanism, they activate transmission cells.
4. Transmission cells send impulse to the brain.

Gate-Control Theory of Pain

How the gate works

- **KEY in this theory:** gate can be opened or closed
 - If **open**: transmission cells send impulses freely
 - Gates **closed/partially closed**: output of transmission cells is inhibited.



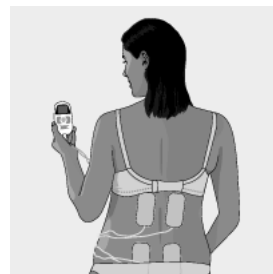
Gate-Control Theory of Pain

What Controls Opening and Closing of the Gate?

- **(1) The amount of activity in the pain fibres**
 - Activity of the large fibres due to injury
 - The stronger the noxious stimulation – the more active the pain fibres
- **(2) The amount of activity in other peripheral fibres**
 - A-beta fibres – carry information about harmless stimulation – touching, rubbing, light scratching
 - Stimulation of the small fibres (e.g. gentle massage, TENS, medication) tends to close the gate (inhibits pain neurons)

Gating example – TENS machine

- TENS = Transcutaneous Electrical Nerve Stimulation
 - Used for surgery, trauma, long-term pain, or child birth
- How it works:
 - The nerve cannot carry pain impulse and non-pain impulse (from TENS) simultaneously – therefore pain signal is overridden
 - Also encourages body to produce endorphins



Gate-Control Theory of Pain

□ *What Controls Opening and Closing of the Gate?*

□ **(3) Messages that descend from the brain**

- ▣ Efferent pathways (brain to spinal cord) can open or close the gate
- ▣ E.g., emotional factors such as anxiety (open gate) or excitement (close)
- ▣ Behavioural factors, such as focusing on pain (open) or concentration on other things or distraction (close)

This pathway explains why people who are distracted by environmental stimuli may not notice the pain.

What controls opening and closing of the gate?

Conditions that open the gate	Conditions that close the gate
Physical conditions • The extent of the injury • Inappropriate activity levels Emotional conditions • Anxiety or worry • Tension • Depression Mental conditions • Focusing on the pain • Boredom; little involvement in life activities	Physical conditions • Medication • Counterstimulation (e.g., heat or massage) Emotional conditions: • Positive emotions (e.g., happiness, optimism) • Relaxation • Rest Mental conditions • Intense concentration or distraction • Involvement and interest in life activities

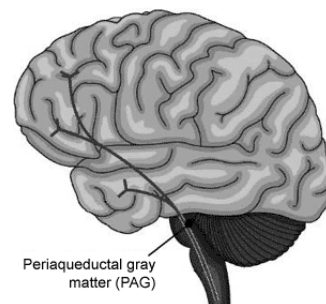
Problems with Gate-Control Theory

- No clear evidence yet for precise location of the supposed “gate”.
- Unclear how exactly the psychological factors interact with the organic basis of pain.

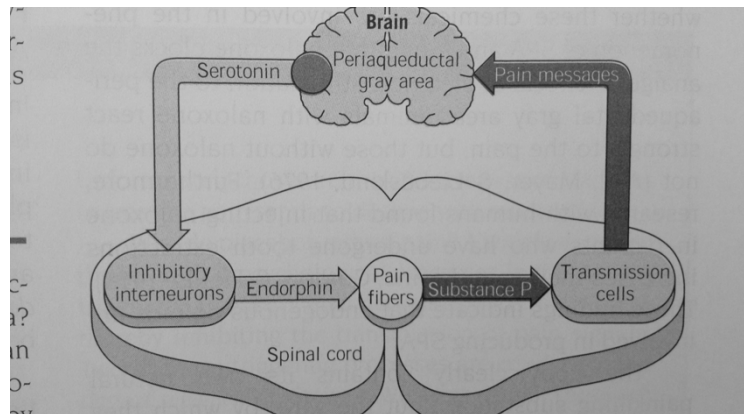


Inhibition of pain

- **Stimulation-produced analgesia (SPA)**
 - ▣ Stimulation to the periaqueductal gray area of the midbrain produces an insensitivity to pain (e.g. TENS, acupuncture); Kotzé & Simpson (2008)
- Serotonin → activates inhibitory interneurons
- → release endorphins at pain fibres
- → endorphins inhibit release of substance P (pain message) from pain fibres



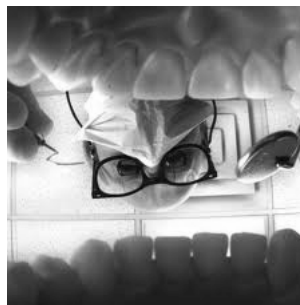
Inhibition of pain



Endorphin = opioid (pain killer)

Pain and the role of learning

- **Classical conditioning:** past experience and association can exacerbate pain (e.g., going to the dentist after a bad experience)
- Jamner & Tursky (1987): migraine sufferers react with more anxiety to words associated with migraine
- **Operant conditioning:** Reinforcement can exacerbate pain (e.g., getting attention)



Pain and the role of affect

□ **Anxiety**

- ▣ Anxiety and worry make pain worse; problem with chronic pain, which is harder to treat
- ▣ High trait anxiety predicts pain experience

□ **Fear**

- ▣ Fear and fear avoidance beliefs (e.g., “It will hurt if I walk”) can exacerbate pain and predict transition from acute to chronic pain
- ▣ Fear of pain might lead to hyper-vigilance of pain and thus more intense experience of it.
- ▣ Treatment could work on reducing these avoidance behaviours.

Cognitions in pain

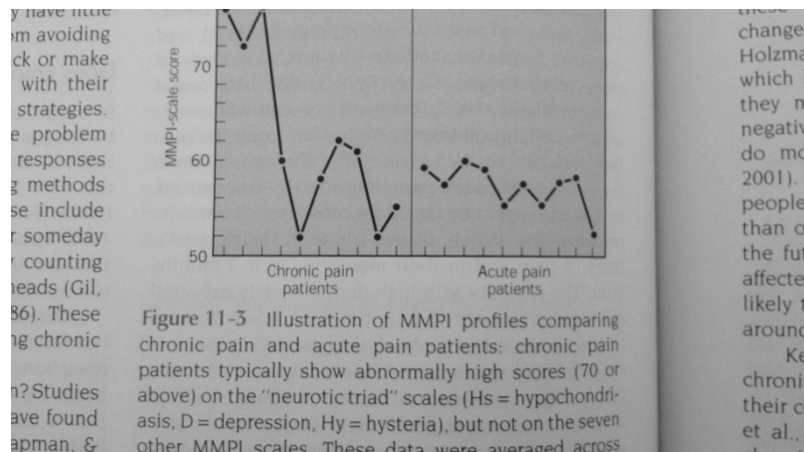
□ **Catastrophising**

- ▣ Rumination (“I can feel my knee click”); focus on threatening information
- ▣ Magnification (“I will become paralysed”); overestimation of threat
- ▣ Helplessness (“Nobody can help me and I just can’t bear the pain anymore”); underestimating personal resources to cope
 - Each predict pain intensity

□ **Meaning**

- ▣ Positive meaning (e.g., childbirth, muscle strength training) may reduce pain
- ▣ Negative meaning (e.g., serious illness) may increase pain

Pain and the Neurotic Triad (MMPI)



Neurotic Triad: Hypochondriasis, Depression, Hysteria
 Pattern exists for both organic pain and psychogenic pain*
Pain acceptance – therefore may be key in properly coping with pain

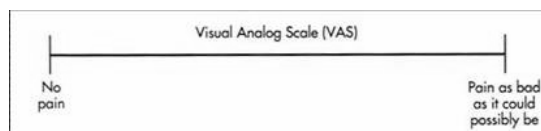
Cognitions and behaviour in pain

- **Self-efficacy**
 - ▣ Past positive experiences may improve pain
 - ▣ Locus of control
- **Attention**
 - ▣ Attention to pain increases pain
 - ▣ Distraction decreases pain
 - ▣ Additionally, pain demands attention leaving less attention to other tasks



Assessing pain

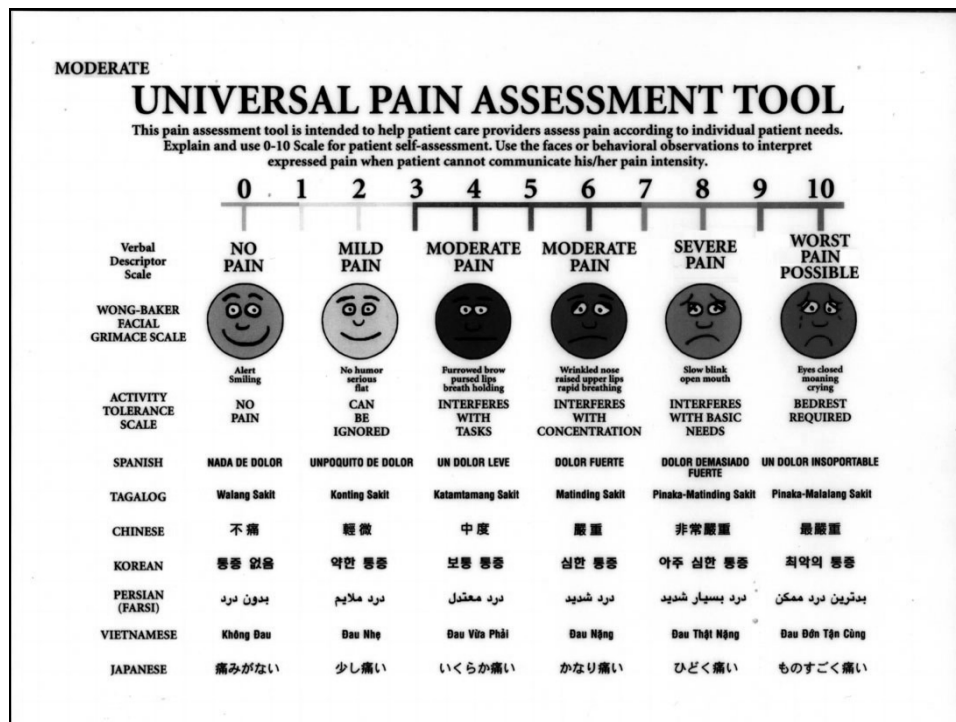
- Interviews:
 - ▣ History of the pain, emotional adjustment, lifestyle factors, impact on interpersonal relations and work
- Pain Questionnaires (e.g. McGill Pain Questionnaire)
- Verbal description of pain
- Pain Rating Scales
 - ▣ Box Scale (0 = no pain, 10 = worst possible pain)
 - ▣ Visual Analogue Scale:



Assessing

- Pain rating scales are simple, direct ways of assessing pain
- Excellent for assessing current functioning and change over time
- Also helps clients and helpers see patterns in their pain, and take more control

Visual analogue scale												
No pain										Worst pain possible		
Box scale												
No pain	0	1	2	3	4	5	6	7	8	9	10	Worst pain possible
Verbal rating scale												
No pain	Some pain			Considerable pain			Worst pain possible					



Assessing pain

- Observational assessment
 - Generally considered unreliable, but sometimes required
 - E.g. children, non-verbal adults, some terminally ill adults
- Physiological measures
 - Assessment of inflammation
 - Measure of sweating, heart rate, skin temperature
 - Also often not reliable

Managing pain

- Clinical pain – any pain that requires professional care

- Acute and chronic

Acute	Chronic
Why is this pain important to manage? - Occurs during surgical procedures - Following surgical procedures - Impacts patient adherence to treatment (e.g., returning to the dentist for another filling)	Why is this type of pain important to manage? - Important in chronic illness – e.g., arthritis, cancer - Needs to be managed properly in terminal cases - Important to the improvement of quality of life

Acute clinical pain

- E.g., pain following abdominal surgery
- Many patients experience greater-than-necessary pain following surgery
 - Can lead to:
 - Increased infection, slow wound healing (pain and related stress impairs immune and endocrine functioning)
 - Medical complications and potentially death

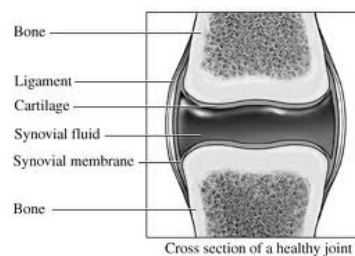


Chronic clinical pain

- e.g., lower back pain, arthritis, cancer
- Can lead to increased hopelessness and despair in the transition from acute → chronic pain
 - While some studies found a relationship between the neurotic triad of personality of the MMPI (hypochondriasis, depression, hysteria) and chronic pain (Armentrout et al., 1982; McGill et al., 1983), others found that the MMPI is not a reliable tool to predict pain perception (Cox et al., 1978; Naliboff et al., 1982)
- Other major issues with chronic clinical pain:
 - Interpersonal and emotional difficulties
 - Excessive drug use
 - Frequent sleep disturbance

Medical treatment for pain

- **Surgical methods**
 - More likely to be effective for acute pain
- **Other methods:**
 - Synovectomy – removing membranes of arthritic joints
 - Spinal fusion – fusing vertebrae to treat severe back pain; typically using donor bone material to join vertebrae



Behavioural and cognitive treatment

- Goals: help patients cope more effectively, and reduce their reliance on drugs; moving client out of comfort zone back into activities that they had been avoiding.

Operant Approach

- ▣ Especially used with children
- ▣ Reinforcement of desirable behaviour (e.g., if you do this exercise, then we can play a game)
- ▣ Give praise for desirable activities – sleeping through naptime, not complaining

Behavioural and cognitive treatment

□ **Relaxation and Biofeedback**

- ▣ Helps reduce stress (which is linked to chronic pain, tension headaches, etc)
- ▣ E.g., progressive muscle relaxation
- ▣ E.g., biofeedback – learning control over bodily functions such as heart rate (through electronic devices)

Cognitive treatment of pain

Cognitive methods:

□ (1) Distraction

- ▣ Focusing on a nonpainful stimulus in the immediate environment
- ▣ Factors:
 - Attention – greater attention, lower pain ratings
 - Whether the distractor is interesting – e.g., watching a movie, being asked to reflect on what's going on in the movie (used when giving needles to children)



Cognitive treatment of pain

□ (2) Imagery

- ▣ Guided imagery – alleviation through imaging mental scene unrelated to the pain
- ▣ Useful in acute pain
- ▣ Not clear in terms of its use in chronic pain
- ▣ Difficult for some people



Cognitive treatment of pain

□ (3) Pain redefinition:

- ▣ Replacing maladaptive thoughts about threat and harm with constructive and realistic thoughts
- ▣ Focus often on the internal dialogue

- ▣ Coping statements: emphasise person's ability to tolerate discomfort (e.g., "It hurts, but you're in control")
- ▣ Reinterpretative statements: designed to negate the unpleasant aspects of discomfort (e.g., "It's not the worst thing that could happen")
 - Useful for those undergoing medical procedures
 - But be careful not to create feelings of guilt

Cognitive treatment of pain

□ Pain Redefinition (continued)

1. **Medical procedure information** – can be provided by a therapist → reduces anxiety and discomfort
2. **Coping with chronic pain** – therapist can promote active coping and pain acceptance
 - ▣ Have them perform activities to see they have enjoyment even with pain present
3. **Reducing illogical thoughts in chronic pain patients**
 - ▣ Helping to reduce overall discomfort

Effectiveness of MBSR

- ❑ Pearlman et al. (2010) exposed novice and experienced meditators to painful thermal stimuli and asked them to engage in focused attention in one condition and open monitoring in another.
- ❑ During the open m. condition, experienced meditators reported the same intensity of pain, but much less unpleasantness.
- ❑ Another study found lower pain sensitivity in experienced meditators compared to controls, as well as changes in cortical structure (Grant et al., 2009).
- ❑ Zeidan et al. (2009) gave people 1-hour mindfulness training for 3 days and then gave painful electrical stimulation. Mindfulness training reduced pain ratings and anxiety. Mathematics distraction had some effect on mild pain, but relaxation did not work.



Importance of pain beliefs

- ❑ Back Pain Attitudes Questionnaire (Back-PAQ-20; Krägeloh et al., in press – <https://doi.org/10.1080/09638288.2020.1861484>)

Bending your back is good for it^b
 It is easy to injure your back
 If you overuse your back, it will wear out
 If an activity or movement causes back pain, you should avoid it in the future
 You could injure your back if you are not careful
 Back pain means that you have injured your back
 A twinge in your back can be the first sign of a serious injury
 Having back pain makes it difficult to enjoy life
 It is worse to have pain in your back than your arms or legs
 It is hard to understand what back pain is like if you have never had it yourself
 If your back hurts, you should take it easy until the pain goes away
 If you ignore back pain, you may cause damage to your back
 It is important to see a health professional when you have back pain
 To effectively treat back pain you need to know exactly what is wrong
 If you have back pain you should avoid exercise
 When you have back pain the risks of vigorous exercise outweigh the benefits
 If you have back pain you should try to stay active^b
 Once you have had back pain there is always a weakness
 There is a high chance that an episode of back pain will not resolve
 Once you have a back problem, there is not a lot you can do about it