Berkshire Healthcare
NHS Foundation Trust

Understanding pain

This guide is to accompany the Understanding Pain video on our website

What is pain?

Pain is defined as, “an unpleasant sensory and emotional experience associated with actual OR potential damage, or described in terms of such damage”. (International Association for the Study of Pain).

This means our body is trying to protect us from what it believes to be a threat. Pain usually makes us change our behaviour – stopping what we are doing or avoiding certain activities.

Pain is complex

Information gathered by our nervous system is added to thing like past experiences, emotions, beliefs and values. This is all processed by our brain to decide whether pain is experienced.

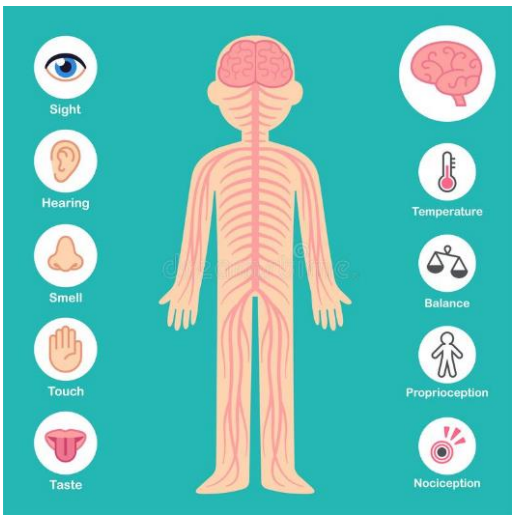
The nervous system

Pain is defined as, “an unpleasant sensory and emotional experience associated with actual OR potential damage, or described in terms of such damage”. (International Association for the Study

All over our body we have receptors, called nerve endings or ‘sensors’.

Different receptors detect different information including:

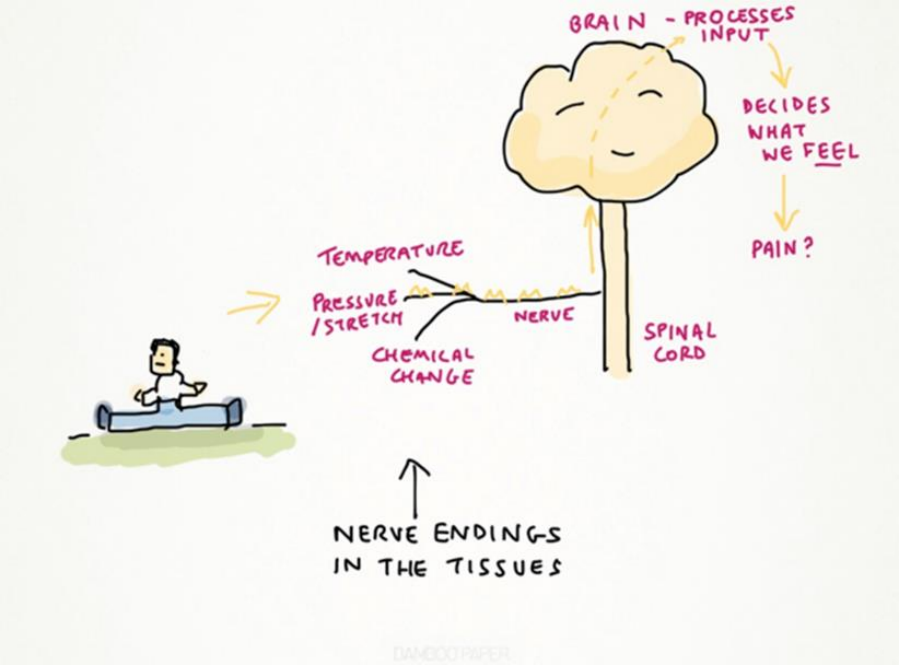
- Temperature
- Pressure
- Touch
- Chemicals



The information detected is sent through the nerves to the spinal cord. This information helps us to understand our world and helps shape how we interact with it.

The information or message that is sent is like a message asking, “Is this something we should be concerned about?”

The spinal cord acts like a postal sorting office and decides when and which messages are then sent to the brain. Not all messages are sent. We are not aware of every time we have been touched: we do not constantly feel our clothes and sometimes we can’t remember where that bruise came from!



When enough ‘concern?’ messages are received the spinal cord sends them on to the brain. The brain processes the ‘concern?’ message and decides if the body is at risk of harm or injury.

If the brain decides the body is at risk, we will feel pain and react to get ourselves out of or away from the threat. This all happens very quickly and without us being aware that it is happening.

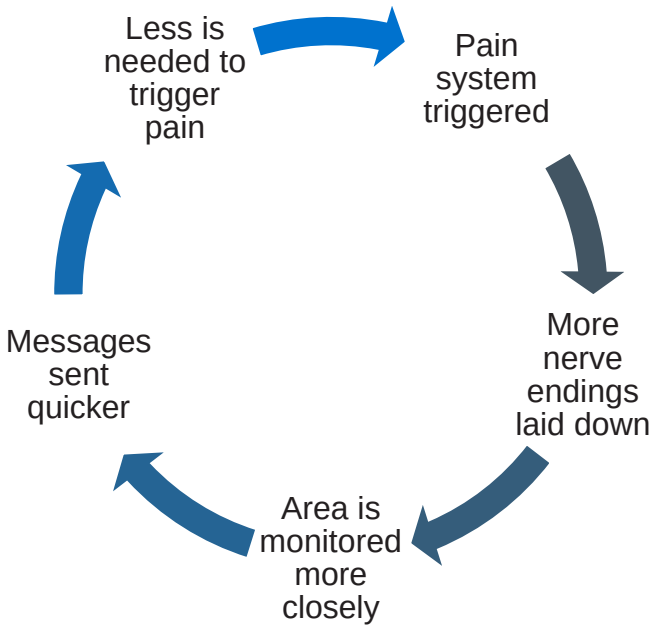
The nervous system is plastic and adapts to our needs. When the brain needs to monitor an area more closely such as learning a new skill or for an injury it lays down more nerves so that the brain can monitor the area more closely. The signals also move more quickly between the brain and the area. Therefore, when you start learning a new skill, such as driving or playing a musical instrument, you are not very good at it and it takes a lot of mental focus and energy to do it. However, over time as you practise you don’t have to think that much and the movements become automatic and precise.

Why do we experience Persistent Pain?

Pain is called persistent when it lasts beyond when medical professionals would have expected the tissues to heal or they cannot find a clear medical reason why the pain is persisting (for example, Fibromyalgia or migraines). The body has laid down more nerve endings and is constantly monitoring the problem area. Once nerve endings have been laid down, they cannot be taken away.

Our brain thinks it needs to protect the area and it does that with pain. A vicious cycle then happens - The longer pain persists, the quicker the brain is at sending these messages. The quicker messages are sent and received around the brain and body, the more danger the brain concludes we are in.

Therefore, the nervous system needs to warn us even more, so we experience more pain.



The system becomes over sensitive like a car alarm that has been set too sensitively and instead of going off for being broken into it goes off for a cat brushing past the car. This can mean that even small changes in our environment can trigger the alarm to go off. This could be a small movement, a touch or a change in temperature.

The vicious cycle continues - the more the system is triggered the more sensitive the system becomes and the easier it can be for the system to be triggered. This highly sensitive system is not designed to be constantly turned on so that means that the more it is triggered the more it can affect your mood, thoughts and behaviours and lead to exhaustion.

This means that often there isn't any problem or damage to the body but instead the pain continues because the system has become too efficient at sending messages.

If we do not understand what is happening, we will adapt the way we move and behave to try to protect ourselves.

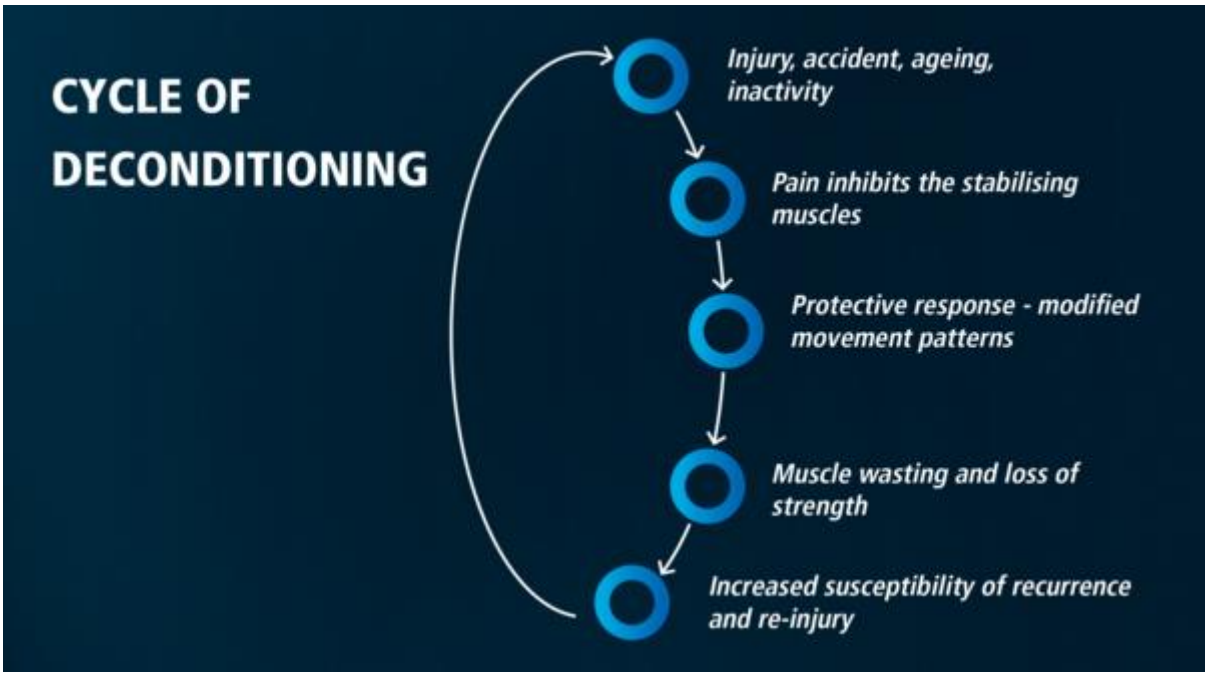
What is deconditioning

When we experience pain from an injury the body wants you to protect that part of your body by not moving it. Your natural reaction to hitting your thumb with a hammer would be to hold it close to the body. This protects the body part, prevents further damage and enables the body to repair itself. If we allow the body to heal and then gradually start moving the body part again then we can regain the strength and movement in the body part.

However, when we stop doing a movement with a part of the body for a prolonged period it can become deconditioned. Often with persistent pain, because the nervous system is over sensitised, we can begin to stop any activity that can aggravate the pain, even though there isn't any damage to repair!

Reduced activity leads to reduced fitness and reduced ability to do what we used to be able to do.

Typical signs might include stiffness, weakness, or loss of endurance. This process happens relatively quickly and progresses with inactivity. Returning to previous levels of activity too quickly may increase chance of injury.

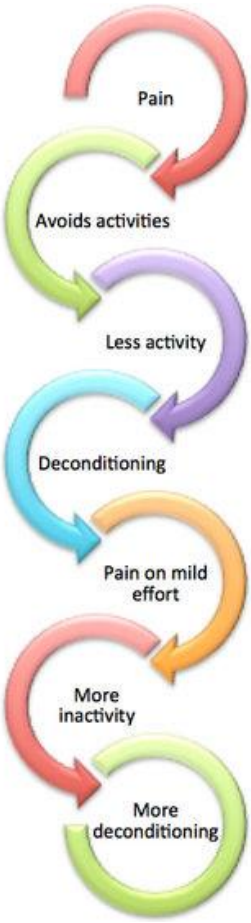


Gradual decline or boom and bust

Deconditioning tends to happen in one of two ways, a gradual decline or boom and bust.

A gradual decline happens when your activity levels decrease slowly over time as your persistent pain is triggered.

Gradually over time you do less and less and then find that you can't do as much and then do less as a result.



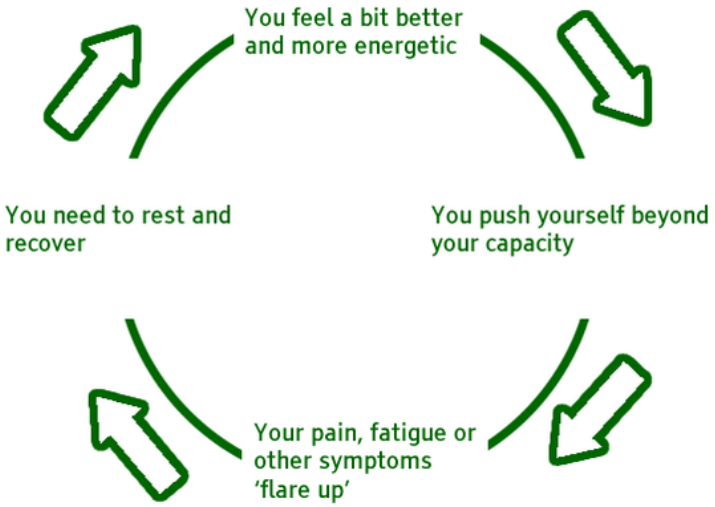
Boom and bust happens when you push yourself so much that you trigger a flare up of your pain and then need to take a rest to be able to recover.

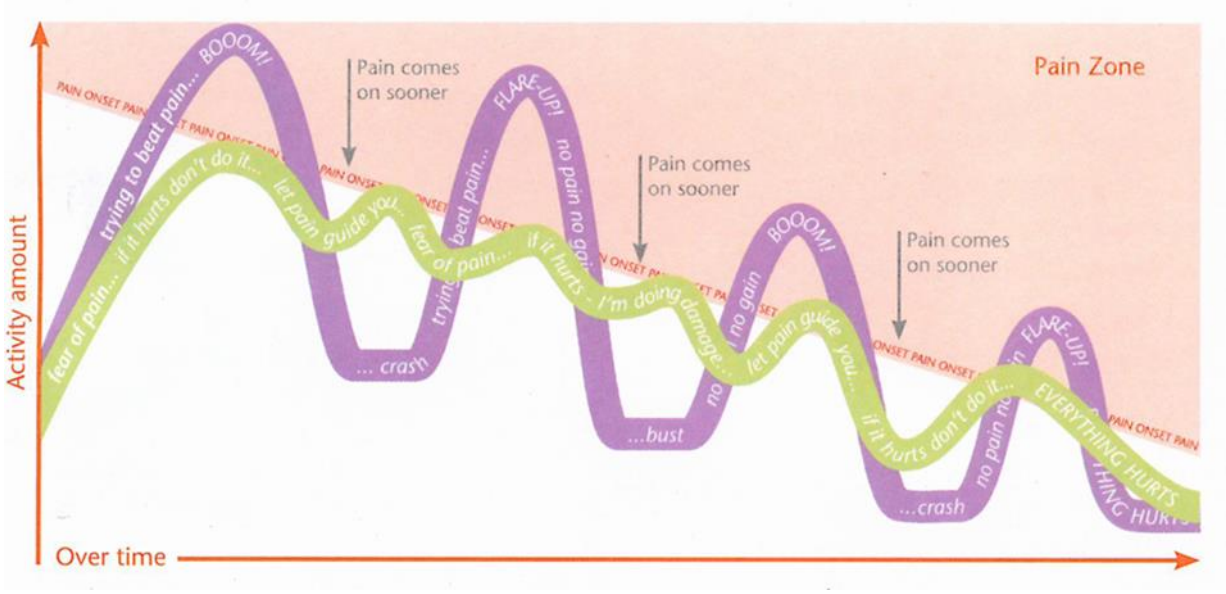
Once you feel better you push yourself again and this can then flare up your pain again leading you to rest and recover.

This pattern over time leads to deconditioning as you find that the amount that you can push yourself each time is slightly less than previously.

So over time the body still gradually deconditions.

Boom bust and gradual decline deconditioning patterns over time.





Watch the Chronic Pain and the Boom Bust Cycle video on YouTube.

Use the link, or search for 'Chronic Pain and the Boom Bust Cycle' by People in Pain Network.

Web youtube.com/watch?v=CHYM4vs32XI

Traditional approach to pain

Pain is complex. However traditional Western medicine focused on cause and effect. Something causes the symptoms and by taking the cause away the pain will go.

Western medicine also focused on separate body parts - the mind and body are seen as divided.

This narrow focus has improved our understanding in some aspects of health but in others it has clouded our view of health. There is often an expectation something is 'wrong' and a type of pill, treatment or surgery can 'fix it'.

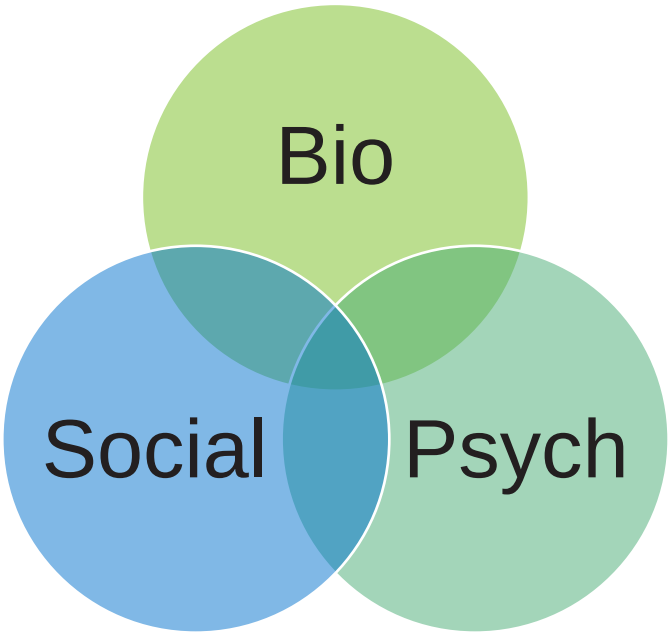
Bio-Psycho-Social Approach

Instead pain is a mixture of the person's biology, psychology and the social world they live in. Previously the medical model has focussed on biology but back in the 1970's Doctors knew that it wasn't just biology that had an impact on patient outcomes.

The person's thoughts, feelings and beliefs could affect how treatments were adhered to and how successful they were.

But we do not live in isolation so a person's experiences and social world (inequality, discrimination, education, relationships, community, environment, pollution, etc.) will impact on a person and their health and wellbeing including pain.

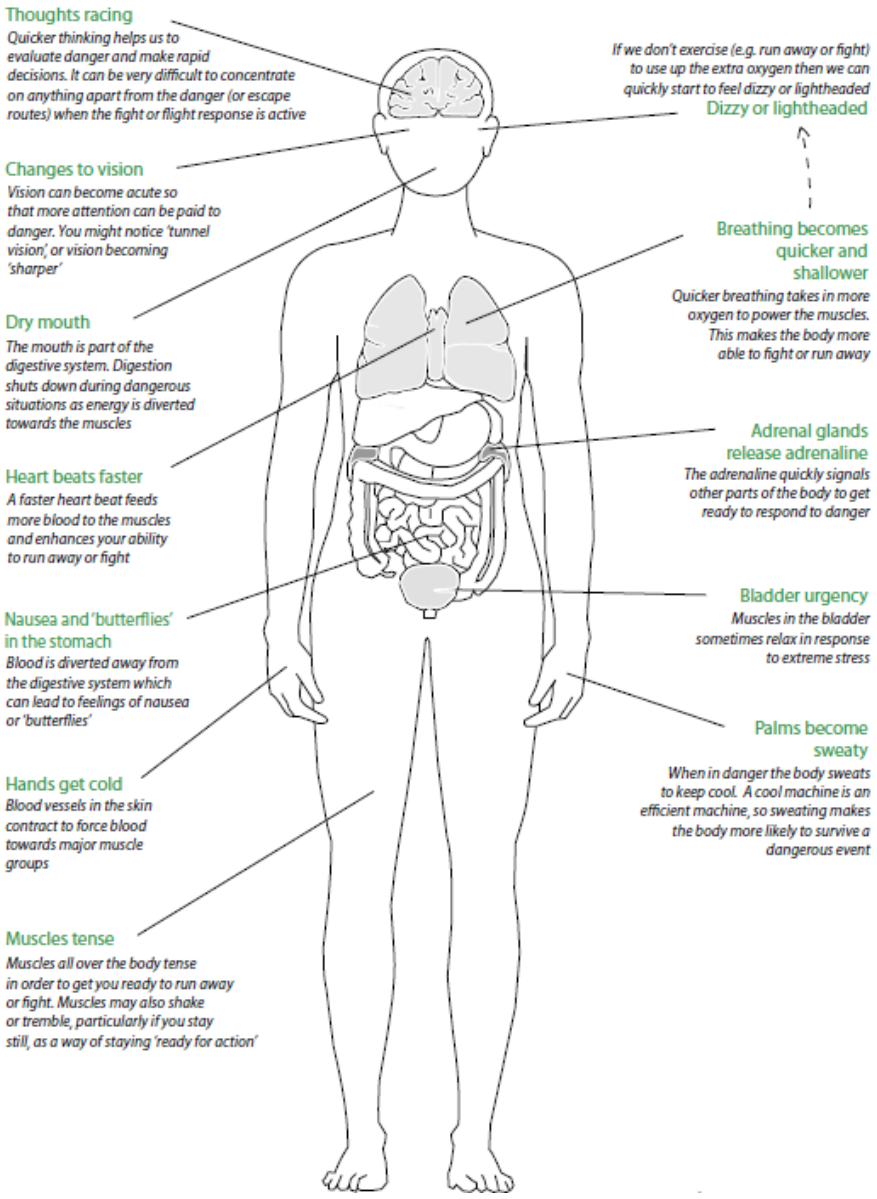
This approach underpins how we work in IPASS and the treatments we offer.



Stress Response – What is it, and what does it look like in the body?

When the body detects a potential threat to life, it also triggers the stress response in the body. This is an automatic process that gets the body ready to react to danger (fight or flight).

This is a very important evolutionary process that has allowed humans to survive and get to the top of the food chain despite not being the biggest or strongest animal. Pain triggers the fight or flight response.



We actually FAFF – Freeze, Appease, Fight and Flight.

Response	Examples of response in a life or death situation….	Examples of what the response may look like in response to pain….
Freeze	Playing dead Disassociation from what is happening	Feeling completely overwhelmed and don't know what to do Doing nothing
Appease	This is a social response so might be giving in to somebody to prevent further argument or threat	This is a social response so in the context of pain it might be agreeing to do sets of exercises from the Physiotherapist even though you may not want to do them
Fight	Staying put and dealing with it	Pushing through the pain Getting frustrated by the pain
Flight	Running away	Trying to avoid the pain by not moving Taking pain medication to reduce it

These reactions were helpful when we were cavemen and threats were very real and often did mean life or death. The frontal lobe, the thinking part of the brain is switched off during fight or flight. These actions are instinctive and automatic as the brain and body didn't want you to be able to think about action, it wanted you to act.

However, in the modern world that we live in our threat system can be triggered by many different stresses and the system can react to them as if they are life and death situations. These can be big things like financial difficulties, redundancy, relationship breakdown or health scares. But can also be tiny things (known as micro stresses) that we wouldn't necessarily think would trigger this system like the alarm clock going off when you're not ready to wake up, emails pinging, a negative news report, losing your keys, the milk going off, your child refusing to eat breakfast or getting caught in traffic making you late.

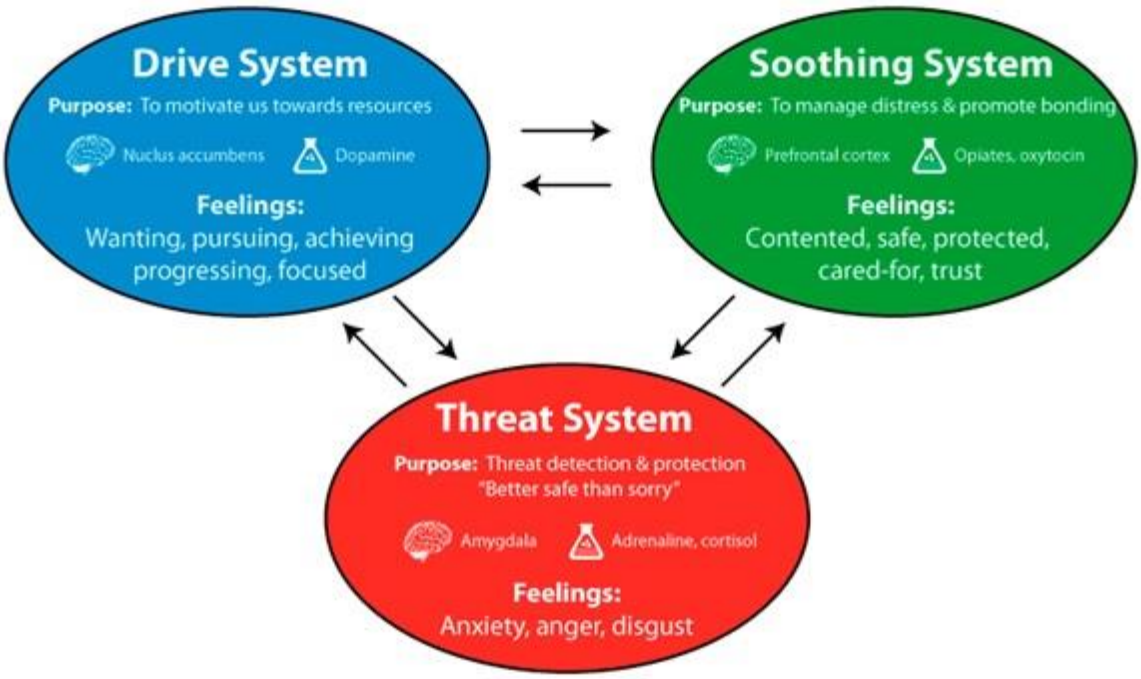
Stress and pain work together, both systems are triggered as a response to possible danger to keep our bodies safe. And pain is seen by the body as a threat in of itself. The more time spent in threat the quicker you can access it and less is needed to trigger the release of adrenaline and cortisol. As there are so many things that can trigger this system, we can get used to experiencing the stress response and even not be aware that we are in it. This system is designed to only be on for short periods of time so if it is being triggered often can lead to exhaustion and pain, creating vicious cycles.

Emotion Regulation Systems – Threat, Drive, Soothe

Although humans evolved to be ‘threat focused’ to any potential danger we also have the drive and soothing system to help us regulate our bodies and emotions.

The drive system helps to motivate us as dopamine can give us a ‘yay’ feeling that can make us feel good and of course we like this feeling. This system can be triggered by many different things some of which are good for us and some that over the long term are not so good for us. Movement and activity including exercise, having good quality sleep, listening to music, mindfulness and sunlight can all increase dopamine levels naturally. Many drugs trigger dopamine release including illegal drugs such as cocaine and amphetamines but also legal substances including nicotine, opioids and alcohol.

The soothing system helps to calm down the threat system and when activated can release hormones including oxytocin which have a natural pain-relieving effect on the body. It is about feeling safe and connected to others. It can be activated by a variety of social activities and alone activities that create a sense of safety and contentment. See examples listed on the next page.



Triggered by:

Threat

Stress

Pain

Difficult thoughts and feelings

Fears

Health Scares

Change

Uncertainty

Memories

Triggered by:

Success, winning, movement, good quality sleep, listening to music, mindfulness, sunlight, food we like, ticking things off a to do list, social media, learning new things.

Legal and illegal drugs including cocaine, amphetamines, nicotine and alcohol.

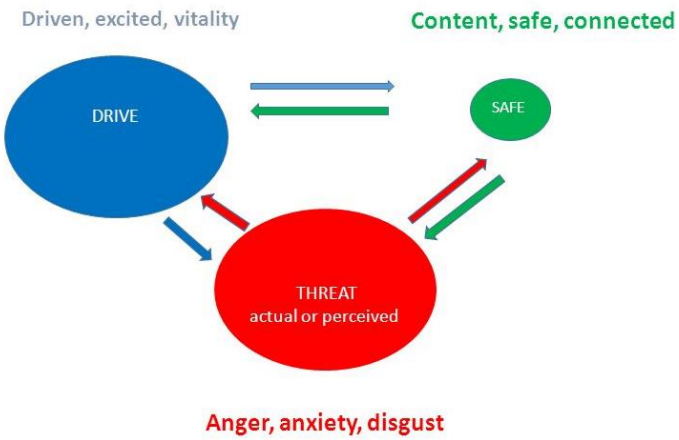
Triggered by:

Breathing, mindfulness, visualisation exercises, particular smells, particular music, hugs, laughter, group singing, massage, helping others, nature, movement (low impact exercise such as Tai Chi and Yoga), time with loved ones, trust and belief in treatment and professionals.

Where we would ideally like to be is to have these systems in balance. However, for a range of reasons they are often out of balance. Usually the threat is bigger while the soothe is smaller, especially in this modern world and because of this it can be usual to bounce between the threat and drive systems.

This results in increased sensitivity of the nervous system and less soothe chemicals being released to calm down the nervous system.

Through understanding these systems and doing things which can help you to find more balance between these systems then it can lead to better pain management.



Primary Pain

The words you would use to describe your pain:

flickering	quivering	beating	jumping	flashing
pricking	boring	drilling	cutting	lacerating
mild	aching	constant	deep	superficial
intense	dull	tugging	wrenching	pins & needles
scalding	tingling	smarting	stinging	hurting
heavy	taut	rasping	splitting	tiring
exhausting	sickening	suffocating	fearful	frightful
terrifying	punishing	grueling	cruel	vicious
killing	wretched	binding	annoying	troublesome
miserable	intense	unbearable	spreading	penetrating
piercing	tight	numb	drawing	squeezing
tearing	cool	cold	freezing	nagging
nauseating	agonizing	dreadful	torturing	trigger points
electrical	lightening	bolts	pressing	excruciating
pounding	cramping	tight	crushing	piercing
knot-like	pinching	pulling	shooting	stretching
tender	gnawing	swollen	stinging	distressing
horrible	burning	stabbing	searing	lancinating
radiating	pulsing	throbbing	prickly	itchy
waves	sore	sharp	hot	intermittent

Secondary Suffering

All the reactions to the unpleasant sensations – mentally, emotionally and physically.

The additional impact that the pain can have on your life.

These add to the pain experience leading to you being overwhelmed/lost behind to the point that they can take over your life.

Stress	Exhaustion	Depression	Anxiety	Fatigue
Sleep Issues	Frustration	Anger	Grief	Loss
Restriction	Inactivity	Deconditioning	Less motivation	Withdrawal
Isolation	Loss of identity	Worrying	Guilt	Avoiding
Self-esteem affected	Poor concentration	Medication side effects	Quality of life affected	Comparing to old life
Impacts on:	Finances	Work	Leisure	Relationships
Thoughts:	Catastrophising	Negative	Overwhelming	Ruminating

Can you identify your primary pain:

Secondary suffering

We may not be able to take away or do anything about the primary pain BUT we can influence and reduce the secondary suffering. When we reduce the secondary suffering, the pain becomes easier to bare. We feel more able to cope and our lives are less controlled and dictated to by our pain.

The truth about x-rays and scans

Reaching a medical diagnosis is a little bit like piecing together a jigsaw puzzle. When you visit a medical professional, your assessment will consist of identifying several ‘puzzle pieces’ which when put together can show you the ‘bigger picture’. Sometimes investigations such as x-rays and scans may be helpful to provide more ‘puzzle pieces’ but are only one piece of the puzzle.

It is important to know that:

- X-rays and scans are usually only required to rule out a suspected pathology or to establish if a treatment intervention such as an injection or surgery is appropriate. For example, if a pattern of symptoms indicate that an individual may have nerve root compression an MRI may confirm this and a nerve root block injection (or surgery) may be offered.
- You can’t see pain on X-rays or scans and many people are disappointed that they don’t get a diagnosis or a clear indication of what is causing their pain.
- Research has indicated that X-rays and scans for reassurance can lead to worse long-term outcomes. They may report changes which are just a normal part of being alive and don’t have to hurt. In addition, these changes don’t necessarily have to stop anyone leading a very functional and active life.
- Age-related changes (called degenerative or arthritic changes) are a normal finding, especially for an older person. Age-related changes in our spines can be observed from the age of 20 and are considered normal.
- Structure and pain don’t always equate. The table below shows some examples of studies involving X-rays and scan results which demonstrate just as many people without pain (asymptomatic) have what would be considered structural abnormalities.

Some pain experiences do include tissue injury or disease. Even if tissue damage is identified the pain will still be due to a mixture of biology, psychology and social factors.

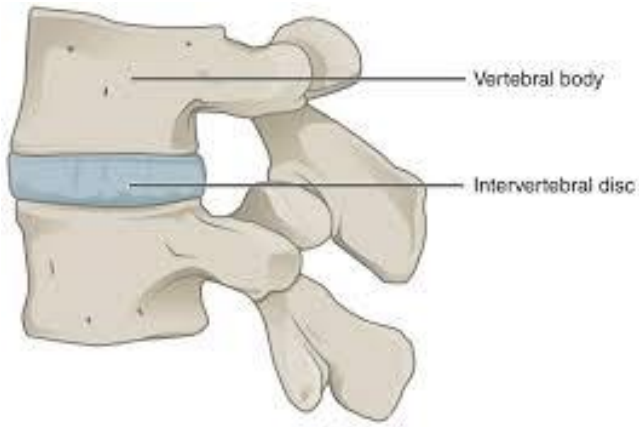
The problem with language

How we talk about pain is important. Language affects how we feel and understand our pain. Terms like slipped disc, crumbling spine, degenerating disc disease, lifelong condition, bone on bone will affect how we feel about our pain and can even intensify the level of pain. Just talking about pain can increase the likelihood that you will feel pain.

Slipped disc

Discs have become so famous and blamed for so much that people often think about them in isolation. Discs are strong and resilient tissues made of the same material as your ear. They are surrounded with strong ligaments, just like the ligaments in your ankle.

Disc injuries attract adjectives like ‘ruptured’, ‘crumbling’, degenerative’, herniated; and ‘slipped’ – these words alone are strong enough to stop you moving properly and they may not be giving you a true indication of what is happening in the disc. Discs are, in fact, firmly attached to the adjacent bones so they don’t ‘slip’.



Lateral view

Although discs never ‘slip’ they do age (degenerate), bulge, herniate, and only sometimes squeeze onto a nerve or release chemicals that irritate a nerve. Despite these dramatic sounding changes this does not necessarily alarm the nervous system (see table above demonstrating these changes in asymptomatic individuals).

“Crumbling spine, arthritic changes, bone on bone”

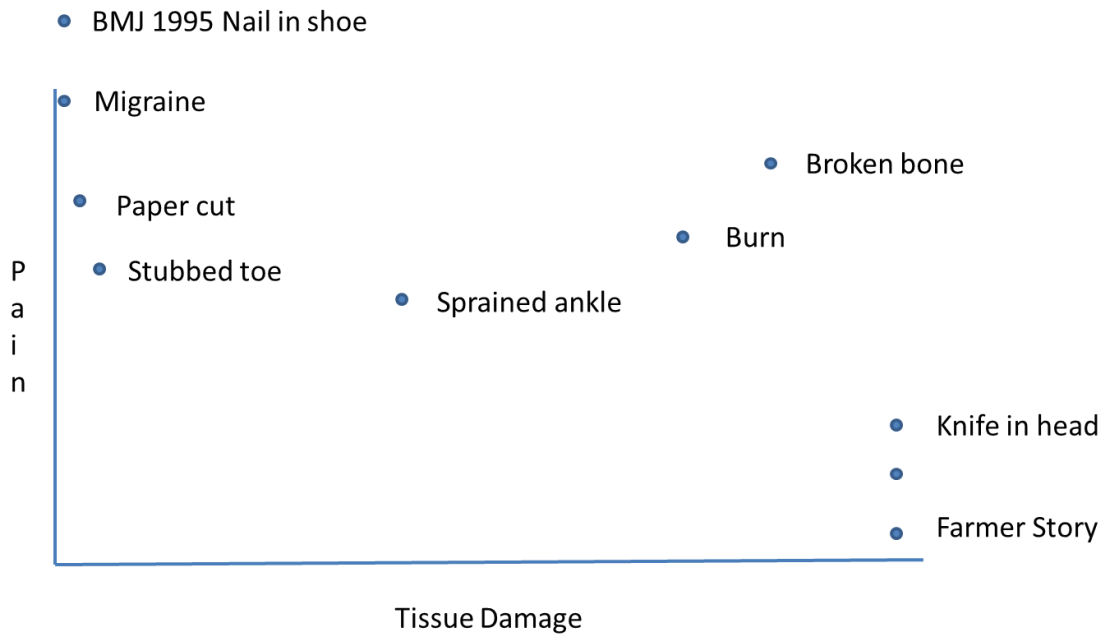
Bones are not brittle tissues and they absorb pressures well. Bones will adapt and change their shape in response to the body’s needs. Bones are living, healing structures that require movement and load for health. Broken bones (factures) can heal, sometimes stronger than before. The repair process is powerful – and most of it is accomplished within six weeks.

Our bones and joints are not attractive when X-rayed, especially if we are a bit older. We all have worn joint surfaces and little bony outgrowths. A person with a horrible looking X-ray may have no pain and a person with a pristine X-ray could be in agony. Pain could be in the left knee, yet the right knee has the worst X-ray.

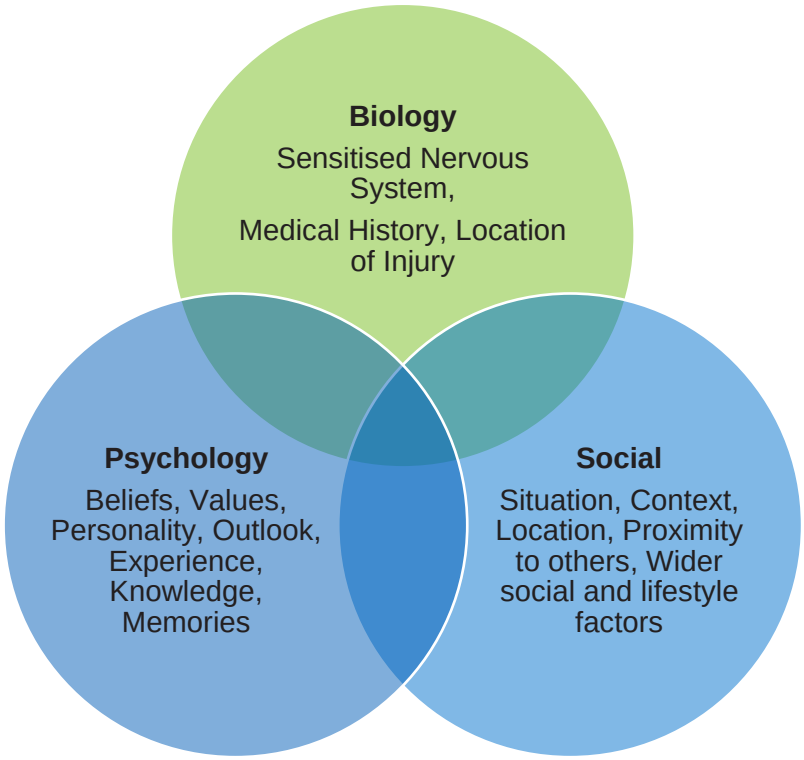
In many cases, bone and joint changes are likely to be normal age-related changes. An important factor related to bone, joints and pain seems to be the speed at which they are damaged – if the changes are slow over time, the brain probably concludes that there is no real danger. Dislocations and fractures are nearly always painful, however most people with worn joints never know about it.

Damage and Pain don’t always equate

Pain like any other of our senses is not always accurate. For example, visual illusions, or feeling hunger after just eating. The graph below can help to illustrate how pain and damage do not always equate with each other. There can be lots of pain with little or no damage or considerable damage with little or no pain.



Things that can affect the intensity of pain include



Everyone experiences pain differently due to this.

Why? Pain relies on context

Sensory information, (any information coming from your senses, such as vision and touch) needs to be evaluated by your nervous system. Evaluation of these cues involves complex memory, reasoning and emotional processes, and must include consideration of the potential consequences of a response. This all happens subconsciously and very quickly.

The context of the pain experience is critical. For example, a minor hand injury to violinist will cause more pain than a dancer because the damage poses a greater threat to the violinist. A painful stimulus will hurt more if you are told it is hot, than if you are told it is cold. In fact, just pairing a painful stimulus with a red light hurts more than when it is paired with a blue light.

Emotional and physical pain are frequently used terms which can be unhelpful. Although many people tend to separate these pains, the processing in the brain is similar. Remember that we can't separate the body and the mind, they are connected and influence each other. So grief or rejection from a loved one will lead to physical changes in muscle tension and altered immune functioning. To effectively deal with pain, it is important to understand the context.

Calming down the body

When the stress response (fight or flight) is triggered our heartrate increases and our breathing becomes quicker and shallower, using only the top part of our lungs. We can control our heartrate and calm down the body using several different things. If we can do this then it can enable us to step out of threat mode and switch on our thinking part of the brain (the frontal lobe) to be able to think about what it is, we need in a certain situation.

Breathing

Breathing is the most powerful tool at your disposal to calm down the body. It's free and it's always with you but it's not a quick fix and needs practice to be effective.

Watch the How to Breath TEDx video by Belisa Vranich on YouTube.

Use the link, or search for 'How to breathe, Belisa Vranich'

Web youtube.com/watch?v=1sgb2cUqFiY

Abdominal Breathing

Just as you can learn to ride a bike or play the piano, you can also train your body to improve its' breathing technique. Abdominal breathing (or diaphragmatic breathing) allows the lungs to expand more fully, and to pass on the good things from the breath, to the blood, and into the body.

As with any new skill, the more you practice, the better you will get at it, and the more benefit you will gain. Here's how to do it:

1. Put one hand on your chest, and the other on your belly
2. Without trying to change anything, take a few breaths and observe where the movement is in your body by watching your hands rise and fall.
3. Now see if you can 'invite' the breath down into the belly, so that as you inhale, the hand on your belly rises. As you exhale, and gently contract your abdominal muscles, this expels the remaining air from the lungs, and you will see the hand on your belly fall.
4. Another way to 'watch' the movement, is to place both hands on your belly with your fingertips just touching. As you breathe in, the fingertips should move gently apart, and as you breathe out the fingertips should come back to touching or overlapping slightly.
5. Remember – we deepen our breathing not by inhaling more air, but through completely exhaling it. Once you get the hang of abdominal breathing, you can add in counting to yourself as you breathe in and out and try to ensure that the exhale is a couple of counts longer than the inhale. So, you could breathe in for a count of 3 and out for 5. Just find whatever works for you.

We're not suggesting that you try to breathe like this all the time. Try to practice this at home for 5 minutes, at least once a day. If you find it hard, strange, uncomfortable or become lightheaded – try not to give up – this is normal! If you find yourself getting frustrated – take a breath – come back and try another time.

As you get more practised at it, you may start to find that it will help with relaxation, give you a sense of improved well-being, and it will also form the foundation for some of the mindfulness exercises that we cover in the pain management group.

Cold water

In fight or flight our heartrate increases and often we can find that our body temperature increases and/or we start sweating. If we can reduce our body temperature, then this will have a direct effect on reducing the heartrate. The best way to reduce our body temperature is to put our whole face (holding our breath) into a bowl of cold water which causes the divers reflex and has an immediate reaction on lowering the body temperature.

If you don't fancy that then running cold water on the wrists or holding a bottle of cold water or ice against the wrists can have a good effect on reducing the body temperature. Some patients have found ways to integrate this into their daily routine and have found it helpful. One person had to regularly wash their hands at work and found putting their wrists under the cold water for 30 seconds afterwards helped his body to calm down. Another person carried a bottle of ice around with them and every time they noticed their anxiety and or pain increase, they held the bottle against their wrists and found this helped them.

Movement

The stress response is preparing the body to fight or run away and so some brief intense exercise or shaking the whole body from top to toe can be helpful in resetting the nervous system and calming down the body. This one is very individual and is unlikely to be suitable for everyone with a persistent pain condition, but this may be useful for some people in finding a practical way to help the body to step out of threat.

Key messages

Pain is real	Pain is complex	Pain is biology, psychology and the social world combined together
Nervous system can become oversensitive	Pain and damage don't always equate	Deconditioning can occur when we stop moving dur to pain
Returning to previous levels of activity too quickly can flare up pain	Balancing Threat, Drive and Soothe can help manage pain	You may never get rid of the Primary pain but can reduce the Secondary Suffering

Find out more

Websites

Retrain pain retrainpain.org/

Pain Management Network - aci.health.nsw.gov.au/chronic-pain/for-everyone

The Pain Toolkit - paintoolkit.org/

Ways to manage chronic pain - nhs.uk/live-well/healthy-body/ways-to-manage-chronic-pain/

NICE Clinical Guidelines nice.org.uk/guidance/ng193

Talking Therapies talkingtherapies.berkshirehealthcare.nhs.uk/

Watch

Use the video links, or search for them on YouTube using the video titles.

Length	Title	Link
5 min	Understanding pain and what to do about it	youtube.com/watch?v=C_3phB93rvI
5 min	Tame the beast	youtube.com/watch?v=ikUzvSph7Z4
9 min	23 and ½ hours	youtube.com/watch?v=aUaInS6HIGo
15 min	Why things hurt- Lorimer Mosley	youtube.com/watch?v=gwd-wLdIHjs
15 min	How to make stress your friend- Kelly McGonigal	ted.com/talks/kelly_mcgonigal_how_to_make_stress_your_friend?language=en
18 min	Fadel Zeidan - A different approach to pain management	youtube.com/watch?v=OLQJJDrbj6Q
20 min each	Being Brilliant everyday Parts 1 and 2 - Alan Watkins	youtube.com/watch?v=q06YIWCR2Js

Read

The Huffington Post: After 12 years of chronic pain, I'm ditching my search for a miracle cure

Popsugar: Here's How Anxiety Could Be the Root of Your Chronic Pain