Wisconsin Public Psychiatry Network Teleconference (WPPNT)

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WPPNT Reminders

How to join the Zoom webinar

- **Online:** https://dhswi.zoom.us/j/82980742956
- **Phone:** 301-715-8592
  - Enter the Webinar ID: 829 8074 2956#.
  - Press # again to join. (There is no participant ID)

Reminders for participants

- Join online or by phone by 11 a.m. Central and wait for the host to start the webinar. Your camera and audio/microphone are disabled.
- Download or view the presentation materials. The evaluation survey opens at 11:59 a.m. the day of the presentation.
- Ask questions to the presenter(s) in the Zoom Q&A window. Each presenter will decide when to address questions. People who join by phone cannot ask questions.
- Use Zoom chat messages to communicate with the WPPNT coordinator or to share information related to the presentation.

- Participate live or view the recording to earn continuing education hours (CEHs). Complete the evaluation survey within two weeks of the live presentation and confirmation of your CEH will be returned by email.
- A link to the video recording of the presentation is posted within four business days of the presentation.
- Presentation materials, evaluations, and video recordings are on the WPPNT webpage: https://www.dhs.wisconsin.gov/wppnt/2021.htm.

A Real Pain in the Brain (and Nervous System):

New Scientific Understandings of Chronic Pain

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All Pain Is REAL, Whether it be Structural or Otherwise!

"Anyone who says your pain isn't real or the pain is all in your head is either cruel, ignorant, or both. It implies that you are crazy or mentally ill which is obviously not true."

-Dr. Howard Schubiner

Structural vs Non-Structural: Both are Real and Both are Painful

Structural

- Tumors
- Physical Injury (broken bones, fracture, sprains, strains, bruises)
- Immune Response (ex. Virus)*
- Nerve damage
- Cancer
- Autoimmune *

Non-Structural

- Fibromyalgia
- Migraines
- IBS
- Back pain, neck pain, knee pain, pelvic pain etc.
- Chronic Fatigue

To Pain Patients' Detriment, The Medical Model Largely Views and Treats All Chronic Pain as Structural Pain—but WHY???

Enter: The 5th Vital Sign

- In 1950 doctors were concerned with four vital signs: body temperature, blood pressure, heart rate, and respiratory rate
- Pain was viewed as unimportant and only as a symptom of an underlying condition
- Anyone who had pain without an identifiable cause was thought to be "crazy"
- Many doctors became concerned that their patients' pain wasn't being addressed
- They advocated for the introduction of the 5th Vital sign, which is a patient's current level of pain

The 5th Vital Sign cont

- Suddenly doctors had a huge problem on their hands due to the large amount of patients with chronic pain, and being untrained in how to help
- This is when doctors started ordering pills, imaging, surgeries and physical therapy
- Due to advances in modern technology doctors can dig to find something that could be the cause of pain
- However, we now know that imaging can show normal abnormalities which are not necessarily the cause of the pain

https://www.npr.org/programs/invisibilia/701219878/the-fifth-vital-sign

Prevent Yourself from becoming a VOMIT

Victim of Medical Imaging Technology

Medical imaging procedures such as MRI's, cat scans, ultrasounds, x- rays can be very valuable for identifying serious medical conditions such as fractures, dislocations, and spinal cord injuries.

However, minor findings are of little to no value to explain the majority of aches and pains. Studies show that from a psychological point of view, the findings are actually harmful. Those patients that became a victim of VOMIT had more doctors visits, longer lasting pain, more disability, and a lower sense of well being

“Structural” conditions with NO pain

- A study of lumbar spine amongst healthy 20 to 22 year olds with no back pain found that 48% had one degenerative disc and 25% had a bulging disc
- A study of the thoracic spine showed 29% of healthy adults had a disc bulge actually deforming and pressing on the spinal cord did not even know about it.
- A study of the hips revealed 77% of healthy hockey players who had no pain had hip and groin abnormalities on their MRI.
- 85% of adults with no actual knee pain have x-rays that show knee arthritis, and 48% of healthy professional basketball players had meniscal damage on their MRI with no pain.
- 40% of professional baseball pitchers had either partial or full rotator cuff tears yet had no pain while playing and remained pain free 5 years after the study
- 32% of people with no foot or heel pain have heel spurs (associated with plantar fasciitis) visible on an x-ray.
- An MRI study of healthy adults and seniors found that 98% of all men and women with no neck pain had evidence of degenerative changes in their cervical disks.

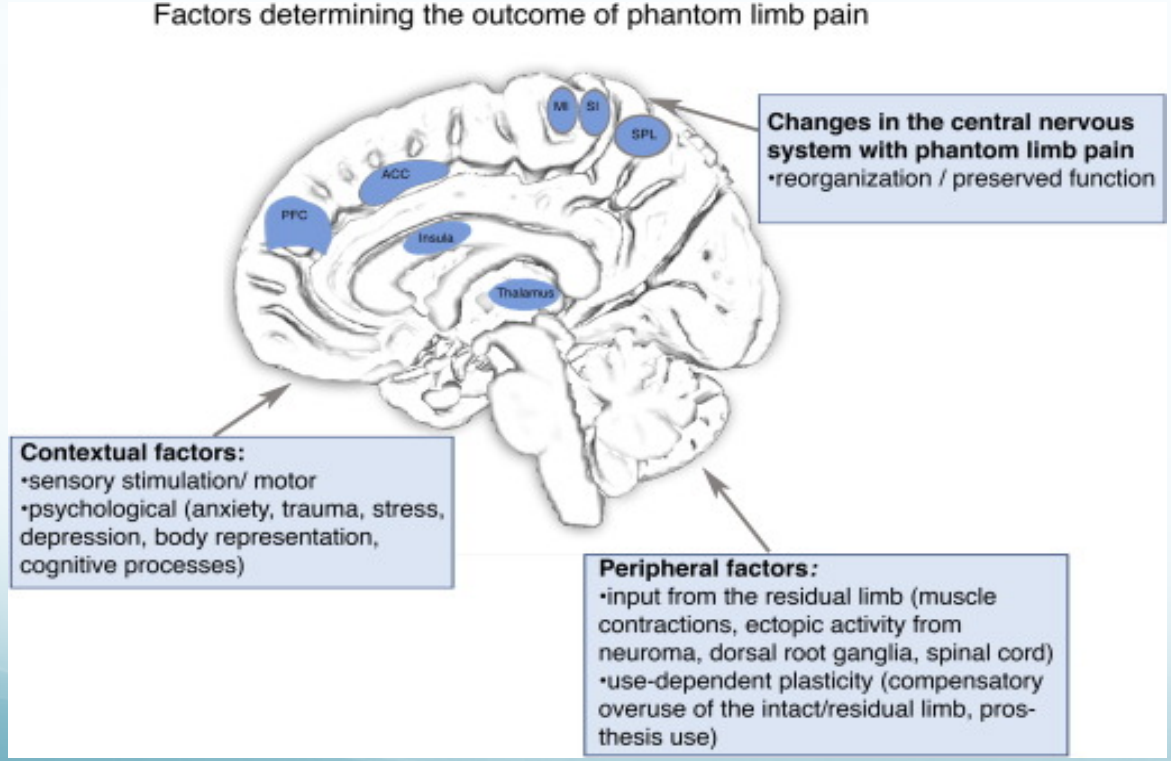
Source: Advanced Physical Therapy Education Institute (APTEI.com)

Prevalence of degenerative spine imaging findings in asymptomatic patients, n=3300

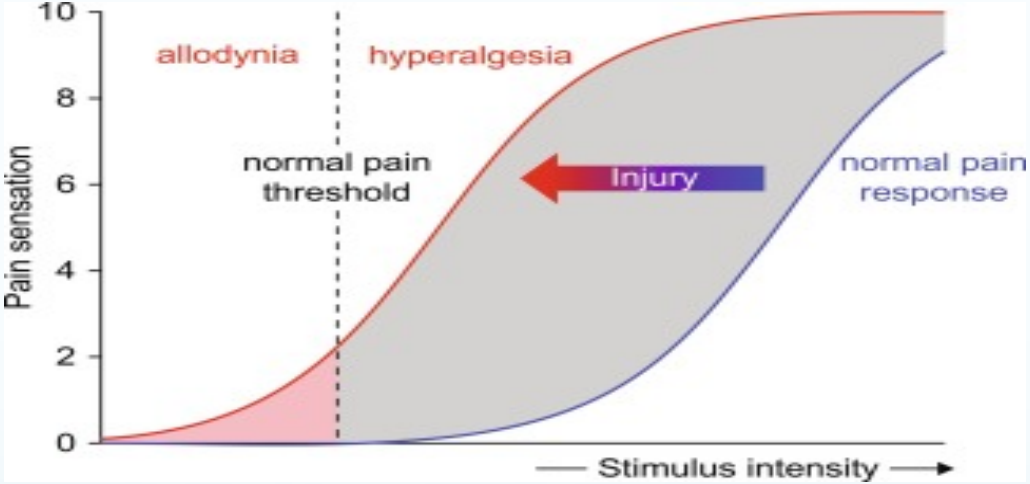
	Age (yr)						
Imaging Finding	20	30	40	50	60	70	80
Disk degeneration	37%	52%	68%	80%	88%	93%	96%
Disk bulge	30%	40%	50%	60%	69%	77%	84%
Disk protrusion	29%	31%	33%	36%	38%	40%	43%
Annular fissure	19%	20%	22%	23%	25%	27%	29%
Facet degeneration	4%	9%	18%	32%	50%	69%	83%
Spondylolisthesis	3%	5%	8%	14%	23%	35%	50%

Source:Brinjiki W, et. al. Am J Neuroradiol. 2015, 36:811-6.

Pain Without Tissue Damage



Pain Without Tissue Damage



Allodynia: pain elicited by a stimulus that normally does not cause pain

Hyperalgesia: an increased pain response produced by a stimulus that normally causes pain

Pain Gate Theory

Stimuli w/no damage

Brain of chronic pain patient will allow the pain signal to enter while most brains will block (gate) the pain signal

Stimuli with damage

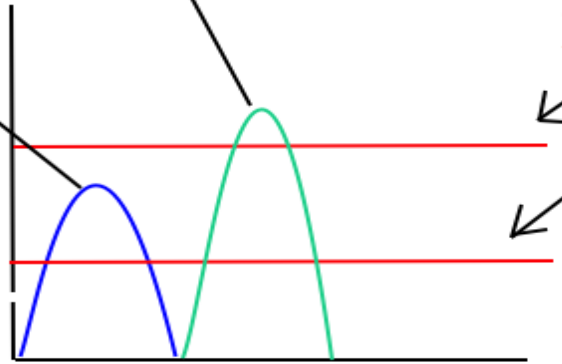
Brain of both chronic pain and normal population will allow pain signal to enter, but intensity may differ.

Factors Affecting Threshold

- ★ -Brain input
- ★ -Spinal cord input
- -Memories
- -Emotions
- -Expectations
- -Attention
- -Genetics

Threshold to perceive pain

Threshold for chronic pain syndromes



Key

- Stimulus w/tissue damage
- Stimulus no tissue damage

@drjonathanchung

Caveman

If one of our ancestors was running to chase a deer and broke their ankle, do they want pain? Yes! Without pain they would run on a broken ankle and may never hunt again because of the damage.

If they were running while being chased by a lion and broke an ankle, they would not get pain even though there is tissue damage. Their brain would decide that their protection is better served by continuing to run, and the pain would become apparent when they are away from the danger.

Nailed It

UK Nail in Boot

This man stepped on a nail at a construction site and had severe pain. He was rushed to the hospital where he was given pain meds immediately. When they removed the boot the nail had gone between his toes. There was no injury at all. His brain decided to protect him by creating severe pain.

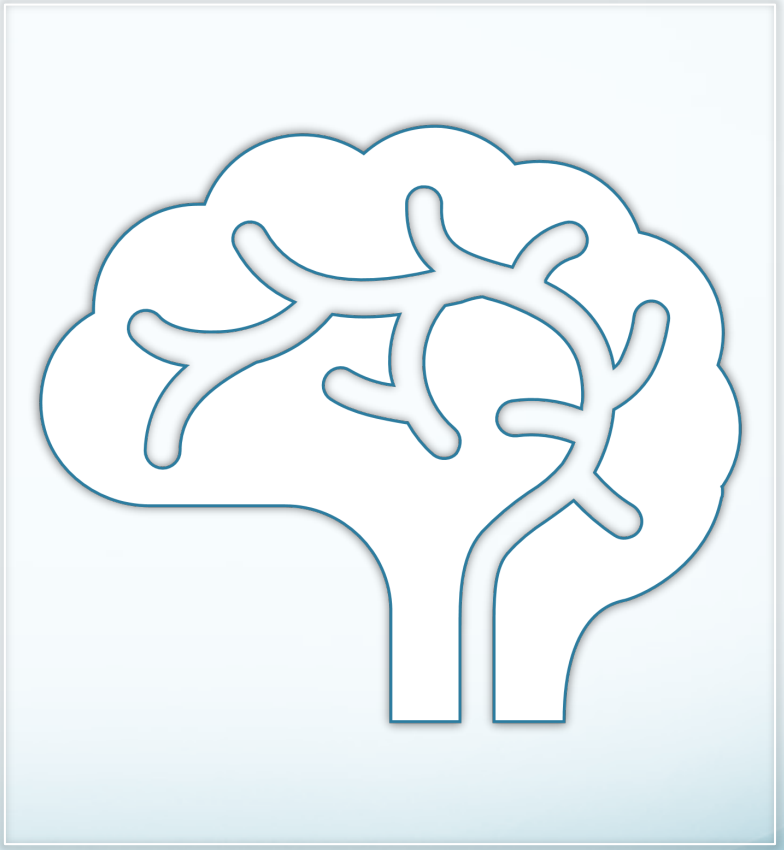
Nail in Hand

This person accidentally shot a nail into their hand while alone at a construction site. They had zero pain. Their brain decided it would be better for them to drive to the hospital than be alone in severe pain. This was a subconscious decision by their protecting brain. When they arrived at the hospital, they began to feel the pain from the nail.

Multiple Factors Coming Together

- The Role of the Brain
- The Role of Emotions
- The Role of Memory and Learning
- The Role of Early Experiences

The Role of the Brain in Pain



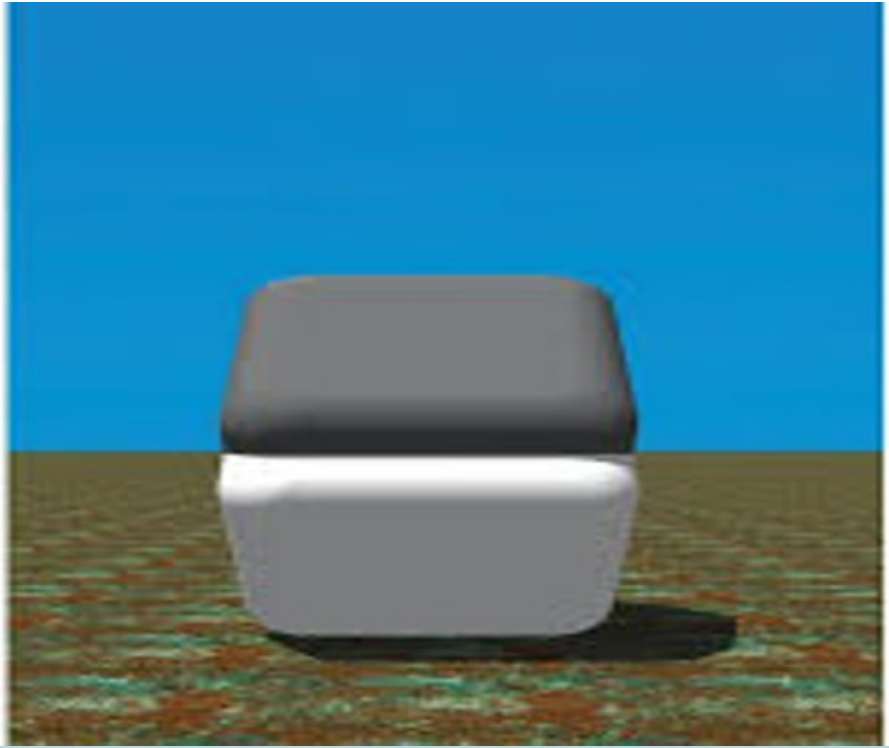
All Sensation is created by the Brain, including pain

Predictive coding: the brain creates all sensory experience The brain is by no means perfect. It can interpret safe situations as dangerous. It can also make mistakes in the way it processes sensory information.

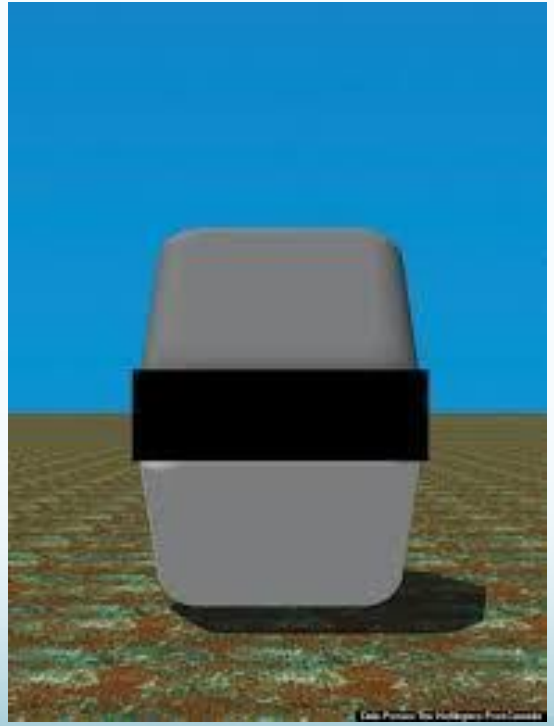
Vision is determined by the visual cortex, not the retina; Taste is determined by the primary gustatory cortex rather than the tongue; Hearing is determined by the auditory cortex, not the ear.

Examples of predictive coding: Expecting an iced tea and getting a coke can create a sensation of disgust rather than pleasure; Cornsweet Illusion; Old/Young Woman; Yanni vs. Laurel

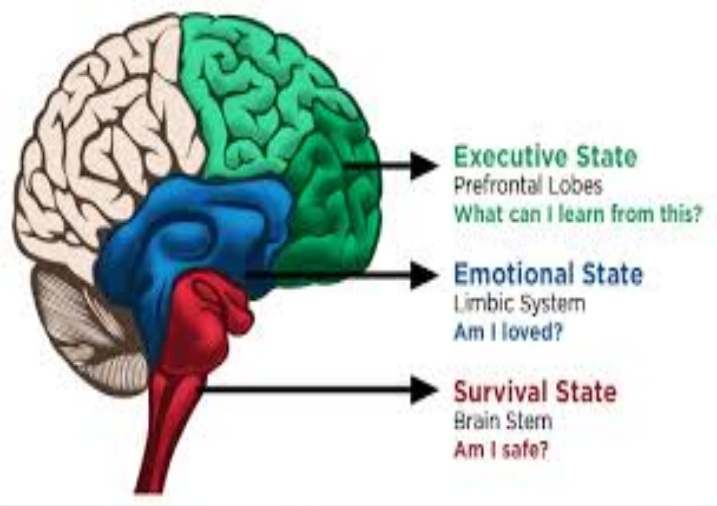
Cornsweet Illusion



The Brain Makes A Mistake



Threat Detection-Brain as Protector



Threat Detection happens completely out of our conscious awareness. 1/10th of a second!

Our brains are constantly on guard**, looking for perceived danger or threat**—this is called **"negativity bias."**

Throughout our lives, our brain, especially our lower brain function, learns and *remembers* threats.

The lower function of the brain **decides if we are generally safe or generally unsafe in the world**—this is called **"neuroception."**

The brain doesn't distinguish between physical and other types of threat. Any threat (real, perceived, or imagined/anticipated) can trigger a stress response in the brain and body.

Pain as Danger Signal

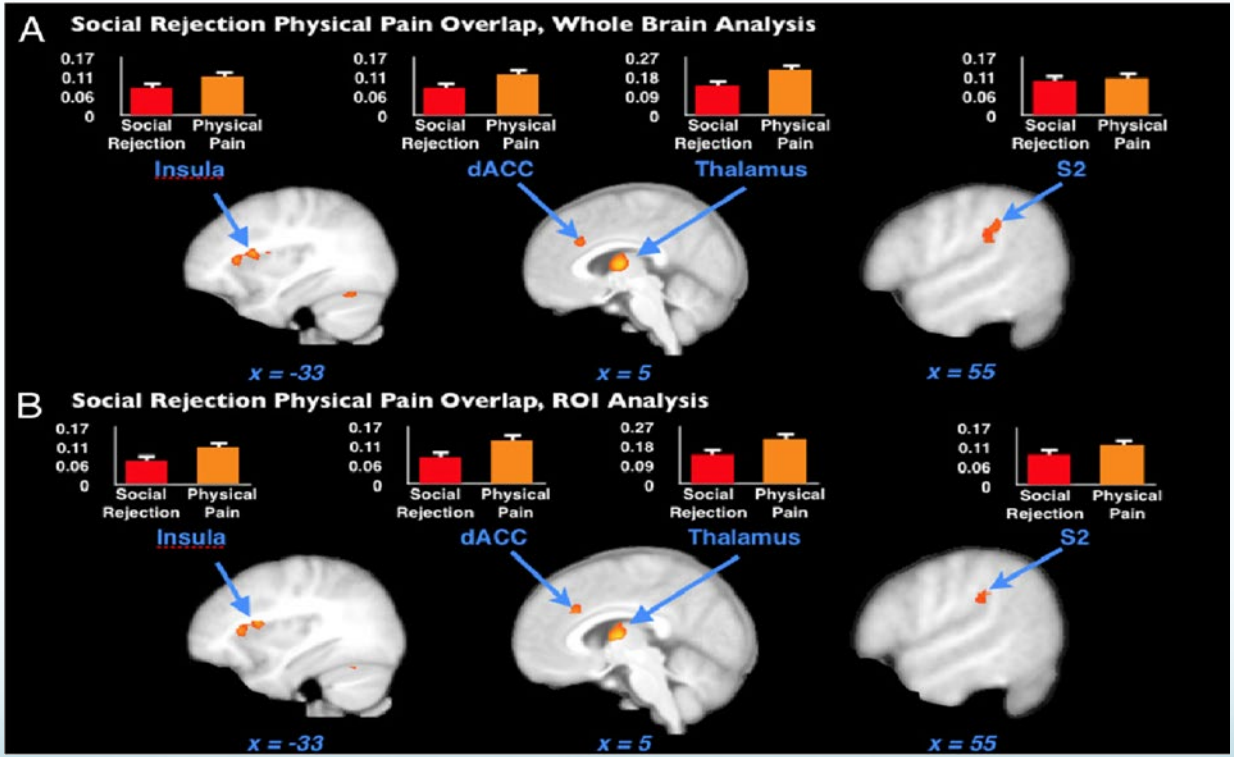
- If you put your hand on a hot stove, pain lets you know to move your hand.
- Sometimes your brain interprets things as dangerous when they are not.
- For example: If I toss you a baseball and your brain thinks it's a hand grenade, you would respond as if it was dangerous even though it is safe.
- When the brain thinks something is dangerous, it amplifies the sensation.
- Imagine you were wearing a hearing aid and I am talking at a 2 out of 10 volume. If your hearing aid is set too high, you would hear me at a 7 even though I'm only talking at a 2. Your brain interprets the signal as louder.

The Role of Emotions in Pain

- Imagine a bucket filled with shame, grief, rage, sadness, stress, and negative thinking. It hits maximum capacity and threatens to overflow.
- Without a release valve, sometimes an emotion can become too strong and overwhelms the brain.
- Because of this, the brain interprets certain emotions as threatening. Emotions themselves become seen as dangerous and the brain and body set off a cascade of physiological changes to defend against the emotion.
  - Over time, this can take the form of tension, pain, anxiety, fatigue, brain fog, and many other symptoms.

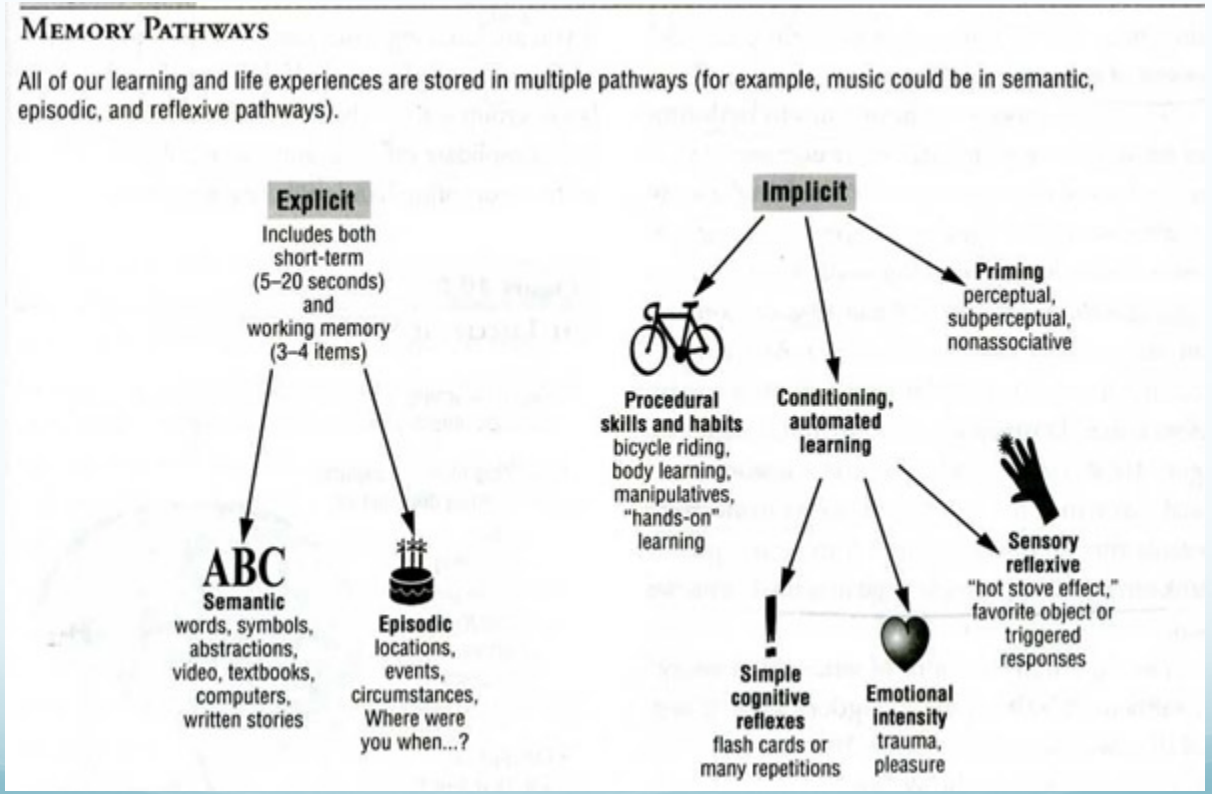
"False" alarms are just as real as "real" alarms.

Emotional pain equals physical pain



Source: Kross, et. al. PNAS. 2011, 108: 18244–18248.

The Role of Memory and Learning



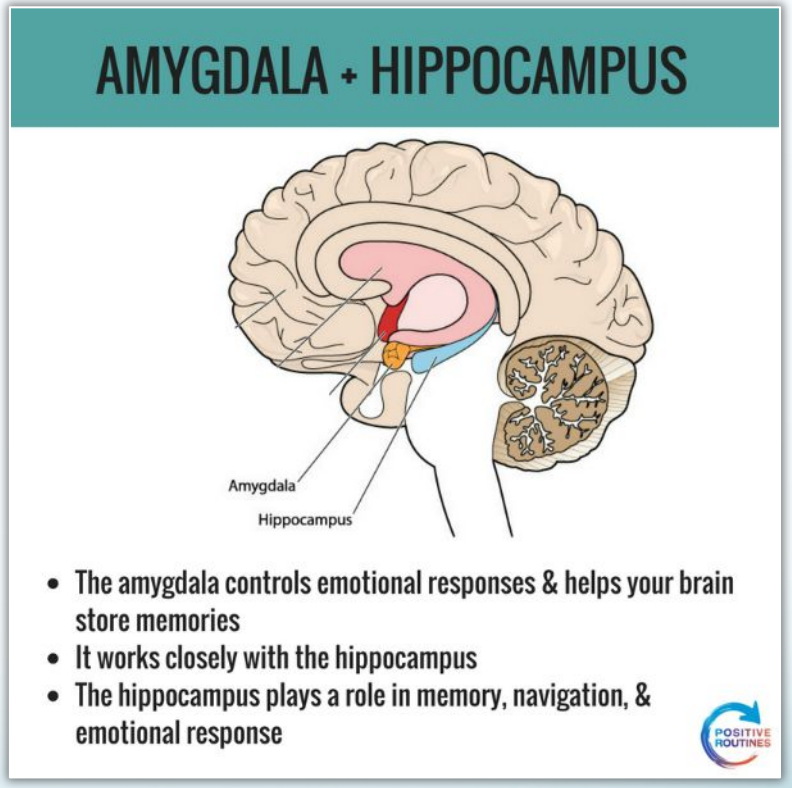
Vietnam Veteran

A woman was in the Vietnam war and got injured by shrapnel in a firefight. She had a lot of pain and got medevaced out in a helicopter. Her injuries healed, because all injuries heal. The danger signal in her brain that activated pain turned off, so she was pain free. Twenty years later she was startled by a helicopter coming up from behind her and felt the same pain from the prior shrapnel injuries. Her brain learned those neural circuits of pain, remembered them, and activated them due to the sound of the helicopter. This sound was the trigger for her pain.

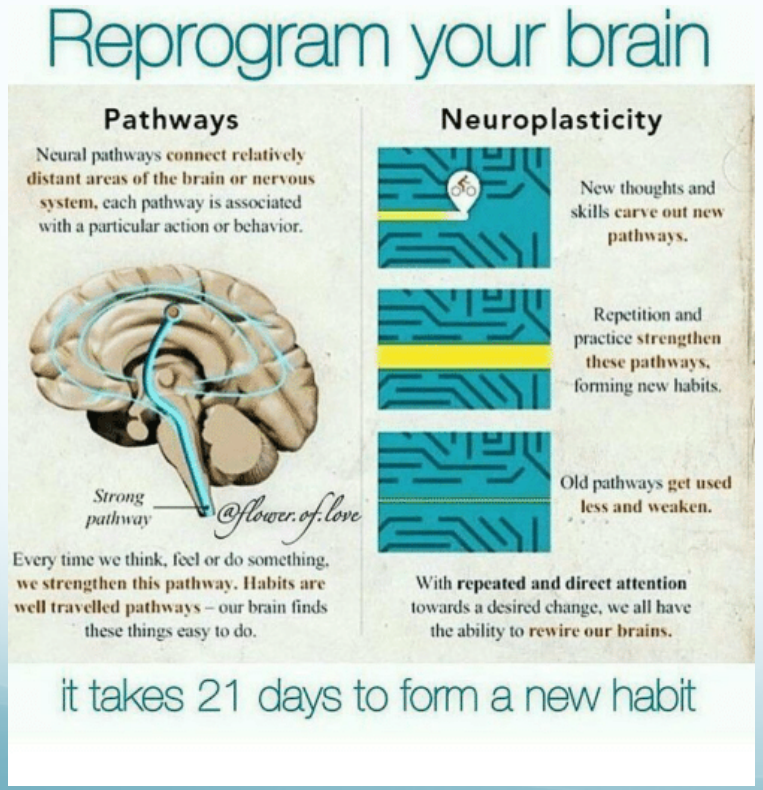
When not under stress, the hippocampus can help to “calm down” the amygdala—snake/garden hose example.

When under stress the hippocampus gets flooded with cortisol and goes offline. Not only does this mean it can’t help calm the amygdala, but it doesn’t put a “time stamp” on the memory.

The memory is stored in “implicit memory” and the brain doesn’t recognize that the danger is in the past. This is what leads to “triggers.”



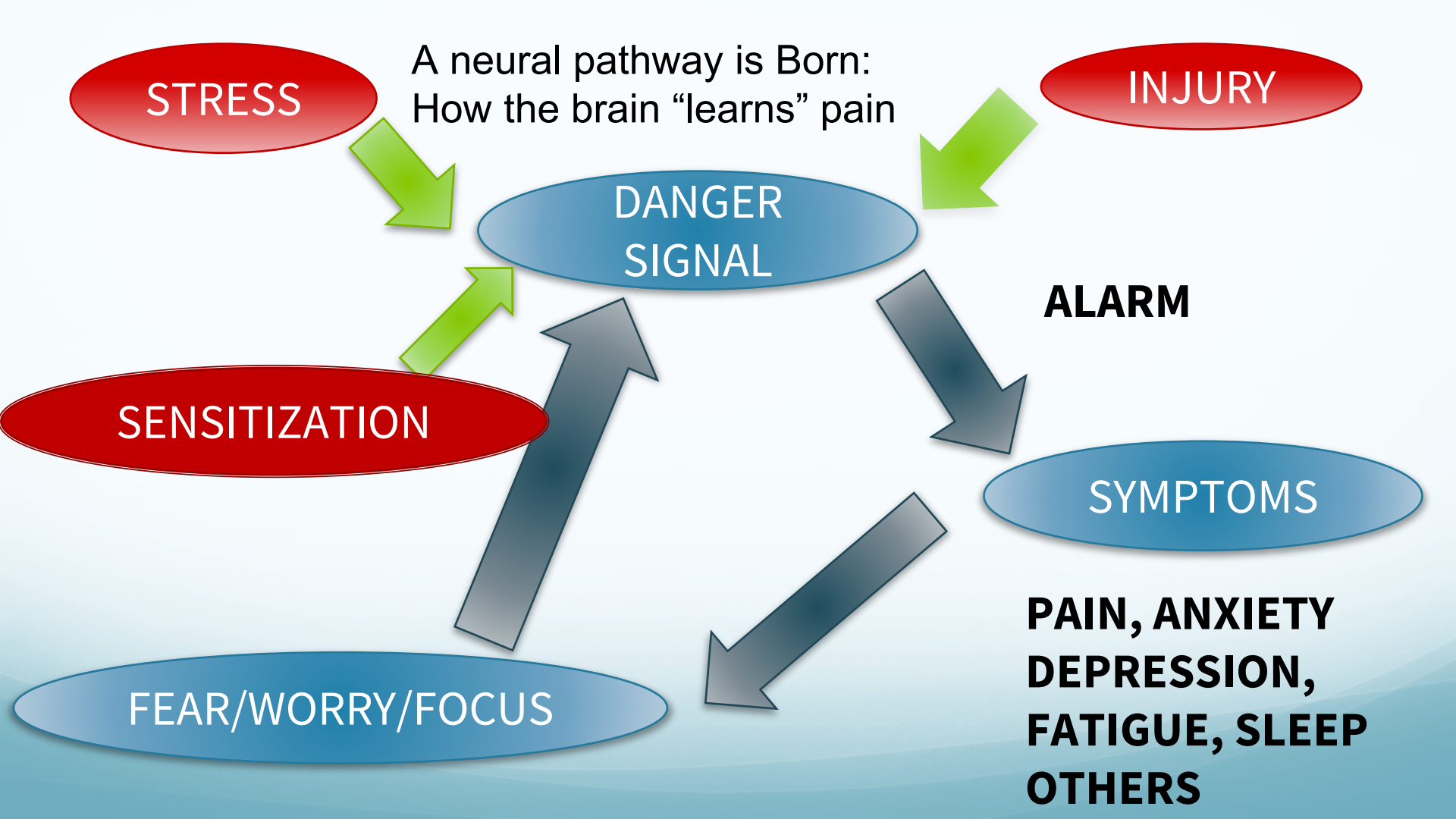
Neuroplasticity-The Learning Brain



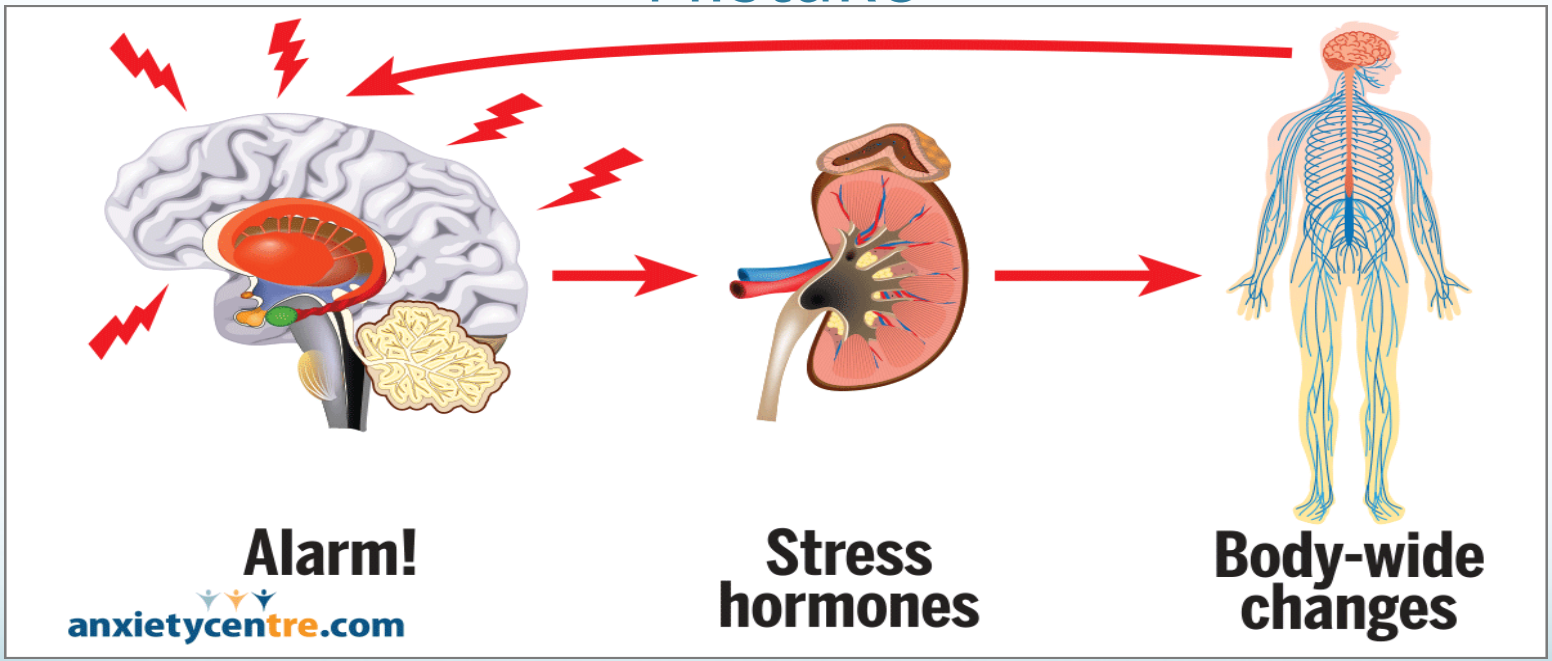
How neural pathways work--pain as a learned habit

Neural pathway pain is very common and reversible!

- learning a language
- playing the piano
- free throw experiment
- diet example

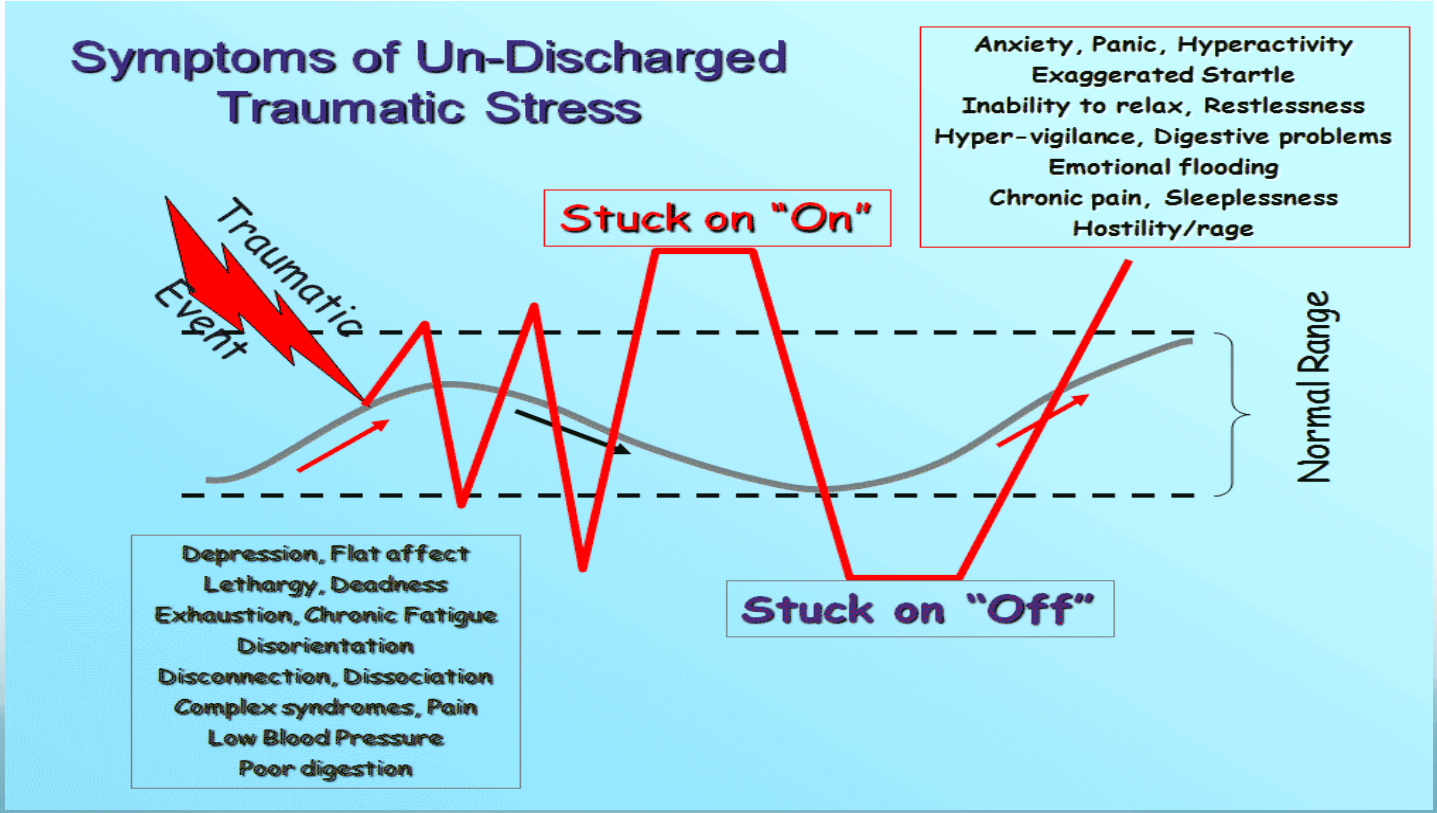

A neural pathway is Born:
How the brain “learns” pain
STRESS
INJURY
DANGER SIGNAL
ALARM
SENSITIZATION
SYMPTOMS
PAIN, ANXIETY
DEPRESSION,
FATIGUE, SLEEP
OTHERS
FEAR/WORRY/FOCUS

The Stress Response: Sometimes, the Brain Makes a Mistake



The Role of Stress in Chronic Pain: Fight, Flight, Freeze

Stress in and of itself isn't the problem. The problem is when the stress response isn't allowed to complete due to chronic stress and/or traumatic events



The Role of Childhood and other LifeExperiences

1. Human brains and nervous systems develop in tandem with the environment. Childhood stress primes the brain and nervous system to be overly reactive.

2. Teen and adult stress triggers and reinforces those same reactions and solidifies coping mechanisms along with personality traits that create increased internal pressure.

Childhood adversities such as divorce, family conflict, sexual or physical abuse along with adult experiences of victimization are common in people with chronic pain.

People develop personality traits to cope with stressful childhood experiences such as: putting more pressure on themselves, self criticism, self blame, excessive worrying, and being overly conscientious people-pleasers. They more often than most lack their own self care and self worth. These traits put people at higher risk for developing chronic pain.

3. Our unconscious brain interprets innocuous sensory information from our environment as dangerous. This danger signal sets off a cascade of physiological changes that create physical symptoms in the body. The symptoms occur due to activation in a part of the brain called the amygdala which prompts the autonomic nervous system to activate the fight, flight, or freeze response.

4. This causes increases in muscle tension, changes in blood pressure, heart rate, body temperature and neurological activity, and gastrointestinal and genitourinary activation, which lead directly to MBS symptoms.

5. This creates more activation of the danger response and a vicious cycle of learned neural pathways occurs due to increased focus, worry and attention to the symptoms.

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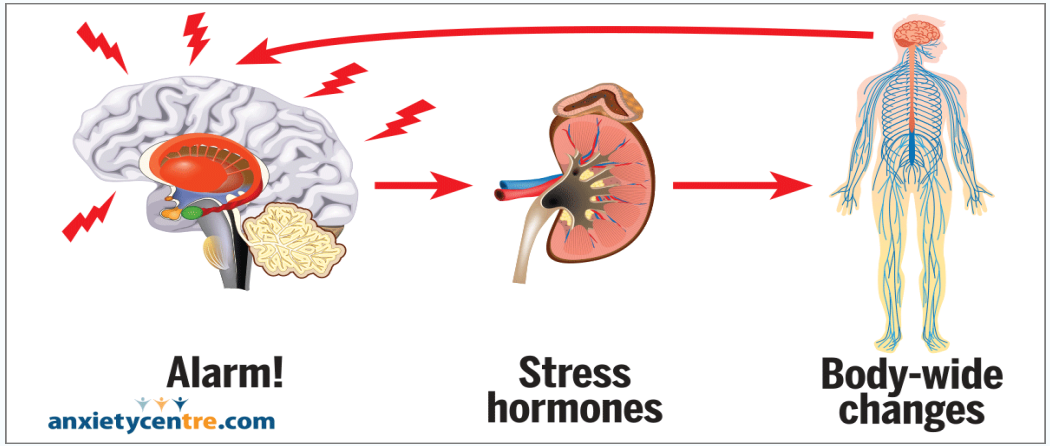
AGE
LIFE EVENT
PATHWAY
SYMPTOMS
Stress/Hurt
Danger
Stress/Hurt
Danger
!
Stress/Hurt
Danger
!!
Stress/Hurt
Danger
!!!

It’s NOT all in your head!

- ✓ The pain is real. Many experts say that this kind of pain is more painful than pain from structural damage.
- ✓ It’s a physical change in the structure and function of your brain and nervous system.
- ✓ Your brain creates neural pathways that link different parts of the brain together. This is why your brain can create a pain response in the absence of tissue damage.
- ✓ Having pain over time changes the physical structure of your brain: Study By Javiera Hashmi
- ✓ In this study she compared patients with acute low back pain (less than 2 months) and chronic low back pain (more than 10 years) Using MRIS they saw that in the first group, the acute pain was activating the front of the brain (that's normal for acute pain). With the second group it moved to the emotional part of the brain!
- ✓ Study by Alan Gordon, LCSW: By treating the causes of chronic pain in the brain, scans showed changes in the activation of brain areas before treatment and after.

Treatment: Helping the Brain to Re-Interpret



-Pain education is first line of treatment.
-Pain reprocessing: imaginal and graded exposure, cognitive and behavioral interventions
-Therapies that work with the lower brain and nervous system: ex. Somatic Experiencing
-Emotion-focused interventions: journaling, emotion identification and expression, ex. ISTDP
-Other therapies that can be helpful: IFS, Neurofeedback, EMDR, Brainspotting (if practitioner understands and reinforces accurate pain science)
-Mindfulness-based practices and therapies that understand and reinforce accurate pain science