
Why Strength & Mobility
Aren't Fixing
LOW BACK PAIN
with Josh Henkin, CSCS
& Jessica Bento, Physical Therapist

WELCOME TO TODAY'S WEBINAR

THE SCIENCE OF LOW BACK PAIN

Evidence. Experience. Empowerment.

MEET YOUR PRESENTERS

JESSICA BENTO, PT

DOCTOR OF PHYSICAL THERAPY

EXPERIENCE

- Over 20 years of experience as a physical therapist.
- International educator and presenter on corrective exercise, pain science, and physical therapy.

FOCUS

Translating the latest pain science into practical strategies that help people move better, get stronger, and build confidence in their body.

OUR MISSION

To cut through the noise, bridge the gap between research and real life, and empower you with knowledge that changes how you think, move, and coach.

JOSH HENKIN

STRENGTH COACH & EDUCATOR

EXPERIENCE

- Over 30 years in the fitness industry.
- International educator and presenter in over 14 countries.
- Works with the US Army and Marines, college athletic programs, hospitals and wellness systems, and coaches around the world.

FOCUS

Teaching how to build resilient, adaptive bodies through integrated movement, strength, and a deep understanding of human function.

"Low back pain is complex. But the science is clear.

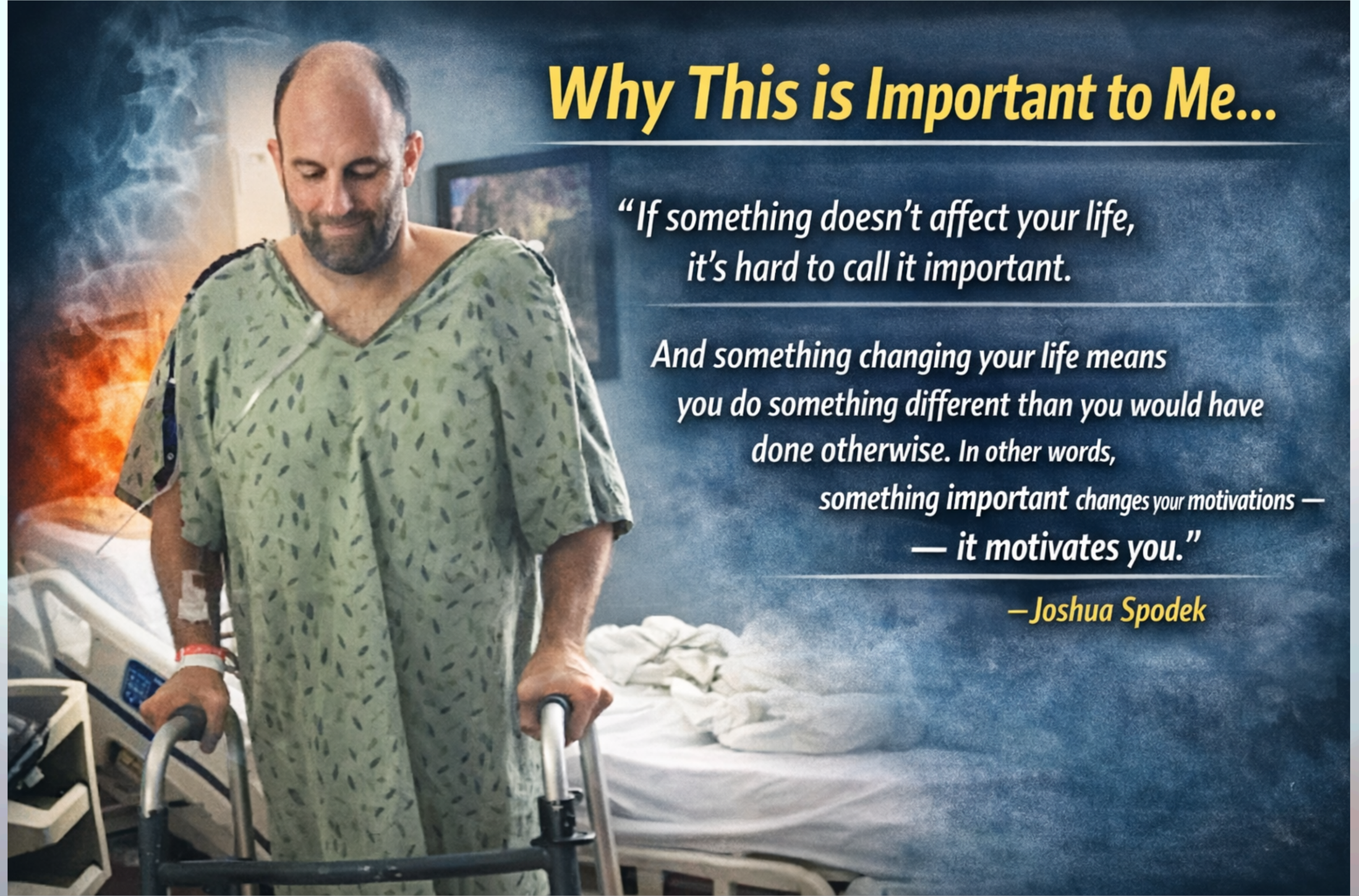
WE STUDY IT.
Relentlessly reviewing the research.

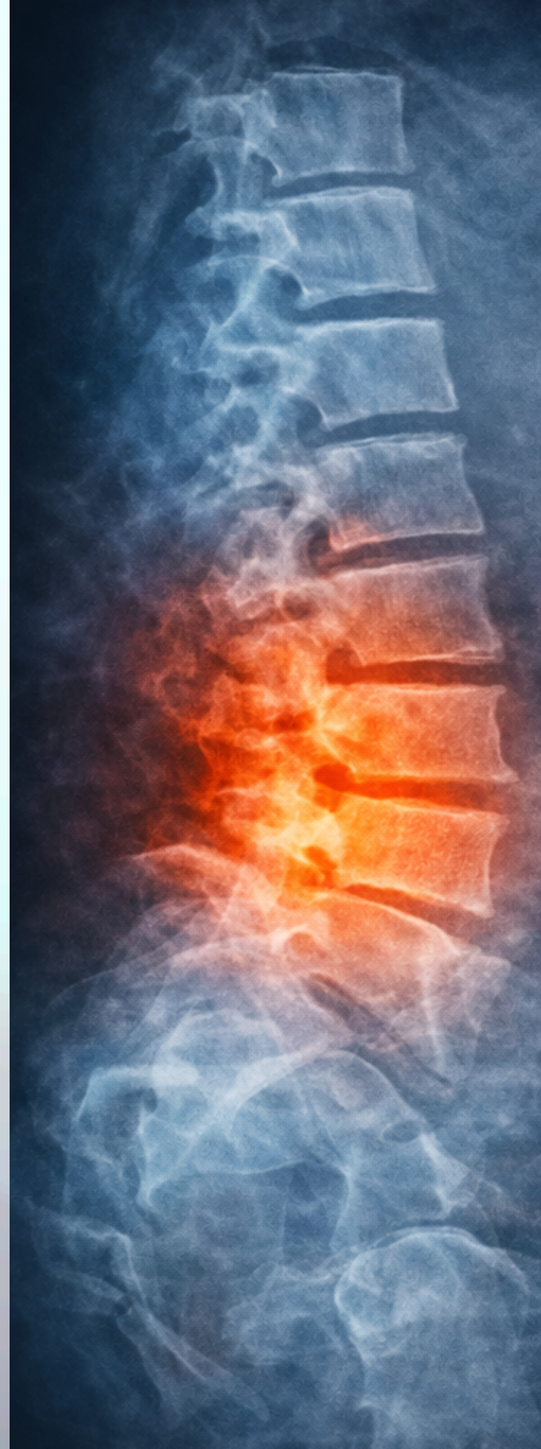
WE APPLY IT.
Bringing evidence to life in the gym and clinic.

WE TEACH IT.
So you can help yourself and others with confidence.

IT'S NOT JUST ABOUT GETTING RID OF PAIN—IT'S ABOUT BUILDING A BODY THAT CAN HANDLE LIFE.


Key Low Back Pain Stats
Back pain is the leading cause of disability in people under 45 years old
Americans spend at least 50 BILLION each year on back pain
80% of people will feel back pain at some point in their lives
Back pain is the most common reason for visits to the doctor's office


Why This is Important to Me...
"If something doesn't affect your life,
it's hard to call it important.
And something changing your life means
you do something different than you would have
done otherwise. In other words,
something important changes your motivations —
— it motivates you."
—Joshua Spodek



Surprising Low Back Facts

1. Most low back pain is "non-specific" (≈80–90%)

A review in the *New England Journal of Medicine* states that "nonspecific low back pain…accounts for approximately **80–90%** of all cases of low back pain."

These cases are **defined** as back pain without an identifiable structural or pathological cause after clinical evaluation.

2. Only a small minority has a clear structural pathology

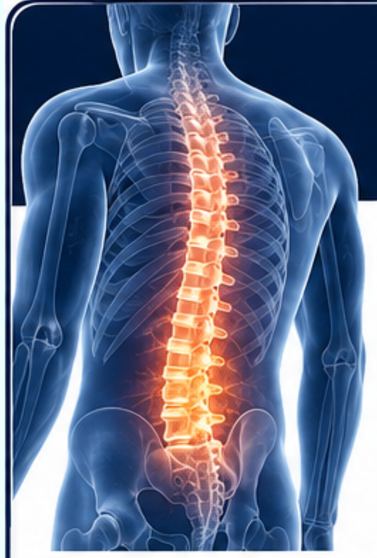
Clinical guidance published in *The BMJ* reports that "less than 5–10% **of all** low back pain is due to a specific underlying spinal pathology."

3. Many patients seeking care still have no identifiable cause

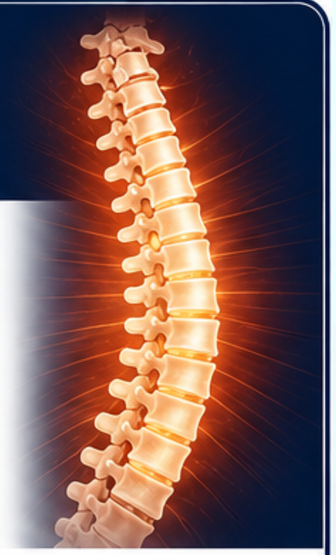
Research in *The Spine Journal* nates that about 85% of patients with low back pain seeking medical care, meaning "**no definitive cause can be identified.**"

4. Non-specific low back pain has no clear pathoanatomical source

Reviews in *The Lancet* explain that non-specific low back pain does not have a **known pathoanatomical cause**, which is why treatment often focuses on symptom management and functional improvement rather than targeting a specific injured structure.



UNDERSTANDING NON-SPECIFIC CHRONIC LOW BACK PAIN (NSCLBP)



*Chronic back pain that **cannot** be attributed to a specific structural or pathological cause*

CORE DEFINITION

Pain between the lower ribs & gluteal folds persisting for more than 12 weeks without a clear structural or pathological cause

12+ WEEKS

WHAT "NON-SPECIFIC" MEANS

No clear diagnosis such as:

- Disc herniation/compression
- Fracture
- Tumor
- Infection

No single clear structural cause can be identified

12+ WEEKS

KEY CHARACTERISTICS (RESEARCH)

- Influenced by many factors (bio-psycho-social)
- Poor correlation with imaging findings
- Pain is not a direct measure of damage
- Most common type of low back pain

WHAT IT IS NOT

A complex, system-level pain issue

(not a meaningless diagnosis)

WHAT IT IS NOT

"Nothing is wrong", "Just in your head"

A complex, system-level pain issue

(not a meaningless diagnosis)

NON-SPECIFIC CHRONIC LOW BACK PAIN IS DRIVEN BY MULTIPLE FACTORS, NOT JUST A SINGLE INJURY.


Athletes and very strong people still frequently develop back pain
1. Low back pain is common even in highly trained populations
A systematic review of 86 studies including over 30,000 athletes found substantial rates of low back pain across sports.
Another systematic review reported:
► 10–67% point prevalence ► 33–84% one-year prevalence of low back pain in athletes.
Some elite sport populations report extremely high rates, with up to 90% of Olympians experiencing low back pain during their careers.
This demonstrates that even individuals with exceptional pssical conditioning still experience back pain.
2. Pain is strongly influenced by the nervous system
Back pain in athletes is also linked to training load, fatigue, and recovery ststem, not just strength.
Sports medicine research describes low back pain as multifactorial, influenced by biomecha-nical demands, training load, and physical stress.
Experimental research shows muscle fatigue in the trunk can impatural control, which may contribute to spinal stress and discomfort.
3. Lifestyle and psychological stress play a role
Modern pain science recognizes back pain as a biopsychosocial condition.
Psychological factors such as anxiety, stress, and pain catastrophizing are associated with chronic loak pain. Studies also show sleep problems, emotional distress, and stress-system changes are.

Surgery Is Needed in Only a Small Minority of Cases

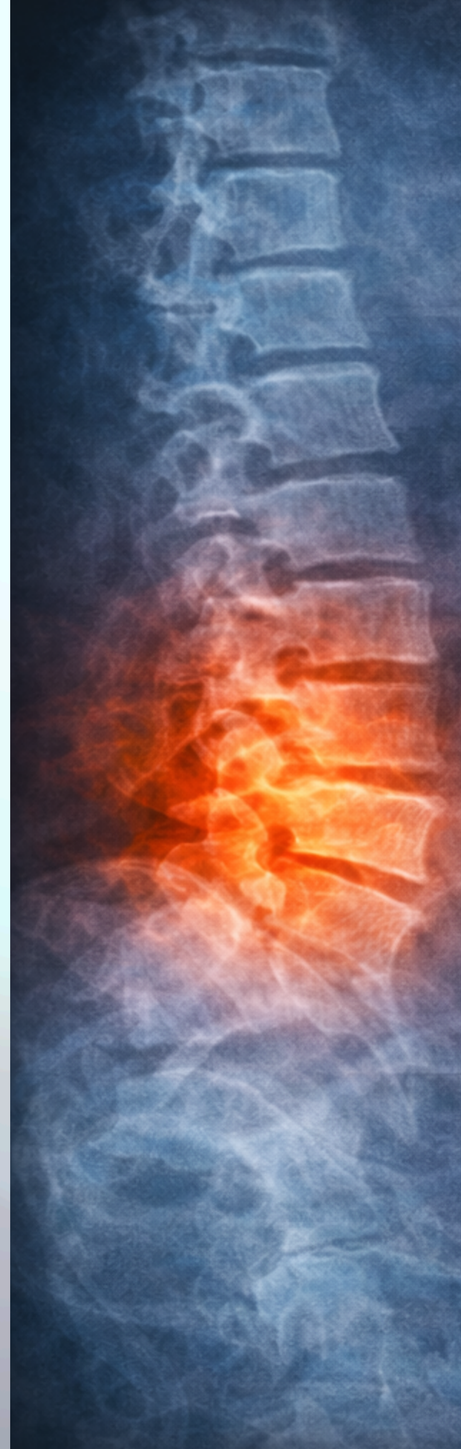
- **Most people with low back pain do not require surgery.**

  Reviews report that **only a minority** of people with back pain (about **1–10%**) require surgery.

- Surgical treatment is typically considered **only after conservative care fails** or when serious neurological problems occur.

- **Many clinical guidelines estimate that roughly 1–2%** of low back pain cases ultimately require surgery, usually for conditions like severe nerve compression, spinal instability, or **cauda equina syndrome.**

Most Low Back Pain Improves Naturally



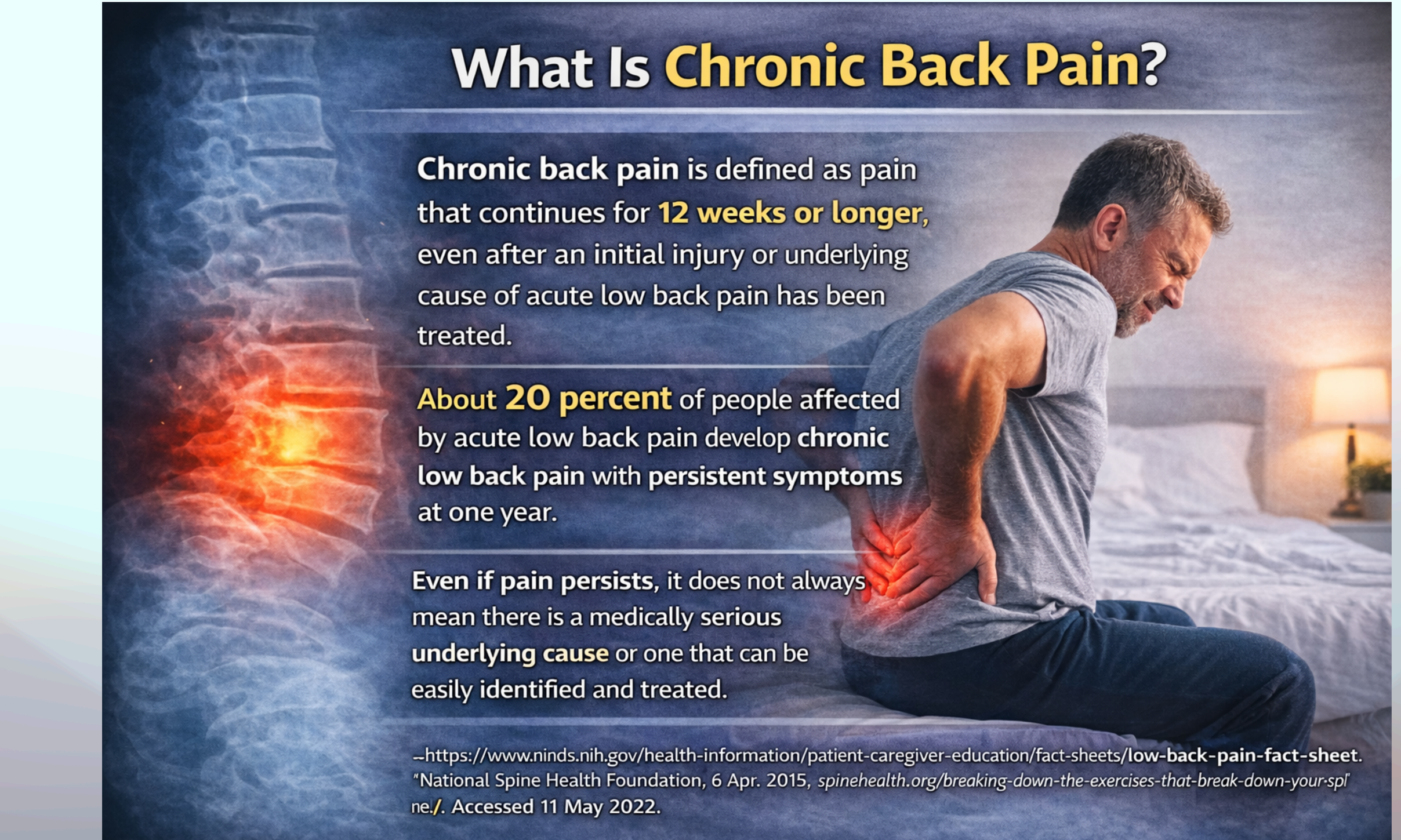
Research shows that most episodes of low back pain improve naturally.

Studies report that around **90%** of people recover within **about six weeks**, even without intensive treatment.

Because of this favorable natural recovery, modern, guidelines recommend **staying** active and avoiding prolonged bed rest.

Evidence from randomized trials shows that remaining active leads to better pain relief and function than bed rest, while excessive rest can weaken muscles and slow recovery.

What Is Chronic Back Pain?



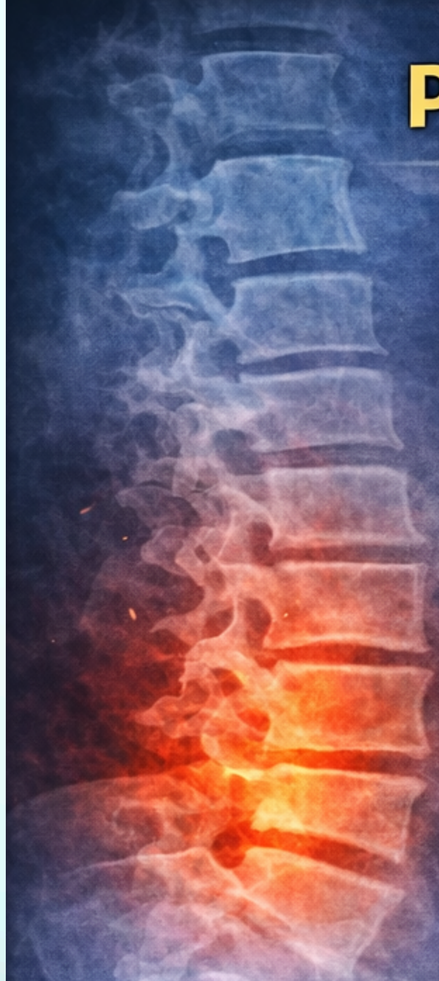
Chronic back pain is defined as pain that continues for **12 weeks or longer,** even after an initial injury or underlying cause of acute low back pain has been treated.

About **20 percent** of people affected by acute low back pain develop **chronic low back pain** with **persistent symptoms** at one year.

Even if pain persists, it does not always mean there is a medically serious **underlying cause** or one that can be easily identified and treated.

--https://www.ninds.nih.gov/health-information/patient-caregiver-education/fact-sheets/**low-back-pain-fact-sheet**.
"National Spine Health Foundation, 6 Apr. 2015, *spinehealth.org/breaking-down-the-exercises-that-break-down-your-spi*ne./. Accessed 11 May 2022.

Potential Causes of Low Back Pain



- **Sprained ligaments**
- **Strained muscles**
- **Injury from sports, car accident, a fall,** which can injure tendons and ligaments or cause compression of the spinal cord
- **Herniated** or **ruptured discs**
- **Intervertebral disc** degeneration **(normal age-related wear and tear** of discs)
- **Infections**
- Tumors
- **Kidney stones**
- **Cauda equina syndrome** (a complication resulting from a ruptured disc)

- **Abdominal aortic aneurysms** (a large blood vessel that supplies the abdomen, pelvis, and legs becomes enlarged)
- **Osteoporsis** (progressive loss of bone density and strength)
- **Endometiosis** (a buildup of **uterine** tissue *outside of the uterus)*
- **Irregular curvature of the spine** such as scoliosis (a sideways curve) or **lordosis** (a large arch in the lower back)
- **Fibromyalgia**
- **Poor posture**
- **Obesity**
- **Pregnancy**
- **Bone loss**
- **Psychological stress**

~ https://www.ninds.nih.gov/health-information/patient-caregiver-education/fact-sheets/low-back-pain-fact-sheet. National Spine Health Foundation. 6 Apr. 2015, *spinehealth.org/breaking-down-the-exercises-that break-down-your-spine/.*

What Influences Back Pain?

INJURY
Sports, accidents, falls

SLEEP ISSUES
Poor sleep, bad mattress

WORK
Heavy lifting, poor posture

STRESS
Chronic tension, anxiety

SEDENTARY LIFE
Sitting too much, no exercise

BODYWEIGHT
Extra weight, obesity

INJURY · WORK · STRESS
Sitting too much, no exercise

Why You Shouldn't Rely on Social Media for Low Back Pain Advice

- ✕ **Pseudoscience and misleading claims** are popular
- ✕ Trendy advice often **lacks good evidence** to back it up
- ✕ **Most posts** don't consider **individual needs**

DANGER! Research shows social media isn't a trustworthy source for health advice.

- A high prevalence of **misleading** or inaccurate posts regarding pain management."
- Over 50% of posts on **back pain** were "biased and non-credible".
- Some posts promote **pseudoscience** and **downplay evidence-based evaluations**."

Stay skeptical, and talk to qualified professionals for safe, effective back pain care.

TikTok is a popular social media channel among young people. However, the most viewed TikTok videos about ANSBP are not produced by mainstream health professionals and the videos featuring the **#backpain** hashtag do not generally reflect contemporary evidence-based practice.

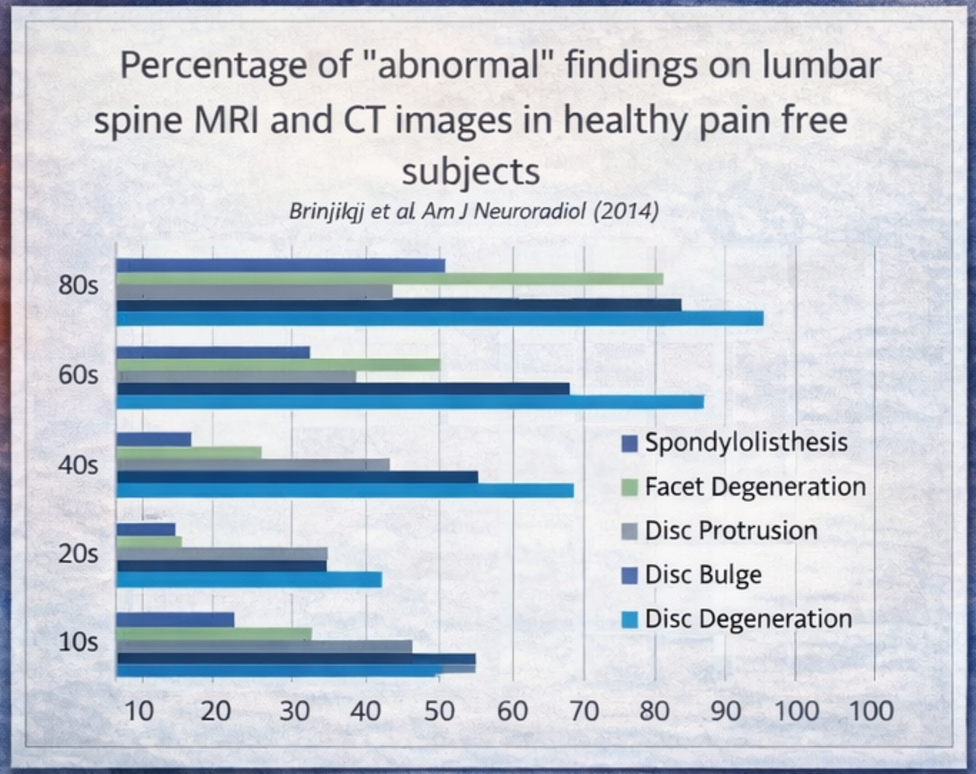
There is considerable scope for mainstream health professionals to provide evidence-informed self-management and self-care content for ANSBP on TikTok.

Zheluk A, Anderson J, Dineen-Griffin S. Analysis of Acute Non-specific Back Pain Content on TikTok: An Exploratory Study. **Cureus**. 2022 Jan 19:14(1):e21404. doi: 10.7759/cureus.21404. PMID: 35198311; PMCID: PMC8856647.

Common Low Back Myths

Percentage of "abnormal" findings on lumbar spine MRI and CT images in healthy pain free subjects

Brinjikji et al, Am J Neuroradiol (2014)



"YOU ARE NOT YOUR MRI."

These imaging findings must be interpreted in the context of the patient's clinical condition."

How MRI Findings Influence Pain Perception?

- ✓ Beliefs
- ✓ Expectations
- ✓ Fear
- ✓ Context

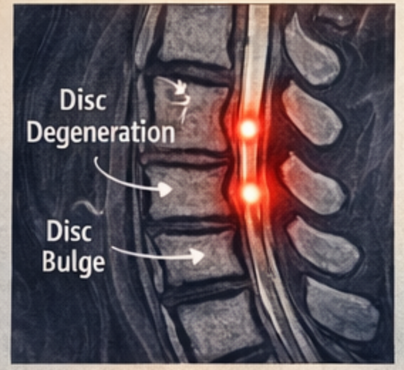
"My spine is damaged"

"I'm fragile"

No Context & Misinterpretation

Normal Changes Seen as Damage

Fear & Catastrophizing



The Nocebo Effect

Negative Expectations
Increased Pain

"Degeneration"

"Tear"

"Collapsed"

Words can worsen pain

↑ **Pain**

↑ Fear & Avoidance

Positive Context & Self-Efficacy

Explaining Changes Reduces Fear

- Understanding Pain
- "These Changes Are Normal"
- You Are Strong & Resilient

Reduced Threat

Pain
Fear & Avoidance

Same MRI, Different Outcome

No Context	Positive Context
Damaged & Fragile	Normal & Resilient
↑ Pain & Fear	↑ Pain, + Confidence

Don't Treat the MRI—Treat the Person.

Key Studies: ▸ *Brinjikiji et al., 2015* ▸ *Darlow et al., 2013* ▸ *Louw et al., 2011—2016* ▸ *Benedetti et al.*

LOADED SPINAL FLEXION:
THE "ROUND BACK" DEBATE

Traditionally, lifting with a rounded back was seen as an "instant injury".

Modern trends supported by recent research argue:

The spine is designed to bend and rotate under load.

THE TRADITIONAL VIEW

INSTANT INJURY?

A SHIFT IN UNDERSTANDING

Traditionally, lifting with a rounded back was seen as an "instant injury"..

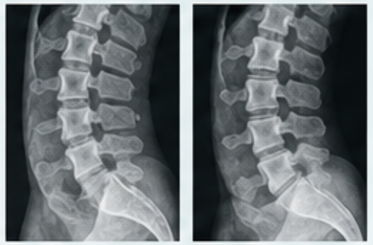
ROUNDED = DANGEROUS?

MODERN RESEARCH SUPPORTS

The spine is designed to **bend** and **rotate** under load.

RECENT RESEARCH

Recent research supports that the spine can tolerate **loaded flexion.**



Healthy Spine

Loaded Spine

SOCIAL MEDIA INFLUENCES ARE CHANGING THE CONVERSATION

Social media influencers now promote exercises like **Jefferson Curls** to build strength in flexed positions.

WHY THIS MATTERS

- The spine is adaptable and resilient.
- Loaded flexion can be safe and effective.
- Strength in multiple positions = better real-life performance.
- Move well in all positions, not just "neutral".

HOW MUCH LUMBAR FLEXION ACTUALLY OCCURS

Another reanalysis of lifting studies found that people typically use **much less spinal flexion** than commonly assumed.

AVERAGE LUMBAR FLEXION DURING LIFTING

≈ 23.5°

About 36%
of available lumbar range of motion

This contradicts the common claim that lifting involves full spinal flexion...

FATIGUE vs SINGLE LIFT INJURY

A key issue is repetitive loading.

Research on repeated flexed lifting suggests:

- Repeated lifting in fully flexed posture can **lead to fatigue failure of spinal tissues over** time, even with moderate loads.

So the risk is often **accumulated exposure**, **not one single** lift...

FATIGUE | REPETITION | LOAD MAGNITUDE | TISSUE TOLERANCE

MOST FLEXED-SPINE LIFTING STUDIES USE LIGHT WEIGHTS

Loads typically involved ≈26 pounds (~12 kg)

WHAT THE LITERATURE ACTUALLY SUGGESTS...

- Evidence linking lumbar flexion to injury used **light loads** (often ≤ 26 lb)
- These studies **DID NOT** find a clear relationship between flexion and low back pain
- Findings don't apply to **heavy gym lifts** because those loads were not studied

MANY EXPERIMENTAL STUDIES

- → Used small objects, small boxes...
- → Up to about **26 lb (≈12 kg)**
- Studies mainly apply to **daily activities & light occupational lifting**

Findings don't apply to **heavy gym lifts** because those loads were not studied

Saraceni et al., JOSPT, 2020

26 lbs vs. 315 lbs

DOES NOT APPLY TO HEAVY LIFTING IN THE GYM

Current evidence is mostly limited to smaller occupational loads.

EVIDENCE LIMITED TO LIGHT LOADS

NO CLEAR LINK BETWEEN FLEXION & LOW BACK PAIN

NOT APPLICABLE TO HEAVY GYM LIFTS

CONSIDER LOAD, CONTEXT, & TOLERANCE

CRITICISMS OF THE 'TO FLEX OR NOT TO FLEX?' REVIEW

Understanding the limitations and methodological concerns surrounding the lumbar flexion meta-analysis.

> "Current evidence does not clearly show lumbar flexion predicts LBP." ≠ "Lumbar flexion cannot contribute to LBP."

⚠ These are NOT equivalent statements.

- CAUSATION CANNOT BE ESTABLISHED
- ABSENCE OF EVIDENCE ≠ EVIDENCE OF ABSENCE
- EVEN THE AUTHORS ACKNOWLEDGED THE EVIDENCE QUALITY WAS LOW

1 THE INCLUDED STUDIES WERE MOSTLY LOW QUALITY

The review only included a small number of studies, and most were:

- Cross-sectional
- Observational
- Heterogeneous
- Underpowered

WHAT THIS MEANS:

- Causation cannot be established
- Absence of evidence ≠ evidence of absence

A FAIR INTERPRETATION IS:
"Current evidence does not clearly show lumbar flexion predicts LBP."

BUT MANY INTERPRETED IT AS:
"Lumbar flexion cannot contribute to LBP."

These are not equivalent statements.

2 CROSS-SECTIONAL STUDIES CANNOT DETERMINE CAUSALITY

Most included studies compared people with and without pain at one time point.

- People in pain may move differently because they already have pain
- Movement differences may not be the cause of pain

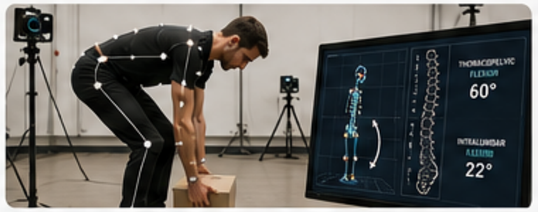
The review found some people with LBP actually lifted with less lumbar flexion.

Critics argue this could reflect:

- GUARDING
- FEAR AVOIDANCE
- ALTERED MOTOR BEHAVIOR

— Not proof that flexion is protective.

3 "LUMBAR FLEXION" WAS MEASURED INCONSISTENTLY



Different studies measured lumbar flexion using:

- ✓ Thoracopelvic angles
- ✓ Intralumbar angles
- ✓ Surface markers
- ✓ Motion capture approximations

⚠ THESE MEASUREMENTS ARE NOT INTERCHANGEABLE.

THORACOPELVIC FLEXION (overestimates lumbar flexion)	≠	TRUE LUMBAR FLEXION (isolated lumbar motion)

4 WHY THIS MATTERS

- Hip motion and pelvic orientation complicate interpretation
- Critics argue some studies compared "apples and oranges"
- Biomechanics is likely more nuanced than:
  - "Flexion is dangerous"
  - OR "Flexion never matters"

THE MOST EVIDENCE-BASED TAKEAWAY

- **CONTEXT MATTERS** — Job demands, task variability, and environment all influence loading.
- **EXPOSURE MATTERS** — Cumulative and repetitive exposures are more important than a single lift.
- **LOAD MATTERS** — Load magnitude, position, frequency, and asymmetry all affect risk.
- **RECOVERY MATTERS** — Fatigue, recovery time, and health status influence adaptation and risk.
- **INDIVIDUAL TOLERANCE MATTERS** — People vary widely in tissue capacity, motor control, and pain sensitivity.

The review challenged simplistic biomechanical narratives — but it did NOT prove lumbar flexion is irrelevant to low back pain.

Saraceni N. et al. "To Flex or Not to Flex? Is There a Relationship Between Lumbar Spine Flexion During Lifting and Low Back Pain?" Systematic Review & Meta-analysis.

CRITICISMS OF THE 'TO FLEX OR NOT FLEX' REVIEW CONTINUED

Important limitations and concerns raised by biomechanics and occupational health researchers

5 THE REVIEW LOOKED AT PAIN, NOT TISSUE INJURY MECHANISMS

Biomechanics researchers often criticize the review for conflating:

EPIDEMIOLOGY WITH TISSUE LOADING SCIENCE

There is substantial cadaveric and animal evidence that repeated loaded spinal flexion can stress:

DISCS · POSTERIOR ANNULUS · LIGAMENTS · ENDPLATES

The review did not invalidate that literature.
Instead, it examined whether real-world lifting flexion correlated with clinical LBP.

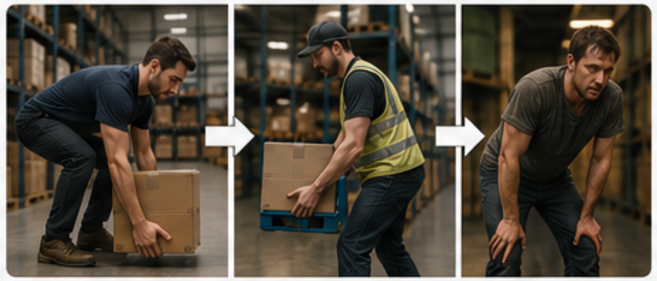
Critics argue these are different questions:

1. Can flexion increase tissue stress?
2. Does flexion predict clinical pain in populations?

You can answer "yes" to #1 and still fail to show a strong epidemiological relationship for #2.

This is one of the most sophisticated criticisms.

6 IT DID NOT ADEQUATELY ADDRESS DOSE AND FATIGUE



A common critique from occupational biomechanics is that the review largely ignored:

- Cumulative loading
- Recovery capacity
- Repetition volume
- Load magnitude
- Fatigue
- Time under load

Flexion during one controlled lab lift ≠ thousands of loaded flexion cycles under fatigue

Critics argue the review may underestimate risk because most included studies examined brief laboratory tasks rather than chronic occupational exposure.

7 THE REVIEW MAY ENCOURAGE OVERSIMPLIFIED MESSAGING

This is more about interpretation than methodology.

Some clinicians used the paper to promote:

- "Rounding is always safe"
- "Neutral spine doesn't matter"
- "All lifting techniques are equivalent"

The review did not actually claim those things.

A more balanced interpretation would be:

- Spinal flexion is normal and unavoidable
- Flexion alone is probably not a strong independent predictor of LBP
- Context, load tolerance, conditioning, fatigue, and exposure matter

Many researchers across camps would agree with that nuanced position.

THE BIG PICTURE

The review provides useful information, but it has important limitations. Understanding these criticisms helps prevent misinterpretation and supports better research, clinical reasoning, and workplace practice.

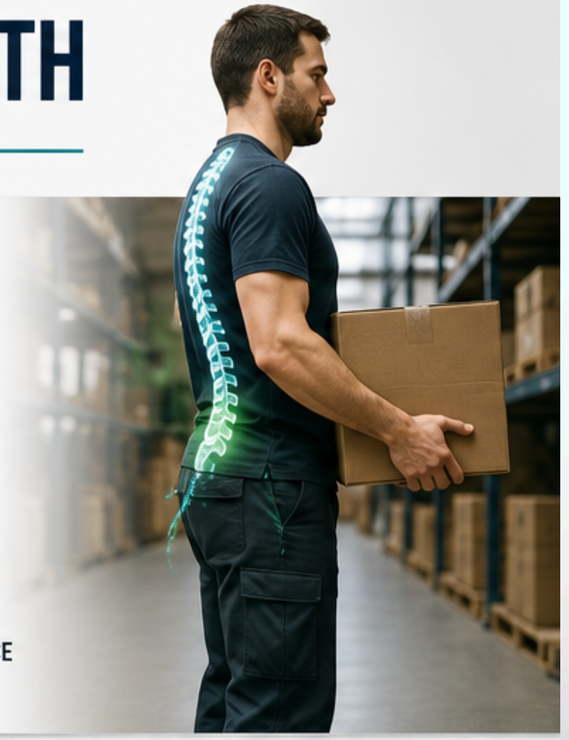
Context Matters · Load & Exposure Matter · Fatigue & Recovery Matter · Individual Tolerance Matters

Saraceni N. et al. "To Flex or Not to Flex? Is There a Relationship Between Lumbar Spine Flexion During Lifting and Low Back Pain?" Systematic Review & Meta-analysis.

THE SCIENCE OF LIFTING & LOW BACK HEALTH

WHAT RESEARCH SAYS

> "Modifications made to workplace environments such as **removing lifts from the ground** and lifting technique suggestions, such as **keeping the load close** when lifting and **reducing lifts in awkward postures**, is sensible advice and may reduce load on the back."



- REDUCE AWKWARD LIFTING
- KEEP LOADS CLOSER TO THE BODY
- MINIMIZE REPEATED GROUND LIFTS
- IMPROVE WORKPLACE SETUP

> "Further research is needed to see how **people who have worked in a lifting job for many years without low back pain** position their back when they lift. These people may hold the clues to better understanding the risk factors for low back pain in lifting occupations."

— Saraceni et al.

Understanding how resilient workers lift may reveal key clues to preventing low back pain in lifting occupations.

Evidence-based practice. Safer workplaces. Stronger backs.

Saraceni N. et al. "To Flex or Not to Flex? Is There a Relationship Between Lumbar Spine Flexion During Lifting and Low Back Pain?" Systematic Review & Meta-analysis.

POSTURE + LOAD = LOW-BACK PAIN RISK

What This Research Reveals for Fitness Professionals & Physical Therapists

A posture and load sampling approach to determining low-back pain risk in occupational settings.

WHAT THE STUDY FOUND

In automotive assembly workers, low-back pain was **strongly associated with both higher spinal loads and greater trunk flexion exposure.**

LOAD MATTERS

PEAK SPINAL COMPRESSION	AVERAGE SPINAL LOAD (OVER SHIFT)	TIME CARRYING LOADS IN HANDS
2.0x higher risk	**1.7x** higher risk	**1.5x** higher risk

POSTURE MATTERS

LARGE TRUNK FLEXION (PEAK)	TIME IN FLEXION >45°
2.2x higher risk	**1.3x** higher risk

Both how much load and how often/long you are exposed increase risk.

HOW THE STUDY WAS DONE

Posture and load sampling in real-world automotive assembly jobs.

- Observed workers across many tasks (not just lifting tasks)
- Measured posture (trunk angles)
- Estimated spinal loads using biomechanical models
- Linked exposures to reported low-back pain

KEY TAKEAWAYS FOR PRACTICE

LOW-BACK PAIN RISK IS DOSE-DEPENDENT
Higher spinal loads and more time in flexion = higher risk.

POSTURE + LOAD INTERACT
Neither factor alone tells the whole story. Both matter.

PEAKS AND ACCUMULATION COUNT
High peak loads and total load across the shift both increase risk.

REAL-WORLD EXPOSURES MATTER
Even without "big lifts," repeated bending and moderate loads can be risky.

WHAT THIS MEANS FOR INTERVENTION

REDUCE LOAD

- Improve lifting mechanics
- Use assistive devices
- Team lifts for heavy parts
- Reduce load weight

IMPROVE POSTURE

- Reduce time in deep flexion (>45°)
- Bring work closer
- Use height-adjustable workstations

BUILD RESILIENCE

- Train spinal control and endurance
- Improve hip hinge, core stability, and mobility
- Gradual load progression and recovery

WHY THIS STUDY MATTERS

PROVIDES REAL-WORLD EVIDENCE
Not just lab studies—this reflects actual workplace conditions.

SUPPORTS TARGETED ERGONOMIC CHANGES
Helps identify which jobs and tasks pose the greatest risk.

GUIDES CLINICAL & FITNESS STRATEGIES
Focus on reducing high-risk exposures and building capacity.

SUPPORTS A PREVENTION-FIRST APPROACH
Lower cumulative load = lower lifetime risk of low-back pain.

BOTTOM LINE

This study shows that low-back pain risk in automotive workers is driven by **measurable spinal loads and posture exposures**—not just specific tasks.

ASSESS EXPOSURE.
REDUCE RISK.
BUILD RESILIENCE. PROTECT WORKERS.

Source: Based on research by Norman, R. W., Wells, R. P., Neumann, W. P., & Frank, J. W. (1998). A comparison of peak vs. cumulative physical work exposure risk factors for the reporting of low back pain in the automotive industry. Spine, 23(5), 561–573.

WHAT REALLY DRIVES LOW BACK PAIN?

KEY CONCLUSIONS FROM A LARGE STUDY OF AUTOMOTIVE ASSEMBLY WORKERS

> Low back pain isn't just bad posture or stress.
>
> It's the interaction of load + environment + perception.

LOAD + ENVIRONMENT + PERCEPTION =

The body breaks down when physical demands exceed capacity AND the system (including psychological factors) can't buffer that stress.

1 PHYSICAL FACTORS ARE THE STRONGEST DRIVERS

Awkward postures, high effort, forceful hand work, and whole-body vibration significantly increase the risk of low back pain.

AWKWARD POSTURES · HIGH EFFORT · FORCEFUL HAND WORK · WHOLE-BODY VIBRATION

Mechanical stress on the body matters most.

2 PSYCHOSOCIAL FACTORS ALONE ARE NOT STRONG PREDICTORS

Job stress, psychological demands, and low job control do NOT consistently predict low back pain on their own.

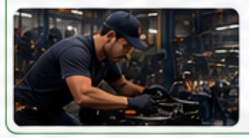
Stress alone isn't the main cause.

3 PSYCHOSOCIAL FACTORS MATTER WHEN COMBINED WITH PHYSICAL STRESS

HIGH PHYSICAL LOAD + LOW JOB CONTROL + HIGH STRESS

HIGHER RISK OF BACK PAIN

HIGH PHYSICAL LOAD + BETTER JOB CONTROL (EVEN WITH STRESS)



LOWER RISK OF BACK PAIN

Stress becomes a bigger problem when the body is already under load.

4 RISK FACTORS DON'T ACT ALONE—THEY INTERACT

Physical stressors combine (e.g., posture + force = worse outcomes).

Physical and psychosocial factors interact together.

This supports a multifactorial model of pain.

5 INTERVENTIONS SHOULD PRIORITIZE HIGH PHYSICAL LOAD JOBS

REDUCE PHYSICAL LOAD

IMPROVE WORK DESIGN & CONTROL

ADDRESS STRESS & RECOVERY

Focus first on reducing physical ergonomic stress. Then address psychosocial factors, especially in high-load environments.

WHY THIS MATTERS FOR YOU

DON'T LOOK AT PAIN IN ISOLATION
Consider the whole person, not just the symptoms.

YOU CAN'T IGNORE LOAD
Understand and address mechanical stressors.

YOU CAN'T IGNORE CONTEXT
Job demands, control, and environment shape risk and recovery.

BUILD PHYSICAL RESILIENCE
Improve movement quality, strength, capacity, and tolerance.

IMPROVE THE ENVIRONMENT
Promote job control, variety, recovery, and smart work design.

PUT IT INTO ACTION

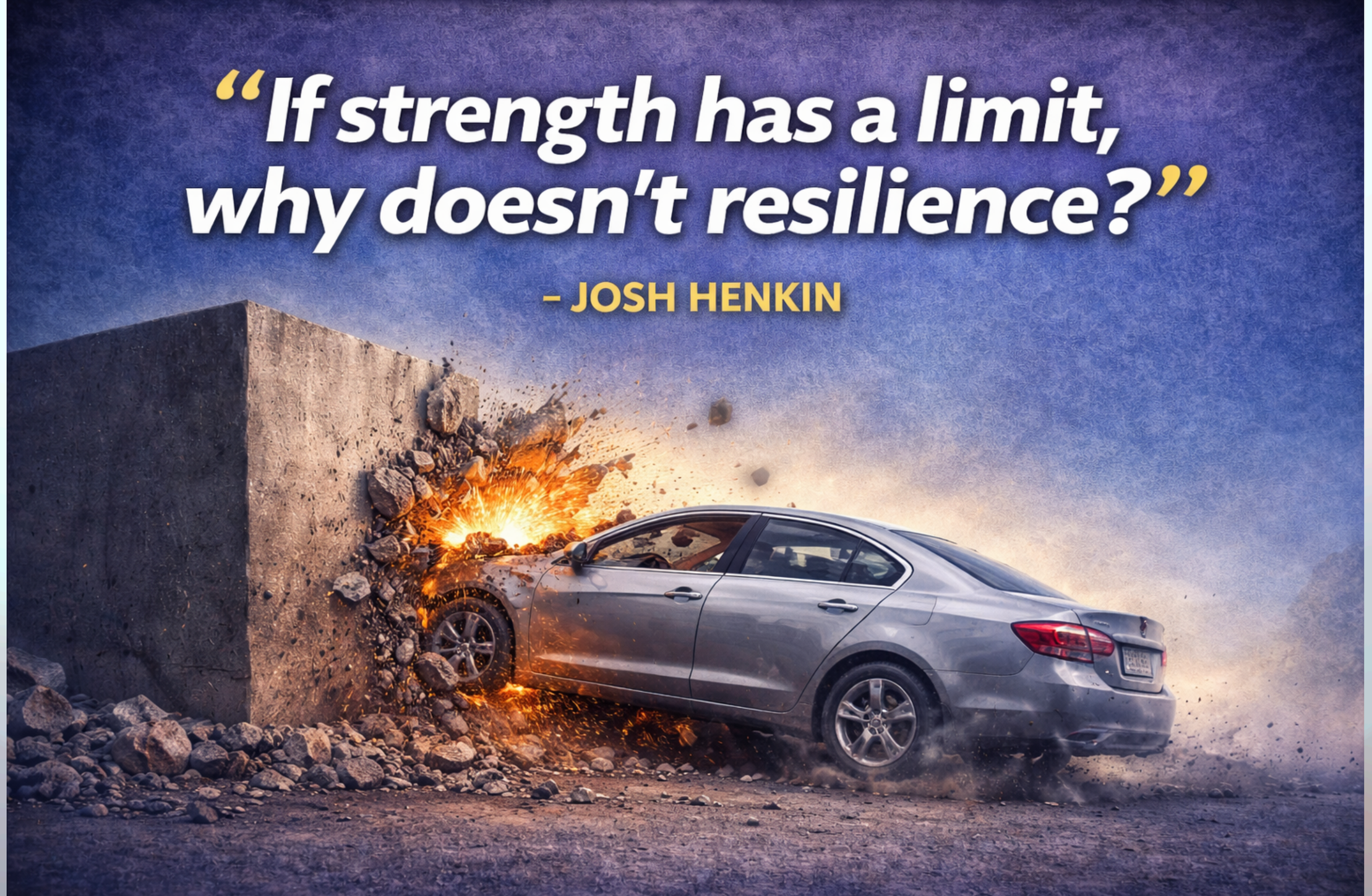
1. Assess the full picture (physical + psychosocial + environment).
2. Identify high-risk jobs and prioritize roles with high load and low control.
3. Intervene strategically—address physical ergonomics first, then psychosocial factors.
4. Build capacity with strength, mobility, and conditioning.
5. Reassess & adapt continuously to ensure lasting impact.

BOTTOM LINE

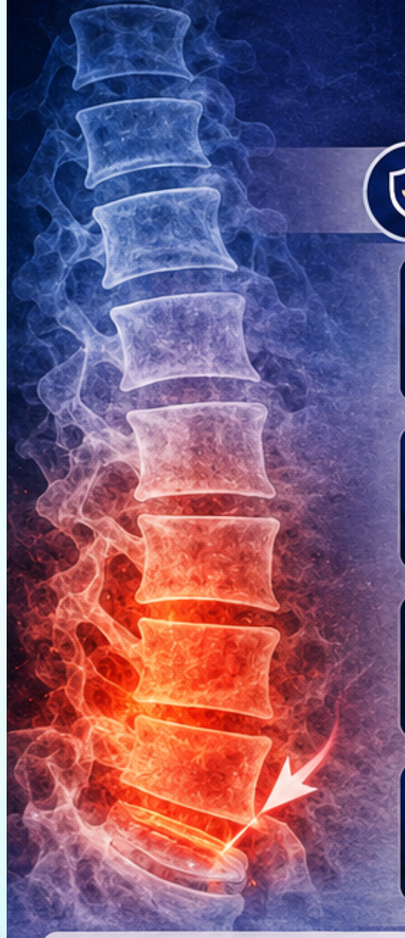
This study shows that low back pain risk in automotive workers is driven by measurable physical loads and their interaction with the work environment and psychological factors—not one single cause.

ASSESS THE WHOLE PICTURE.
REDUCE EXCESS LOAD.
BUILD RESILIENCE. IMPROVE CONTEXT.

Source: Based on research by Norman, R. W., Wells, R. P., Neumann, W. P., & Frank, J. W. (1998). A comparison of peak vs. cumulative physical work exposure risk factors for the reporting of low back pain in the automotive industry. *Spine*, 23(5), 561–573.


“If strength has a limit, why doesn’t resilience?”
– JOSH HENKIN

The Spine is Resilient



Evidence of the process of disc herniation is repeated lumbar flexion with very little load.

22K–28K

Callaghan and McGill (2001) consistently created disc herniations with modest load in the neighborhood of **22,000–28,000** cycles of flexion.

With increased loads the number of flexion cycles required to cause a disc herniation decreased to **5,000–9,500**.

More recently, **Tampier (2007)** and **Veres (2009)** confirmed that the greater the load and the more repetitions, the faster a herniation will occur.

This research shows that the spine can tolerate a lot of load and repetition—its **true limit is surprisingly high.**

WHAT THIS MEANS FOR PRACTICE

LOAD MATTERS
Higher loads increase risk—but the spine can tolerate a lot more than we often assume.

EXPOSURE MATTERS
Repetition and cumulative flexion exposure drive injury risk.

NOT FRAGILE
The spine is resilient—stronger than it appears under the right conditions.

FOCUS ON CONTROL
Manage load, limit excessive repetition, and improve movement quality to reduce risk.

BUILD RESILIENCE
Progressive loading, strength, and recovery build a more capable, resilient spine.

BOTTOM LINE:

The spine is resilient and can handle high loads and repetitions.
Injury risk comes from how **load, environment, and perception** interact—*not from simple tasks.*

DISC HEALTH IS A SYSTEM

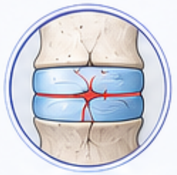
Research shows disc structure affects how the spine **moves, loads,** and **adapts.**

Normal Disc
Healthy disc height helps distribute load and maintain motion.

Endplate Injury
Endplate defects are strongly linked to disc degeneration and can accelerate structural decline.

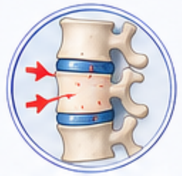
Disc Height Loss (~70%)
Loss of height alters spinal mechanics and increases stress on other tissues.

Advanced Degeneration
Loss of disc pressurization, annular/endplate tears, fractures, and reduced ability to manage load.



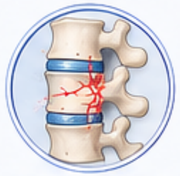
1 ENDPLATE INJURY & DISC DEGENERATION

Endplate injury is strongly linked to disc degeneration. Vertebral endplate defects are associated with intervertebral disc degeneration, likely because the endplate helps distribute load and maintain disc nutrition. Damage there can accelerate structural decline.



2 LOSS OF DISC HEIGHT CHANGES MECHANICS

Finite-element research shows that reduced disc height changes stress distribution across the lumbar spine, increasing mechanical demands on other tissues such as facets, ligaments, and adjacent structures.



3 TRAUMA & ENDPLATE FRACTURES MATTER

Clinical research shows that vertebral and endplate fractures are associated with later disc degeneration, kyphotic change, Modic changes, and high-intensity zones.

4 DISC DEGENERATION = LOSS OF INTEGRITY

Reviews describe degeneration as involving loss of disc pressurization, annular/endplate tears, fractures, and reduced ability of the disc to manage load normally.

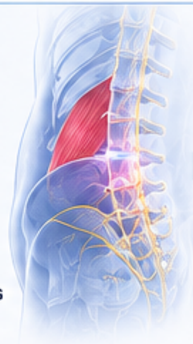
A 70% LOSS OF DISC HEIGHT REPRESENTS A MAJOR STRUCTURAL CHANGE.
That segment likely has less passive resilience—less natural shock absorption and less ability to distribute forces like a healthier disc.

THE GOOD NEWS:
YOU CAN STILL BUILD RESILIENCE.

While the disc may be compromised, the human being is not automatically fragile.

YOU CAN BUILD ACTIVE RESILIENCE THROUGH:

- HIP & PELVIC CONTROL
- TRUNK STABILITY & STRENGTH
- BREATHING & INTRA-ABDOMINAL PRESSURE
- GRADED LOADING & SMART PROGRESSION



THE TAKEAWAY:

- The spine is adaptable.
- Structure may be changed, but capacity is trainable.
- Smart training, movement quality, and recovery expand your margin for load.
- You don't get the same spine back... but you can build a strong, resilient system around it.

BOTTOM LINE:

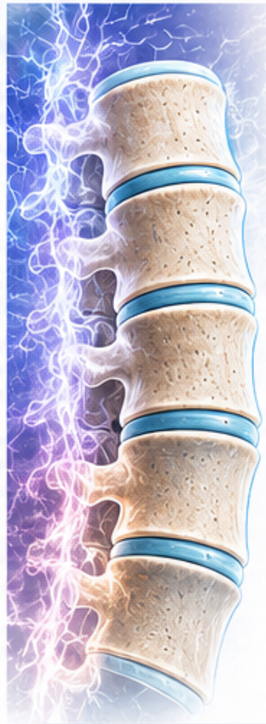
Disc health depends on many interconnected factors. By understanding how **structure, load,** and **environment** interact, we can **assess better, train smarter,** and **keep more people moving with less pain.**

- ASSESS THE WHOLE SYSTEM
- LOAD INTELLIGENTLY
- MOVE WELL
- RECOVER WELL
- BUILD RESILIENCE

Sources: Adams & Roughley, 2006 (Spine J.) • Urban & Roberts, 2003 (Arthritis Res Ther.) • Brinjikji et al., 2015 (AJNR)
Steffens et al., 2016 (Spine J.) • Callaghan & McGill, 2001 (Spine) • Tampier, 2007 (Spine) • Veres et al., 2009 (Spine)

STRUCTURAL RECOVERY ≠ FUNCTIONAL CAPACITY

You may not restore the disc—but you can restore the system's ability to handle load.



1. STRUCTURAL REALITY: THE DISC DOESN'T FULLY RESTORE

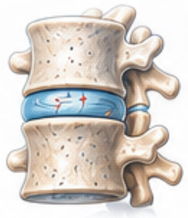
Once a disc has lost significant height (like ~70%) and has endplate damage, the tissue itself does not fully restore to its original structure.

Disc degeneration is largely irreversible structurally (Adams & Roughley, 2006; Urban & Roberts, 2003)

Mechanical properties like hydration and pressurization are reduced.

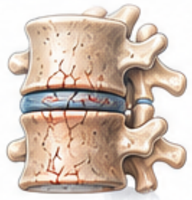
So passive tissue tolerance is permanently altered.

HEALTHY DISC



- Normal height
- Good hydration
- Optimal pressure
- Even load distribution

DEGENERATED DISC (~70% HEIGHT LOSS)



- Severely reduced height
- Endplate damage
- Dehydration
- Loss of pressure
- Altered load distribution

2. FUNCTIONAL REALITY: FUNCTION CAN IMPROVE SUBSTANTIALLY

People can regain a high level of function and load tolerance despite structural changes.

Many people with significant degeneration are asymptomatic and highly functional. (Brinijkji et al., 2015)

Exercise-based rehab improves pain, function, and load capacity even with structural spine changes. (Steffens et al., 2016)

TRANSLATION:
You may not restore the disc—but you can restore the system's ability to handle load.

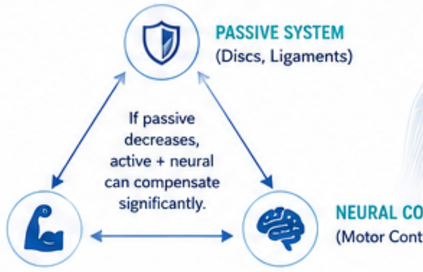
3. THE BODY SHIFTS FROM PASSIVE → ACTIVE STABILITY

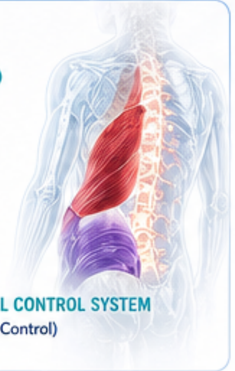
When the disc contributes less, muscles, fascia, and motor control take on more of the role.

The system becomes more dependent on:

- Trunk stiffness/ control
- Hip contribution
- Load distribution strategies

Panjabi's Spinal Stability Model (1992)





4. WHAT MAY REMAIN LIMITED

- Reduced tolerance to repeated end-range loading (especially flexion under load)
- Lower buffer for fatigue + poor recovery
- Greater sensitivity to spikes in load (volume/intensity)

It's less about a "ceiling" and more about a smaller margin for error.

5. THE BIG TAKEAWAY

The disc may be compromised. → But YOU are not fragile. → Build strength, control & capacity. → Move well. Load smart. Recover fully. → **Build a resilient system that can handle life, training, and stress.**

BOTTOM LINE:

Disc health depends on many interconnected factors. By understanding how structure, load, and environment interact, we can assess better, train smarter, and keep more people moving with less pain.

ASSESS THE WHOLE SYSTEM | LOAD INTELLIGENTLY | MOVE WELL | RECOVER WELL | BUILD RESILIENCE

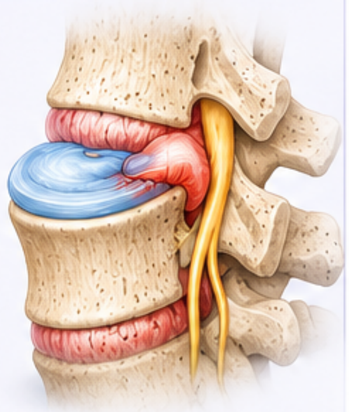
REFERENCES: Adams, M. A., & Roughley, P. J. (2006). Spine. • Urban, J. P. G., & Roberts, S. (2003). Arthritis Res Ther. Brinijkji, W., et al. (2015). AJNR. • Steffens, D., et al. (2016). Spine J. • Panjabi, M. M. (1992). The Stability of the Spine.

LUMBAR DISC HERNIATION RISK: BEYOND McGILL'S LABORATORY

BIOMECHANICS STUDIES

Adams & Hutton, 1982

- Cadaver Discs Loaded in Flexion
- Repetitive Loading
  - → Progressive Disc Prolapse

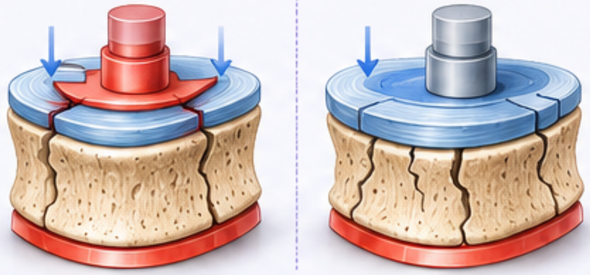


LOADING RATE EFFECTS

Veres et al., 2010

High Load, Faster Failure

Slow Load, Gradual Damage



EPIDEMIOLOGY FINDINGS

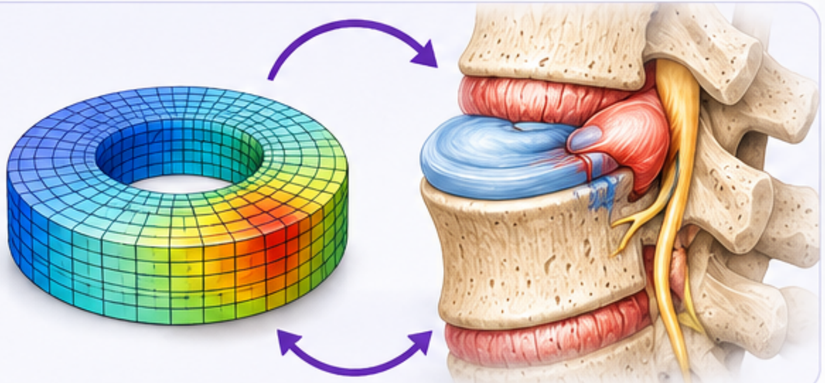
EPILIFT Study, 2009

- Cumulative Occupational Load
  - → 3× Higher Disc Herniation Risk

MODELING RESEARCH

Qasim et al., 2012

- Cyclic Loading Simulation
  - → Fewer Reps
  - → Faster Disc Failure



DOSE–RESPONSE RELATIONSHIP:

MORE WEIGHT & REPS → HIGHER HERNIATION RISK

*Based on non-McGill research evidence.

THE SPINE NEEDS MORE MOBILITY

> Many therapy approaches focus on strengthening muscles and increasing spine range of motion. However, those who have more motion in their backs have a greater risk of having future back troubles.

(Parks et al., 2003)

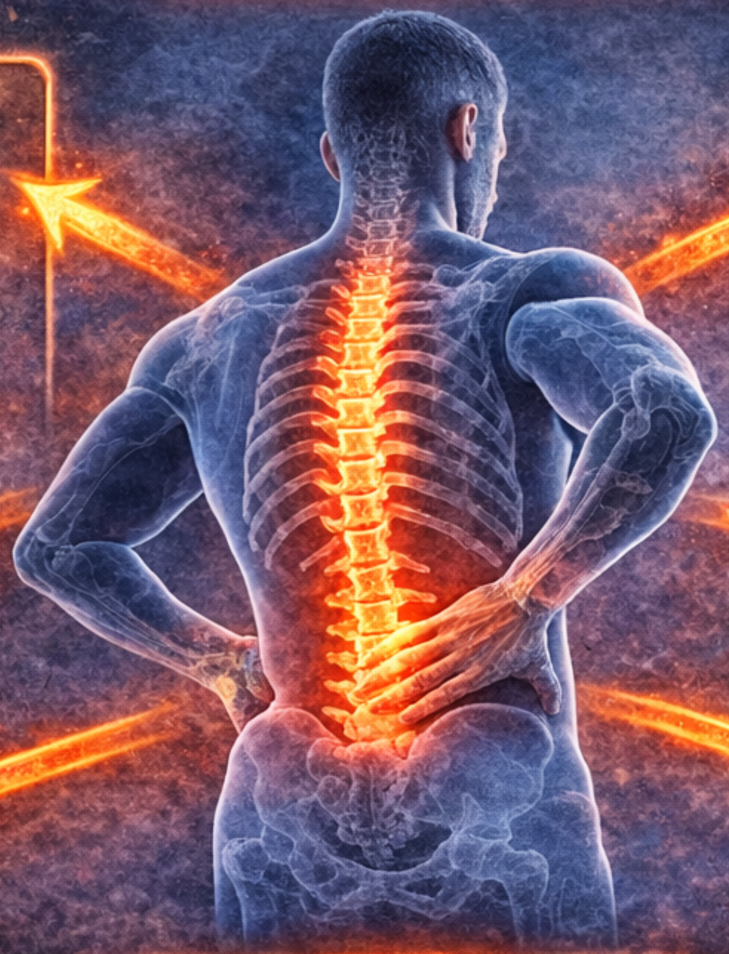
Muscle Guarding & Kinesophobia:

Why Spinal Mobility Can Be Limited

Muscle Guarding

Protective Muscle Tension & Stiffness

Muscles stay tight to "protect" the spine,



Kinesophobia

Fear of Movement

Avoidance due to pain & fear of injury

Fear of Movement

Avoidance due to pain & fear of injury

Increased Pain & Stiffness

Reduced Spinal Mobility

Limited Flexibility & Range of Motion

Avoidance of Activity

"THE MOST COMMON CAUSE OF UNRESOLVED CHRONIC BACK PAIN IS SPINAL INSTABILITY."

> "Many people are walking around with mechanical instability but are asymptomatic because the force required to perform current normal activities is not beyond the ligaments and muscles ability and strength to perform these functions."
>
> — *Hauser, R., Lumbar Instability & Osteoarthritis of the Spine*

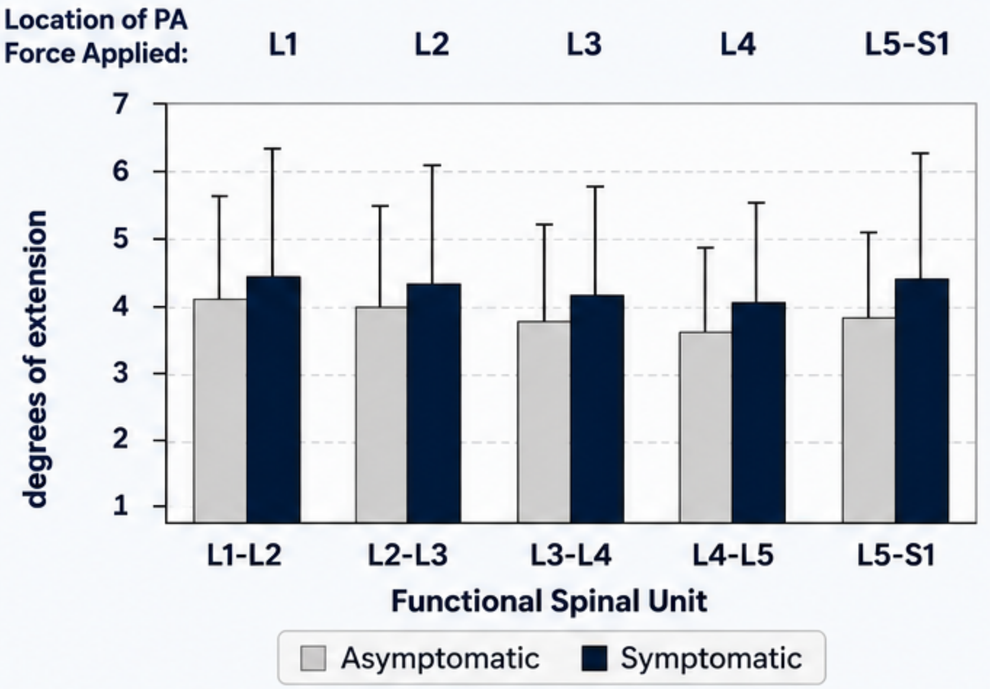
SPINAL RANGE OF MOTION & LOW BACK PAIN

▶ **Sullivan et al. (2000) found no correlation between lumbar range of motion and low back pain.**

Parks et al. (2003) demonstrated that spine range of motion has little to do with functional activities such as walking, standing, sitting, pushing, pulling, lifting, and carrying.

– Parks et al., 2003

FIGURE 8



Mean segmental motion of the target lumbar segment during the posterior to anterior (PA) mobilization procedure. Error bars represent ± SD.

KEY POINT
Multiple studies show that spinal range of motion does not correlate with low back pain or functional ability.

FUNCTIONAL ACTIVITIES
Walking, standing, sitting, pushing, pulling, lifting, and carrying.

IMPLICATION
Focus on function, not just range of motion, when assessing and treating low back pain.

APPLICABLE TO
Clinicians, trainers, therapists, and anyone helping people with low back pain.

SOURCE: National Spine Health Foundation | Back Pain | Neck Pain | Surgery. *National Spine Health Foundation, 6 Apr. 2015, spinehealth.org/breaking-down-the-exercises-that-break-down-your-spine/.* Accessed 11 May 2022.

DO PEOPLE WITH LOW BACK PAIN REALLY "NEED MORE SPINAL MOBILITY"?...

BUT...

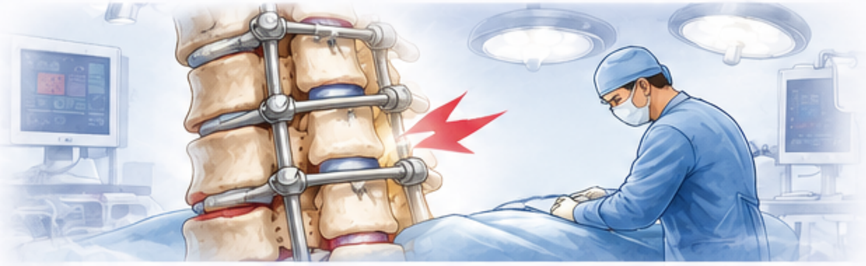
MOBILITY ADVICE

- People are often told they need to increase spinal movement to treat low back pain
- The idea is that the back is just too "stiff"

BUT...

But what is the **#1 surgery for low back pain?**

SPINAL FUSION SURGERY



- To permanently fuse vertebrae for "stability" and reduce motion thought to cause the pain

→ **Most Common Surgery for Low Back Pain**

SPINAL FUSION INVOLVES CREATING MORE STABILITY to fix "too much" instability.

There is a clear contradiction in these approaches to back pain.

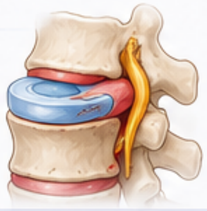
IS THE BACK TOO UNSTABLE OR TOO STIFF?

Spinal fusion surgery aims to reduce motion by creating more stability, not more mobility. The real question is: **what's actually driving your low back pain?**

BIOMECHANICS STUDIES

Adams & Hutton, 1982

- Cadaver discs loaded in flexion
- Repetitive loading → progressive disc prolapse



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Veres et al., 2010

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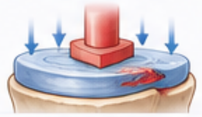
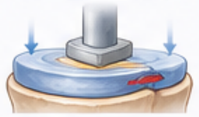


Slow Load, Gradual Damage



EPIDEMIOLOGY FINDINGS

EPILIFT Study, 2009

- Cumulative Occupational Load

→ **3× Higher Disc Herniation Risk**

DOSE–RESPONSE RELATIONSHIP: MORE WEIGHT & REPS → HIGHER HERNIATION RISK

**Based on non–McGill research evidence.*

WHAT SHOULD WE BE FOCUSING ON?

A study done in 2015 looked at all the studies they could to determine the effectiveness of various core strength training strategies for patients with **chronic low back pain**.

WHAT WERE THEY LOOKING AT?

- Trunk balance, stabilization, segmental stabilization, and motor control exercises

SO WHAT DID THEY FIND OUT????

- Core stabilization and motor control strategies **alleviated** chronic low back pain.

THE TAKEAWAY

Core stabilization and motor control strategies are **effective** for reducing chronic low back pain.

Focus on building **stability, control,** and **movement quality.**


CORE STABILITY DOESN'T FIX LOW BACK PAIN!
IT'S A TRAP!
Pointless Planks!
Endless Crunches...
THERE'S MORE TO BACK PAIN THAN JUST YOUR ABS!

STABILIZATION EXERCISES SIGNIFICANTLY REDUCED PAIN

People who performed these exercises had **noticeably less back pain** compared with other treatment groups.

The improvement was considered a **large effect**, meaning the change was meaningful clinically.

THEY ALSO IMPROVED DISABILITY

Patients could function better in daily life, meaning things like:

- walking
- bending
- lifting
- daily activities

became easier.

LONGER PROGRAMS WORKED BETTER

The biggest improvements occurred when programs lasted:

8–12 WEEKS

Shorter programs still helped but not as much.

This type of back pain actually makes up most back pain cases.
These patients responded better to stabilization exercises than people with specific structural problems.

Pain and Disability Therapy with Stabilization Exercises in Patients with Chronic Low Back Pain: A Meta-Analysis

EVIDENCE ON STRETCHING FOR LOW BACK PAIN

What Direct Research & Meta-Analyses Show

SYSTEMATIC REVIEW OF STRETCHING (RCTs)

A systematic review of 16 randomized trials found that:

- Decreases pain and disability
- Improves function and range of motion

However, this review did not report a single % reduction, which is common in rehab research.

META-ANALYSIS: HAMSTRING STRETCHING FOR LBP

Pain reduction effect size:

Standardized Mean Difference (SMD) ≈ 0.72

How to interpret that:

- 0.2 = small
- 0.5 = moderate
- 0.8 = large

So ≈ 0.72 = moderate-to-large pain reduction

BROADER EXERCISE RESEARCH (INCLUDES STRETCHING)

Because stretching is often bundled into "exercise therapy," we need to look at larger datasets:

Cochrane Review (249 trials)

~15% absolute reduction in pain

Approximate % translation

~20–40% reduction in pain (depending on baseline severity)

KEY TAKEAWAY

- Direct research shows stretching can reduce pain and disability.
- Meta-analysis shows moderate-to-large pain reduction.
- Broader exercise research supports meaningful benefits.
- Hip-focused exercises help low back pain a little—but help movement and function even more.

Hip-focused exercises help low back pain a little—but help movement and function even more.

- Improve flexibility & range of motion
- Support movement quality
- Reduce stiffness & tension
- Promote long-term resilience & health

CORE STABILIZATION EXERCISES SIGNIFICANTLY REDUCED CHRONIC LOW BACK PAIN

A 3-month clinical trial with **30 patients** with non-specific chronic low back pain (NSCLBP) compared...

CORE STABILIZATION EXERCISES

Exercises Included:

- Slow Curl Ups
- Bird Dog
- Plank
- Modified Sit-Ups

76.8%
Reduction

Pain Reduction

76.8% Reduction **vs.** **62.8%** Reduction

CONVENTIONAL SPINE EXERCISES

Exercises Included:

- Dynamic Back Stretches
- Pelvic Tilts
- Knee-to-Chest

62.8%
Reduction

Pain Reduction

Both exercise programs helped, **BUT** the **core stabilization exercises reduced pain significantly more.**

Clinical Trial

Inani S.B., Selkar S.P., *Effect of core stabilization exercises versus conventional exercises on pain and functional status in patients with non-specific low back pain: A randomized clinical trial.*

J. Back Musculoskelet. Rehabil. 2013;26:37–43, doi: 10.3233/BMR-2012-0348.

STUDY SUMMARY: EFFECTIVENESS OF CORE STABILITY EXERCISES FOR CHRONIC LOW BACK PAIN

Efficacy of Core Stability Exercise in Non-Specific Chronic Low Back Pain

J. Funct. Morphol. Kinesiol. 2021 Jun; 6(2):37
https://doi.org/10.3390/jfmk6020037

REDUCES PAIN

CSE significantly reduced pain intensity with clinically meaningful effects

IMPROVES DISABILITY & FUNCTION

Improved daily function scores (ODI/RMDQ) in CLBP

BETTER MUSCLE FUNCTION

Increased core activation & coordination—not just strength gains

EFFECTIVE—BUT NOT CLEARLY SUPERIOR

Similar results to general exercise; no clear dominance

BEST IN CHRONIC, NON-SPECIFIC CASES

Stronger effects in chronic cases (>12 weeks)

CORE STABILITY EXERCISES ARE EFFECTIVE FOR CHRONIC LOW BACK PAIN BUT NOT UNIQUELY BETTER THAN OTHER EXERCISE OPTIONS.

Source: Mahdieh Kazemi, H., Ghasemi, G., Negahban, H. et al. Efficacy of Core Stability Exercise in Non-Specific Chronic Low Back Pain. J. Funct. Morphol. Kinesiol. 2021, 6(2):37. https://doi.org/10.3390/jfmk6020037

> **...true authentic stability** is about **effortless timing** and the ability to go from **hard** to **soft** to **hard** to **soft** in a blink.

EFFORTLESS TIMING
Move and react with natural timing—
without tension or overthinking.

FLOW BETWEEN STATES
The ability to transition smoothly
from hard (stability) to soft (relaxation)
and back again.

DYNAMIC ADAPTATION
Adapt instantly to changing demands
while staying strong, controlled,
and efficient.

THE GOAL
This is the foundation of resilient,
pain-free movement in real life.

True authentic stability isn't about holding still—
it's about moving well, responding fast, and always in control.

PROGRESSING STABILITY

WHO ARE WE WORKING WITH?
People that don't know how to create any stability.

THIS IS WHY BODY WEIGHT DOESN'T ALWAYS WORK.
Body weight alone doesn't build true stability.

TRUE REFLEXIVE STABILITY IS THE ULTIMATE GOAL.
It's about reacting, adapting, and staying strong under any condition.

BEGINNERS NEED TO KNOW HOW TO CREATE STABILITY...
...and then how to progress it step by step.

PROGRESSING STABILITY BUILDS RESILIENCE FOR LIFE.
Stronger today. More capable tomorrow.

Stability isn't built overnight—it's built with intention, practice, and progression.
Start where you are. Build the foundation. Keep progressing.

THE BIG PICTURE ON EXERCISE FOR CHRONIC LOW BACK PAIN

What the best evidence tells us

Exercise intervention for patients with chronic low back pain:
a systematic review and network meta-analysis

WHAT IT LOOKED AT

Compared multiple **types of exercise** for chronic low back pain

Included many RCTs (high level of evidence)

Used a network **meta-analysis** → allows comparison across many interventions, even if not directly studied head-to-head

KEY POINT:
This is one of the strongest ways to compare exercise types.

KEY FINDINGS
(WHAT ACTUALLY MATTERS)

EXERCISE WORKS—CONSISTENTLY

Almost all exercise interventions:

- Reduced pain
- Improved function

TRANSLATION:
Doing something is far better than doing nothing.

WHAT THIS MEANS CLINICALLY

SPECIFICITY MATTERS LESS THAN WE THOUGHT

This challenges the idea:

- ✗ "You must do THIS type of exercise"

Instead:

- ✓ Most well-designed programs produce similar results

THE TAKEAWAY

Move more.
Build strength. Improve movement. Do it consistently.

The type matters less than you think.

HOW DIFFERENT EXERCISES REDUCE LOW BACK PAIN

STRENGTH TRAINING

- Moderate reduction in low back pain
- Average Hedges' g = −0.63 *(Low evidence)*

(Nature, 2025)*

STRETCHING

- Moderate improvenent
- 0.7 SMD improvement in pain
- 6.97 ODI points better function

(SAGE Open Med, 2024)

BREATH WORK

- Small reduction in back pain
- 0.5 points lower VAS pain score
- 2.5 points lower disability (ODI)

(Man Ther, 2023)

CORE STABILITY

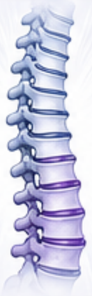
- Small-to-moderate pain reduction
- >0.5 SMD improvement in pain
- Broader core approaches perform slightly better

(Front Physiol, 2025)

AEROBIC EXERCISE

- Walking reduced low back pain by:
- 1.0 pain point on VAS
- 6.3 points better on the ODI

(Front Physiol, 2026)



All exercise types are effective for low back pain, but the best approach varies by person → Matching the method to the individual and keeping it consistent are most important.

**Rough average estimates from systematic reviews/meta analyses*

THE DEFINITION OF PAIN

International Association for the Study of Pain
Advancing the Science of Pain

> **PAIN IS AN UNPLEASANT SENSORY AND EMOTIONAL EXPERIENCE**
>
> — ASSOCIATED WITH, OR RESEMBLING THAT ASSOCIATED WITH, ACTUAL OR POTENTIAL TISSUE DAMAGE.

SENSORY
How pain feels in the body.

EMOTIONAL
How pain affects how we feel.

PROTECTIVE
A vital signal that helps protect us.

KEY POINT:
Pain is real, complex, and personal. It is influenced by biological, psychological, and social factors—and it is always valid.

WHY IT MATTERS:
Understanding pain helps us communicate better, make better decisions, and improve outcomes.

This modern definition recognizes that pain is more than tissue damage—
it's a **whole-person** experience shaped by the body, brain, and life context.

THE SCIENCE OF PAIN

THE DEFINITION OF PAIN
BY DR. RACHEL ZOFFNESS

PT, DPT, PhD, OCS
Researcher • Educator • Pain Science Expert

> "Pain is the brain's opinion of how much danger you are in."

Pain is a protective output of the brain, based on its evaluation of danger, not a direct measure of tissue damage.

INPUTS TO THE BRAIN

BIOLOGICAL
Injury, inflammation, illness, genetics, tissue health

PSYCHOLOGICAL
Thoughts, beliefs, emotions, past experiences

SOCIAL
Environment, culture, relationships, work, stress, support

OUTPUT: PAIN
A protective response designed to keep you safe.

REAL AND PRODUCED BY THE BRAIN
Pain is a real experience.
It is produced by the brain's neural processing, not just a direct signal from tissues.

PROTECTIVE, DESIGNED TO KEEP YOU SAFE
Pain acts as an alarm system.
It motivates protective changes in thoughts, behaviors, and movement to reduce perceived threat.

BIOPSYCHOSOCIAL
Pain is influenced by a combination of biological, psychological, and social factors—all interacting together in a unique way for each person.

KEY TAKEAWAY
Pain is not simply a damage alarm. It is the brain's best attempt to protect you based on all the information it has about you and your current situation.

Understanding pain this way empowers better education, reduces fear, and supports more effective recovery.

Being strong **MIGHT** prevent injury,

But it **DOES NOT** prevent pain.

– Charlie Merrill

PAIN IS LIKE A SMOKE DETECTOR

It's an alarm system—not a damage detector.

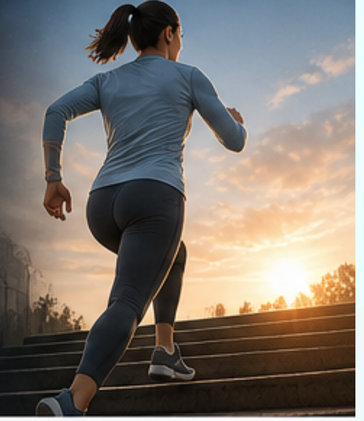
Research shows non-specific chronic low back pain is not caused by a "weak back," but by a complex interaction of biological, psychological, and social factors.

Pain is real.
But it doesn't always mean damage.

It's protective.
It alerts you to potential threat.

It's sensitive.
It can overreact when the system becomes more sensitive.

It can be calmed.
By reducing threat and improving safety, confidence, and context.



THE SMOKE DETECTOR ANALOGY

A smoke detector doesn't go off because there's a fire.
It goes off because it senses smoke—
which could mean fire... or toast.

REAL FIRE
Danger is real.
The alarm helps protect you.

BURNT TOAST
Annoying alarm.
But it's still trying to help.

The alarm is doing its job.
The question is: Why is it going off?

PAIN WORKS THE SAME WAY

Sometimes there is real tissue threat or injury.

Sometimes it's irritation, overload, or stress.

Sometimes it's sensitive nerves and a protective brain.

Pain is an output of the nervous system, influenced by many inputs.
It's not just about your back.

WHAT REALLY MATTERS MORE THAN SITTING

Research shows sitting alone is a weak and inconsistent risk factor for chronic low back pain.

Stronger predictors include:

Psychosocial factors
Stress, fear of movement, catastrophizing, mood

Work & life factors
Job satisfaction, control, support, demands

Lifestyle factors
Low physical activity, poor sleep, general health

Social factors
Support, connections, isolation

Sleep & recovery
Sleep quality, fatigue, recovery capacity

Overall health
Fitness, nutrition, other health conditions

Movement, strength, and fitness help—
but they are only part of the bigger picture.

TURNING DOWN A SENSITIVE ALARM

We can't (and shouldn't) remove the alarm.

But we can reduce false alarms by changing what the system perceives.

MOVE MORE

More movement = more variety and better nervous system tuning.

REDUCE THREAT

Less fear, stress, and worry = a calmer, less sensitive alarm system.

BUILD CONFIDENCE

Belief in your body is a powerful pain buffer.

IMPROVE CONTEXT

Supportive relationships, meaningful work, and good communication matter.

OPTIMIZE HEALTH

Sleep, nutrition, activity, and overall health support resilience.

A calmer system.
Fewer false alarms.
Less pain.
Better life.

THE GOAL: Help your nervous system feel safe again—so it doesn't need to keep the alarm blaring.

Pain is real.
You are not broken.
And things can get better.

EVEN IF PAIN IS STRUCTURAL,
THIS IS STILL IMPORTANT

Pain is real. Structure matters. But the brain, mind, and environment shape how pain is experienced—and how recovery happens.

1 FEAR AND CATASTROPHIZING CAN INCREASE DISABILITY

Research consistently shows that fear avoidance, catastrophizing, and beliefs about damage are some of the strongest predictors of chronic disability in low back pain—even when structural findings are present.

EXAMPLES

- Someone with stenosis may become afraid to walk.
- Someone with a disc injury may fear bending.
- Someone with arthritis may avoid exercise entirely.

OVER TIME, THIS MAY LEAD TO:

- Deconditioning
- Reduced movement tolerance
- Social withdrawal
- Increased guarding
- Worsening pain sensitivity

In many cases, the fear surrounding the structure becomes just as disabling as the structure itself.

2 SOCIAL FACTORS MATTER TOO

Research shows social influences affect pain outcomes significantly.

These include:

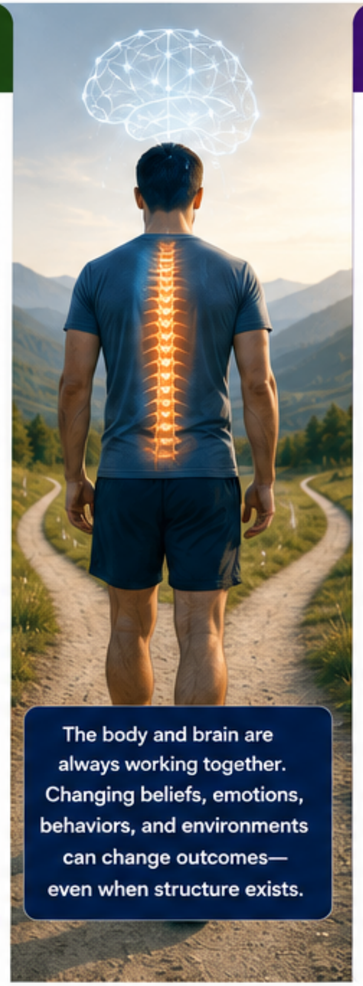
- Social support
- Work stress
- Financial stress
- Family beliefs
- Healthcare messaging
- Isolation

FOR EXAMPLE:

People told their spine is "degenerating" or "crumbling" often experience worse fear and disability.

Supportive environments and encouraging communication improve outcomes.

Pain is not experienced in a vacuum. The nervous system constantly interprets: safety, threat, stress, and environment.



The body and brain are always working together. Changing beliefs, emotions, behaviors, and environments can change outcomes—even when structure exists.

3 RESEARCH SUPPORTS INTEGRATED APPROACHES

Modern low back pain research increasingly supports approaches that combine:

- Exercise
- Education
- Psychological support
- Graded exposure
- Stress management
- Lifestyle interventions

Cognitive Functional Therapy (CFT), for example, has shown strong outcomes by addressing:

- Movement behaviors
- Beliefs
- Fear
- Stress
- Lifestyle factors

alongside physical rehabilitation.

This doesn't ignore structure. It recognizes: humans are more than MRI findings.

4 IMPORTANT CLARIFICATION

Addressing psychological and social factors does NOT mean:

- ✕ "the pain is all mental"
- ✕ or the structural issue is fake.

It means:

All pain experiences are influenced by both body and brain.

Even acute injuries involve nervous system processing.

The more persistent pain becomes, the more these broader influences matter.

Structure can start the story. But many factors influence how the story unfolds.

THE BIG PICTURE

- Structural findings can be real and painful.
- The brain, beliefs, emotions, and environment strongly influence pain and disability.
- Movement, confidence, support, and education help the nervous system feel safer.
- Better nervous system safety + better coping + better function = better outcomes.

So even if pain is structural, addressing fear, beliefs, stress, and social factors is still one of the most important things we can do to improve outcomes.

Systematic Review: "Obesity and Pain"

(International Journal of Obesity)

This large systematic review examined **70 studies** on obesity and pain.

The review concluded there is a strong and complex relationship between:

OBESITY

CHRONIC PAIN

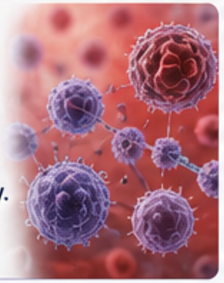
DISABILITY

PSYCHOLOGICAL DISTRESS

The authors emphasized that the relationship is influenced by multiple interacting factors:

INFLAMMATION

Low-grade inflammation can increase pain sensitivity.



BEHAVIOR

Eating patterns, stress, and coping strategies influence pain and weight.

EMOTIONAL STRESS

Stress can amplify pain perception and drive unhealthy behaviors.

PHYSICAL INACTIVITY

Reduced movement increases pain and worsens metabolic health.

METABOLIC HEALTH

Insulin resistance, fat distribution, and metabolic dysfunction contribute to pain pathways.

IMPORTANTLY:

The review supports the idea that pain is not simply caused by "carrying extra weight."

Pain in people with obesity is **multifactorial**, driven by a combination of biological, psychological, behavioral, and social factors.

Cite: Dixon, J. B., et al. (2017). Obesity and pain: a systematic review. *International Journal of Obesity*, 41(5), 744–759. https://doi.org/10.1038/ijo.2017.43

RESEARCH SUMMARY FOR FITNESS PROFESSIONALS

CHRONIC PAIN & WEIGHT LOSS: LOSING ISN'T THE HARD PART—KEEPING IT OFF IS.

A 2-year study found that while people with chronic pain can lose weight at first just as well as those without pain, they regain it faster and end up losing about **33% less** weight overall.

2-YEAR WEIGHT LOSS OUTCOMES

NOT A MOTIVATION PROBLEM

Both groups reported similar eating habits and physical activity levels.

People with chronic pain are **not trying less hard.**

SOMETHING DEEPER MAY BE HAPPENING

The similar effort but different outcomes suggest underlying physiological factors are making weight loss harder to maintain.

POSSIBLE BIOLOGICAL FACTORS IN CHRONIC PAIN

CHRONIC INFLAMMATION
Promotes metabolic dysregulation and fat storage.

INSULIN RESISTANCE
Reduces the body's ability to use glucose efficiently.

HORMONAL & STRESS-SYSTEM DYSFUNCTION
Elevated cortisol and altered hormones favor weight gain.

NERVOUS SYSTEM OVERLOAD
Heightened threat state increases protection and energy conservation.

METABOLIC ADAPTATIONS
The body adapts to resist further weight loss.

MENTAL & EMOTIONAL FACTORS MATTER

Chronic pain is strongly linked with depression, anxiety, trauma, poor sleep, and stress.

These factors affect hunger, recovery, motivation, and metabolism.

THE WRONG TAKEAWAY:

"PEOPLE WITH CHRONIC PAIN DON'T TRY HARD ENOUGH."

THE RIGHT TAKEAWAY:

People with chronic pain may be fighting **biological, neurological,** and **psychological barriers** that make keeping weight off much harder—even when they're doing many of the right things.

WHAT THIS MEANS FOR FITNESS PROFESSIONALS

- Go beyond calories and willpower.
- Prioritize pain management, stress reduction, and sleep.
- Use a gradual, individualized approach.
- Focus on function, consistency, and long-term support.
- Celebrate non-scale victories.

REFERENCED STUDY

Liedberg, G. M., Sundström, J., Stenström, C. H., et al. (2020). People with chronic pain have greater weight regain than people without pain: a 2-year follow-up of a lifestyle intervention trial. *Obesity (Silver Spring)*, 28(2), 221–228.

EVIDENCE-BASED. CLIENT-CENTERED. STRONGER OUTCOMES.

Swedish Cohort Study: "Lose Pain, Lose Weight, and Lose Both"

This study looked at obese patients in chronic pain rehabilitation programs.

Researchers wanted to know:
if people's pain improved,
would they naturally lose weight too?

WHAT THE STUDY FOUND

PAIN IMPROVED

Participants reported significant reductions in pain.

PHYSICAL ACTIVITY IMPROVED

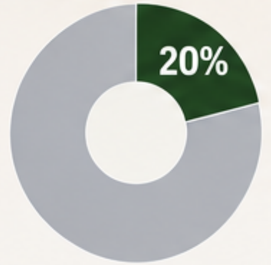
Participants became more active.

PSYCHOLOGICAL DISTRESS IMPROVED

Levels of anxiety, depression, and distress improved.

BUT WEIGHT LOSS REMAINED DIFFICULT FOR MANY PARTICIPANTS

Only about one-fifth (20%) achieved clinically significant weight loss.



Only about one-fifth (20%) achieved clinically significant weight loss.

WHY THIS STUDY IS IMPORTANT

This study shows that even when people feel better and move more, weight regulation is still biologically and behaviorally complicated in chronic pain populations.

FACTORS THAT MAKE WEIGHT LOSS CHALLENGING IN CHRONIC PAIN POPULATIONS

- Metabolic and hormonal dysregulation
- Chronic inflammation
- Sleep disturbances and fatigue
- Medications
- Emotional eating and stress
- Reduced physical capacity

THE AUTHORS CONCLUDED

These patients likely need targeted weight management support, not just pain reduction alone.

Cite: Ljótsson, B., Hedman, E., Lindefors, N., et al. (2020). Lose pain, lose weight, and lose both—a Swedish cohort study of an interdisciplinary pain rehabilitation program for individuals with obesity. *Journal of Rehabilitation Medicine*, 52(6), jrm00102.

WHY WEIGHT LOSS REMAINS SO DIFFICULT IN CHRONIC PAIN—EVEN WHEN THINGS IMPROVE

Key insights from the chronic pain weight loss study

> "Behavior alone may not fully explain obesity in chronic pain populations."
>
> – Dr. Howard Schubiner

WHAT THE STUDY EXPECTED vs. WHAT THEY FOUND

Researchers expected:

Pain improves → Mood improves → Activity improves → Weight loss improves

But what they found:

Pain improved ↑ Psychological distress improved ↑ Quality of life improved ↑ Some health behaviors improved ↑

Most still struggled to maintain significant long-term weight loss.

THE BIG PICTURE

Chronic pain affects far more than just how we feel—
it changes how the brain and body regulate weight.

Even when people feel better, their bodies may still be operating in "survival mode."

Nervous system sensitization | Inflammation | Hormonal dysregulation | Metabolic adaptation | Altered movement behavior | Stress physiology

...all interacting together to make sustained weight loss much harder.

5 MAJOR REASONS WEIGHT LOSS IS SO CHALLENGING IN CHRONIC PAIN

1 Chronic pain may create lasting physiological changes

Even when someone feels psychologically better, the body may still be dealing with:

- Inflammation
- Insulin resistance
- Altered stress hormones
- Autonomic nervous system dysfunction
- Metabolic adaptation
- Disrupted appetite regulation

In simple terms:
The brain and body may still be operating in "survival mode" even after pain decreases.

2 Self-reported behavior changes are often inaccurate

The study relied heavily on self-reported physical activity and nutrition data.

People may genuinely believe they're moving more or eating better, but those changes may not have been large enough to significantly impact weight loss.

This is extremely common in obesity research.

3 Pain changes movement efficiency

Even if people become more active, chronic pain often changes:

- Gait
- Muscle recruitment
- Fatigue levels
- Recovery
- Energy expenditure

So two people may do the "same amount" of activity, but the person with chronic pain may tolerate less intensity, recover worse, and unconsciously conserve energy elsewhere in the day.

4 Weight regain is heavily biological

It's not that people with pain can't lose weight initially—
it's that they regain weight faster.

The body strongly resists sustained weight loss through:

- Increased hunger signals
- Lower metabolic rate
- Fatigue
- Hormonal adaptations
- Energy conservation mechanisms

Add chronic pain and nervous system sensitization on top of that, and the challenge becomes even bigger.

5 Psychological improvement may not equal nervous system recovery

Someone can report less depression, less pain, and better quality of life... but still have a nervous system that remains physiologically sensitized and stress-reactive.

Chronic pain alters stress physiology, autonomic regulation, inflammatory signaling, and reward/motivation pathways in the brain.

These systems influence cravings, energy regulation, movement tolerance, and metabolic function.

THE TAKEAWAY: Obesity in chronic pain populations is not simply a motivation or compliance problem.
It likely involves a complex interaction of **nervous system sensitization, metabolic adaptation, inflammation, hormonal dysregulation, altered movement behavior, and stress physiology—all working together.**

THE BOTTOM LINE:
Understanding these deeper mechanisms helps us move beyond blame and outdated assumptions—and toward more effective, compassionate, and personalized approaches.

CHRONIC BACK PAIN
& THE MIND-BODY CONNECTION

Dr. Howard Schubiner's Study:

88% of Chronic Back Pain is **NOT** Due to Structural Damage

1 MIND-BODY CAUSES

- Brain & Nervous System Sensitization
- Emotional & Psychological Factors

2 STRUCTURAL DAMAGE
Less Common

- Disc Degeneration, Arthritis, etc.
  Often **NOT** the Cause of Pain

Treat the SOURCE, Not Just the Symptoms

HOW CHRONIC PAIN CHANGES THE BRAIN

New Research from Northwestern University (Apkarian Lab)

When pain persists, the brain shifts from processing pain in sensory regions to involving emotional, motivational, and survival networks.

> Chronic pain shifts from being primarily a sensory experience to more of an emotional and motivational state.
>
> – Vania Apkarian, PhD

THE SHIFT OVER TIME: FROM SENSORY TO EMOTIONAL CIRCUITS

ACUTE / NEW PAIN

Pain is mainly processed in sensory pain regions.

Key Regions Involved

- Somatosensory cortex (S1, S2)
- Insula
- Anterior cingulate cortex (sensory)
- Thalamus

PAIN PERSISTS

The brain begins to rewire.

What's Happening

Connections strengthen in emotional and survival networks. Pain becomes more than a signal—it becomes a learned experience.

CHRONIC PAIN

Pain is increasingly processed in emotional and motivational circuits.

Key Regions Involved

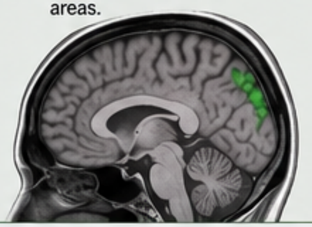
- Medial prefrontal cortex
- Amygdala-related networks
- Nucleus accumbens (reward/avoidance)
- Hippocampus (memory)
- Anterior cingulate cortex (emotional)
- Other limbic and default mode regions

THE NORTHWESTERN UNIVERSITY STUDY

Researchers followed people with new low back pain over time using fMRI brain scans. Some recovered. Others developed chronic pain.
What they found was remarkable:

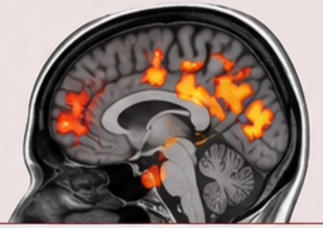
RECOVERED GROUP

Continued showing activity in normal acute pain-processing areas.



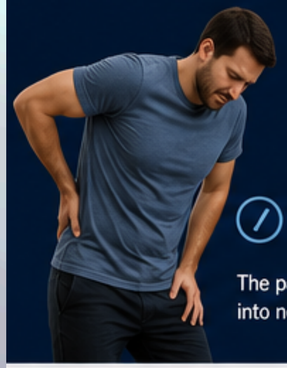
CHRONIC PAIN GROUP

Showed increasing activity in emotional circuits over time.



The researchers concluded that chronic pain represents a **"brain reorganization"** or **emotional learning process.**

THIS DOES NOT MEAN...



- ✗ "The pain is fake"
  or
- ✗ "It's all psychological."

It means the nervous system changes over time.

The pain becomes more deeply wired into networks involved in:

CHRONIC PAIN IS WIRED INTO NETWORKS FOR:

- THREAT DETECTION
- FEAR & ANTICIPATION
- EMOTIONAL SALIENCE
- PROTECTIVE BEHAVIOR
- MEMORY & LEARNING

This helps explain why chronic pain is often associated with:

- ANXIETY
- DEPRESSION
- FEAR OF MOVEMENT
- HYPERVIGILANCE
- SLEEP PROBLEMS
- FATIGUE
- INCREASED SENSITIVITY

WHY TREATING TISSUES ISN'T ENOUGH

As pain becomes chronic, the brain itself has adapted around the pain experience.

Treatment needs to include **the brain, the body, and the person.**

Effective care addresses nervous system sensitivity, emotions, movement, sleep, stress, and meaning—not just tissues.

KEY STUDY: Hashmi, J. A., Davis, K. D., & Apkarian, A. V. (2013). Shape shifting pain: chronification of back pain shifts brain representation from nociceptive to emotional circuits. *Brain*, 136(9), 2751–2768. doi:10.1093/brain/awt211

> The longer pain persists, the less it behaves like a simple injury signal and the more it becomes tied into the brain's emotional and survival networks.

Understanding the brain's role in chronic pain opens the door to more effective, whole-person approaches to recovery.

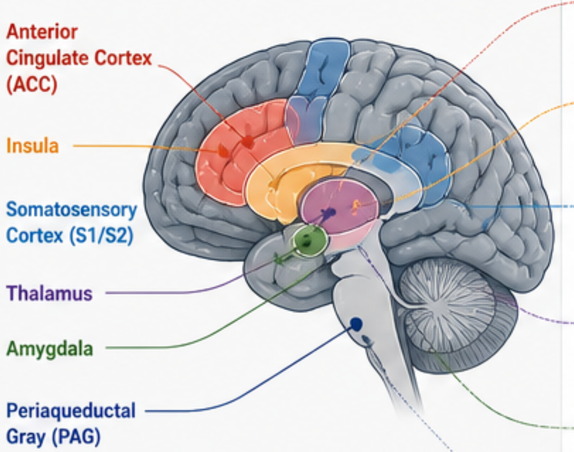
EMOTIONAL PAIN AND PHYSICAL PAIN SHARE VERY SIMILAR NEURAL NETWORKS

Pain is not just in the body—it's in the brain.

Research shows that the brain processes emotional pain and physical pain using many of the same regions.

PHYSICAL PAIN

Example: Back injury, inflammation, or tissue damage



These regions detect, evaluate, and respond to physical pain.

THE OVERLAPPING NEURAL NETWORK

Anterior Cingulate Cortex (ACC)
Processes the unpleasantness and intensity of pain.

Insula
Integrates sensation with emotion; key for how pain "feels."

Somatosensory Cortex (S1/S2)
Processes the location and intensity of pain signals.

Thalamus
Relays and modulates pain information.

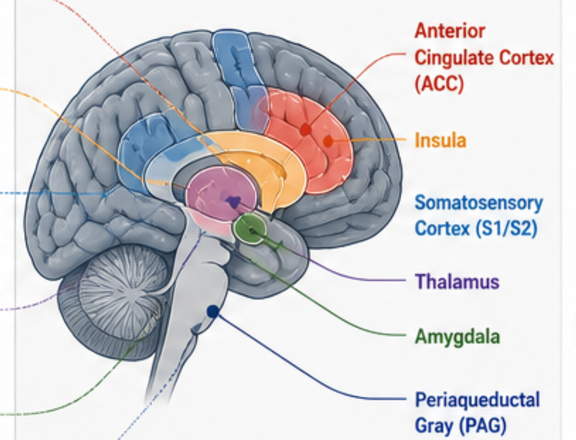
Amygdala
Processes threat, fear, and emotional salience of pain.

Periaqueductal Gray (PAG)
Modulates pain and can turn pain signals up or down.

These shared networks explain why emotional pain can feel so real—and why it can hurt so much.

EMOTIONAL PAIN

Example: Rejection, loneliness, grief, heartbreak



These same regions are activated during emotional pain.

WHAT RESEARCH SHOWS

Eisenberger et al., 2003 (Science)
Social rejection activates the same brain regions as physical pain.

MacDonald & Leary, 2005 (Psychol. Bull.)
A meta-analysis showing strong overlap in neural circuitry between physical and social/emotional pain.

Wager et al., 2013 (PAIN)
Both types of pain engage a common "pain matrix" in the brain.

WHAT THIS MEANS

Emotional pain is real pain.
Your brain doesn't fully distinguish between the two.

The brain is trying to protect you.
It responds to emotional threats the same way it responds to physical threats.

Healing emotional pain can reduce physical pain.
Addressing stress, trauma, and emotional wellbeing matters.

KEY TAKEAWAYS

Pain is an output of the brain.
It integrates body sensations, emotions, and context.

The same neural networks process physical and emotional pain.
That's why both can feel equally intense.

It's not "all in your head"—it's in your brain.
And your brain is in your head.

You can retrain your brain.
Safety, connection, movement, and supportive care can calm the system.

Pain is a protective signal generated by the brain. Understanding this helps us treat the whole person—not just the body.

HOW EMOTIONAL DISTRESS SHOWS UP AS PHYSICAL AILMENTS

Your mind and body are deeply connected.

When you experience emotional distress, your brain triggers physical responses designed to protect you. When this stress response stays "on" for too long, it can lead to pain, tension, and illness.

COMMON EMOTIONAL TRIGGERS

- Stress
- Anxiety
- Fear
- Anger
- Sadness
- Grief
- Overwhelm
- Trauma

1 EMOTIONAL DISTRESS

You experience a difficult situation or emotion.

Your brain perceives a threat.

It doesn't always distinguish between physical danger and emotional pain.

2 STRESS RESPONSE ACTIVATES

Your brain activates the fight-or-flight response to protect you.

HYPOTHALAMUS activates the stress response

SYMPATHETIC NERVOUS SYSTEM

Releases stress hormones (adrenaline, cortisol)

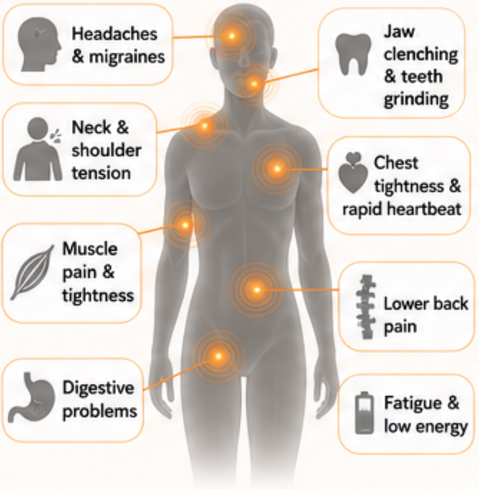
BODY PREPARES FOR ACTION

Heart rate ↑
Breathing ↑
Muscles tense
Digestion slows

This response is helpful in the short term. But when distress is constant, your body stays in high alert.

3 PHYSICAL CHANGES OCCUR

Prolonged stress keeps your body in a heightened state, leading to wear and tear.



These are real physical changes driven by your brain and nervous system.

4 CHRONIC SYMPTOMS DEVELOP

Over time, these physical responses can become chronic and contribute to:

- Chronic pain (back, neck, shoulders, joints)
- Tension headaches
- Irritable bowel & digestive issues
- Fibromyalgia symptoms
- Fatigue & sleep problems
- Weakened immunity
- High blood pressure & heart problems

The body adapts to survive. But adaptation can become the problem.

5 HEALING IS POSSIBLE

When you address the underlying emotional distress and regulate your nervous system, your body can heal.

- Process emotions and reduce stress load
- Calm your nervous system (breathing, mindfulness, rest)
- Move your body gently and consistently
- Build support and connection
- Seek professional help when needed

Healing your emotions can help heal your body.

THE BOTTOM LINE

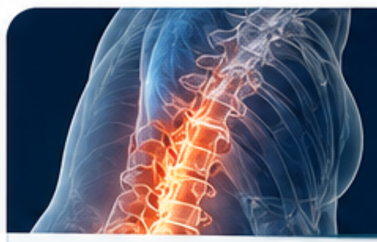
Your body listens to your mind.
Unresolved emotional distress can show up as physical pain, tension, and illness—but with awareness and the right support, your body has an incredible ability to heal.

WHAT YOU CAN DO TODAY

- Take slow, deep breaths
- Journal or talk about how you feel
- Move in ways that feel good
- Prioritize sleep
- Be kind to yourself

SOURCE: Abbaszadeh, S., et al. (2020). Emotional effects on factors associated with chronic low back pain. *Journal of Pain Research*, 13, 2871–2881. https://doi.org/10.2147/JPR.S275423

Mind and body are one. Treat both.



WHAT THE "BOULDER BACK STUDY" REVEALED ABOUT CHRONIC BACK PAIN

STUDY DESIGN

Researchers studied **151 people** with chronic back pain lasting at least **6 months**.

Participants were divided into 3 groups:

- Pain Reprocessing Therapy (PRT)
- Placebo injection
- Usual medical care

8 therapy sessions over 4 weeks.

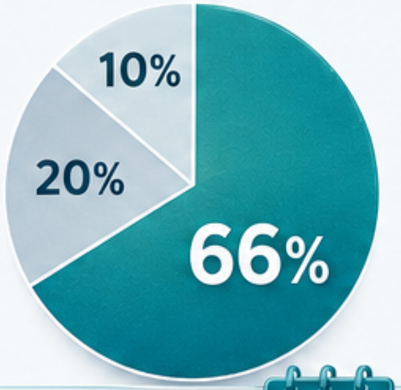
KEY RESULTS

After 4 weeks of treatment:

66% of PRT patients were pain-free or nearly pain-free

Compared with:

- **20%** in the placebo group
- **10%** in the usual care group



Most improvements remained for a full year.

THE BIG TAKEAWAY

The study suggests a shift in how we understand some **chronic back pain**:

- nervous system sensitivity
- fear and threat perception
- learned pain pathways
- brain interpretation of movement

PRACTICAL MEANING

For many chronic back pain cases:

Recovery may involve a **combination** of approaches:

- Movement & physical training
- Reducing fear of movement
- Nervous system desensitization
- Changing pain beliefs

WHY PAIN REPROCESSING THERAPY (PRT) IS EFFECTIVE FOR CHRONIC LOW BACK PAIN

Chronic low back pain is often maintained by the brain and nervous system—not ongoing tissue damage.
PRT helps retrain the brain, calm the nervous system, and break the pain cycle.

> *"Pain is real, but it does not always mean harm. The good news is that the nervous system can change."*
>
> – Dr. Howard Schubiner

1. CHRONIC PAIN IS A BRAIN-DRIVEN PROBLEM

Research shows that persistent pain is associated with changes in the brain's networks for danger, emotion, and protection.

ACUTE PAIN
Brain processes pain in sensory (nociceptive) regions.

PAIN PERSISTS
The brain begins to shift.

CHRONIC PAIN
Pain becomes linked to emotional, memory, and threat networks.

This "brain reorganization" creates a self-perpetuating pain cycle:

Threat Detection → Fear & Anticipation → Increased Sensitivity → Protective Behaviors → More Pain & Disability

2. PRT TARGETS THE ROOT CAUSE: THE ALARM SYSTEM

PRT is a mind–body treatment that helps people unlearn the pain alarm and reduce the brain's need to produce pain.

- Calms threat and fear circuits
- Reduces pain-related catastrophizing and worry
- Retrains the brain to interpret signals as safe
- Restores balance to emotional, motivational, and sensory networks

PRT doesn't just manage symptoms—
it changes how the brain and nervous system process pain.

3. HOW PRT CREATES LASTING CHANGE

Through education, psychology, and self-directed practices, PRT helps:

CHANGE YOUR MIND, CHANGE YOUR BRAIN
Understanding pain neuroscience reduces fear and changes brain activity.

REDUCE THREAT AND FEAR
Addressing fear, stress, and past experiences lowers danger signals.

RETRAIN PAIN PERCEPTIONS
The brain learns that safe movement and normal sensations are not dangerous.

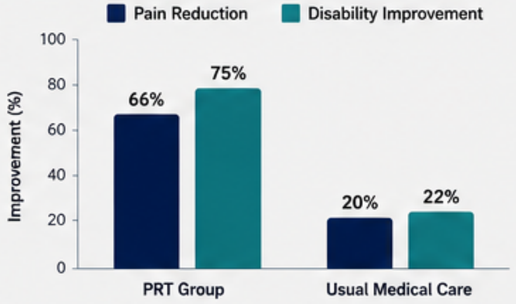
BREAK THE PAIN CYCLE
With less threat and more safety, pain naturally decreases and function improves.

4. STRONG EVIDENCE SUPPORTS PRT

Multiple high-quality studies show that PRT is effective for chronic low back pain.

- Large randomized controlled trials show clinically meaningful reductions in pain and disability.
- Benefits are durable—maintained at 6, 12, and 24 months.
- Works even for people with long-term pain and high levels of distress.
- Comparably effective to physical therapy, and more effective than usual medical care.

EXAMPLE: PRT STUDY OUTCOMES*



*Adapted from studies by Pielech et al., 2016, 2017, 2020 (JAMA Psychiatry, PAIN).

5. WHY IT WORKS

PRT addresses the key drivers of chronic pain:

- **Neuroplasticity:** The brain can change.
- **Safety:** When the brain feels safe, pain turns down.
- **Empowerment:** You learn skills to regulate your nervous system.
- **Whole-Person Approach:** Mind, body, emotions, and experiences are all included.

THE BOTTOM LINE

PRT helps the brain learn a new story:

"I am safe. My body is not in danger. I can move forward."

By retraining the brain and calming the nervous system, PRT reduces pain, improves function, and helps people get their lives back.

PAIN IS REAL. HEALING IS POSSIBLE. THE BRAIN CAN CHANGE—AND SO CAN YOUR LIFE.

Evidence. Education. Empowerment.
That's the power of Pain Reprocessing Therapy.

KABAT-ZINN'S ORIGINAL CHRONIC PAIN STUDY (1982)

ORIGINAL STUDY (1982)

Citation: Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results.

Ceneral Hospital Psychiatry, 4(1), 33–47.

Patients participated in a 10-week mindfulness meditation program.

The study included 51 chronic pain patients who had not improved with traditional medical treatment.

Results showed:

- 65% reduced their pain scores by at least 33%
- 50% reduced pain by at least 50%

65% Reduced pain by ≥33%

50% Reduced pain by ≥50%

Participants also showed improvements in **mood, psychological symptoms, and overall well-being.**

FOLLOW-UP CLINICAL STUDY (1985)

Citation: Kabat-Zinn, J., Lipworth, L., & Burney, R. (1985). The clinical use of mindfulness meditation for the self-regulation of chronic pain. *Journal of Behavioral Medicine,* 8(2), 163–190.

pain intensity

activity limitations caused by pain

anxiety and depression

90 chronic pain patients completed a 10-week mindfulness program.

Improvements also included **reduced medication use** and **increased activity levels.**

MINDFULNESS CAN HELP REDUCE PAIN AND IMPROVE QUALITY OF LIFE.

DR. HOWARD SCHUBINER'S

F.I.T. CRITERIA

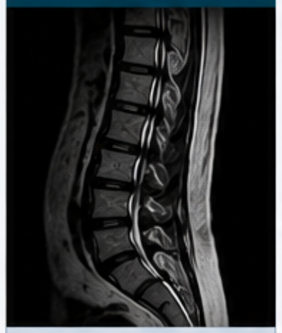
FOR SYMPTOMS OF NEUROPLASTIC PAIN

A simple framework to help identify pain that is more likely **driven by** nervous system sensitization rather than ongoing tissue damage.

F FUNCTIONAL

Symptoms behave differently than typical structural injuries.

NORMAL SCANS OFTEN

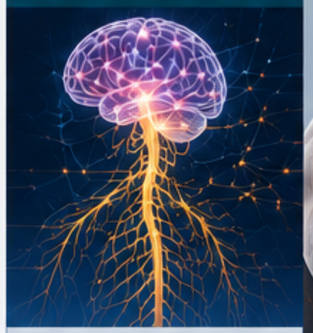


Imaging and tests may appear normal despite significant pain.

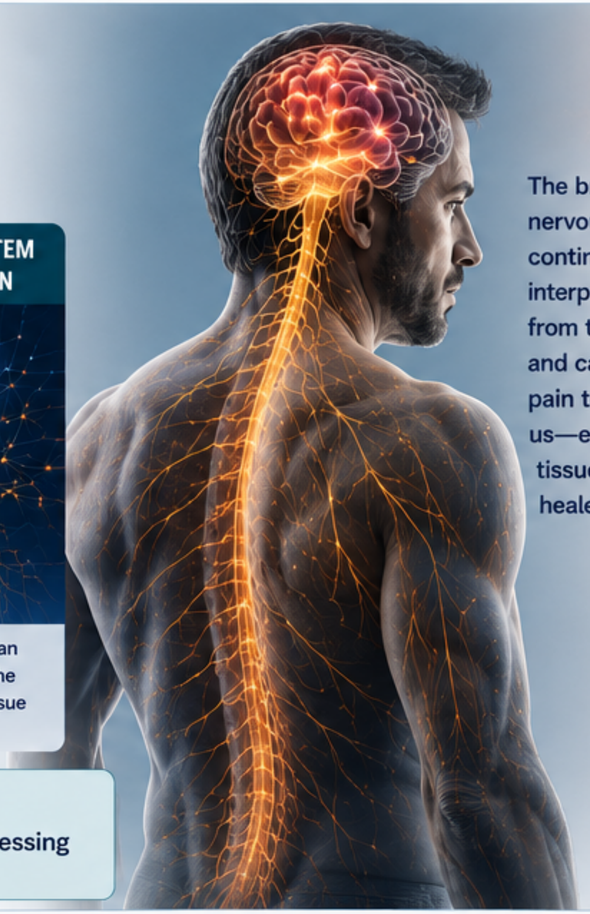
PAIN CAN SPREAD AND MOVE

Pain may not follow anatomical patterns and can appear in multiple areas of the body.

THE NERVOUS SYSTEM CAN AMPLIFY PAIN



The nervous system can produce real pain in the absence of ongoing tissue damage.



The brain and nervous system continuously interpret signals from the body and can create pain to protect us—even when tissues have healed.

EXAMPLES INCLUDE:

- Symptoms persisting long after normal tissue healing
- Pain appearing without a clear injury
- Symptoms spreading or moving around the body
- Pain occurring in multiple body regions
- Burning, tingling, numbness, hot/cold sensations
- Symptoms that do not match normal anatomical patterns

KEY TAKEAWAY

Functional symptoms suggest altered nervous system processing rather than ongoing tissue damage.

IMPORTANT CLARIFICATION

The F.I.T. criteria do NOT mean:

- Pain is imaginary
- Symptoms are "all psychological"
- Biomechanics never matter

Instead:

The criteria help identify when the nervous system may be amplifying pain through learned protective pathways and sensitization.

NEUROPLASTIC PAIN IS REAL PAIN — BUT THE BRAIN AND NERVOUS SYSTEM CAN CHANGE.

Understanding this is the first step toward recovery.

Based on the work of Dr. Howard Schubiner, MD
Unlearn Your Pain & F.I.T. Criteria Framework
www.unlearnyourpain.com

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F.I.T. CRITERIA

FOR SYMPTOMS OF NEUROPLASTIC PAIN

A simple framework to help identify pain that is more likely driven by nervous system sensitization rather than ongoing tissue damage.

I INCONSISTENT

Symptoms vary in ways structural injuries typically do not.

Pain changing locations
Pain shifts from one area to another, or varies in exact location.

Symptoms worse during stress
Emotional stress, worry, or pressure increases pain intensity.

Pain appearing after activity instead of during
More pain shows up hours later, not while you are active.

Symptoms changing with time of day
Pain levels vary throughout the day without a clear physical reason.

Pain decreasing during enjoyable or distracting activities
Engagement, fun, or focus can reduce or eliminate pain.

Symptoms improving temporarily with passive treatments
Short-term relief from rest, medication, massage, or other passive care.

PAIN FLUCTUATES DAY TO DAY

High one day, low the next—without a clear physical cause.

GOOD DAYS AND BAD DAYS

Levels of pain vary in ways that don't match tissue damage.

SYMPTOMS IMPROVE IN SAFE, RELAXED ENVIRONMENTS

Pain often decreases on vacation or when you feel safe and relaxed.

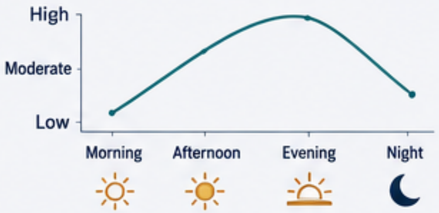
STRESS TURNS UP THE VOLUME

Stress sensitizes the nervous system, making pain worse.

PAIN OFTEN ARRIVES AFTER ACTIVITY

More pain shows up later, not while you are active.

PAIN CHANGES WITH TIME OF DAY



Pain levels ebb and flow without a clear physical explanation.

FOCUS AND ENJOYMENT CAN REDUCE PAIN

When you're absorbed or enjoying yourself, pain often fades into the background.

PASSIVE TREATMENTS OFFER TEMPORARY RELIEF

These can reduce pain short-term, but symptoms often return—because the nervous system is still driving the pain.

KEY TAKEAWAY

Inconsistent symptoms suggest the brain and nervous system are influencing pain intensity.

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DR. HOWARD SCHUBINER'S

F.I.T. CRITERIA FOR SYMPTOMS OF NEUROPLASTIC PAIN

A simple framework to help identify pain that is more likely driven by nervous system sensitization rather than ongoing tissue damage.

T TRIGGERED

Symptoms are activated by cues that are not actually dangerous to tissues.

EXAMPLES INCLUDE:

Pain triggered by stress or anticipation
Worry, deadlines, conflict, or anticipating pain can turn the volume up on symptoms.

Symptoms triggered by certain environments or memories
Places, smells, or reminders can activate pain responses.

Fear of movement increasing symptoms
The brain interprets movement as threatening, which amplifies pain.

Pain activated by harmless activities
Activities like chores, exercise, or sitting too long can trigger symptoms.

Symptoms triggered by thoughts, emotions, or attention
Negative thinking, frustration, or focusing on pain can increase symptoms.

Weather, sounds, smells, or situations triggering flare-ups
The nervous system can react to many seemingly unrelated cues.

HOW IT WORKS

The nervous system is designed to protect us. When it detects potential danger—real or perceived—it activates "alarm systems" in the brain and body.

1. A trigger is detected (stress, thought, memory, environment, etc.)
2. The brain interprets the cue as a threat.
3. The nervous system activates a protective response.
4. Pain and other symptoms are produced—even without tissue damage.

COMMON TRIGGERS

STRESS & WORRY

ENVIRONMENTS & SITUATIONS

MEMORIES & PAST EXPERIENCES

FEAR & ANTICIPATION OF PAIN

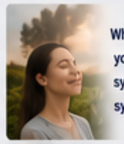
WEATHER & PHYSICAL SENSITIVITY

SOUNDS, SMELLS & OTHER SENSORY CUES

KEY TAKEAWAY

Triggered symptoms reflect learned protective responses within the nervous system. The threat may be real or perceived, but the pain is real.

THE BRAIN CAN LEARN SAFETY



When the brain learns that you are safe, the alarm systems quiet down and symptoms can reduce.

- Rewire threat responses
- Build tolerance & resilience
- Restore confidence in movement
- Improve quality of life

IMPORTANT CLARIFICATION

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EFFECTIVE METHODS TO HELP NEUROPLASTIC PAIN

Four Evidence-Based Methods That Personal Trainers Can Use to Assist Clients With Neuroplastic Pain

EDUCATION & REFRAMING

- Teach clients about the role of the brain in pain perception.
- Address fear-avoidance beliefs and encourage confidence in movement through gradual exposure.

GRADUAL EXPOSURE

- Develop a step-by-step approach to regain movement confidence.
- Slowly increase range or duration of activities based on client comfort.

MINDBODY TECHNIQUES

- Incorporate breathing exercises, meditation, or body scan practices.
- Help clients develop strategies to calm the nervous system and reduce pain sensitivity.

EMOTIONAL SUPPORT

- Create a supportive environment where clients feel heard and understood.
- Validate clients' experiences while encouraging positive lifestyle changes.

EFFECTIVE METHODS FOR RETRAINING PAIN PATHWAYS

- **Ashar et al., 2021** (graded exposure, psychoeducation)
- **Adams et al., 2022** (mindbody interventions)
- **Chowanec et al., 2024** (therapeutic alliance)

As with all pain topics, **referring out** for formal diagnosis and mental health support should be done when appropriate.

PAIN EDUCATION WORKS. NOT BECAUSE PAIN IS "IMAGINARY," BUT BECAUSE THE BRAIN CAN CHANGE.

Research shows that Pain Reprocessing Therapy (PRT) can significantly help some people with chronic low back pain by reducing how the nervous system perceives threat and processes pain.

THE LANDMARK STUDY

Ashar et al. (JAMA Psychiatry, 2021) studied people with chronic low back pain and compared:

- Pain Reprocessing Therapy (PRT)
- Placebo Treatment
- Usual Care

RESULTS AFTER JUST 4 WEEKS

66%	20%	10%
of the PRT group became pain-free or nearly pain-free	in the placebo group	in usual care

Many improvements were maintained at **1-YEAR FOLLOW-UP.**

SO HOW DOES PAIN EDUCATION WORK?

Chronic pain is not always a direct measure of tissue damage.

Many cases of chronic low back pain involve:

- Central sensitization
- Fear and avoidance
- Learned pain responses
- Increased threat perception

PRT teaches people to reinterpret pain signals as "non-dangerous" rather than signs of injury.

The therapy uses:

- Pain neuroscience education
- Exposure to feared movements
- Cognitive reframing
- Somatic awareness

The goal is essentially:
Retraining the brain to stop treating normal sensations as dangerous.

WHAT CHANGED BIOLOGICALLY?

Researchers used functional MRI (fMRI) scans and found actual changes in brain activity.

PRT participants showed:

- Reduced activation in brain regions associated with pain threat and emotional processing
- Changes in connectivity between sensory and regulatory brain regions

TRANSLATION:
The brain became less reactive and less "alarm-oriented."

WHY THIS MATTERS FOR LOW BACK PAIN

Pain is influenced by:

- beliefs
- fear
- stress
- previous experiences
- nervous system sensitivity

This doesn't mean pain is fake.

It means the nervous system can become overprotective.

PRT attempts to calm that protection response.

IMPORTANT NUANCE (VERY IMPORTANT)

This does NOT mean:

- ✕ "All back pain is psychological"
- ✕ "Structural issues don't matter"
- ✕ "People should ignore pain"

The study focused primarily on:
Primary chronic back pain
(where ongoing tissue damage was not clearly driving symptoms)

WHAT BROADER RESEARCH SHOWS ABOUT PAIN EDUCATION

Pain neuroscience education more generally has been shown to:

- Reduce fear of movement
- Improve confidence
- Improve function
- Reduce catastrophizing

Effects are usually small to moderate on its own.

It often works best when combined with:

- Exercise
- Gradual loading
- Behavioral change

KEY TAKEAWAY

Pain education approaches like Pain Reprocessing Therapy help chronic low back pain by teaching the brain and nervous system that movement and sensation are **not necessarily dangerous**, reducing the body's protective pain response.

KEY SOURCES

- Ashar et al., JAMA Psychiatry (2021) – "Effect of Pain Reprocessing Therapy vs Placebo and Usual Care for Patients With Chronic Back Pain"
- NIH Research Matters – "Retraining the brain to treat chronic pain" (ncbi.nlm.nih.gov)
- ScienceDaily (2021) – "Back pain: Psychological treatment shown to yield strong, lasting pain relief and changes in brain activity"

HOW TO TALK ABOUT PAIN SCIENCE

A GUIDE FOR FITNESS PROFESSIONALS

The goal is NOT to convince someone their pain "isn't real."

*The goal is to help them understand: Pain is real, but pain is **not always** a direct measurement of tissue damage.*

THE BIGGEST MISTAKE

Accidentally communicating:

"Your pain is all in your head."

Even when that's not what you mean.

WHAT RESEARCH SHOWS

Believed | Understood | Safe | Empowered

NOT dismissed.

1. START BY VALIDATING THE EXPERIENCE

Acknowledge their reality first.

"What you're feeling is absolutely real. Chronic pain can be incredibly frustrating and overwhelming."

2. AVOID DISMISSIVE OR OVERLY PSYCHOLOGICAL LANGUAGE

✗ INSTEAD OF SAYING:	✓ TRY SAYING:
"Your MRI doesn't explain your pain."	"Pain is influenced by more than just what we see structurally."

This preserves credibility while expanding the conversation.

3. EXPLAIN PAIN AS A PROTECTIVE RESPONSE

Pain is your body's alarm system.

Sometimes when pain sticks around for a long time, the alarm system becomes more sensitive—even when tissues are no longer being seriously damaged.

This avoids blame, minimizes fear, and is supported by modern pain science.

4. TAKE A BALANCED, EVIDENCE-BASED VIEW

Structure can matter, but it's only one piece of the picture.

Sleep, stress, fear, movement history, fitness levels, and nervous system sensitivity all influence pain too.

5. USE METAPHORS THAT MAKE SENSE

Like a car alarm that becomes too sensitive.

- The alarm is real.
- The sound is real.
- But the response may be bigger than the actual threat.

This helps clients understand sensitization without feeling dismissed.

6. FOCUS ON HOPE WITHOUT FALSE PROMISES

The amazing thing about the body and nervous system is that they can change.

We can build tolerance, confidence, and resilience over time.

Empowering. Not unrealistic.

7. FRAME MOVEMENT CAREFULLY

✗ INSTEAD OF:	✓ TRY SAYING:
"You need to stop being afraid."	"We're going to gradually teach your body that movement is safe again."

This feels collaborative, not confrontational.

8. DON'T TRY TO "WIN" AN ARGUMENT ABOUT PAIN

Education is most effective when it's conversational, curious, and patient—not when it feels like a lecture.

THE BEST PROFESSIONALS BLEND:

Empathy | Science | Reassurance | Gradual exposure to movement

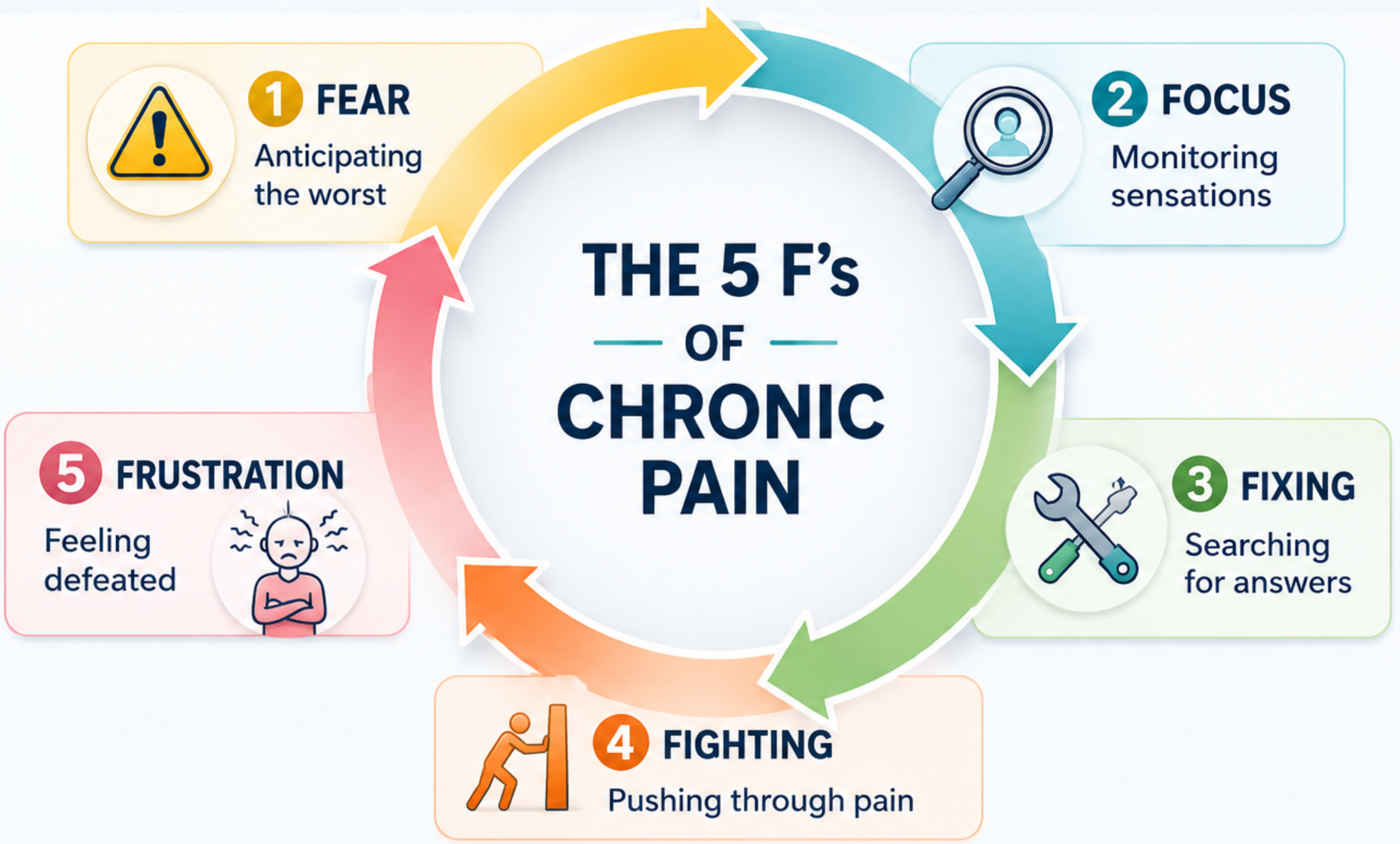
THE TAKEAWAY MESSAGE

Your pain is real.

But pain is influenced by many systems in the body, not just tissue damage. The good news is that those systems can adapt, and movement is one of the most powerful ways we help that happen.

Builds Trust | Builds Credibility | Creates Hope | Supports a Healthier Relationship with Movement

THE 5 F's OF CHRONIC PAIN



Common behaviors that can keep us **stuck in a cycle** of intensified pain or symptoms.

WHY YOU EXERCISE MATTERS: A MODERN PAIN SCIENCE PERSPECTIVE

Modern pain science and exercise psychology research increasingly suggest that **why we exercise** may significantly influence the effects exercise has on chronic pain.

This is a really important shift because historically exercise for chronic low back pain was often prescribed almost like medicine:

"fix this muscle," "correct this dysfunction," "stabilize your spine," or "eliminate pain."

WHEN EXERCISE IS OVERLY FOCUSED ON...

- Fixing the body
- Monitoring symptoms
- Avoiding damage
- Constantly trying to "solve pain"

People may actually become:

- More hypervigilant
- More fearful
- More symptom-focused
- More protective

The nervous system stays centered around threat.

VS.

IN CONTRAST, EXERCISE THAT PROMOTES...

- Enjoyment
- Autonomy
- Exploration
- Confidence
- Body awareness
- Accomplishment
- Social connection
- Meaningful participation

Often produces better long-term adherence and may reduce pain more effectively.

The purpose behind exercise shapes the *experience*, and the experience shapes the outcome.

Focus less on "fixing pain." Focus more on living well.

Sources: Moseley, G. L. (2007). A pain neuromatrix approach to patients with chronic pain. *Manual Therapy*, 12(2), 130–140.

Vlaeyen, J. W. S., & Linton, S. J. (2012). Fear-avoidance and its consequences in chronic musculoskeletal pain: A state of the art. *Pain*, 153(6), 1144–1147. | Louw, A., et al. (2017). Therapeutic neuroscience education for persistent musculoskeletal pain: A systematrapy, 103(2), 167–178.

persistent musculoskeletal pain: A systematic review. *Physiotherapy*, 103(2), 167–178.

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THE LOW BACK PAIN REVOLUTION:

EXERCISE, NEUROSCIENCE & REAL-WORLD RESULTS

NEUROSCIENCE EXPLAINED
Understand pain at the source.

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Apply what works in the real world.

PATIENT-CENTERED APPROACH
Build confidence, reduce fear, drive change.

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