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Pain Reprocessing Therapy:
Retraining the Brain

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Speaker and all moderators and planners have no relevant financial relationships with ineligible companies to disclose.

FAMILY MEDICINE POP! PRISM OF PRACTICE

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Learning Outcomes

- Explain the pathophysiology of nociplastic pain and distinguish it from nociceptive and neuropathic pain
- Describe the principles of Pain Reprocessing Therapy (PRT) and discuss the application in the management of nociplastic pain conditions

Mechanistic Types of Chronic Pain

Pain Type	Defining Characteristics	Examples	Treatment
Nociceptive	Pain due to tissue injury, inflammation, damage or degeneration	Osteoarthritis, rheumatoid arthritis, fracture, burns	Topical analgesics, nonsteroidal anti-inflammatory drugs, acetaminophen, opioids, steroids
Neuropathic	Pain due to nerve injury or damage	Radiculopathy, diabetic neuropathy, chemotherapy-induced neuropathy	Topical or local therapy; systemic neuropathic medications such as gabapentin, pregabalin, and tricyclic antidepressants
Nociplastic	Pain arising from a sensitized nervous system (amplified processing of pain signals, decreased inhibition of pain or both)	Fibromyalgia, chronic back pain, chronic temporomandibular pain disorders	Multimodal management approach

Nociplastic Pain

- Term proposed by the IASP in 2016
- A mechanistic descriptor for chronic primary pain defined as:

  "Pain arising from the altered function of pain-related sensory pathways in the periphery and CNS causing increased sensitivity"

- Due to changes in **neurophysiology** rooted in **neuroplasticity**
- Involves amplified processing and/or decreased inhibition of pain stimuli at multiple levels
  - Supraspinal
  - Spinal
  - Peripheral

Fitzcharles MA, et al. *Lancet*. 2021;397(10289):2098-2110.

Localized Nociplastic Pain Conditions

Chronic Primary Headache and Orofacial Pain
Chronic migraine
Chronic tension-type headache
Trigeminal autonomic cephalalgias
Chronic temporomandibular pain disorders without anatomic abnormality or explanation
Chronic burning mouth
Chronic primary orofacial pain
Chronic Visceral Pain Syndrome
Chronic primary bladder pain syndrome or interstitial cystitis
Chronic pelvic pain syndrome
Irritable bowel syndrome
Chronic chest pain
Chronic abdominal pain
Chronic Primary Musculoskeletal Pain
Primary cervical, thoracic, lower back and limb pain; extent of pain and suffering is greater than expected based on the underlying pathology
Complex regional pain syndrome

Thapa R. *Cleve Clin J Med*. 2025;92(4):236-247

2020 Revised IASP Definition of Pain

- **IASP definition of pain:**

  "An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage"

- **Key notes:**
  - Pain is always a personal experience that is influenced to varying degrees by biological, psychological, and social factors.
  - **Pain and nociception are different phenomena**. Pain cannot be inferred solely from activity in sensory neurons.
  - Through their life experiences, individuals *learn* the concept of pain.

Raja SN, et al. *Pain*. 2020;161(9):1976-1982.

What is *pain*?

- Pain is a danger signal generated by the **brain**
- An internal reinforcement signal used for learning to guide behavior
- The brain is not passively waiting for nociceptive stimuli to impinge on it, but is actively making inferences based on prior experience and expectations
- Sometimes the brain infers incorrectly and generates a *false alarm*

Seymour B. *Neuron*. 2019;101(6):1029-1041
Kaptchuk TJ, et al. *BMJ*. 2020;370:m1668.
Büchel C, et al. *Neuron*. 2014;81(6):1223-1239.

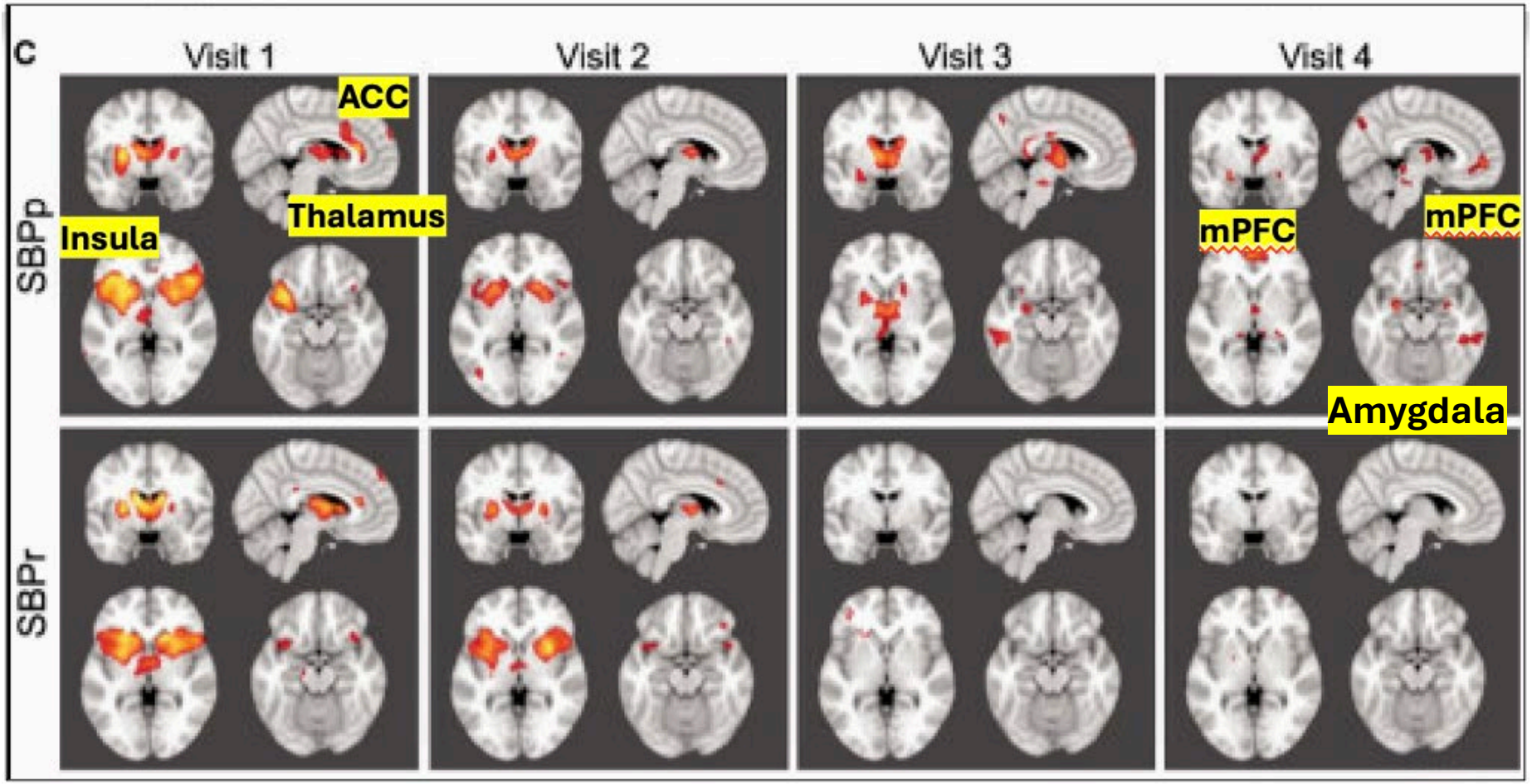
Chronic Pain and the Brain

- As pain transitions from acute to chronic we see the following changes in brain activity
- Pain becomes:
  - Less closely tied to systems encoding nociceptive input
  - Increasingly associated with activity in the emotional/motivational systems associated with avoidance
- Brain regions serving allostasis and predictive control have been implicated in animal and human studies of chronic pain modulation

Ashar YK, et al. *JAMA Psychiatry*. 2022;79(1):13-23. || Kuner R, et al. *Nat Rev Neurosci*. 2016;18(1):20-30. || Hashmi JA, et al. *Brain*. 2013;136(Pt 9):2751-2768. || Roy M, et al. *Nat Neurosci*. 2014;17(11):1607-1612

Shape Shifting Back Pain

- Chronification of back pain shifts brain representation from nociceptive to emotional circuits



Hashmi JA, et al. *Brain*. 2013;136(Pt 9):2751-2768.

If the brain can learn pain,
can the brain ***unlearn*** the pain?

Pain Reprocessing Therapy (PRT)

- Developed based on the neuroscience of chronic primary pain/nociplastic pain
- A mind-body intervention aimed to help patients reconceptualize their pain as due to **nondangerous brain activity** rather than *peripheral tissue injury*
- Retrains the brain to interpret & respond to signals from the body properly

Ashar YK, et al. *JAMA Psychiatry*. 2022;79(1):13-23.

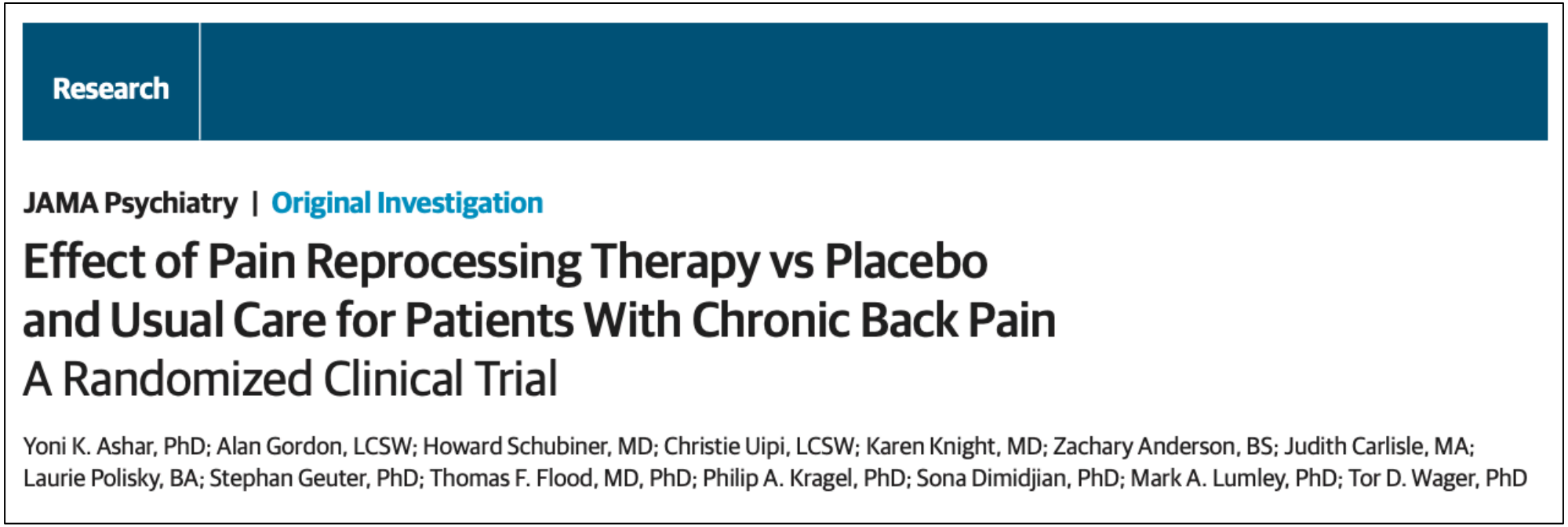
What does PRT involve?

1. **Education** about the brain origins and reversibility of nociplastic pain/primary pain
2. Gathering and reinforcing personalized **evidence** for the brain origins and reversibility of pain
3. Attending to and appraising pain sensations through a lens of **safety**
    - Somatic tracking
4. Addressing other emotional **threats**
5. Gravitating towards **positive** feelings and sensations

Ashar YK, et al. *JAMA Psychiatry*. 2022;79(1):13-23.

PRT for Chronic Back Pain

"The Boulder Back Pain Study"



Research

JAMA Psychiatry | Original Investigation

Effect of Pain Reprocessing Therapy vs Placebo and Usual Care for Patients With Chronic Back Pain
A Randomized Clinical Trial

Yoni K. Ashar, PhD; Alan Gordon, LCSW; Howard Schubiner, MD; Christie Uipi, LCSW; Karen Knight, MD; Zachary Anderson, BS; Judith Carlisle, MA; Laurie Polisky, BA; Stephan Geuter, PhD; Thomas F. Flood, MD, PhD; Philip A. Kragel, PhD; Sona Dimidjian, PhD; Mark A. Lumley, PhD; Tor D. Wager, PhD

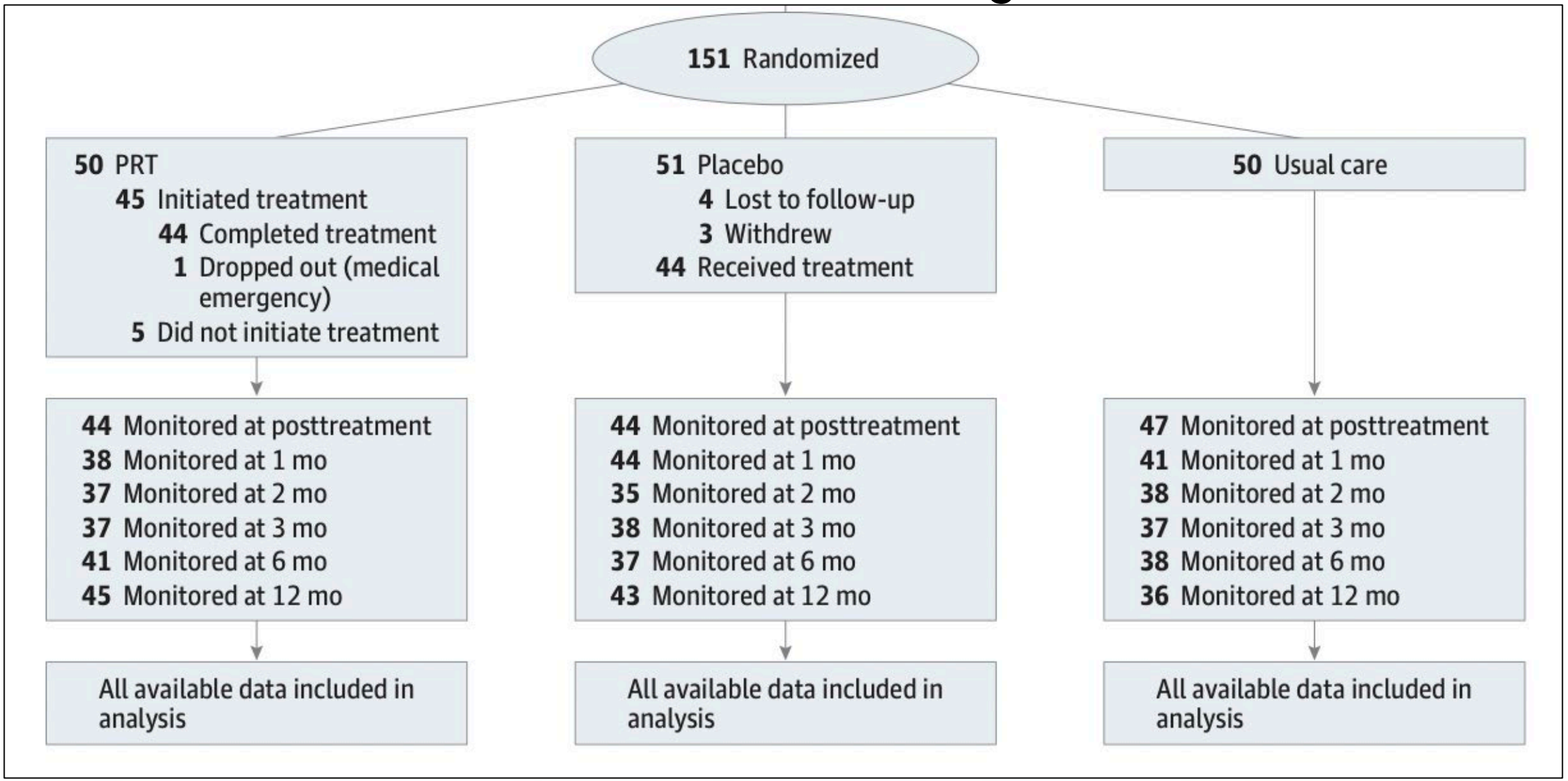
Ashar YK, et al. *JAMA Psychiatry*. 2022;79(1):13-23.

Boulder Back Pain Study

- *N*=151 pts with chronic back pain
- Inclusion criteria:
  - Pt 21-70 yo
  - Back pain for at least 1/2 the days of the last 6 months
  - 1-week average pain intensity score of 4/10 or greater at screening
  - Excluded pts with leg pain worse than back pain or bowel/bladder incontinence

Ashar YK, et al. *JAMA Psychiatry*. 2022;79(1):13-23.

Boulder Back Pain Study



Ashar YK, et al. *JAMA Psychiatry*. 2022;79(1):13-23.

Boulder Back Pain Study

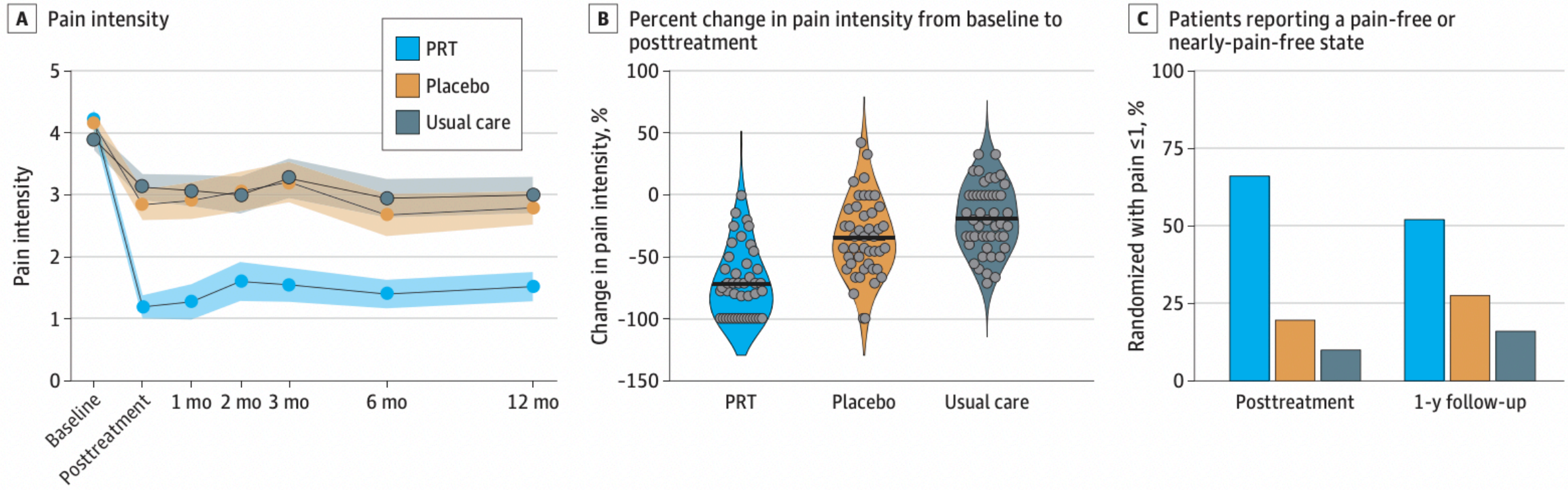
- Spinal anomalies among participants randomized to PRT with prior spinal imaging (*N*=20)
- All had at least 1 spinal anomaly, median of 4 per participant

Radiological finding	*N*	%
Disc degenerative changes	15	75%
Disc herniation or rupture	7	35%
Spinal misalignment	14	70%
Osteoarthritic changes	13	65%
Neuroforaminal narrowing	9	45%
Central canal stenosis	9	45%

Ashar YK, et al. *JAMA Psychiatry*. 2022;79(1):13-23.

Results

Figure 2. Clinical Outcomes



A, Shading indicates standard error. B, Dots represent individual participants; thick lines represent the group mean. C, Percentage of patients reporting pain scores of 0 or 1 of 10 (ie, pain-free or nearly pain-free) at posttreatment and at 1-year follow-up. PRT indicates pain reprocessing therapy.

Ashar YK, et al. *JAMA Psychiatry*. 2022;79(1):13-23

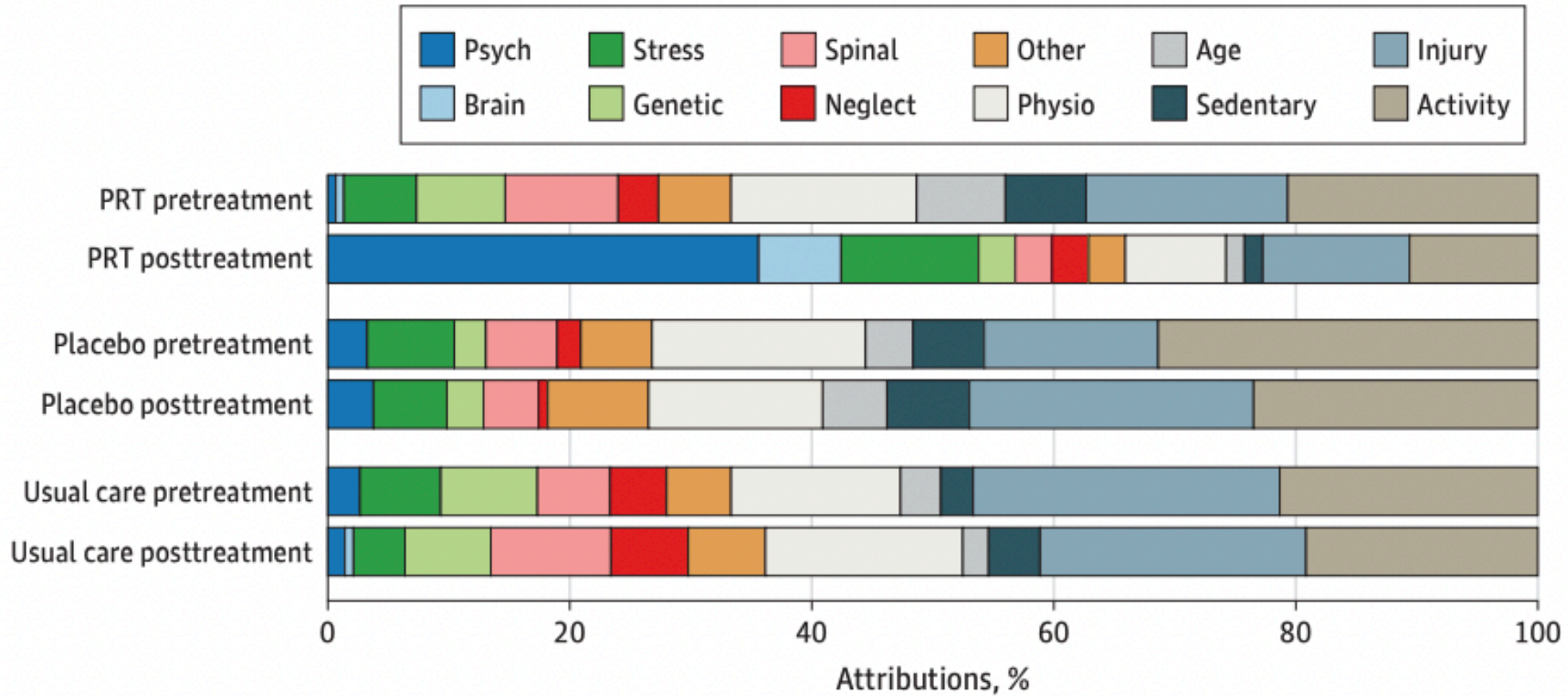
Changes in Brain Connectivity

- Longitudinal fMRI outcomes:
  - Reduced responses to evoked back pain in the anterior midcingulate and the anterior prefrontal cortex for PRT vs placebo
  - Reduced responses in the anterior insula for PRT vs usual care
  - Increased resting connectivity from the anterior prefrontal cortex and the anterior insula to the primary somatosensory cortex for PRT vs both control groups
  - Increased connectivity from the anterior midcingulate to the precuneus for PRT vs usual care

Ashar YK, et al. *JAMA Netw Open*. 2023;6(9):e2333846.

Reattribution of Pain

Figure 2. Pain Attribution Category Prevalence

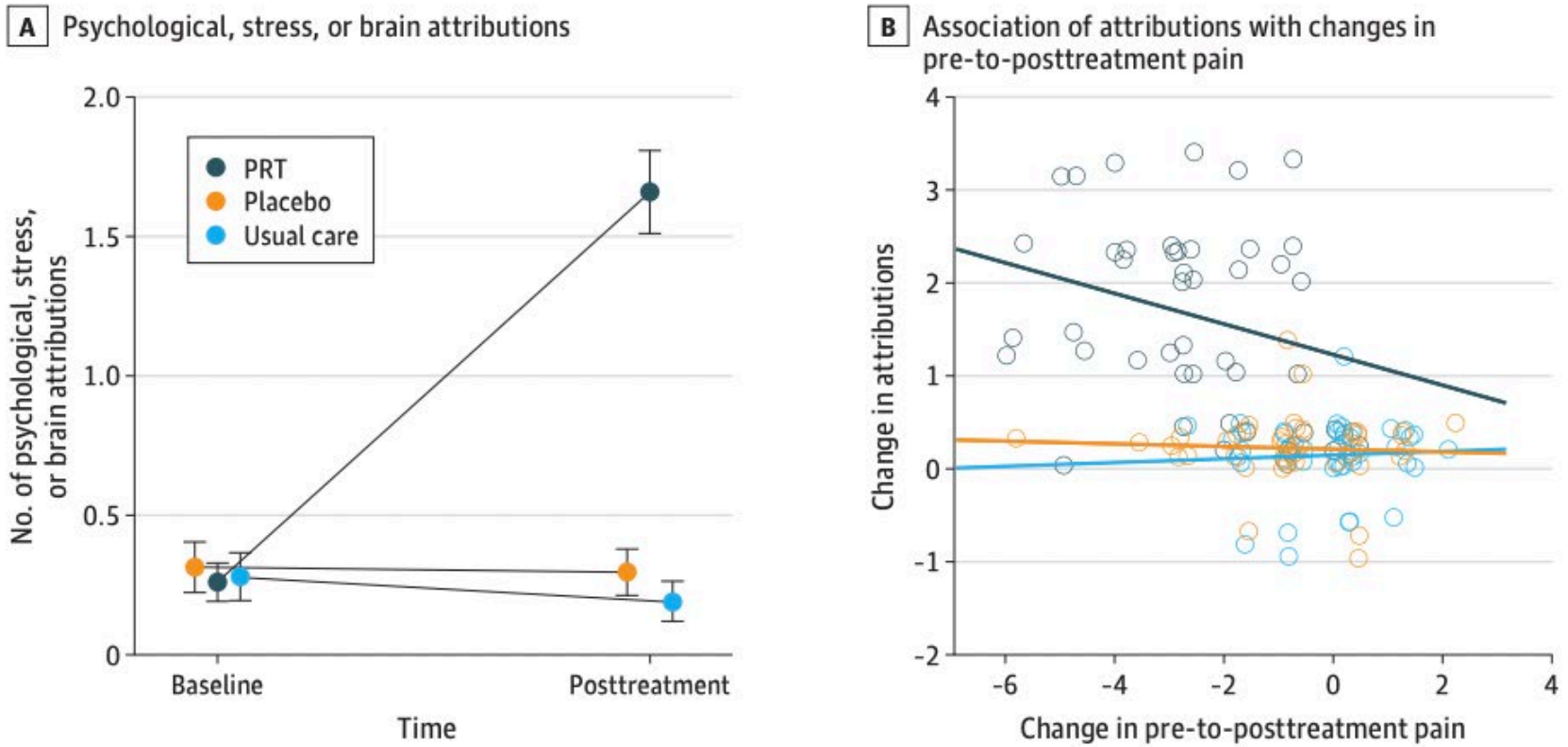


Ashar YK, et al. *JAMA Netw Open*. 2023;6(9):e2333846.

Reattribution of Pain

- PRT produced large increases in mind-brain attribution scores compared to control
- Increased mind/brain attributions within PRT significantly associated with decreases in pain intensity
- Reattribution alone not necessarily enough to change pain

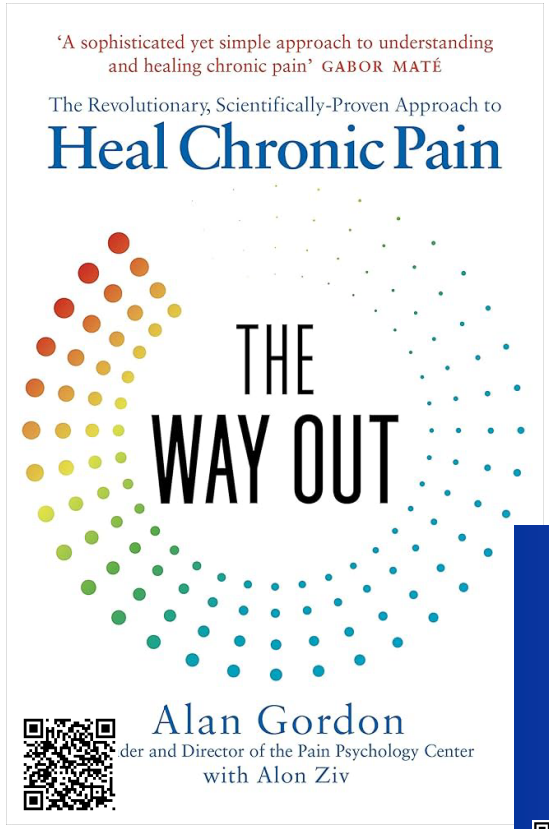
Figure 3. Effects of Pain Reprocessing Therapy (PRT) on Patients' Attributions Regarding the Underlying Causes of Chronic Back Pain

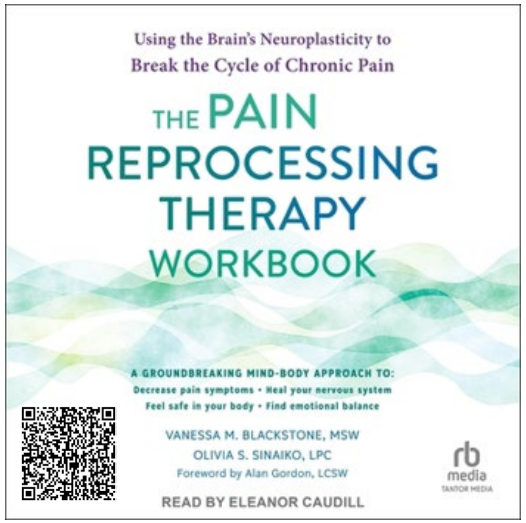


Ashar YK, et al. *JAMA Netw Open*. 2023;6(9):e2333846.

Patient Education Resources

- Association for the Treatment of Neuroplastic Symptoms (ATNS)
  - Patient education videos on *Symptomatic.me*
- Book: *The Way Out* by Alan Gordon
- Pain Reprocessing Therapy Workbook
- Curable App
- Insight Timer (somatic tracking)
- Podcasts
  - Pain Reprocessing Therapy Podcast
  - The Story Behind The Symptoms (ATNS- David Clarke MD)





Key Points

- Nociplastic pain is due to maladaptive rewiring of the nervous system that leads to sensitization of the peripheral and central nervous system

- Pain reprocessing therapy is a promising treatment for chronic low back pain

Thank You!