

Chronic Pain and Pain Rehabilitation

Christopher D. Sletten, Ph.D.

Mayo Clinic, Jacksonville



How Did Pain Become a Medical Problem?

- Descartes – The body is like machine, pain is a signal travelling from the source to the brain
- Henry Beecher – Army physician in WWII, wounded soldiers responded differently to their injuries than his patients at Mass General
- John Bonica – Anesthesiologist after WWII founded first multi-disciplinary pain clinic.

ACUTE VS CHRONIC PAIN

Acute Pain

- Associated with tissue damage
- Abrupt in onset
- Short duration
- Correlation is observed between the site and extent of tissue injury and the location and intensity of pain experienced or expressed

Chronic Pain

- Sudden or gradual onset
- May be associated with a chronic disease process or nervous system dysfunction
- May occur in the absence of identifiable causes

Chronic Pain/Symptom Conditions

- Headache
 - Abdominal Pain
 - Pelvic Pain
 - Back/Neck Pain
 - Fibromyalgia
 - Myofascial Pain
 - TMD
- Spells
 - Environmental Sensitivity
 - Spasms
 - Nausea/Vomiting
 - Dizziness

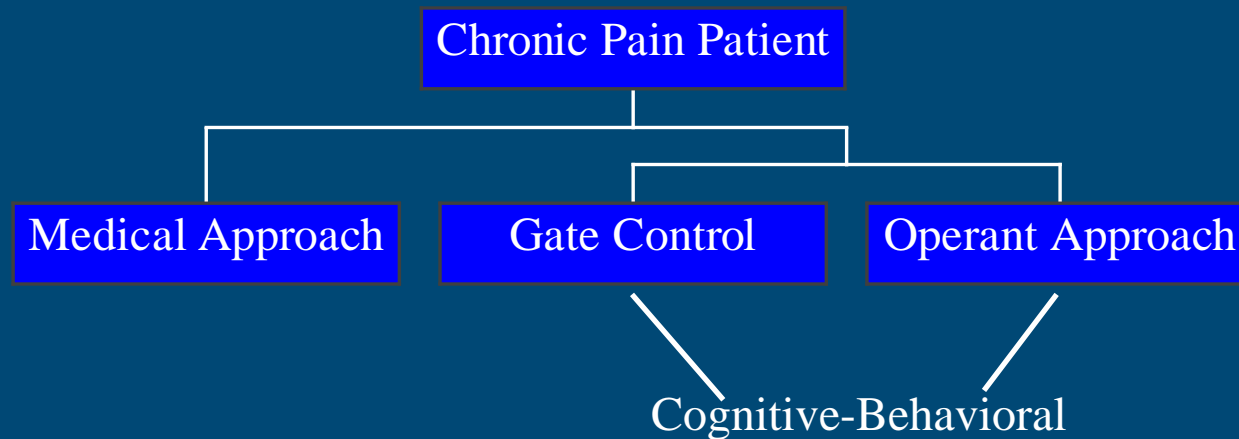
Chronic Pain Syndrome Characteristics

- Primary complain of persistent pain/symptoms
- Pain behaviors in excess of physical findings
- Deconditioned physical state
- Disturbed sleep
- Depressive symptoms
- Altered social functioning
- Disability or impaired job performance
- Potential abuse of alcohol or prescription medications
- Over-utilization of health care resources

The Psychological Set-up

- Chronic pain is invisible and incurable
- The behavioral consequences begin early and often escalate
- Social and environmental influences can be significant
- Behavioral issues worsen by physical factors – medications, de-conditioning etc

Theoretical Approaches to Chronic Pain/Symptoms



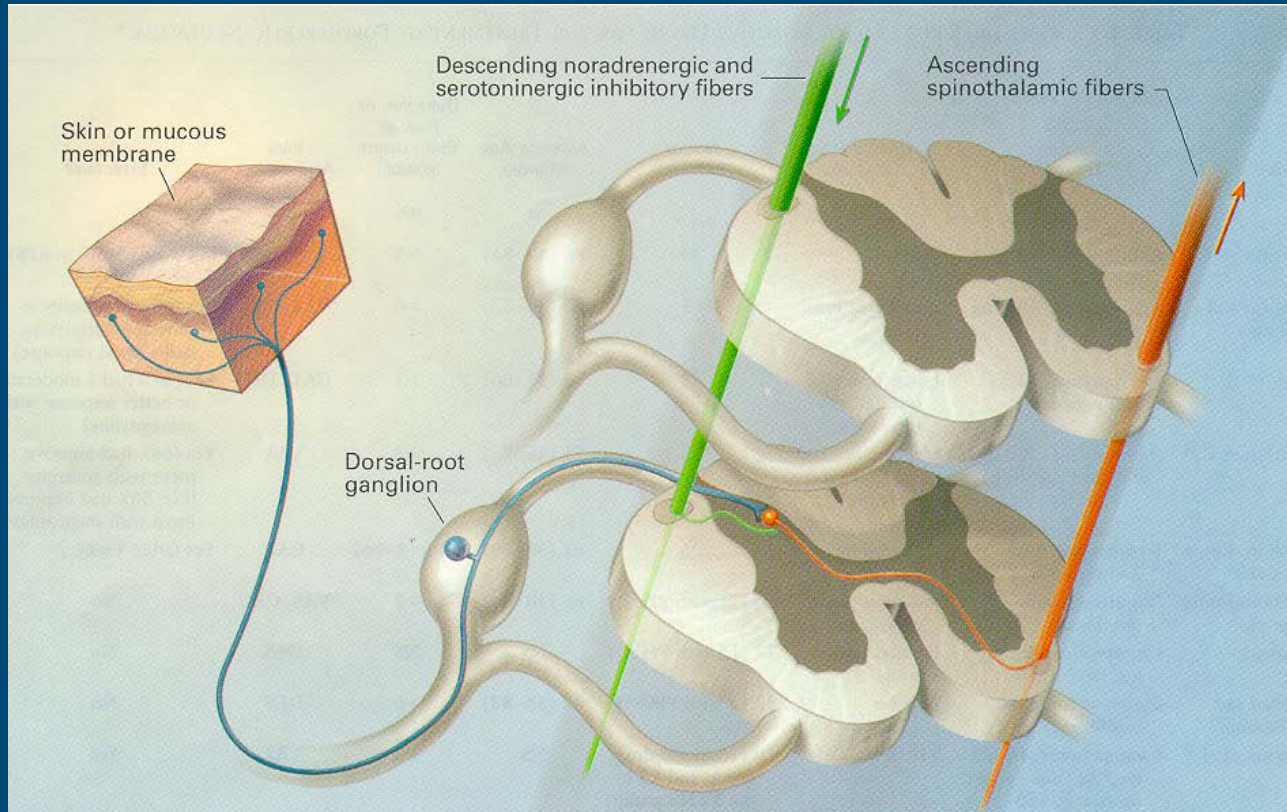
Traditional Medical Model

- Pain/Symptom perception is the direct result of tissue damage or disease process
- Severity of pain or pain complaints are directly proportional to the severity of the tissue damage
- Pain/Symptoms, in the absence of identifiable pathology, is questionable or *psychogenic*
- Fits acute pain/symptoms fairly well

Pain - Modern Concepts

- Excitatory Pathways
- Inhibitory Pathways
- Neuromodulation
 - Short-term changes
- Neuroplasticity
 - Long-term changes

Pain Pathways



Abnormal Central Processing

- Patients with chronic pain have been shown to have exaggerated temporal summation of painful stimuli.
- This is analogous to “wind-up” phenomena seen in animal models of pain.
- In those models, wind-up is thought to reflect changes in the receptors for excitatory amino acids (NMDA) and neuropeptides in spinal neurons.

Medical/Biomedical

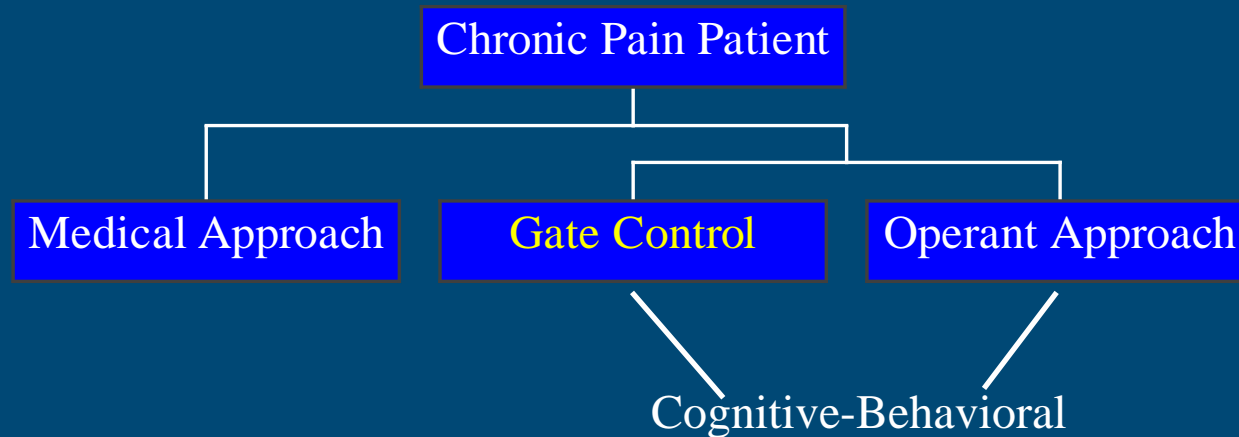
- Beginning point of investigation and intervention
- Views pain as a problem to be fixed
- Mechanistic and orderly approach to pain generators and mechanisms
- Often highly effective

“A narrow medical focus may miss that which should be found and find that which should be missed.”

J.D. Loeser, M.D.



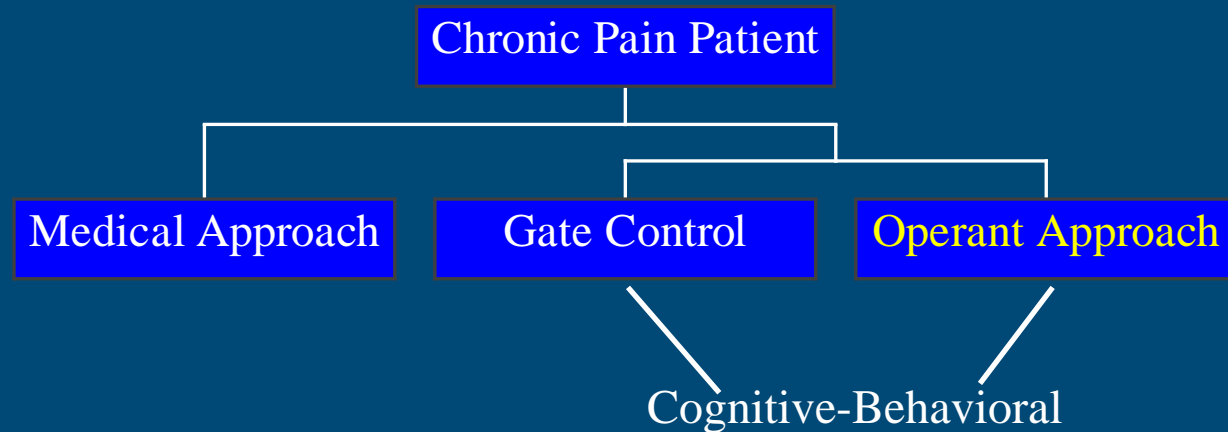
Theoretical Approaches to Chronic Pain



Gate Control Theory (Wall & Melzack)

- First multidimensional model of pain
- Experience of pain the result of integration of motivational-affective, cognitive-evaluative, and sensory-discriminative components
- Increased emphasis on cognitive and affective components that contribute to experience of pain and suffering

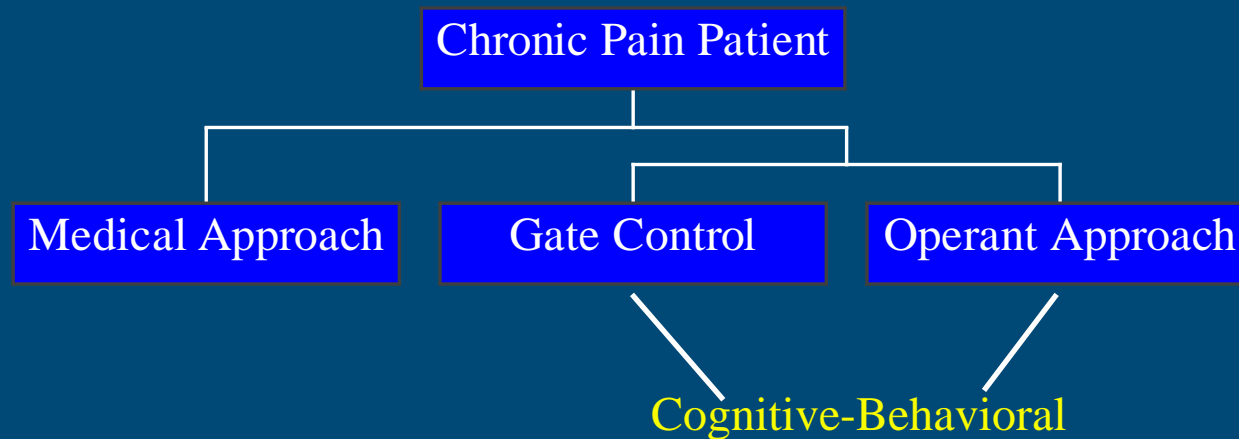
Theoretical Approaches to Chronic Pain



Operant Theory (Fordyce)

- Based on principles of operant learning
- Subjective experience of pain is irrelevant because it is unobservable
- Focuses on observable “pain behaviors”
- Production and maintenance of “pain behaviors” are under environmental control via selective reinforcement

Theoretical Approaches to Chronic Pain



Cognitive-Behavioral (Turk)

- Incorporates cognitive/affective components with operant learning factors
- Uses behavioral techniques
- Treatment focused on cognitions, emotions, and behavior
- Specific attention given to maintenance of treatment gains

Biopsychosocial Model

- Recognizes that pain/symptoms are multidimensional
- Pain/symptom perception is the result of emotional, environmental, and cognitive factors in addition to physical factors
- Outcomes of disability or loss of function result from the interplay of all of these variables
- Fits chronic pain/symptoms better than traditional model

Biopsychosocial Model

Psychosocial Variables

- Mood
- Attributions (beliefs) about pain
- Attention on pain
- Anxiety
- Social/Family support
- Employment status
- Disability compensation
- Family models of chronic pain
- Abuse history
- Somatization

Assumptions Underlying Treatment at Multidisciplinary Pain Centers

1. A chronic pain problem always involves psychological and social factors in addition to physiological ones
2. Patients benefit from taking an active role in the management of their pain problems
3. “Cure” of the pain in the sense of alleviation of the source of nociception may not be possible, but that pain complaints and behaviors need not be the focal point of the patient’s life

Objectives of Cognitive-Behavioral Approach to Pain Rehabilitation

1. Combat Demoralization
2. Foster Self-Efficacy
3. Break up automatic, maladaptive patterns
4. Skills Training
5. Facilitate maintenance and generalization

Treatment Goals

Reduce the frequency of pain behaviors

Increase the patient's capabilities and activities to a level considered normal for his/her age and sex

Eliminate the patient's reliance on pain-relieving medications

Reduce the patient's utilization of medical care resources for the purposes of pain relief

Educate family members/significant others in pain rehabilitation approach in order to maintain the gains achieved while in the program

“A chronically ill person needs more than symptom relief to resume a normal lifestyle.”

J.D. Loeser, M.D.



“The goals of behavioral methods in pain treatment programs are to reduce excess disability and expressions of suffering.”

Fordyce, 1985



ABC Versions of a Chronic Pain Patient

- A-Pre-Pain

- Active
- Productive
- Social
- Motivated
- Independent

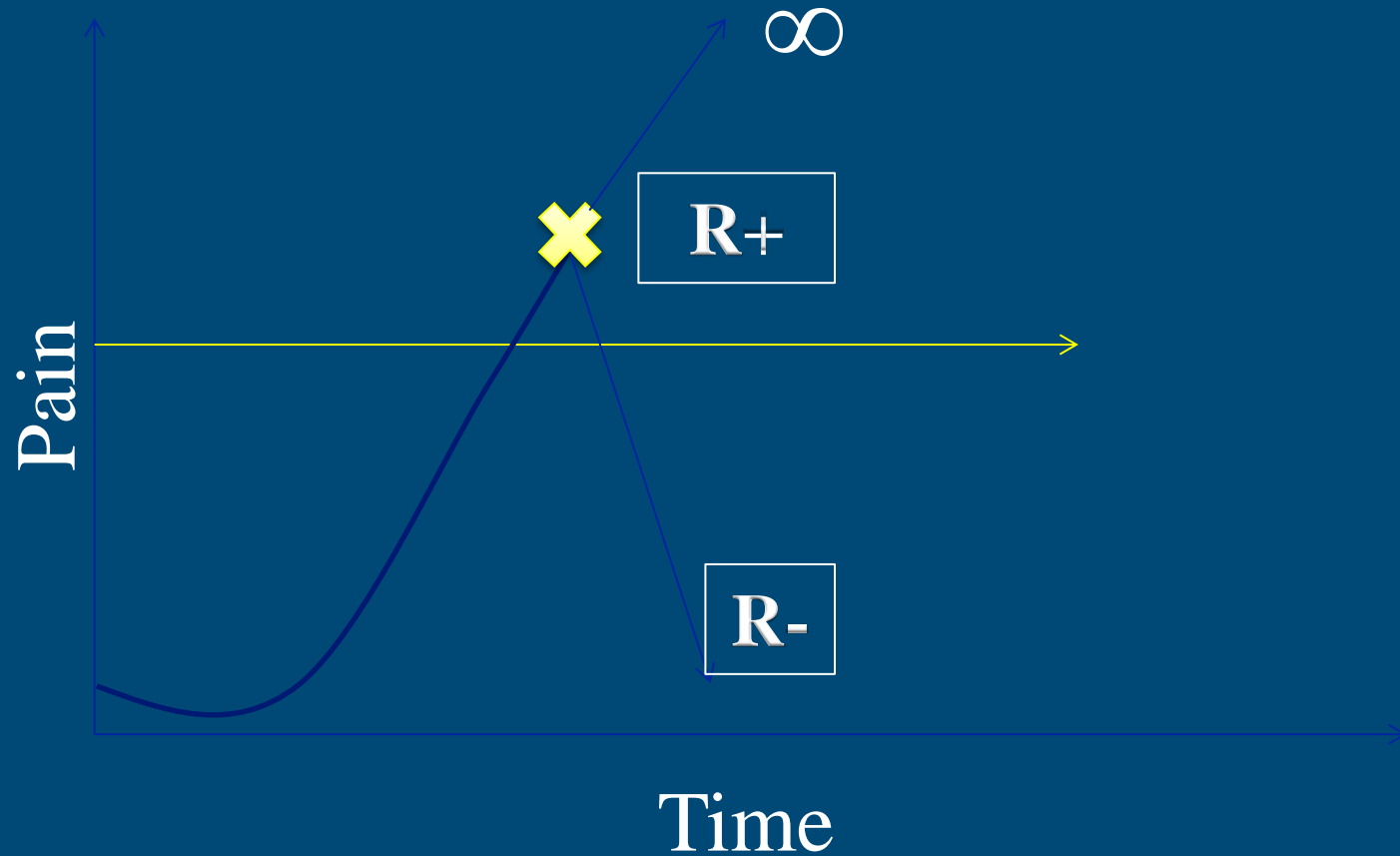
- B-Pain

- Depressed
- Deconditioned
- Discouraged
- Dependent
- Drugged

- C-Post PRC

- More active
- More productive
- Stable
- Moderation
- More Independent

Pain and Behavioral Reinforcers



Reactive and Maintaining Factors

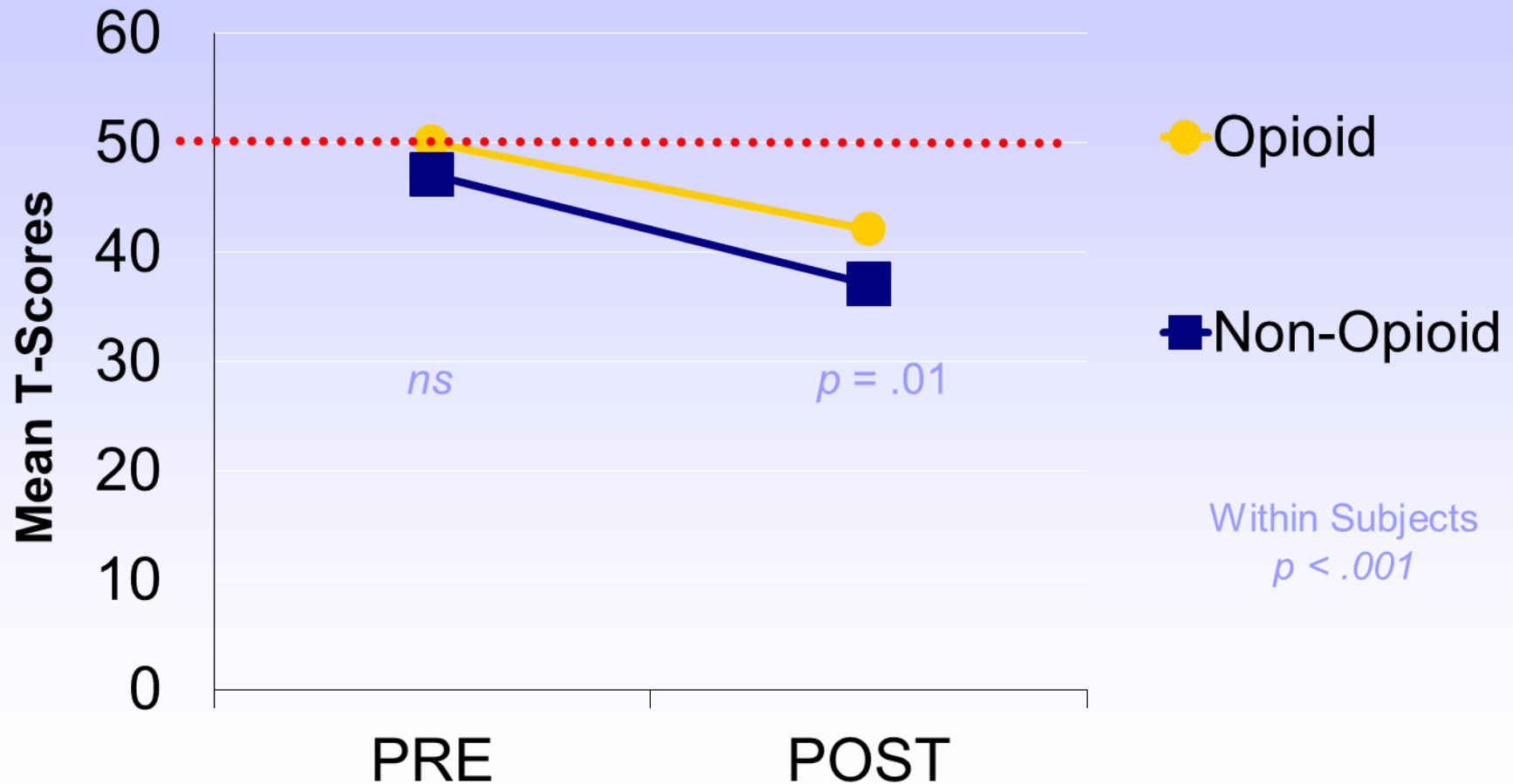
- Physical
- Behavioral
- Emotional
- Chemical

Treatment Outcomes for PRC

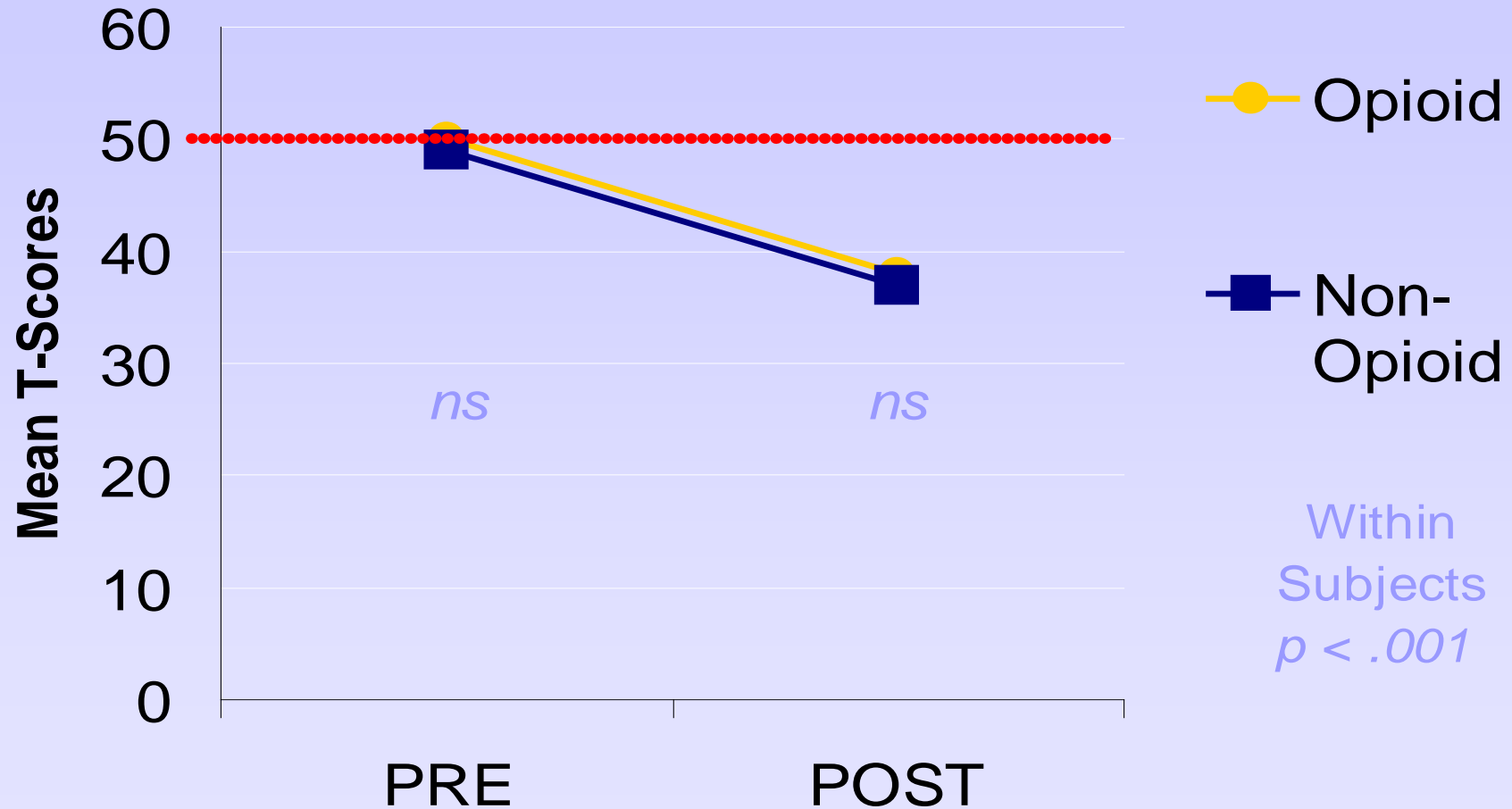
Rome, JD. Townsend, CO. Bruce, BK. Sletten, CD. Luedtke, CA. Hodgson, JE.
Chronic noncancer pain rehabilitation with opioid withdrawal: Comparison of
treatment outcomes based on opioid use status at admission. Mayo Clinic
Proceedings. 2004 Jun; 79(6): 759-68



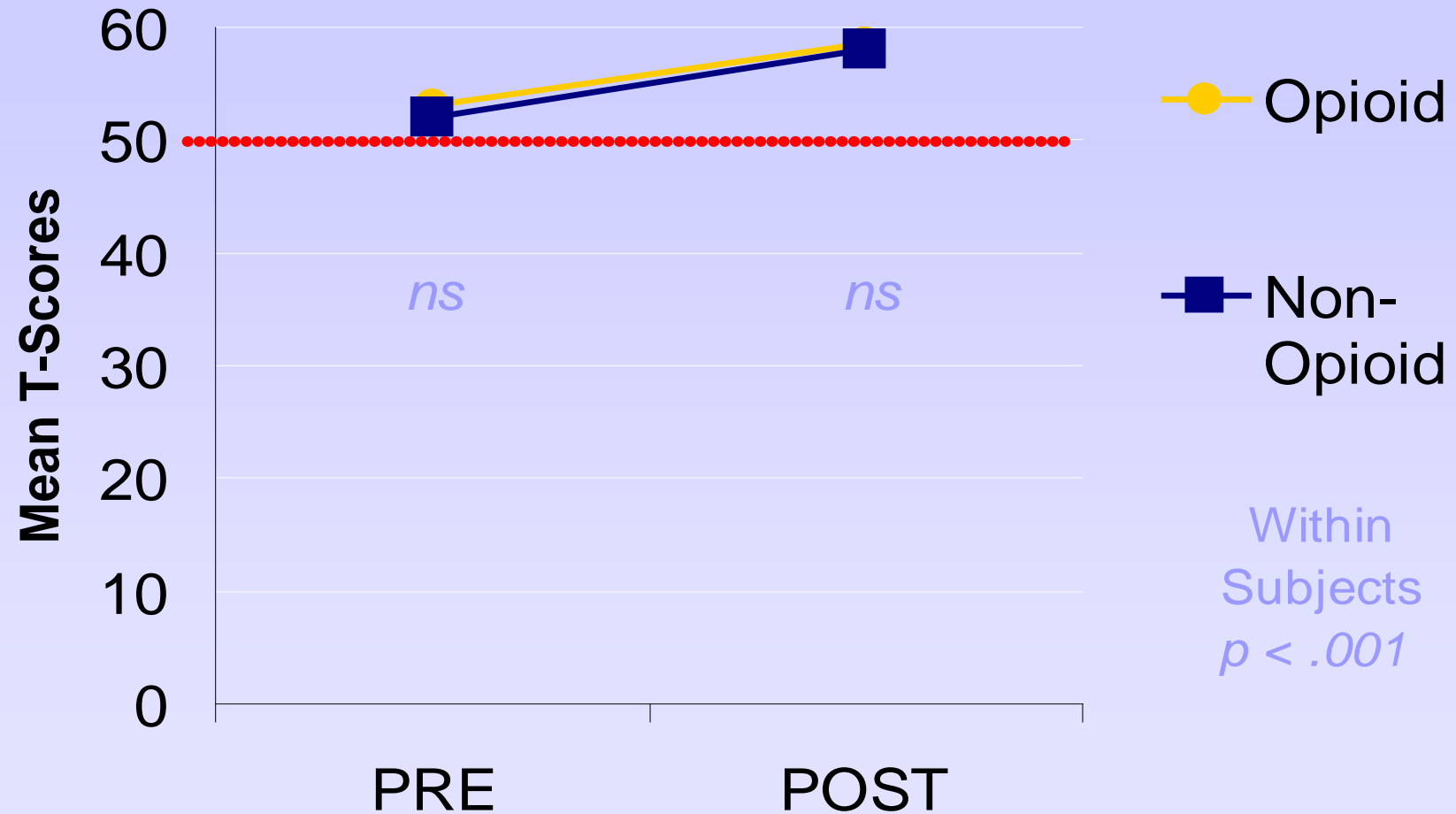
Pain Severity (MPI)



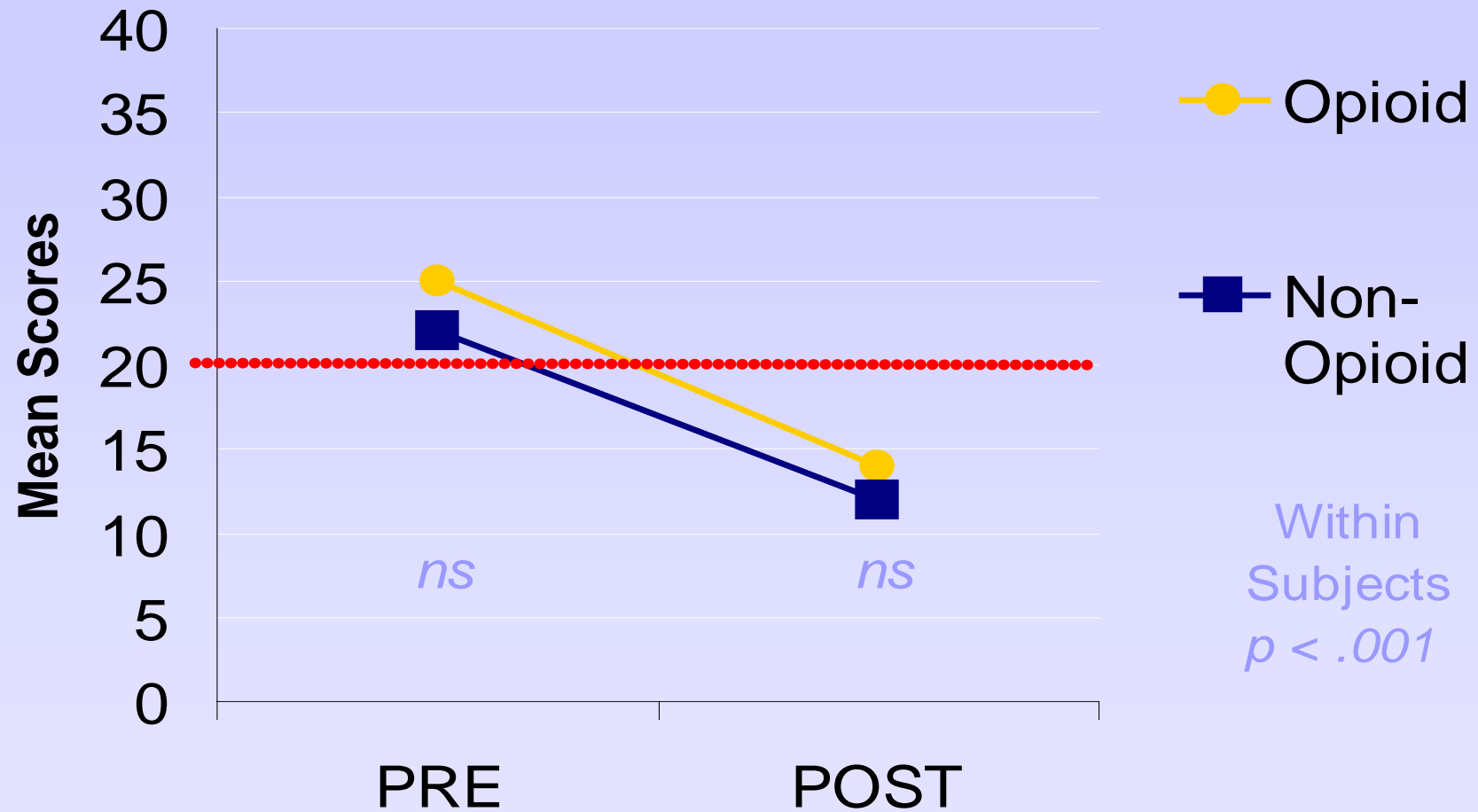
Interference With Life (MPI)



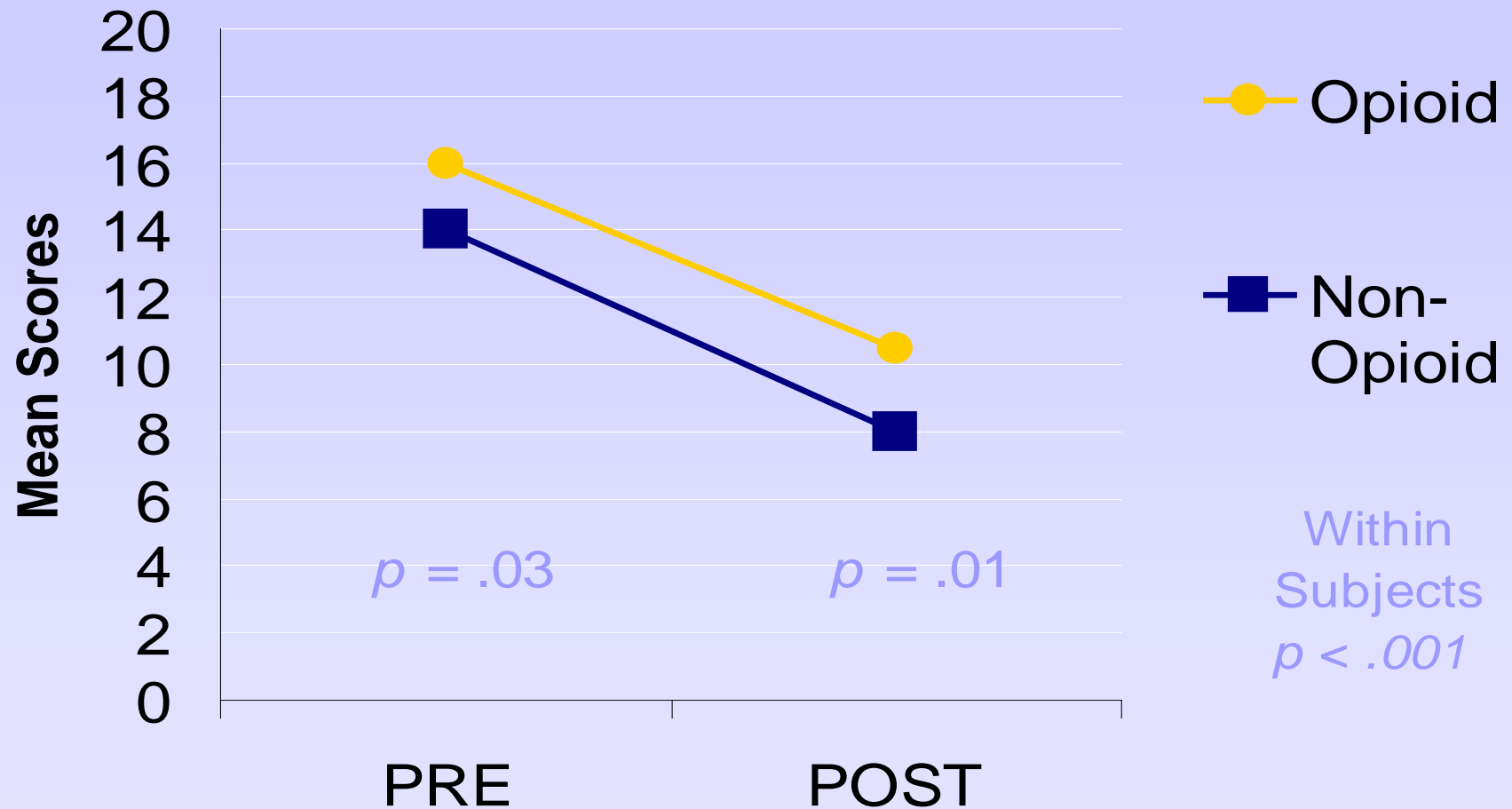
General Activity (MPI)



CES-D



Catastrophizing (CSQ)



“Real” Reason to Hurt

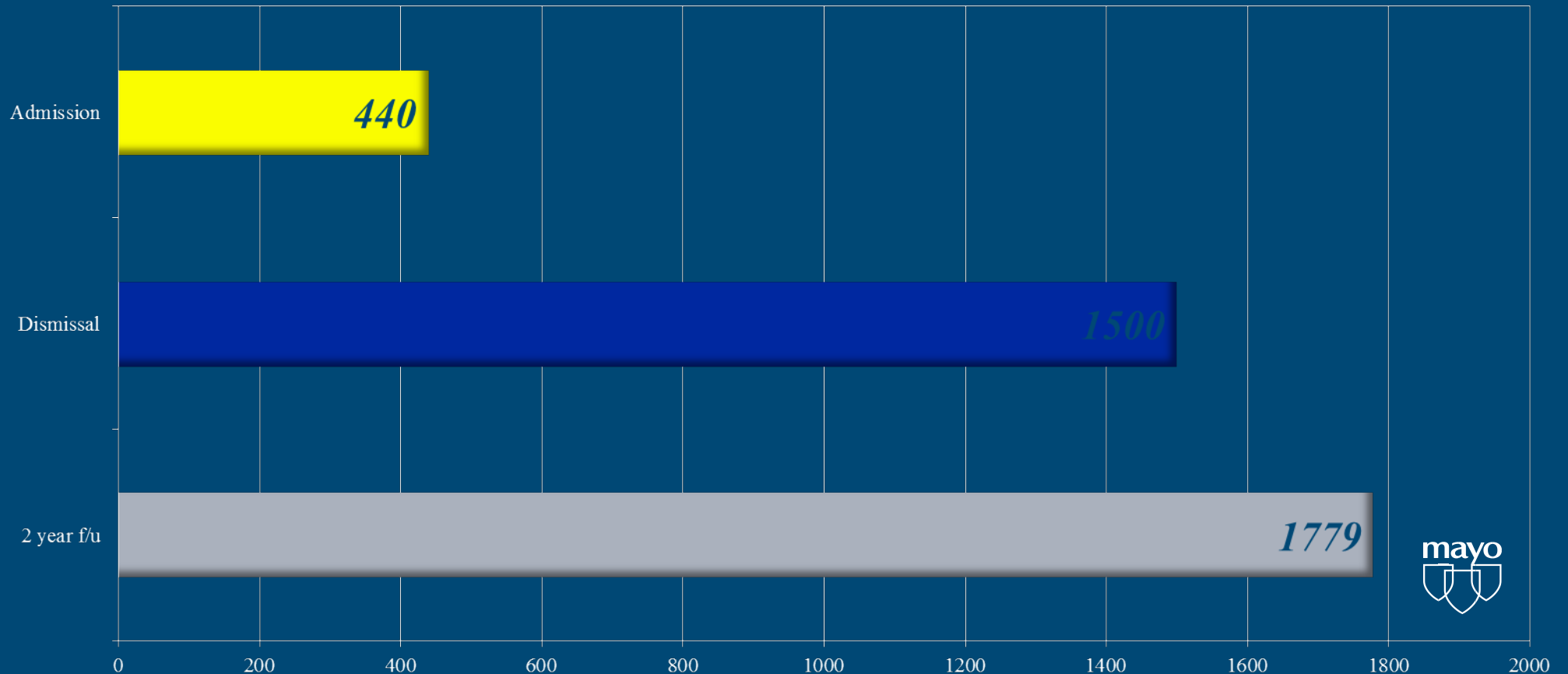


A Behavioral Rehabilitation Model for Chronic Pain: A Case Study

- The case is of a 33 year-old Caucasian female with a complex lower extremity injury following MVA in November 2006. She sustained LLE Pilon fracture initially treated with ORIF. She developed significant co-morbidities, including recurrent cellulitis.
- Interventions including outpatient PT, pharmacotherapies and chiropractic care were ineffective in relieving pain or restoring function. From injury to PRC over 6 years, Pt. became increasingly sedentary due to pain. Treatment was largely ineffective in restoring patient to her previous functional level.
- Since PRC, pt. has continued to attend PRC Aftercare sessions. She participates in a regular fitness routine. She is active in volunteer activities with PRC graduates and current patients. She has also returned to teaching music.

6 Minute Walk Test Data

Distance in Feet



Outcomes

ADMISSION TO PRC:

440 ft @ 0.8 mph

Fall Risk, Cane

OME = 240

Limited Community Ambulator

Sedentary, living with family , requires assistance

PRC DISCHARGE:

1500 ft @ 2.8 mph

No Fall Risk, no A.D.

OME = 0

Community Ambulation

Active lifestyle, living with family and no assistance

2 Year FOLLOW UP:

1779 ft @ 3.4 mph

No fall risk, OME = 0

Independent mobility

Return to vocation

Regular fitness routine, living independently

Conclusion

- 3-week PRC has a significant and enduring effect on direct medical costs
- Patients and health care systems are able to manage chronic medical conditions in a more conservative and cost-effective manner.
- The comprehensive nature of this treatment results in better independent functioning.

Economic Analysis of a Comprehensive Pain Rehabilitation Program

Sletten, Kurklinsky, Chinburapa, and Ghazi (2015).



Study Background

- First of its kind collaboration between a major commercial health insurance company and an independent health care organization
- Blue Cross/Blue Shield of Florida (Florida Blue) provided economic costs for a sample of 53 patients
- These patients completed the Mayo Clinic Pain Rehabilitation Center (MCPRC).
- MCPRC is a 3-week, hospital-based, day treatment program that includes:
 - Physical Therapy: Daily stretches, Cardiovascular conditioning, and PT strengthening
 - Occupational Therapy: Daily instruction in moderation, time management and functional adaptation
 - Behavior Therapy: 3, one-hour group sessions/day focused on behavioral therapy for stress management and behavior change
 - Medically supervised medication withdrawal: Opiates, benzodiazepines, sleeping pills etc.



Key Findings

Category	3 Months (pre/post)	6 Months (pre/post)	12 Months (pre/post)	18 Months *(pre/post)
Average Medical Cost	- 86%	- 68%	- 64%	- 90%
Total Pharmacy Cost	3%	- 24%	- 42%	- 72%
Specialty Care Visits	- 17%	- 34%	- 39%	- 51%

*only 10% of original sample was eligible for 18 Month analysis



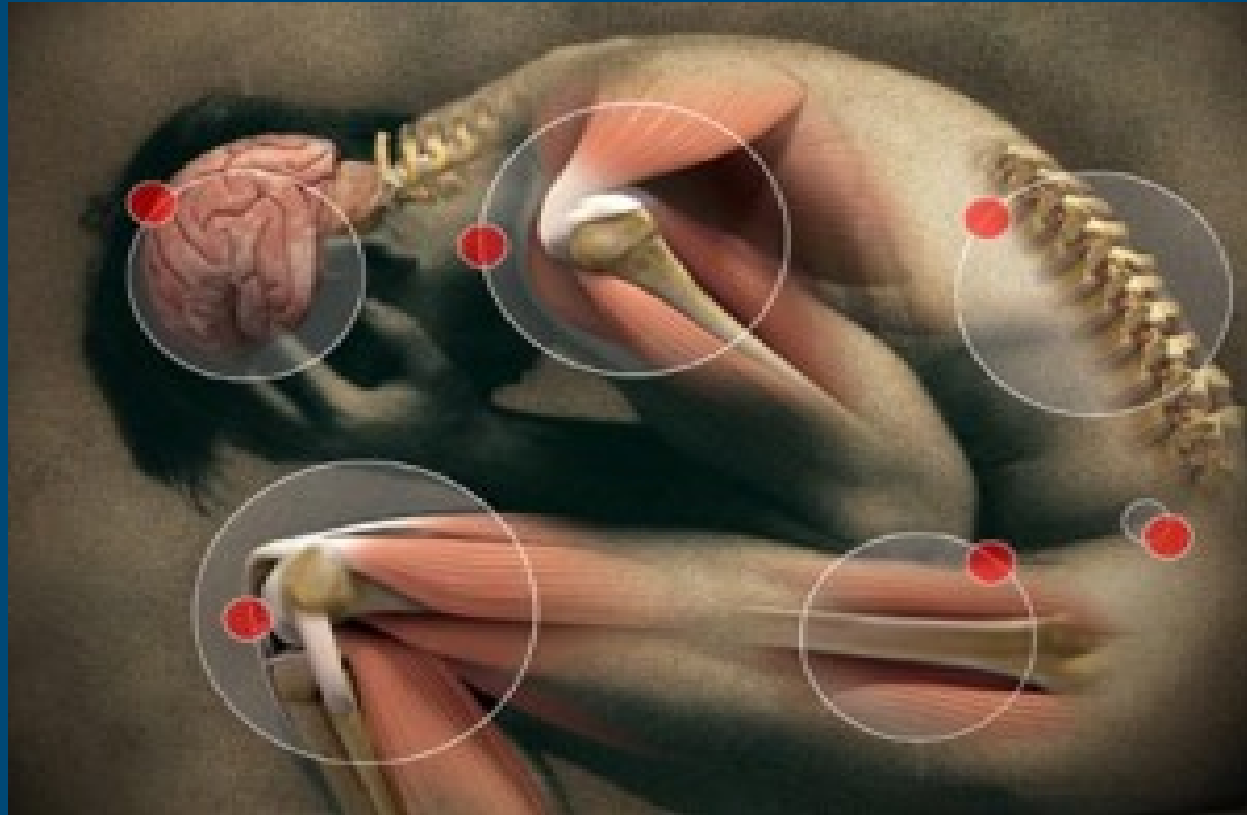
Conclusion

- 3-week PRC has a significant and enduring effect on direct medical costs
- Patients and health care systems are able to manage chronic medical conditions in a more conservative and cost-effective manner.
- The comprehensive nature of this treatment results in better independent functioning.

Future Directions

- Expand treatment to more conditions that fall under Central Sensitization Syndromes
- Outcome studies for these new populations

Central Sensitization



Peripheral Upregulation

- Skin
- Gut
- Muscle
- Bones
- Joints
- Vascular
- Nerves
- Balance
- Taste
- Smell
- Vision
- Hearing

Central Sensitization

- Somatosensory Cortex
- Consequence: More sensitive to...

Pain

Fatigue

Dizziness

Nausea

Touch

Light

Sound

Smell

Temperature

Taste

Central Sensitization

- Motor Cortex
- Consequence: More prone to...

Imbalance

Weakness

Tremor

Abnormal Gait

Spasms

Muscle ‘Jerks’

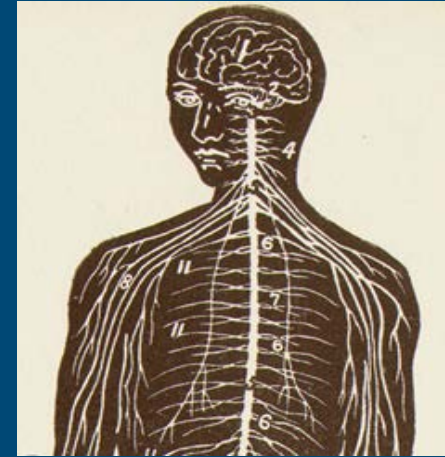
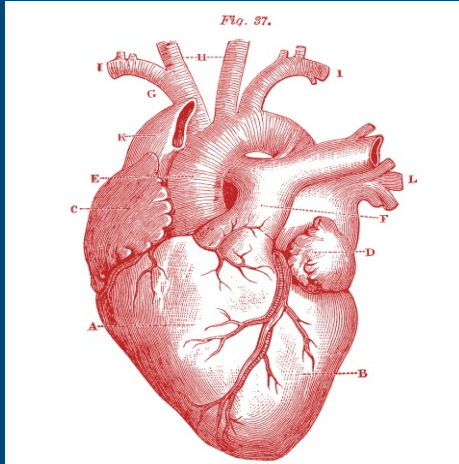
Spells

Seizure-Like

Difficulty starting and maintaining movements



Autonomic dysfunction (dysautonomia)



Dizziness, lightheadedness

Passing out (syncope)

Cold hands and feet

Leg/arm swelling (RSD/CRPS)

Heavy sweating (hyperhidrosis)

Temperature intolerance

Mottled purple/blue legs

Bowel/bladder symptoms

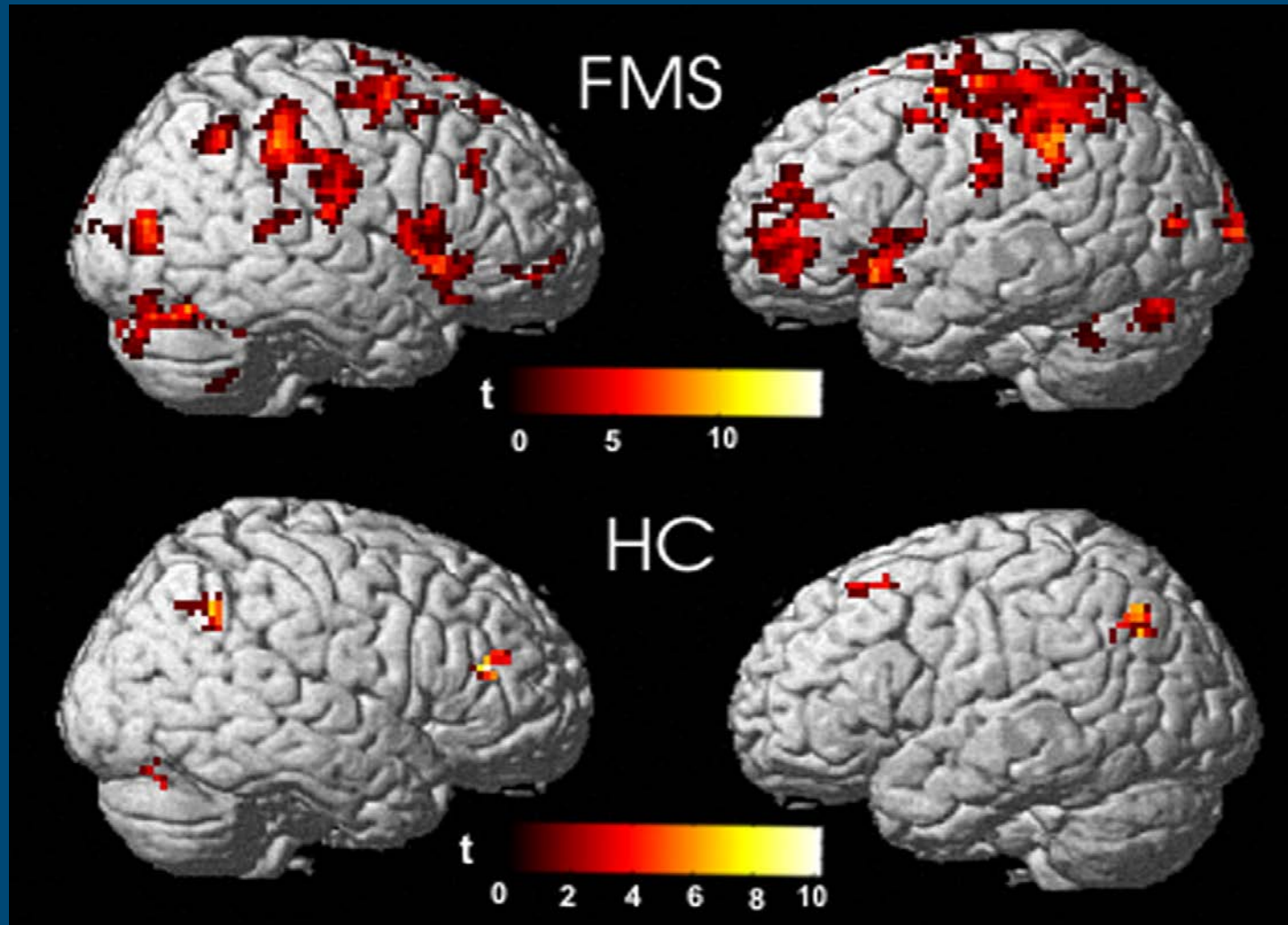
Hair loss

Fingernails brittle, deformed



Brain imaging of Fibromyalgia pain

**Painful
forearm
injection**



Central sensitization

BRAIN REORGANIZATION



Sensory Amplification

No return to normal

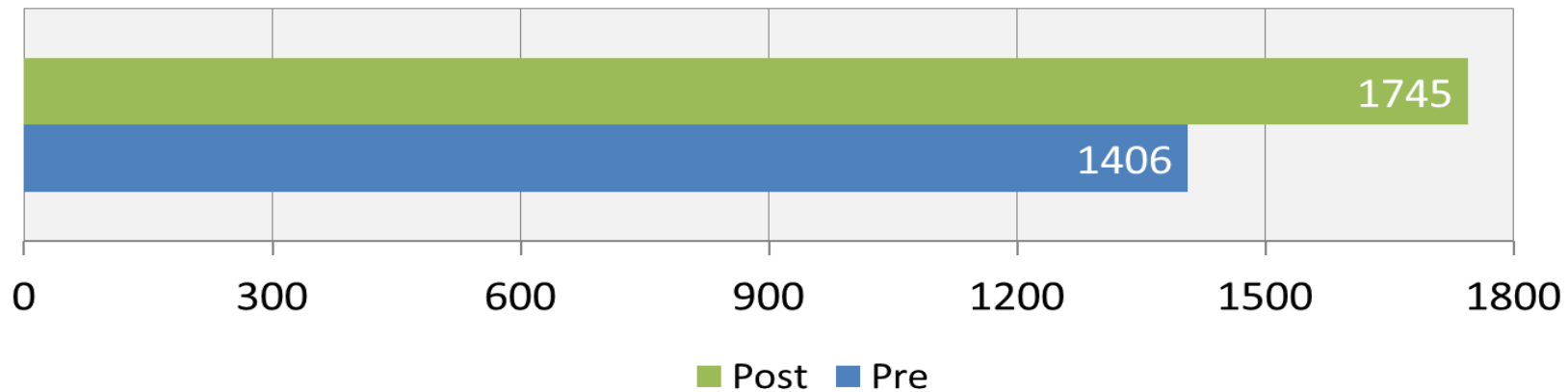
No self-adjustment to pain

**TENDS TO PERSIST
EVEN WITH REDUCED
SENSORY INPUT**

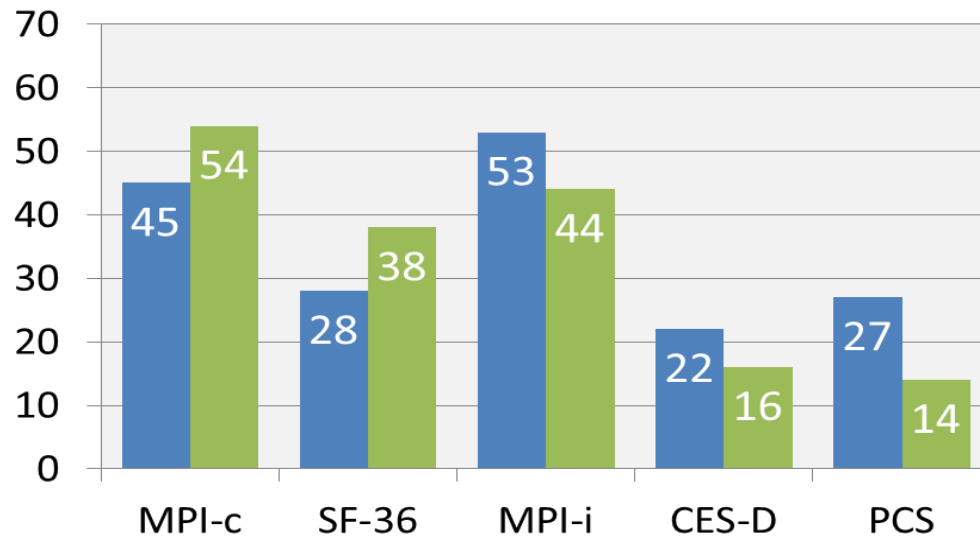
**Pain begets more pain,
becoming autonomous**

Postural Orthostatic Tachycardia

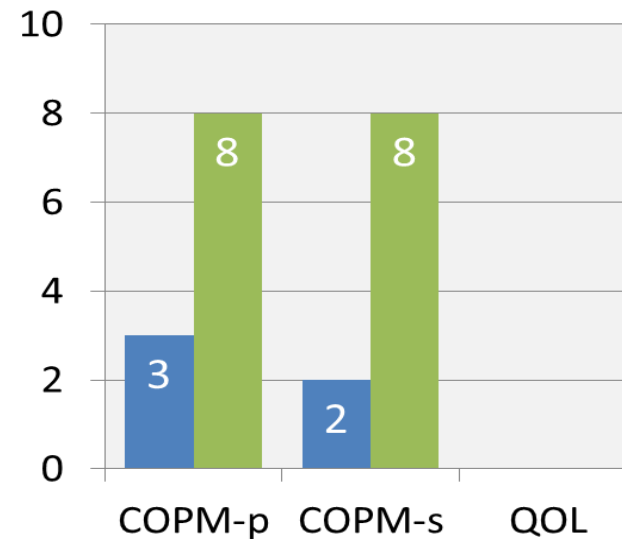
Six-minute Walk (feet)



Psychosocial Outcomes

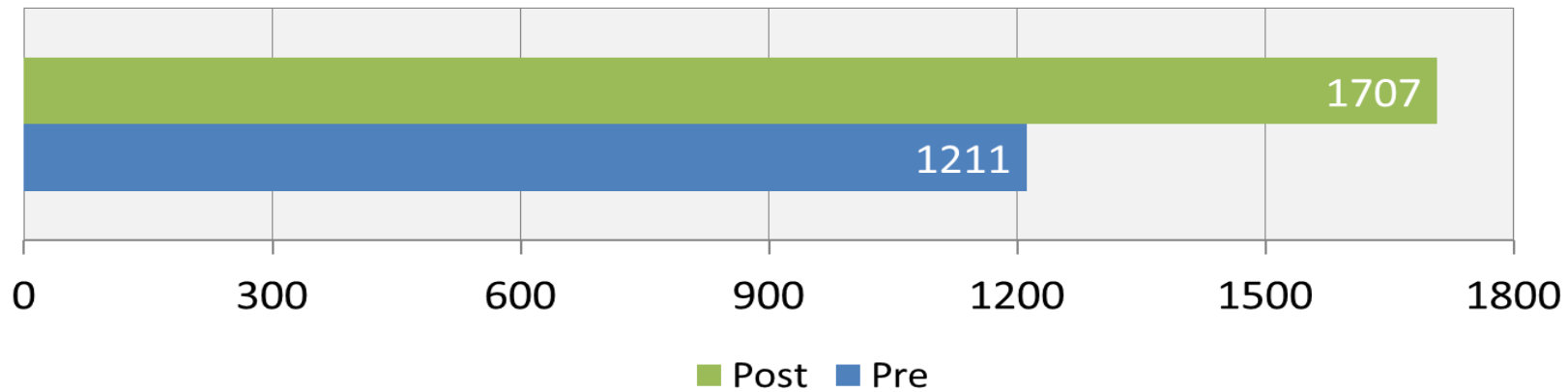


Performance & Satisfaction

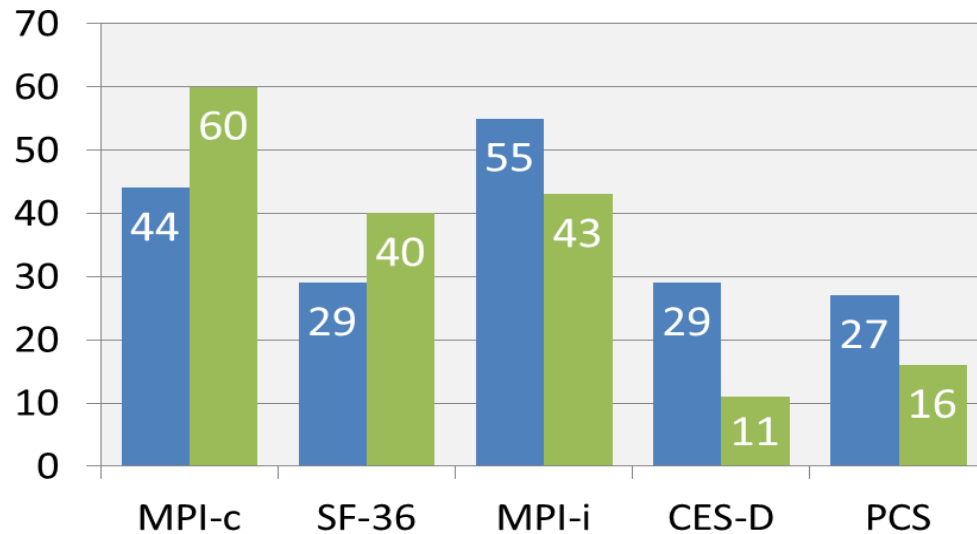


Ehlers Danlos

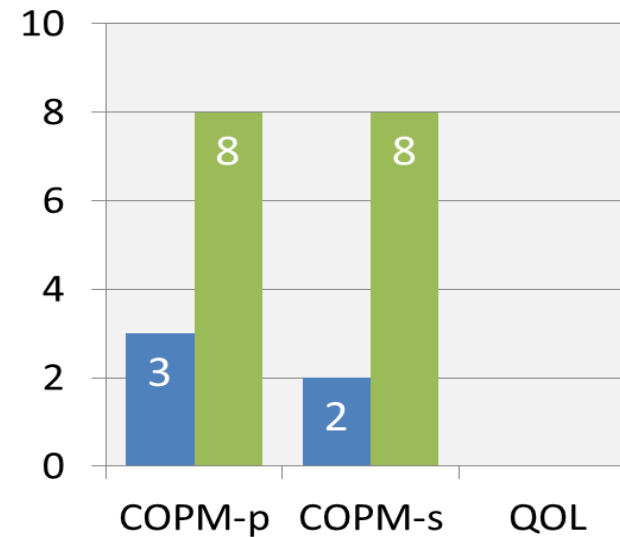
Six-minute Walk (feet)



Psychosocial Outcomes

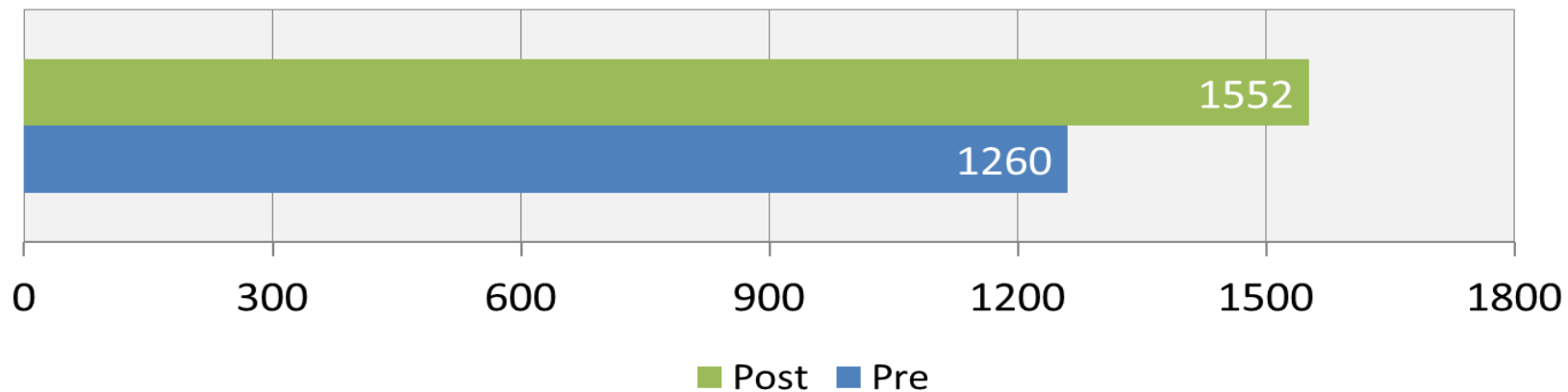


Performance & Satisfaction

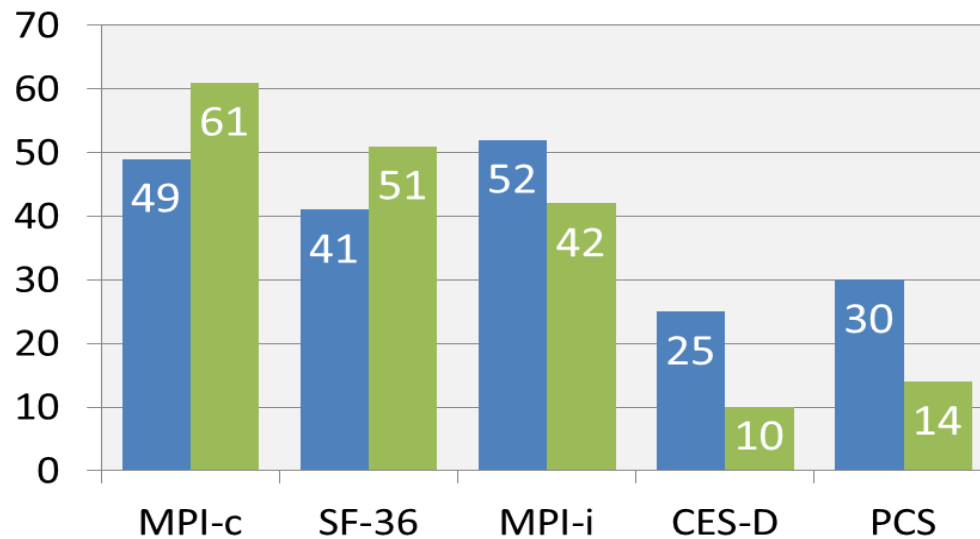


Peripheral Neuropathy

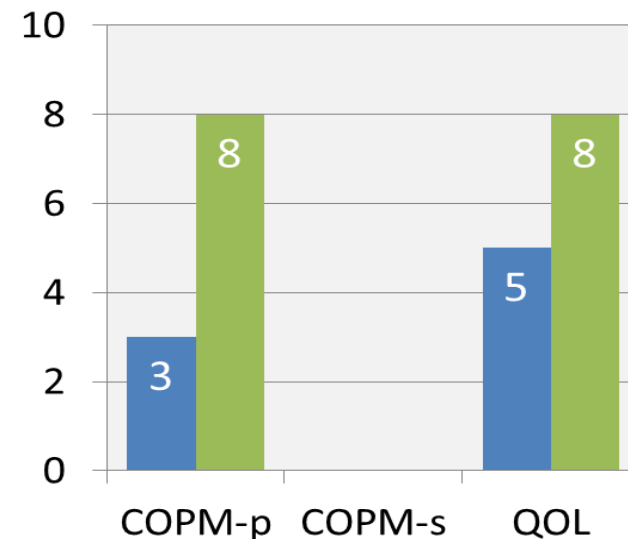
Six-minute Walk (feet)



Psychosocial Outcomes

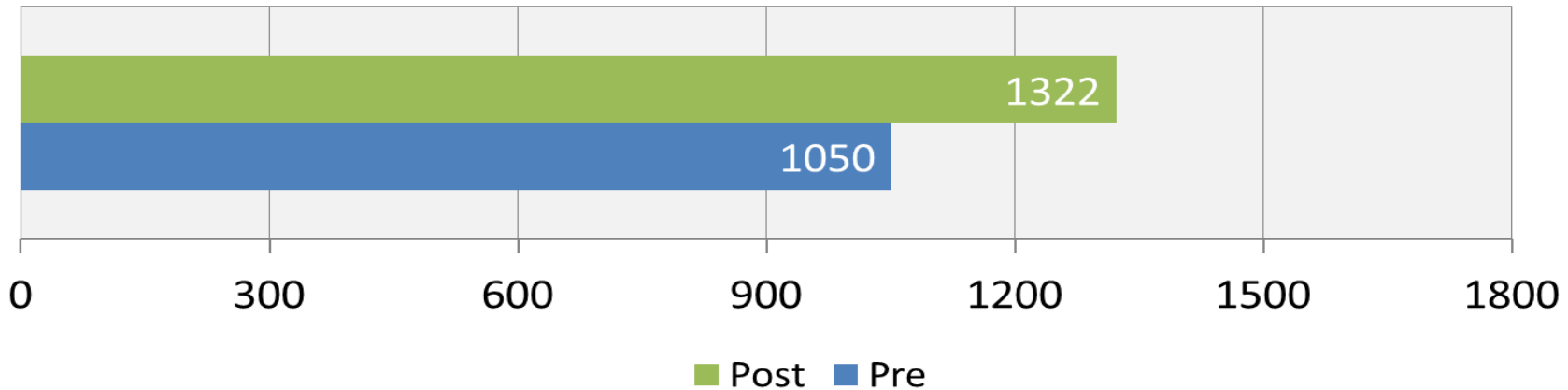


Performance & Satisfaction

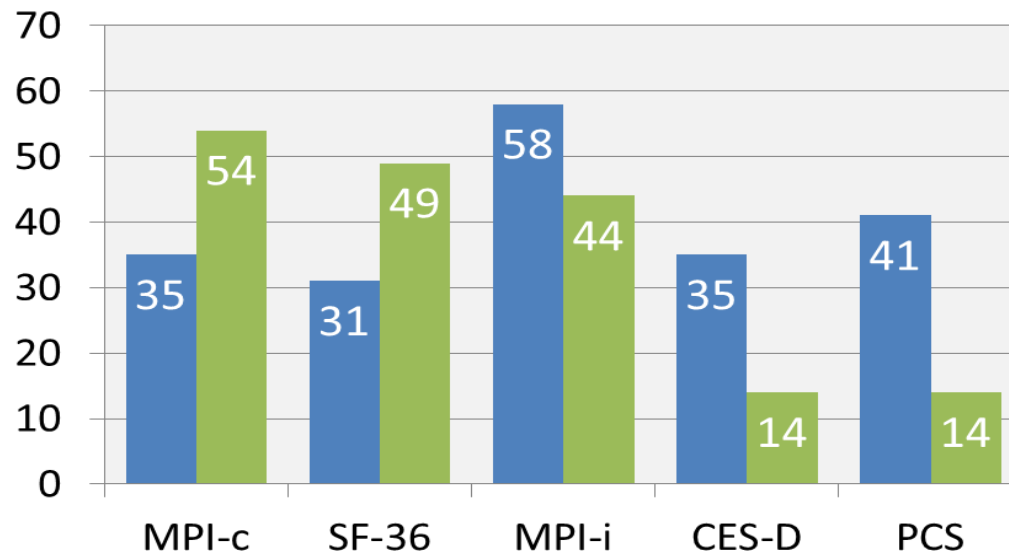


Movement Disorder

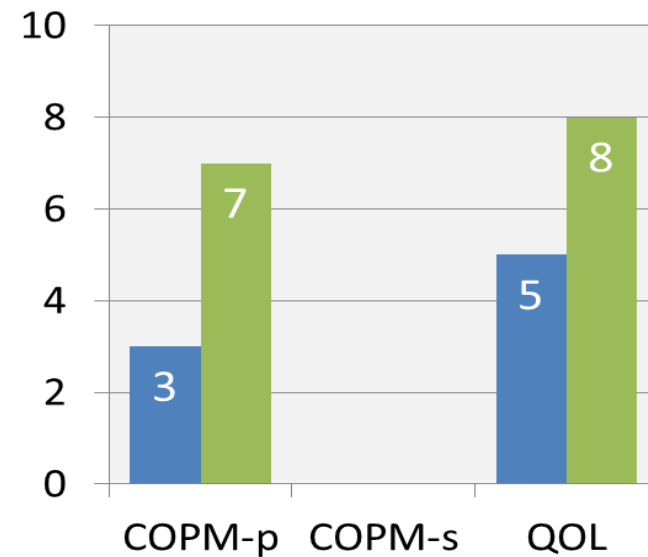
Six-minute Walk (feet)



Psychosocial Outcomes

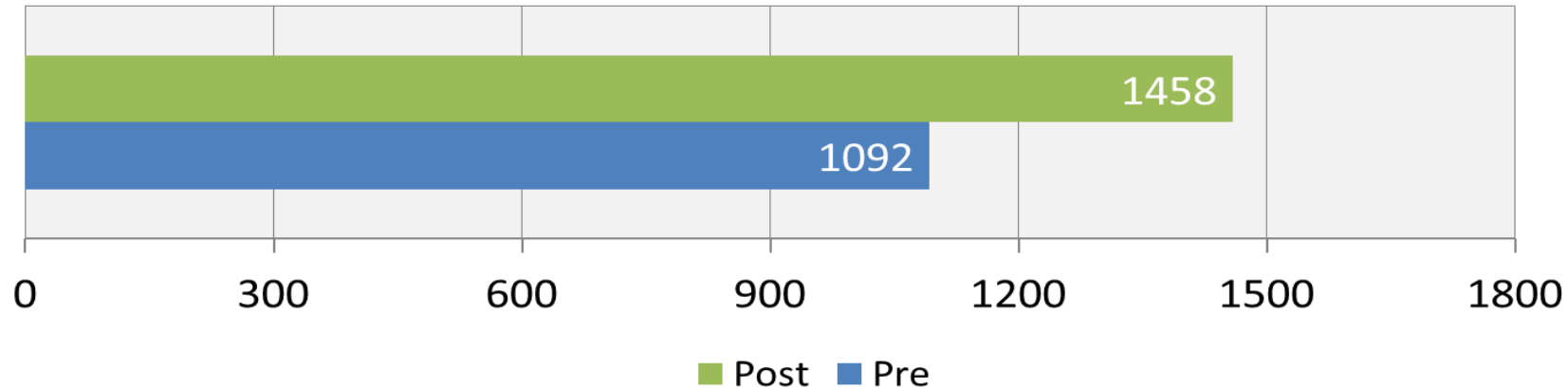


Performance & Satisfaction

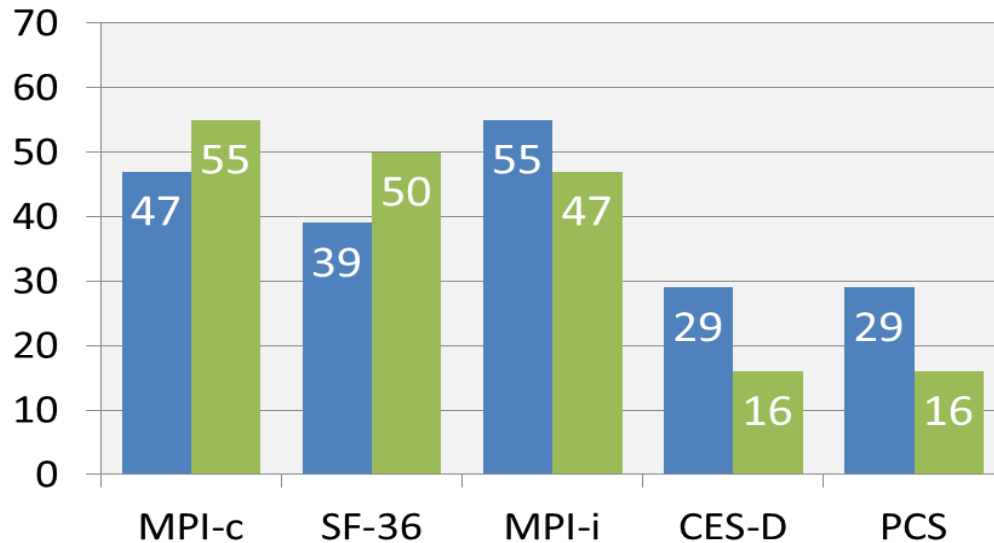


Functional Movement Disorder

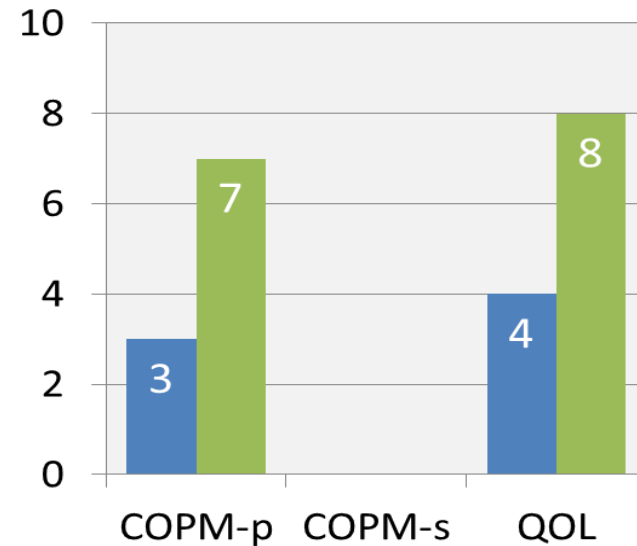
Six-minute Walk (feet)



Psychosocial Outcomes



Performance & Satisfaction



Questions & Discussion