

# Evidence-Informed Practice in Orthopedic Physical Therapy: Low Back Pain

American Academy of Orthopedic Physical  
Therapy: Clinical Practice Guidelines



**APTA**  
**Maine**

A Chapter of the American  
Physical Therapy Association

# AOPT CPGs

<https://www.orthopt.org/content/practice/clinical-practice-guidelines>



# Objectives:

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At the conclusion of this 2-part education track, participants will:

1. Summarize evidence in the relevant CPGs.
2. Apply A and B level evidence in clinical practice through case examples.
3. Provide rationale for clinical decisions citing evidence from the low back pain CPGs (2012 and 2021).
4. Demonstrate psychomotor skills for select examination and treatment techniques.

# Presenter



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Assistant Professor

Husson University School of Physical Therapy

Vice chair of the Maine APTA Ortho-Manual SIG

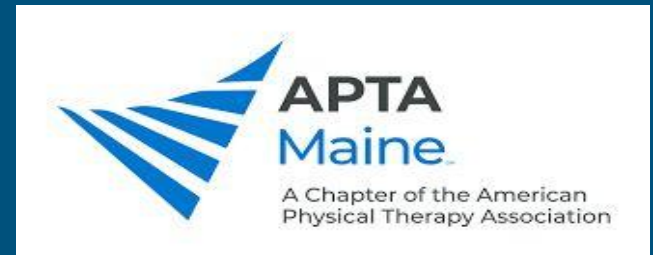
[ME APTA Ortho-Manual SIG](#)

## **Background:**

- Two decades of experience as a PT
- Post-professional education from the University of St. Augustine for Health Sciences and Andrews University
- 7-years experience as a MSK anatomy educator and teaching musculoskeletal assessment and treatment

# ME APTA Ortho-Manual SIG

- ❑ Established in 2020-2021
- ❑ Journal clubs and presentations
- ❑ Continuing education for chapter conferences
- ❑ Network, share, and progress orthopedic physical therapy practice, including orthopedic manual physical therapy
- ❑ Good way to enter into the state's chapter. Multiple positions open on the SIG's BoD



# Epidemiology and Nature History of LBP

## Disc pathology:

30% have evidence of a bulging disc and 29% with disc protrusions



mid  
30's to  
50's

## Degenerative changes

Modic changes occur with age but the type does not appear to correlate with pain or functional deficits.

20's

## Degenerative changes and clinical/functional instability

Higher proportion of reported LBP in the population.

60-70'



80's

## Degenerative changes

84% have evidence of a bulging disc and 43% for disc protrusions

# Epidemiology and Nature History

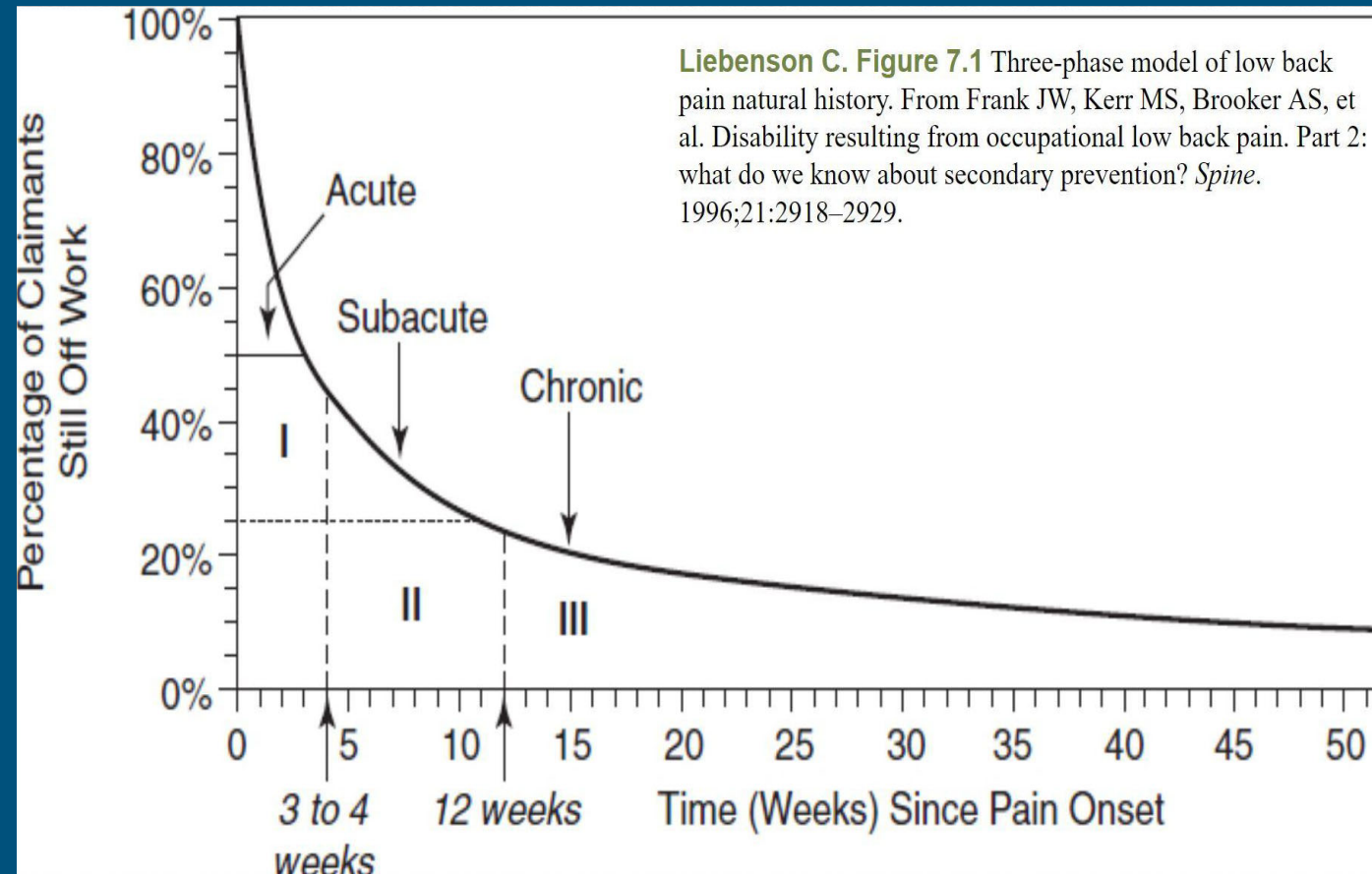
**85%**

**Experience an episode  
of LBP in their lifetime**



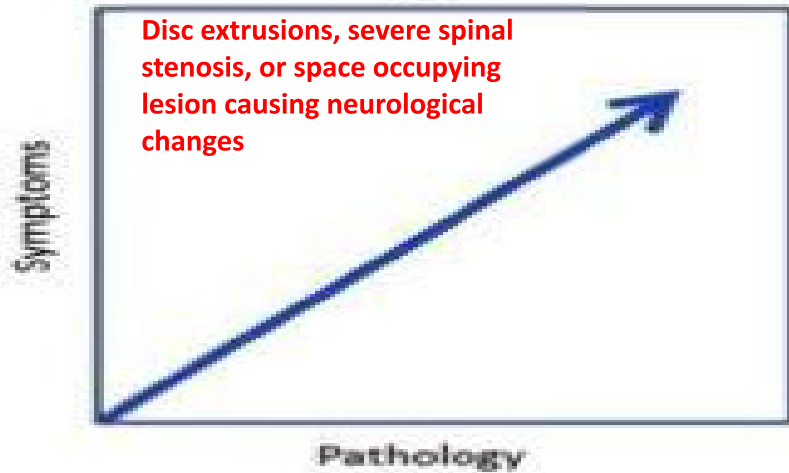
**65% & 45%**

**recurrence at 1-year and  
3rd-year, respectively**

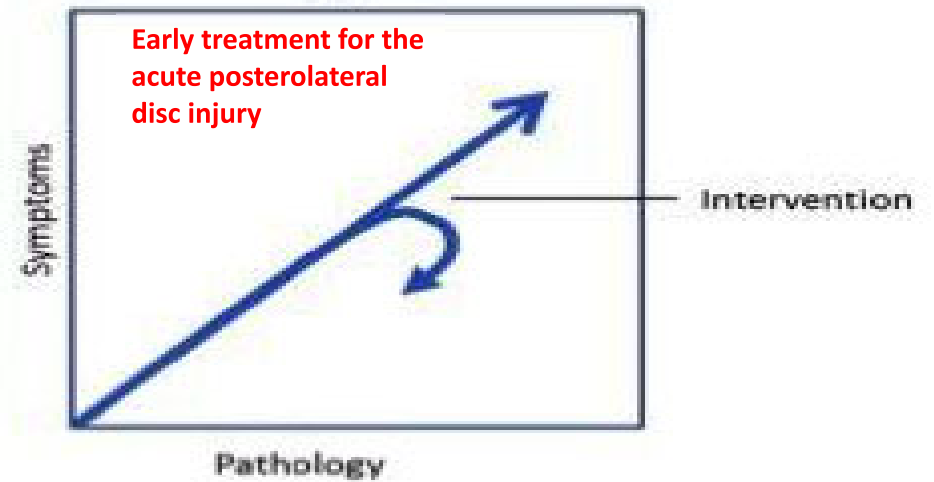


Costa Lda C, Maher CG, McAuley JH, Hancock MJ, Herbert RD, Refshauge KM, Henschke N. Prognosis for patients with chronic low back pain: inception cohort study. *BMJ*. 2009 Oct 6;339:b3829. doi: 10.1136/bmj.b3829. PMID: 19808766; PMCID: PMC2758336 <https://pubmed.ncbi.nlm.nih.gov/19808766/>.

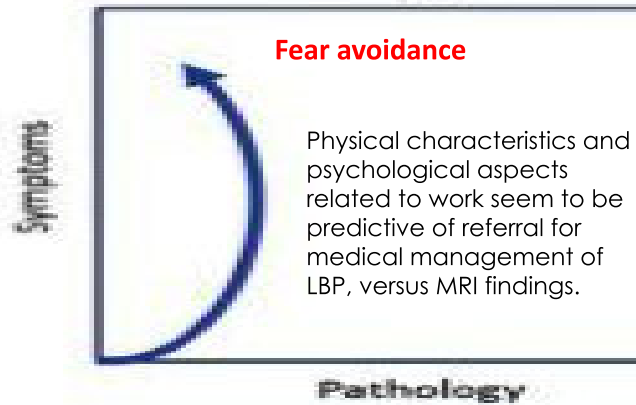
**A**



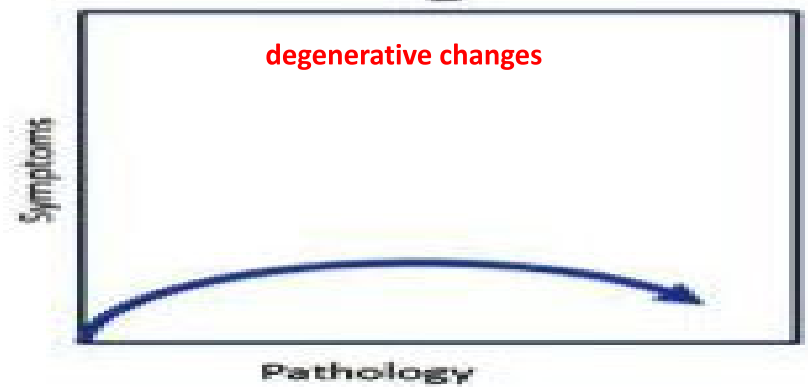
**B**



**C**



**D**



## **LBP and Societal Variables to Consider**

- Chronic LBP is now the #1 claim of disability in industrialized nations.
- Prevalence varies due to stratification across different age groups. However, chronic LBP should not be associated with “older age”.
- The distribution of those with LBP is not equal across race, gender, and socioeconomic status.
- Concerning race, inequality appears to exist irrespective of socioeconomic status. This could affect physician recommendations, referrals, and diagnostic categorization. This has implications to patient/client management for LBP.
- Minorities and female gender experience greater pain, higher levels of disability, and less access to evidence-based interventions for LBP.

From AOPT Current Concepts of Orthopedic Physical Therapy

# Background on CPGs and Their Intended Use



**Studies must be specific to patient/client management delivered by physical therapists**

# Background on CPGs and Their Intended Use

## A = strong evidence = “Should”

- ☐ Mostly level I and/or level II studies

## B = moderate evidence = “May”

- ☐ A single high quality RCT or mostly level II studies. Includes studies with short-term follow-up of 3 months or less and participant sizes <100.



## C = weak evidence = “Can”

- ☐ A single level II study
- ☐ Consensus by content experts

## D = Conflicting or no evidence = “Should not”

- ☐ Level I and II studies disagree in their conclusions. Lack of evidence to provide benefit.

# Low Back Pain CPG: ICF model and definitions

## International Classification of Function (ICF) and corresponding ICD from 2012

Acute LBP with mobility deficits (ICD: segmental/somatic dysfunction of the lumbar region)

Acute or chronic LBP with movement coordination impairments (ICD: spinal instabilities in the lumbar region)

Acute or chronic LBP with related (referred) leg pain (ICD: intervertebral disc displacement in the lumbar region)

Acute or chronic LBP with radiating pain (ICD: lumbago with sciatica; lumbar radiculopathy)

Acute LBP with related cognitive or affective tendencies (ICD: low back pain, low back strain)

Chronic LBP with related generalized pain (ICD: low back pain, low back strain, lumbago)

## 2021 CPG update: patient subgroups

Acute LBP  
Chronic LBP

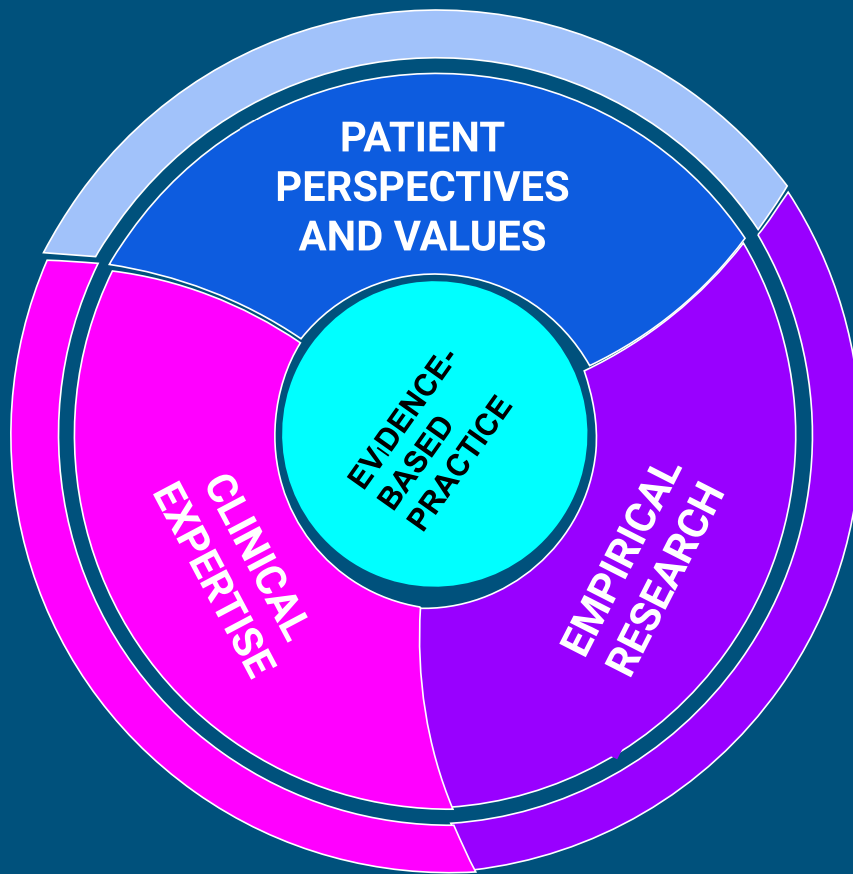
LBP with leg pain

- ☐ Acute
- ☐ Chronic

LBP in older adults

Post operative LBP

# Evidence-Based Practice



## Clinical reasoning in hypothesis generation and testing

- ❑ Interactive and collaborative
- ❑ Diagnostic
- ❑ Intervention
- ❑ Predictive/prognostic

Hypothesis generated by the subjective history taking process and confirmed or refuted by findings from the examination.

# Classification Systems (From 2012)

## 2012 CPG endorsements:

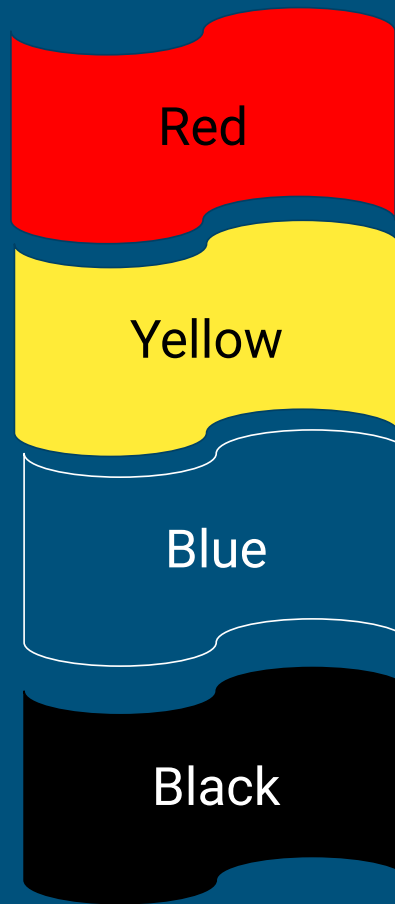
- ☐ Emphasis on subgrouping patients based on clinical patterns
- ☐ Importance in primary care management
- ☐ De-emphasize identifying the specific anatomical lesion after red flag screening is completed\*

**TABLE 6**

OPERATIONAL DEFINITIONS FOR CLASSIFICATION SYSTEMS

Intervention	Operational Definition
Mechanical Diagnosis and Therapy	Classification method based on changes in low back pain (and/or lower extremity) symptoms in response to direction-specific, repeated lumbar spine movements or sustained postures. Findings are used to classify patients into different syndromes (ie, derangement, dysfunction, or postural) that guide the treatment approach
Treatment-based classification	Classification method to guide initial treatment approach (manipulation, stabilization, specific exercise, or traction) based on specific initial assessment findings, including but not limited to patient history, clinical presentation, and physical examination
Movement system impairment	Classification method based on impaired trunk movements and postures associated with low back pain symptoms observed during a standardized examination. Test results are used to classify patients based on observed lumbar movement or alignment impairments (rotation, extension, flexion, rotation with extension, or rotation with flexion), with subgroup assignment guiding the initial treatment approach to match specific signs and symptoms
Cognitive functional therapy	Classification method that uses an integrated behavioral approach for individualizing the management of low back pain. Pathoanatomical, physical, psychological, social, lifestyle, and health-related risk factors are assessed, with nonmodifiable barriers and a modifiable target for change identified to guide treatment based on 3 components ("making sense of pain," "exposure with control," and "lifestyle change"). Formerly called O'Sullivan's classification system
Prognostic risk stratification	Classification method that identifies patients at different levels of risk for persistent pain (low, medium, high) using a multidimensional screening tool, with each risk category associated with different treatment pathways. Examples include the StarT Back Tool
Pathoanatomic-based classification	Classification method based on pathoanatomic-based findings from examination that could cause low back pain. Subgroups are defined by symptom location and response to examination procedures and used to guide the treatment approach

# Examination Recommendations (2012 CPG)



Medically emergent versus cautious waiting

Beliefs about pain, social economic factors, relationship with others

Beliefs about work and re-injury,, support by employer and co-workers, work stressors and barriers to returning back

Professional environment, healthcare system, healthcare disparities, three party payers, and healthcare policies

# Intake: Risk Stratification and Outcome Tools

## STarT back tool

Examines three domains: pain, function, fear

Risk factors for transitioning from acute LBP to chronic LBP based on a total score.

- ☐ < 3 = low risk
- ☐ 4 or more with a sub score of 3 or less = medium risk
- ☐ 4 or more with a sub score of 4 or more = high risk

## Oswestry

Determine the patient's perceived level of disability, based on a raw score out of 50 points and then converted to a total percentage.

Pair with STarT back tool when possible.

Change over time:

- ☐ 5-points or 10% or less = no change since its around the SEM and below MDC.
- ☐ >6-points or above 12% = clinically meaningful/acute change in the measure occurred.
- ☐ At or above 10 points or 20% = meaningful change observed by the patient/therapist.

## OSPRO-YF

3 separate domains of psychosocial distress: negative mood, fear avoidance, and negative affect/coping.

Useful tool to extract data and correlate to other known measures.

### OSPRO-YF

Note: Fear-Avoidance Behavior Pain Questionnaire <19 work subscale (*TJM CPR*)

**2012 Level C: Prognostic risk stratification may be used**

# Intake: Risk Stratification and Outcome Tools

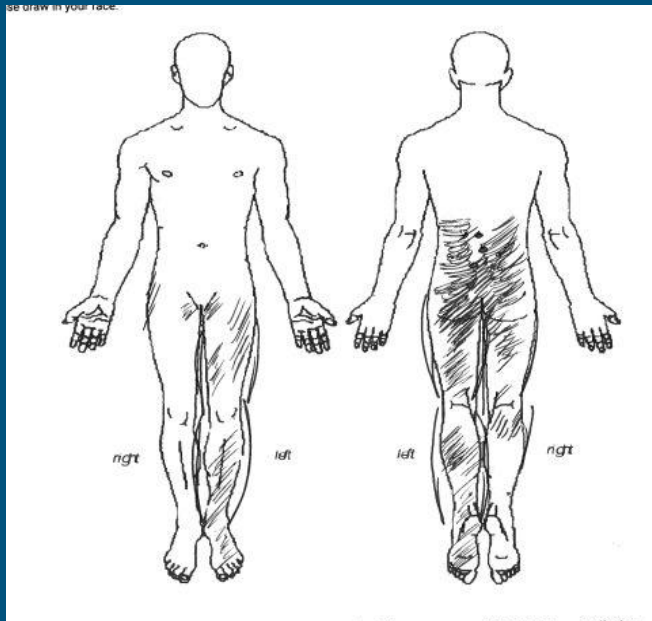
Tool/Measure	Brief Description	Clinical Utility
<b>Primary care evaluation of mental disorders</b>	A patient questionnaire used to screen for depressive symptoms in the physical therapy settings.	<p>“No” to both questions: depression symptoms appear to be highly unlikely.</p> <p>Answers ‘yes’ to one or both questions raises suspicion and should be communicated to the referring healthcare provider.</p>



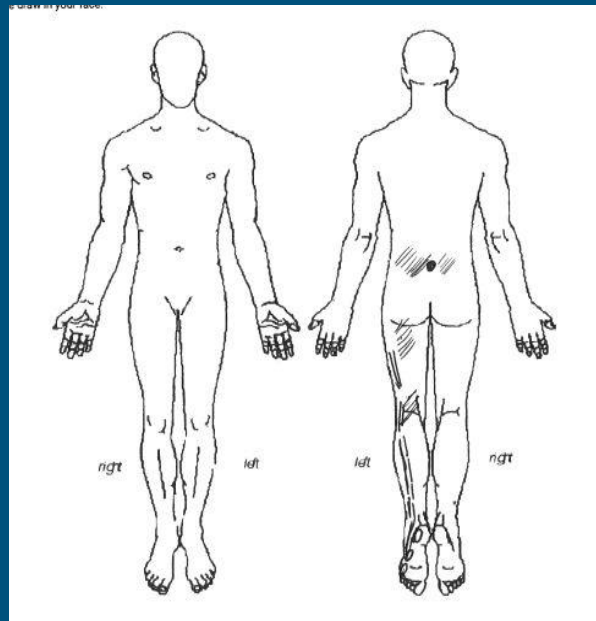
# Pain Phenotype: SMART study

Nociceptive (Somatic Tissue)	Peripheral Neuropathic	Central Mechanisms (Nociplastic)
<p>Pain localized to the area of injury or dysfunction</p> <p>Clear, proportionate mechanical or anatomical nature to aggravations and eases</p> <p>Usually intermittent and sharp with movement or mechanical provocation; may be more constant dull ache or throb at rest</p> <p>Absence of the following:</p> <ul style="list-style-type: none"> <li>▪ Pain with other dysesthesias</li> <li>▪ Night pain or disturbed sleep</li> <li>▪ Antalgic postures or movement</li> <li>▪ Pain variously described as burning, shooting or electric, shock-like</li> </ul>	<p>Pain perceived in a dermatome or cutaneous nerve distribution</p> <p>History of nerve injury, pathology, or mechanical compromise</p> <p>Pain/symptom provocation with mechanical testing which move, load or compress neural tissue (e.g. active, passive or neurodynamic tests)</p> <p><u>SLANNS</u></p>	<p>Disproportionate, non-mechanical, unpredictable pattern of pain provocation in response to multiple or non-specific aggravating/easing factors.</p> <p><b>MUST RULE OUT RED FLAGS</b></p> <p>Pain disproportionate to the nature and extent of injury or pathology</p> <p>Diffuse/non-anatomic areas of pain/tenderness on palpation</p> <p>Strong association with maladaptive psychological factors (e.g. negative emotions, poor self-efficacy, maladaptive beliefs and pain behaviors)</p> <p><u>Central Sensitization Inventory</u></p>
<p><b>Sensitivity 90.9%</b>  <b>Specificity 91.0%</b>  <b>Dx odds ratio 100.67</b></p>	<p><b>Sensitivity 86.3%</b>  <b>Specificity 96.0%</b>  <b>Dx odds ratio 150.9</b></p>	<p><b>Sensitivity 91.8%</b>  <b>Specificity 97.7%</b>  <b>Dx odds ratio 486.56</b></p>

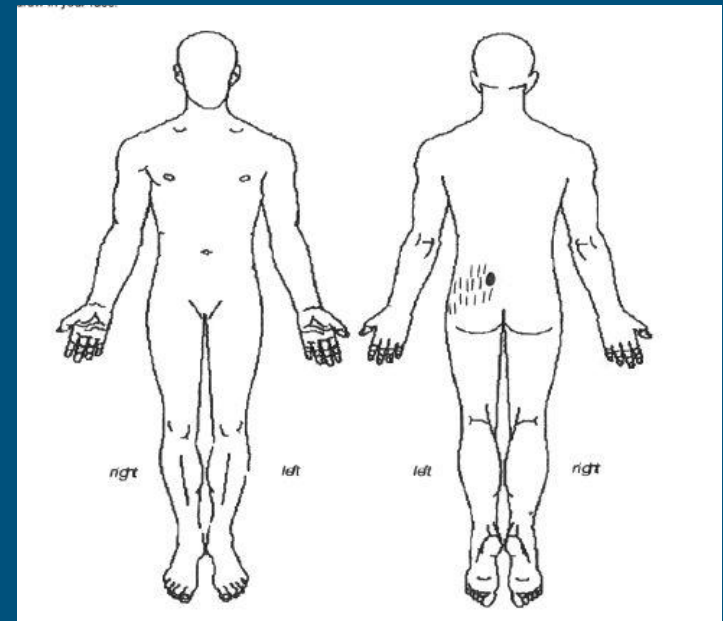
# Pain Mapping: A Comparison



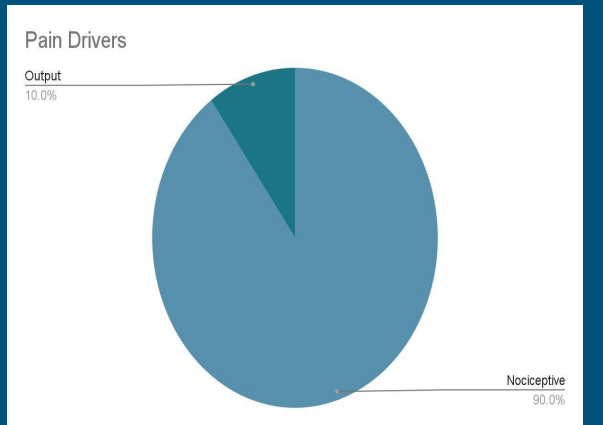
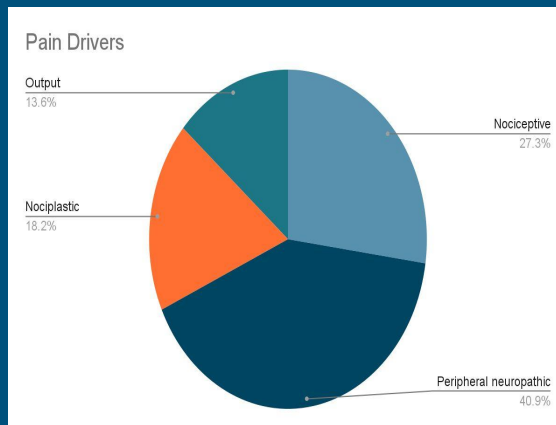
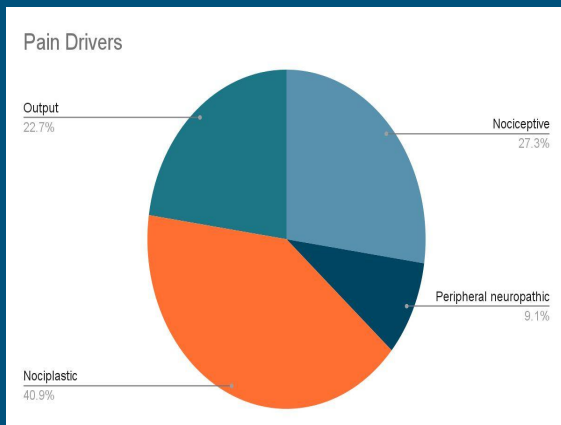
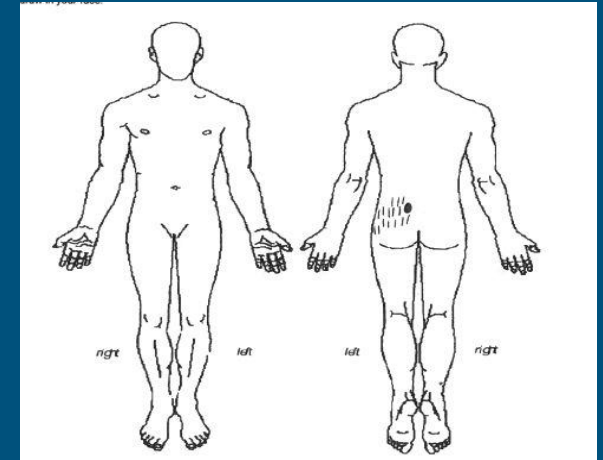
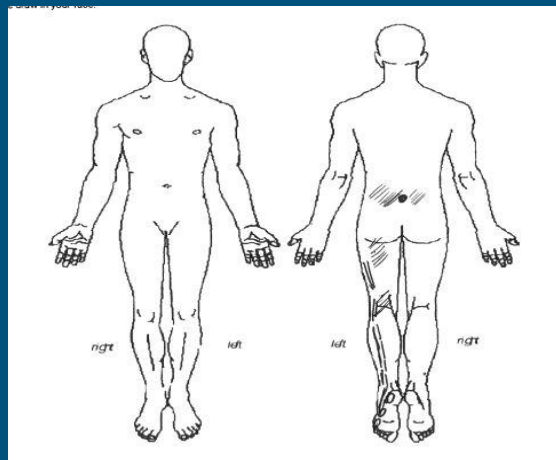
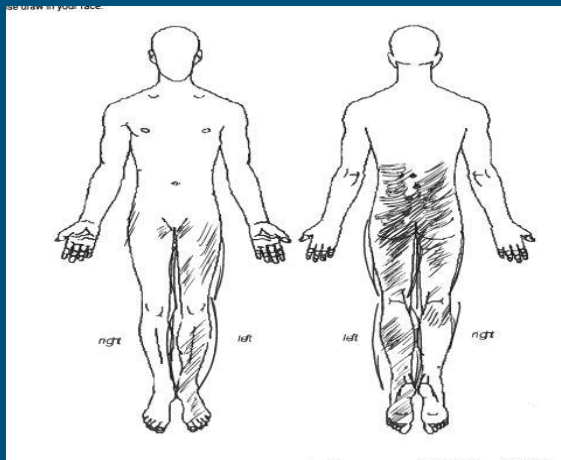
A



B



C

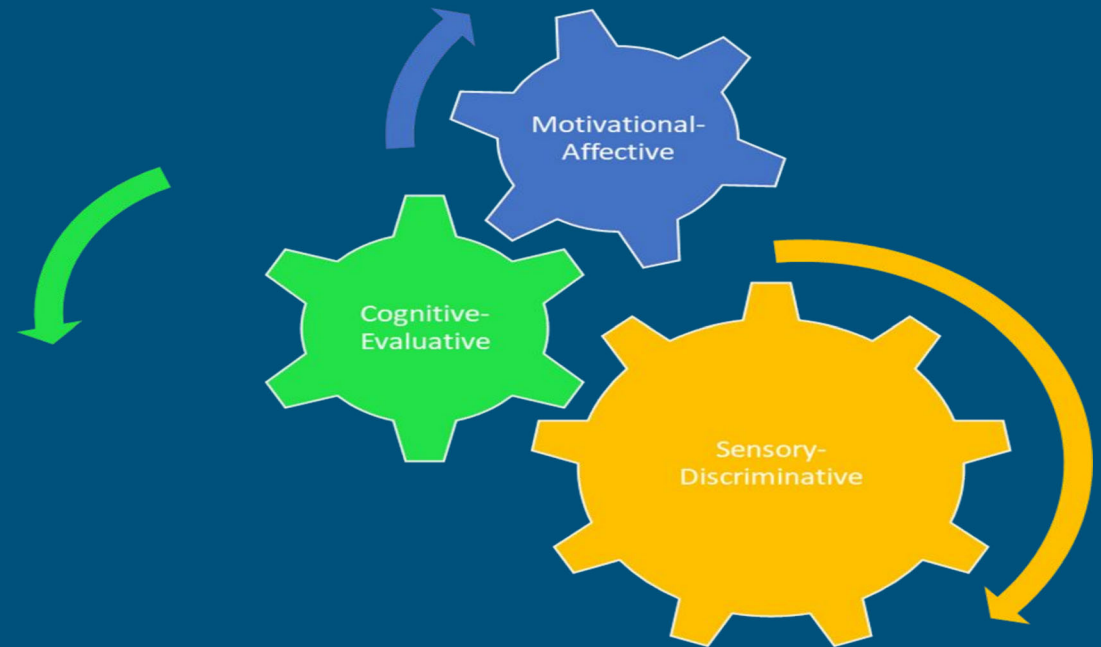
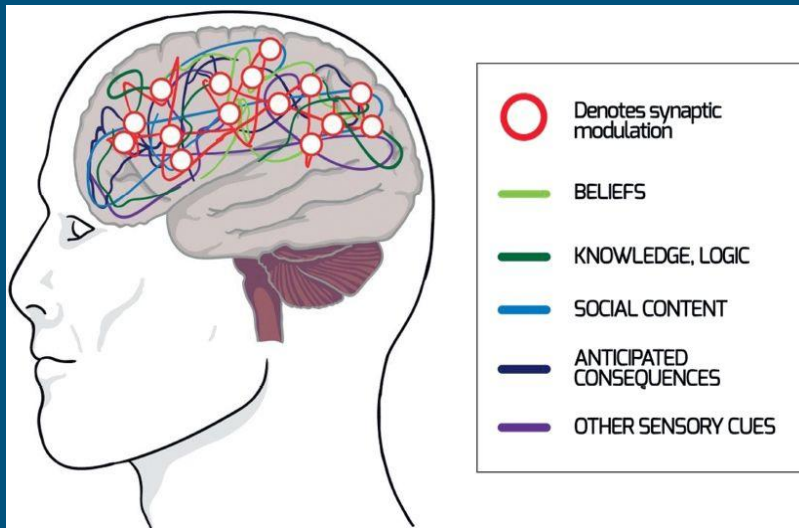


## Pain phenotypes

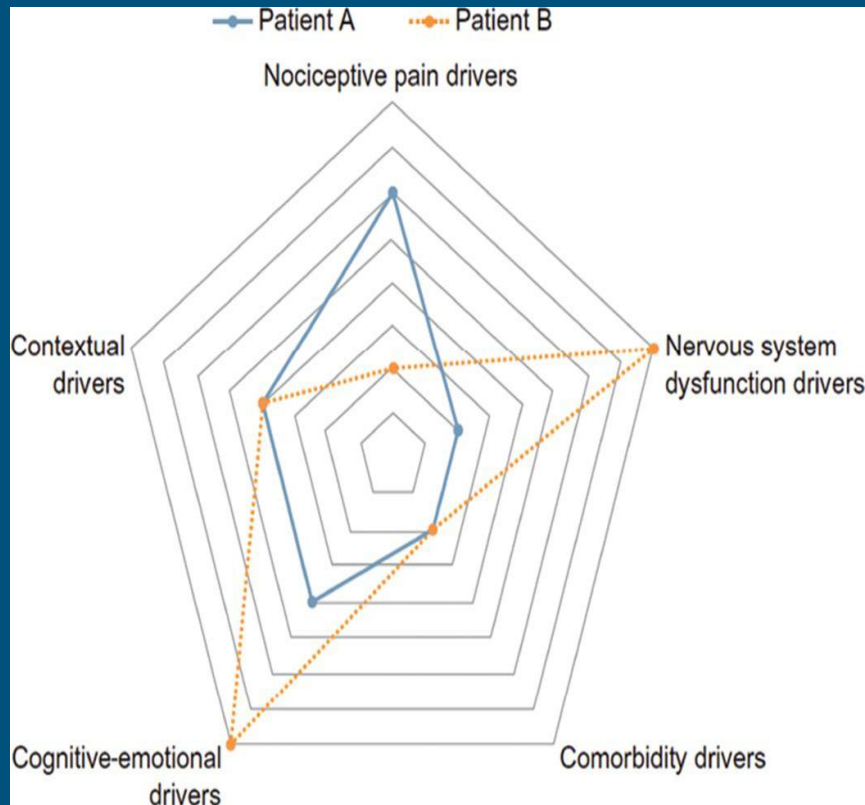
# Pain and the Brain

Gray matter volume changes

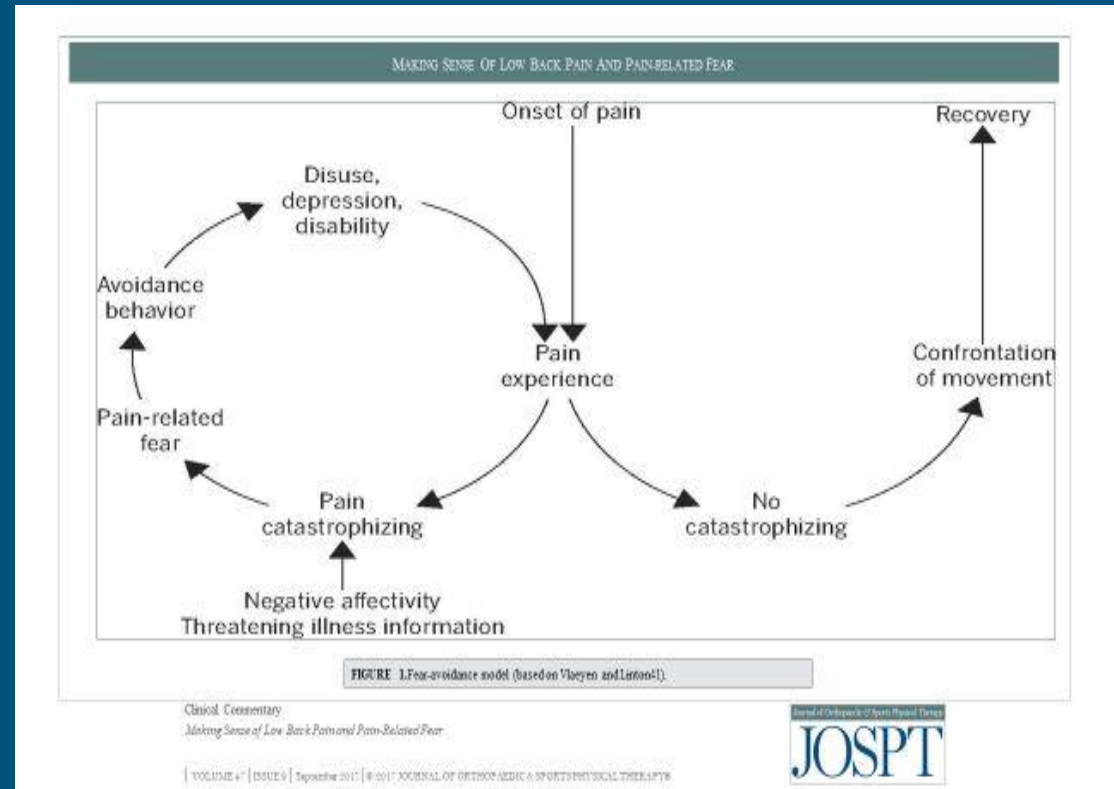
- ❑ Prefrontal dorsolateral cortex
- ❑ Temporal lobe
- ❑ Insula
- ❑ Somatosensory cortex



# Biopsychosocial: The Mature Organism



*Biopsychosocial phenotype. From Louw A, Puentedura E, Schmidt S, Zimney L. Integrating Manual Therapy and Pain Neuroscience. OPTP; 2019.*



## Classification Systems (From 2012)

## Acute LBP

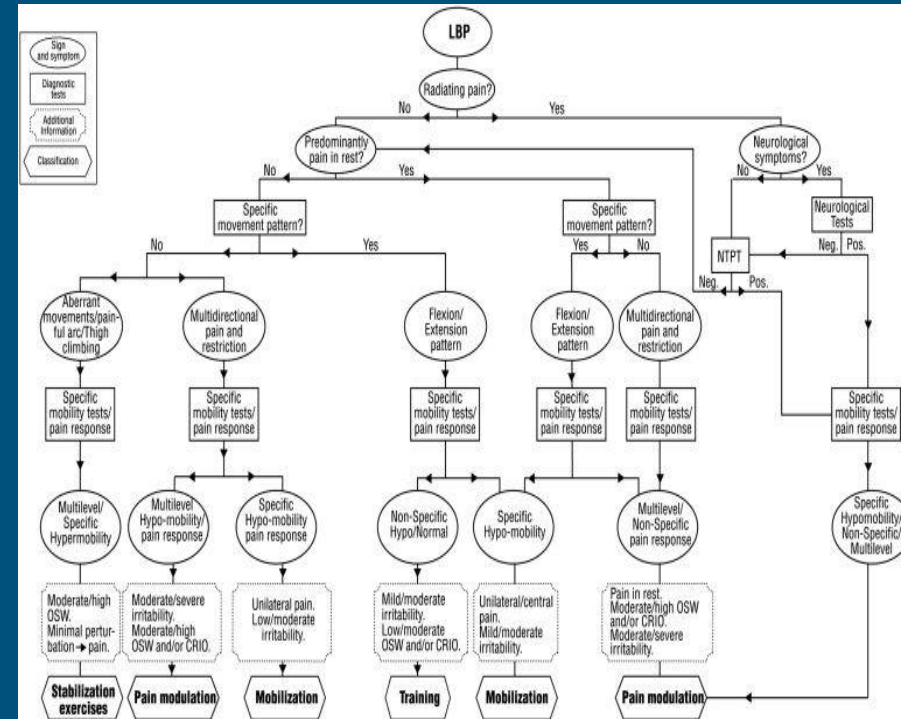
- ❑ TBC may be used

## Acute LBP with radiating pain

- ❑ MDT can be used

## Chronic LBP

- ❑ TBC, CFT, or MSI can be used
- ❑ MDT may be used
- ❑ Prognostic risk stratification may be used
- ❑ Pathoanatomic-based classification may be used



Widerström B, Olofsson N, Arvidsson I, Harms-Ringdahl K, Larsson UE. Inter-examiner reliability of a proposed decision-making treatment based classification system for low back pain patients. *Man Ther.* 2012 Apr;17(2):164-71. doi: 10.1016/j.math.2011.12.009. Epub 2012 Jan 20. PMID: 22261649.

# Treatment-based classification

## Avenue 1 (Medical management)

Triage the patient and screen for associated flags.

- ❑ Red flags requiring immediate medical assessment

## Avenue 2 (Self-management)

Low risk of developing cLBP

- ❑ Patient advice, education, and reassurance to remain active

## Avenue 3 (Rehabilitation)

Moderate-to-higher risk for developing cLBP

- ❑ Movement-based classification systems:
  - ❑ Modulation
  - ❑ Movement control
  - ❑ Functional optimization

From the AOPT's Current Concepts of Orthopedic Physical Therapy

Serious pathology	Clinical finding	Sensitivity and Specificity and Likelihood ratios
Cancer	Age >50 No relief with bed rest  History of cancer Failure to improve w/in 30 days Unexplained weight loss	High sensitivity High sensitivity  High specificity and +LR 23.7 High specificity High specificity
Infection	Fever	High specificity and +LR
Unstable vertebral fracture	History of trauma	Moderate specificity +LR 12.8
Cauda equina syndrome	Urinary retention	High sensitivity and specificity +LR 18.0 -LR 0.11
Abdominal aneurysm	Abdominal girth <100 cm  Palpation of the abdominal pulse site and increase expansion  History of smoking	High sensitivity  Moderate sensitivity  +LR 5.07
Visceral inflammation/rupture	McBurney's point Sign of the psoas or obturator sign	

# Screening for structural compromise



Lumbar compression overload test

Clinical features of a lumbar vertebral compression fracture:

- ❑ Flexion-compression intolerance
- ❑ Limited tolerance to sitting, standing, and walking
- ❑ **Heightened risk factors**
  - ❑ Prolonged use of corticosteroids
  - ❑ Significant trauma
  - ❑ >70 years of age
  - ❑ Female gender

**2 risk factors present** +LR 15.5

**3 risk factors present** +LR 218.3

# Screening for structural compromise

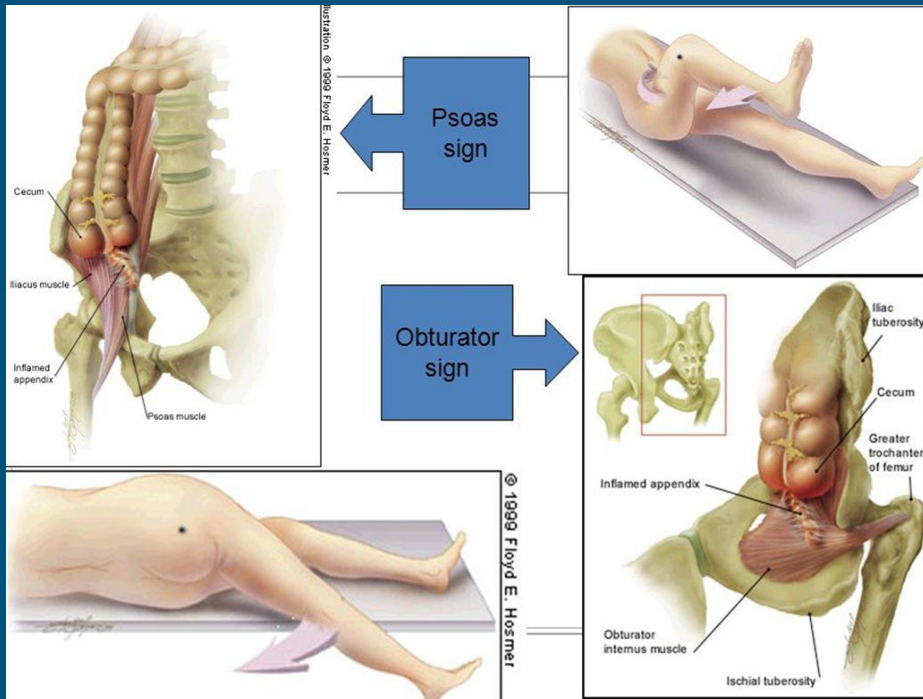


Pelvic compression test

## Clinical features of a pelvic fracture

- ❑ Limited tolerance to standing and walking - antalgic pattern
- ❑ Unable to weight bear fully on one side
- ❑ Difficulty with movement transitions such as rolling over in bed
- ❑ Trauma (includes recent childbirth)
- ❑ Heightened risk factors
  - ❑ Prolonged use of corticosteroids
  - ❑ Significant trauma
  - ❑ >70 years of age
  - ❑ Female gender

# Screening for visceral inflammation or rupture

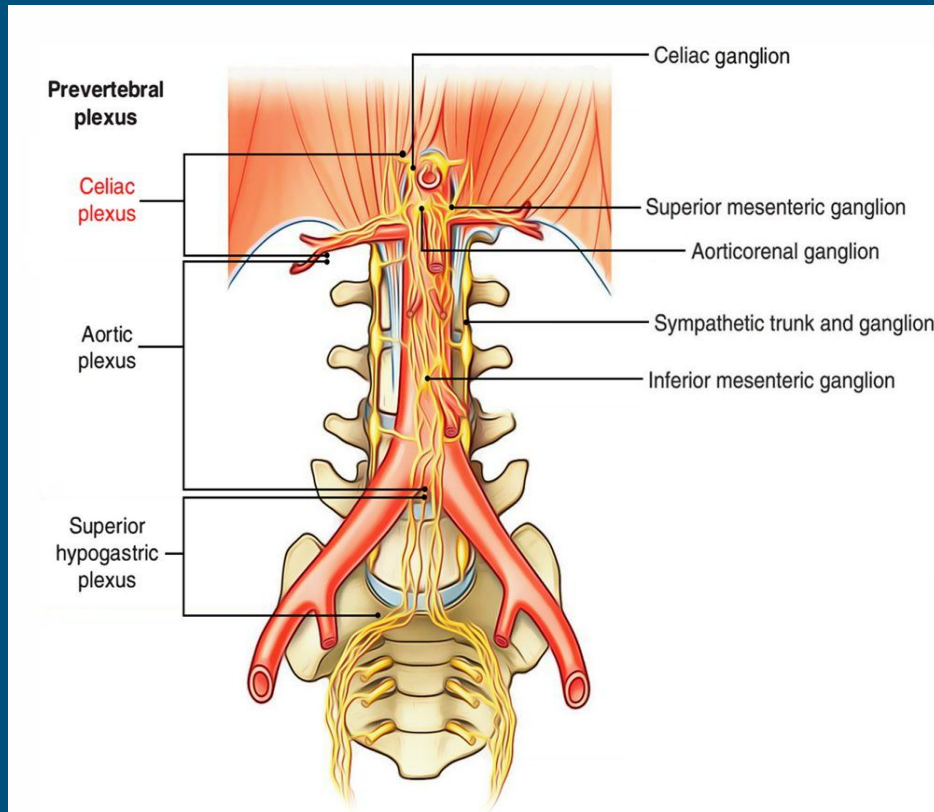


Sign of the psoas, obturator sign, and palpation of McBurney's point

Clinical features:

- ❑ Pain in the right lower abdominal quadrant
- ❑ Fullness in the abdomen/bloating
- ❑ Unaffected by rest
- ❑ Low grade fever
- ❑ Nausea or vomiting
- ❑ Change in appetite
- ❑ Bowel/bladder changes

# Screening for aneurysm/dissection



Abdominal aorta pulse site palpation

## Clinical features:

- ❑ Severe back pain, abdomen, and legs
- ❑ Pain spreads into the pelvis
- ❑ Pulsatile sensation in the abdomen
- ❑ Aggravated when lying supine
- ❑ Low BP
- ❑ Nausea

# Subjective History, Review of Systems, and Scanning

- ❑ Nervous system functioning is fine
- ❑ Structural integrity is fine
- ❑ Other body systems functioning fine



# Low Back Pain Examination: Loading Tolerance

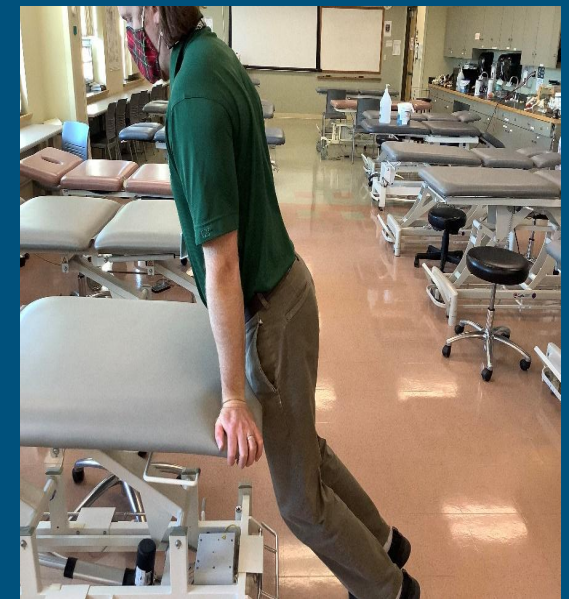
Physical exam	Types of measurement	Clinical decision-making
Mechanical loading	Dichotomous: reproduces concordant sign/symptom or provides alleviation	Identify nociceptive trigger Guide the examination Guide exercise prescription



► Flexion Compression



► Extension Compression



► Unloading

# Low Back Pain Examination (2012)

Physical exam	Types of measurement	Clinical decision-making
Lumbar AROM	Inclinometer	Reliable method using continuous data
	Modified-modified Schober method	Screening tool for ankylosing spondylitis
Segmental mobility assessment <input type="checkbox"/> provocation/alleviation <input type="checkbox"/> mobility	Posterior-to-anterior spring test  Posterior-to-anterior translation (ventral glides)	Reproducing the concordant symptom or sign  Evaluate for alleviation (modulation)  Moderate reliability with use of a dichotomous measure <input type="checkbox"/> Normal <input type="checkbox"/> Hypomobile ( <i>TJM CPR</i> ) <input type="checkbox"/> Hypermobile*

# Low Back Pain Examination (2012)

Physical exam	Types of measurement	Clinical decision-making
Judgments of centralization during movement testing	<p>Active and passive testing</p> <p>Flexion Extension</p> <p>Lateral shift Overpressure</p>	<p>Peripheralization of symptoms vs. centralization of symptoms</p> <p>Directional preference</p> <p>Directional and loading intolerances</p>
Judgments of the presence of aberrant movement	<p>AROM in the sagittal plane</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> painful arc</li> <li><input type="checkbox"/> Instability catch</li> <li><input type="checkbox"/> Gower's sign</li> <li><input type="checkbox"/> Juttering</li> <li><input type="checkbox"/> Reversal of the lumbopelvic rhythm</li> </ul>	<p>Active motion control problem secondary to altered muscle activation patterns</p> <p>(+) sign is the presence of at least one of the five aberrant movements</p>

## Examples of AROM assessments



AROM in the  
cardinal planes



Combined AROM  
(quadrant testing)

## Examples of passive IV segmental motion assessments



Rotational PIVM



PAIVM

# Low Back Pain Examination (2012)

Physical exam	Types of measurement	Clinical decision-making
<p>Spondylolisthesis</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Passive lumbar extension + traction</li> <li><input type="checkbox"/> Anterior shear test</li> <li><input type="checkbox"/> Lumbar torsion test</li> </ul>	<p>Dichotomous tests (positive or negative)</p>	<p>Identification of structural lumbar instabilities secondary to stress fractures of the neural arch or deterioration of the intervertebral motion segment.</p> <p>Presence of a palpable step helpful for identifying a spondylolisthesis</p>
<p>Prone instability test</p>	<p>Dichotomous test with two phases (positive or negative).</p> <p>Reliable measure between raters.</p>	<p>Not a standalone test.</p> <p>May be useful with other measures in predicting treatment success with a motor control training program - in particular, patients with clinical signs of functional/clinical instability of the lumbar spine.</p>

## Identification of a IV step and segmental stress (end-feel) testing



Step deformity



Lumbar anterior shear test

# Low Back Pain Examination (2012)

Physical exam	Types of measurement	Clinical decision-making
<p>Hip mobility</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> ER - IR</li> <li><input type="checkbox"/> Flexion</li> <li><input type="checkbox"/> Extension</li> </ul>	<p>Continuous when using a goniometer</p>	<p>Screen out the hip as a potential source of heightened nociception</p> <p>Restricted mobility</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Capsular pattern</li> <li><input type="checkbox"/> Non-capsular pattern</li> <li><input type="checkbox"/> Obligatory movement</li> </ul> <p>&gt; 35 degrees (<i>TJM CPR</i>)</p>
<p>Screening the sacroiliac joints</p>	<p>Continuous and dichotomous (positive or negative/ painful or painless)</p>	<p>Screen out the sacroiliac joint as part of the clinical exam</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Testing clusters</li> <li><input type="checkbox"/> Help rule out pelvic fx</li> <li><input type="checkbox"/> Active inflammation secondary to spondyloarthropathy</li> </ul>

# Low Back Pain Examination (2012)

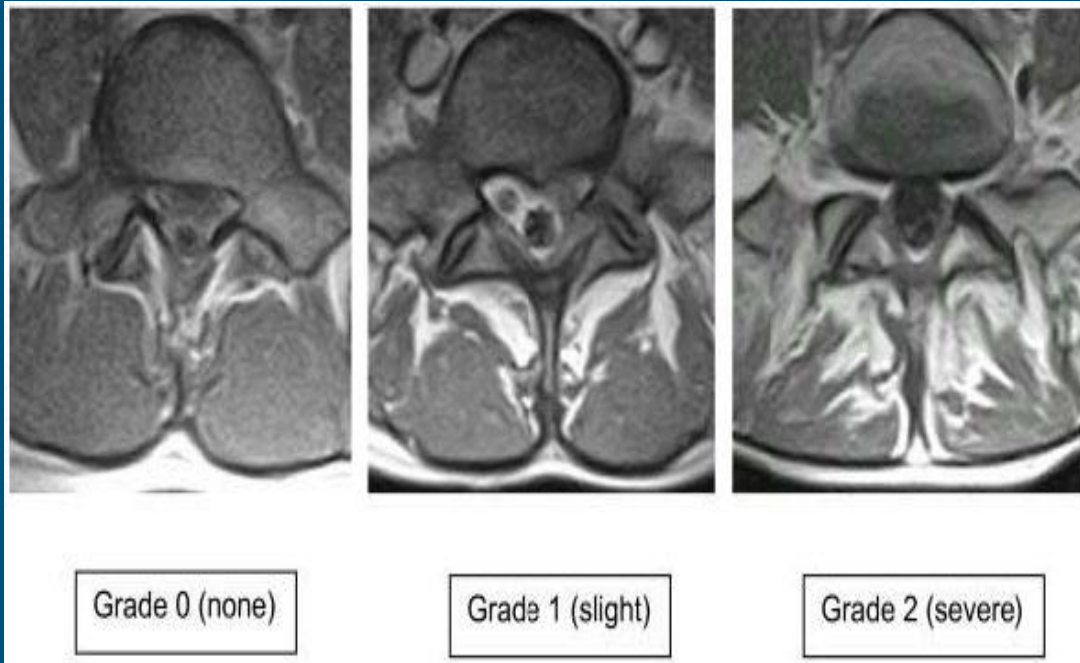
Physical exam	Types of measurement	Clinical decision-making
<p>Neural dynamics (SLR test)</p> <p>Neural dynamics (Slump test)</p>	Categorical/dichotomous (positive or negative)	<p>Better at ruling out lumbar radicular pain with a negative test finding.</p> <p>Concordant sign below the knee (+ test) increases the specificity significantly.</p> <p>Considerations:</p> <ul style="list-style-type: none"> <li>❑ cross-SLR sign</li> <li>❑ conflicting results between the SLR and slump test</li> </ul>
Neurological function	<p>Categorical</p> <p>DTR (absent, hypo, normal, hyperactive)</p> <p>Dermatomes (absent, diminished, present)</p> <p>Myotomes (weak/fatigable, strong)</p>	<p>Accuracy of the segmental level involved can be difficult to determine</p> <p>Useful for identifying acute, compressive nerve root lesions causing radiculopathy</p>

# Low Back Pain Examination (not included 2012)

Physical exam	Types of measurement	Clinical decision-making
Laterality	Percentage score for visual discrimination between right and left sides of the body	More studies with higher quality needed. 80% accuracy rate with speed of identification ranging from 1.1 - 2.1 sec
2-point discrimination	Continuous with a comparison to normative values	Back: average 55.5 mm with a SD of 12.7 mm. >68.2 mm considered atypical. More studies are needed.
Localization	Percentage score for tactile sensation acuity	Expert opinion to consider its use for identifying plastic changes in those with clinical features of a nociplastic pain mechanism.

# Low Back Pain Examination

Physical exam	Types of measurement	Clinical decision-making
Motion control testing ❑ Multifidus lift test	Dichotomous	Movement control phase of rehabilitation
Endurance testing ❑ Endurance ratios (McGill et al)	Continuous	Functional optimization phase of rehabilitation  Appears to be conflicting evidence with correlations between improvement in trunk endurance times and self-reported pain scales and functional outcome measures.  Values have been described in the literature for adolescent and adult populations



Correlations between fatty infiltration and motor control deficits still undetermined.

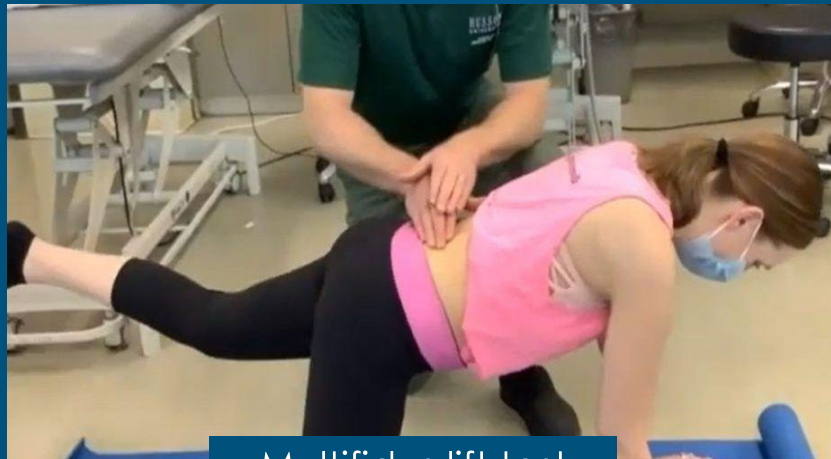
Hildebrandt M, et al 2017;  
<https://dx.doi.org/10.1186%2Fs12891-016-1376->

Hodges and Tucker theory of motor adaptation to pain. Pain leads to:

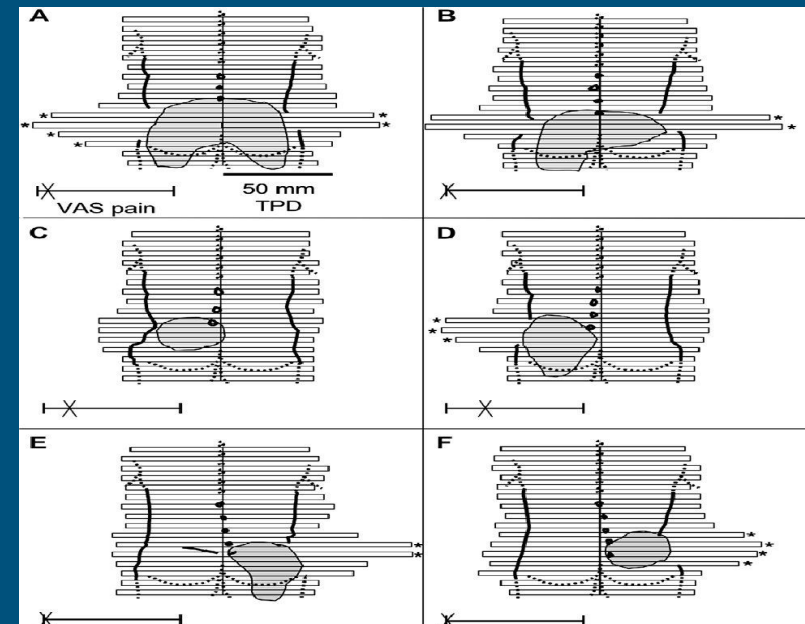
1. *Redistribution of activity between muscles*
2. *Adaptations changing the mechanical behavior of muscles*
3. *Motor plans develop to protect from the perceived threat*
4. *Over time, changes occur to the motor system*
5. *For the CNS, the end justifies the means but it's useful in the short-term and has consequences in the long-term.*

[Hodges PW, Tucker K. Moving differently in pain: a new theory to explain the adaptation to pain. Pain. 2011 Mar;152\(3 Suppl\):S90-S98. doi: 10.1016/j.pain.2010.10.020. Epub 2010 Nov 18. PMID: 21087823.](#)

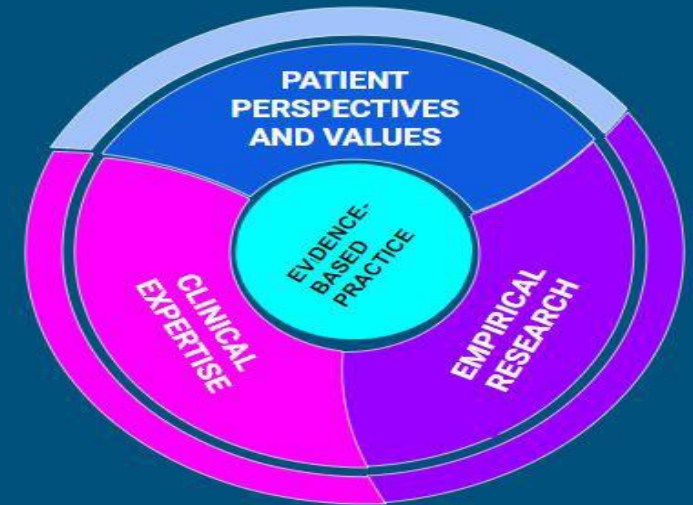
# Motor/Motion Control Testing



Multifidus lift test



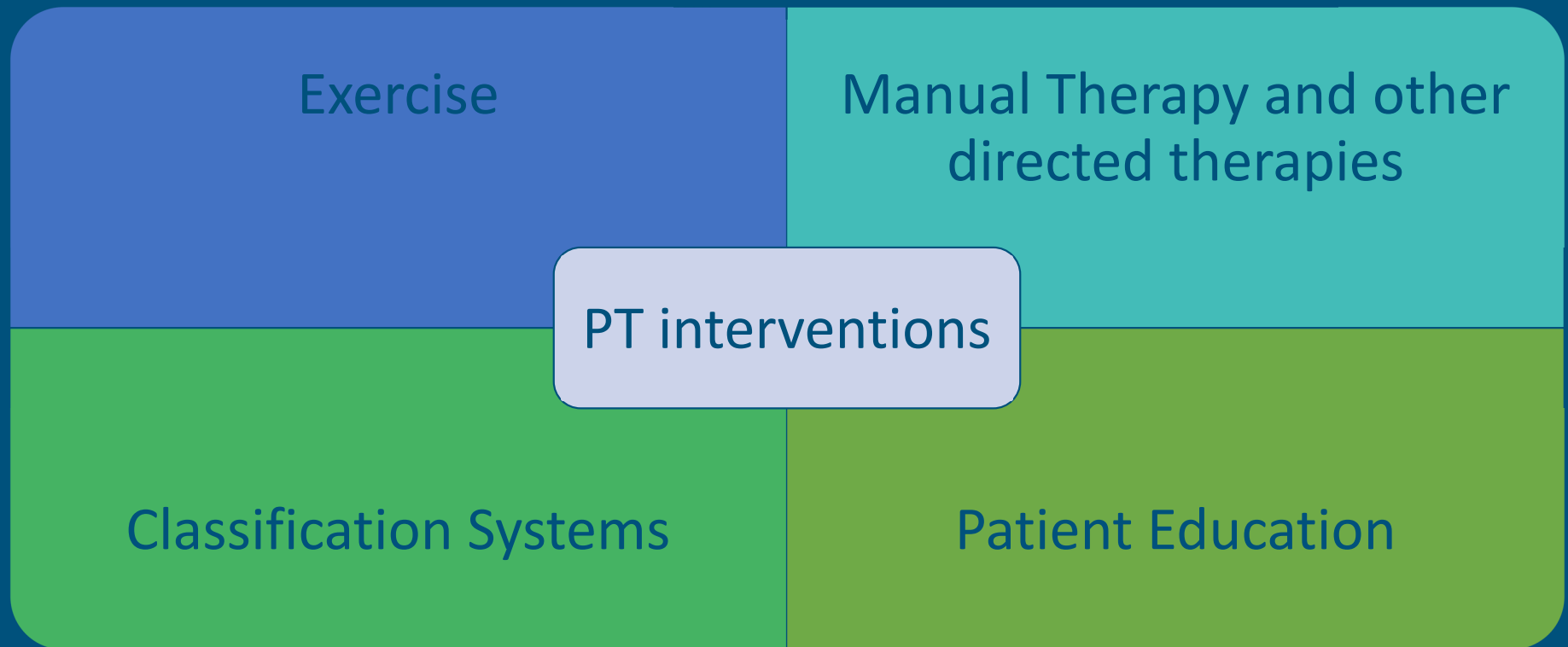
## General algorithm



Create a profile of the patient that guides the clinical decision-making process for patient/client management

# Revised 2021 CPG for Low Back Pain

## PT Interventions



# Treatment-based classification

## Avenue 3 (Rehabilitation)

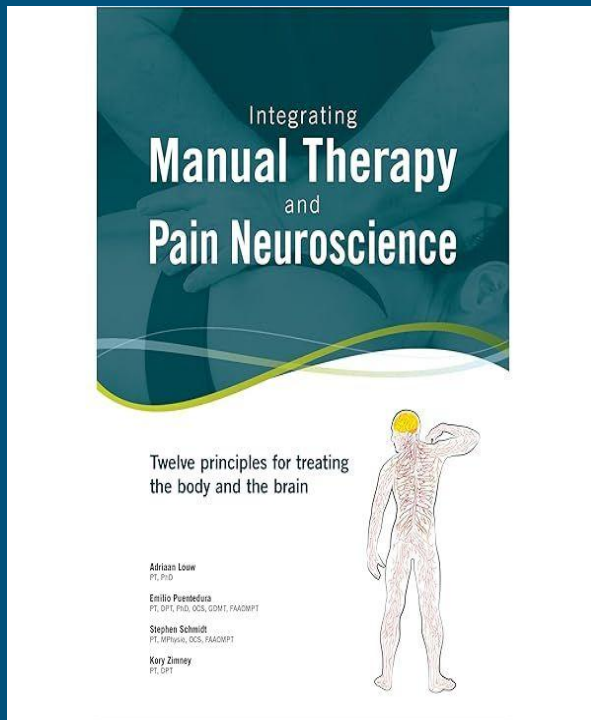
Moderate-to-higher risk for developing cLBP

- ❑ Movement-based classification systems:
  - ❑ Modulation
  - ❑ Movement control
  - ❑ Functional optimization

Modulation	Movement control	Functional optimization
Report of high pain, higher symptom provocation, and higher levels of perceived disability	Symptoms and pain moderate-to-low  Perceived disability moderate-to-low  Symptoms stable	Low perceived disability  Pain low-to-none  Symptoms controlled
Directional preference exercises  Manual therapies and other directed therapies  Active rest	Exercise <ul style="list-style-type: none"> <li>❑ motor control</li> <li>❑ trunk strength/endurance</li> </ul>	Strength training Aerobic training Higher level fitness training  Return-to-work or return-to-sport rehab

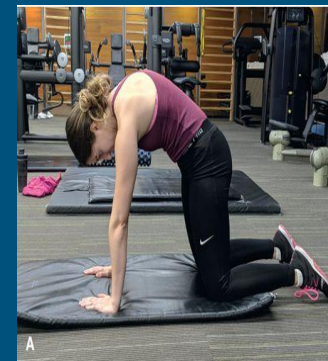
[Riley SP, Swanson BT, Dyer E. Are movement-based classification systems more effective than therapeutic exercise or guideline based care in improving outcomes for patients with chronic low back pain? A systematic review. J Man Manip Ther. 2019 Feb;27\(1\):5-14. doi: 10.1080/10669817.2018.1532693. Epub 2018 Oct 17. PMID: 30692838; PMCID: PMC6338264.](#)

# Patient Education



2021 update: **A**

*For patients with chronic LBP, physical therapist should deliver Pain Neuroscience Education (PNE), in combination to exercise, active treatments, and/or manual therapy.*



O'Sullivan PB, Caneiro JP, O'Sullivan K, Lin I, Bunzli S, Wernli K, O'Keefe M. Back to basics: 10 facts every person should know about back pain. Br J Sports Med. 2020

# Graded Exposures

Type of exercise intervention	Definition	Recommendations
Graded activity and graded exposure	Operant conditioning used to encourage activity. Working through identifiable, fearful activities starting from the least and progressing towards the greatest over time.	Consider the use of lateralization, graded motor imagery, and progression towards confronting fearful or avoided movements.  Combined with manual therapy and exercise versus being a standalone.

Therapist-Patient Alliance in the reconceptualization of pain

# Sensorimotor Training: Recognizing, Imagining, and Identifying Movements



Mind to Hands

# Manual Therapy and Other Directed Therapies:

## 2021 Low Back CPG Evidence Map



- A. Manual and other directed therapies appear to have a short half-life. The evidence shows beneficial effect in the short-term (3-weeks to 2-months).
- B. When paired with exercise interventions, TJM or non-TJM can produce a significant change in pain and disability in patients with chronic LBP.
- C. Dry needling can be considered as part of a multimodal approach.
- D. The use of spinal traction is not supported by the recent evidence.

# Clinical Reasoning Models for TJM of the Spine

Clinical Prediction Rule for success with TJM in cases of acute LBP

## Patient-Therapist factors:

1. Take a complete history and rule out serious pathology
2. Perform the appropriate scanning procedures to rule out structural and neurological compromise
3. Biomechanical examination to rule out instability
4. Identify whether any of the items from the CPR are present
5. Explain your assessment and proposed treatment to the patient/client. Ask the patient about their preferences, including past experiences with manipulative therapy.

Clinical Findings	Components of the subjective history and objective exam to consider
Symptom duration < 16 days	Acute LBP
No symptoms distal to the knee	Unilateral LBP with referred pain into the leg (SOMATIC)
FABQ work subscale score < 19	No significant fear avoidance behaviors Yellow flags impacting potential for chronicity appears to be a low risk
Hip internal rotation > 35%	Unlikely hip joint pathology is present or the issue driving the acute LBP
Hypomobility in lumbar spine	PA test shows segmental stiffness  (osteokinematic and accessory motion restriction present)

## Exercise (From 2021 CPG)

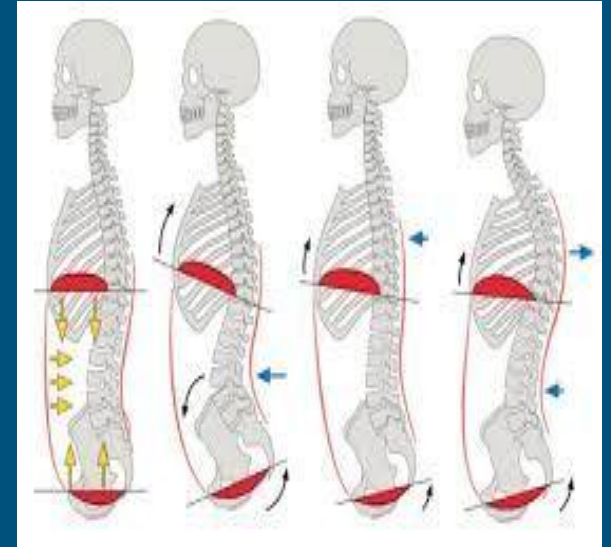
### Key points:

1. The type of exercise may not matter so much as we think. It is not possible to recommend any one type of exercise. Many exercise training interventions have the potential to reduce pain and disability across different ICF classifications.
2. Patients with acute or chronic LBP with leg pain benefit from either motor control or trunk muscle strength/endurance exercise training.
3. The evidence is not clear about dosage parameters for patients with acute or chronic LBP.
4. At a minimum, prescribe a walking program starting at 150-minutes per week.
5. Can recommend progressive exercise training to older adults with chronic LBP.
6. Published studies reported no adverse events with exercise training across the different ICF classifications.

Type of exercise intervention	Definition	Recommendations
<b>Motor control</b>  (2021 CPG movement control exercises and specific trunk muscle activation exercises)	Exercise training to address altered muscle activation and recruitment patterns which cause aberrant stress on the spine. Exercises are designed to regain control of functional movements and tasks.	<p><b>A = strong evidence for cases of chronic LBP with movement control impairment</b></p> <p><b>B = moderate evidence for cases of acute LBP with leg pain or radiating pain</b></p> <p><b>B = moderate evidence for patients with chronic LBP and chronic LBP with leg pain.</b></p> <p><b>C = weak evidence for patients with acute LBP</b></p>
<b>Trunk muscle strengthening/ endurance</b>	Exercise training focused on increasing the spinal musculature ability to stabilize the spine. Exercise training aimed to improve strength, endurance, or power. Examples include the McGill big three.	<p><b>A = strong evidence for its use for patient with chronic LBP, when combined with a multimodal approach.</b></p>
<b>Walking and general exercise</b>	An aerobic exercise consisting of walking or aquatic-based exercises, along with generalized strength/endurance exercises which include progressive resistance training.	<p><b>A = strong evidence for patients with chronic LBP. Evidence supports 150-minutes per week.</b></p> <p><b>A = strong evidence for older adult patients with chronic LBP.</b></p> <p><b>C = weak evidence for patients following low back surgery</b></p>

# Motor Control

- ❑ Neutralizing the pelvis
- ❑ Relaxing tension in axial musculature
- ❑ Diaphragmatic breathing (emphasizing eccentric/full exhalation)
- ❑ Pelvic diaphragm
- ❑ Activation of the TrA/IO

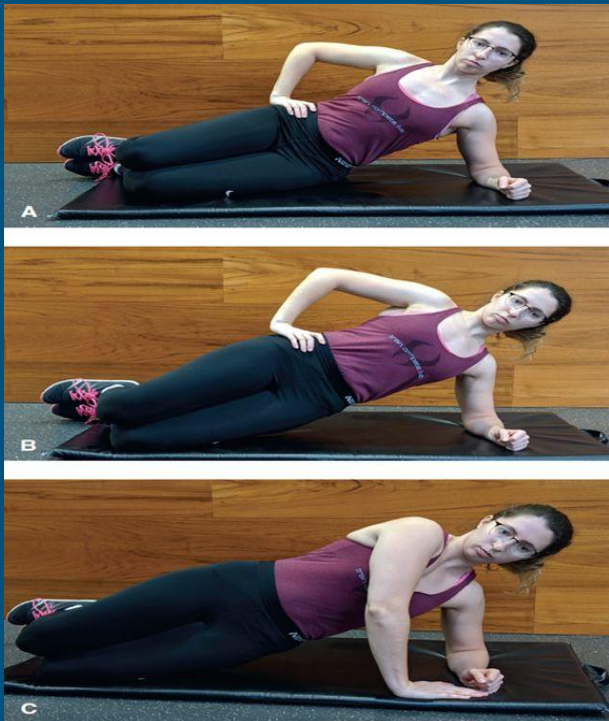


# Exercise Prescription: Trunk Muscle Strengthening

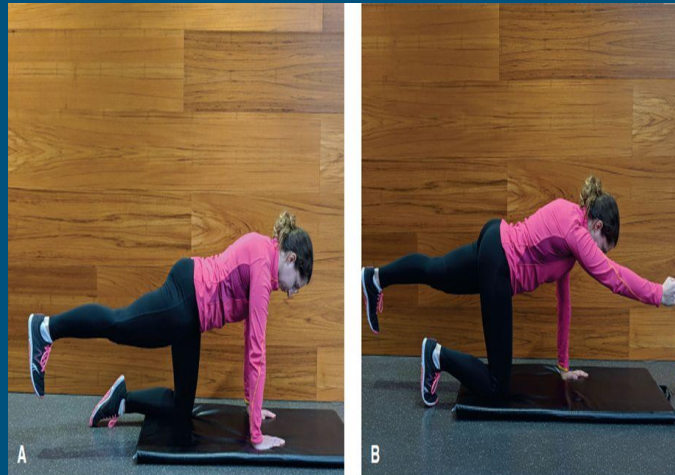
- Demanding ADL's involve compressive loads upwards of 6,000 N
- Elevated risk for injury with heavy lifting (based on NIOSH) is 6,400 N
- Elevated risk for injury with repetitive cycles of loading (based on NIOSH) is >3,300 N
- Safe limit is approximately 3,000 N or less (1,348 pound-force)

Low-Risk Exercises	High-Risk Exercises
Cat-Camel (<2,000 N) Quadruped single leg raise (2,000-2,300 N) Quadruped alternating arm-leg raises (3,000 N) Side bridge on knees (<2,000 N) Side bridge on ankles (2,600 N) Partial curl-up (2,000 N) (lumbar spine remains in neutral lordosis)  Straight leg raise (2,500 N) and bent knee raise (<2,000 N)	Sit-ups bent knee (3,350 N) Sit-ups straight knee (3,500 N) Curl-up on ball (4,000 N) Prone superman (4,300 N)

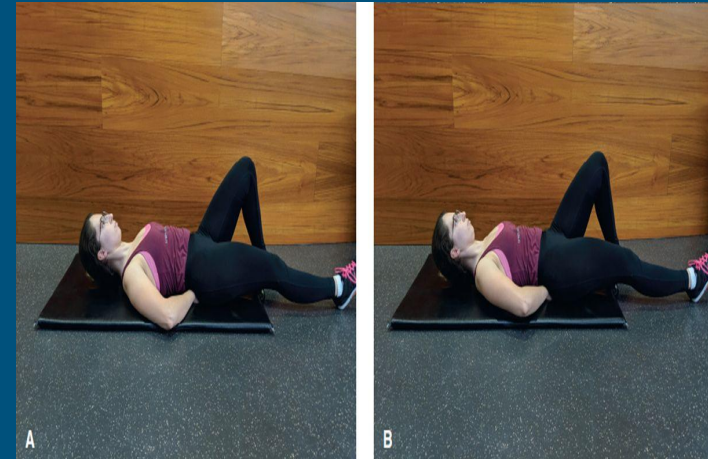
# McGill Big Three



Side plank



Bird dog



Partial curl-up

# Trunk Muscle Endurance and Ratios

Task	Mean	SD	Ratio	Mean	SD	Ratio
Extension	161	61	1.0	185	60	1.0
Flexion	136	66	0.84	134	81	0.72
RSD	95	32	0.59	75	32	0.40
LSB	99	37	0.61	78	32	0.42
Flex/Ext ratio	0.84			0.72		
RSB/LSB ratio	0.96			0.96		
RSB/Ext	0.58			0.40		
LSB/Ext	0.61			0.42		

From McGill, S. Low Back Disorders, 2<sup>nd</sup> edition 2007. Chapter 11 pp 211.  
Mean Endurance Times (sec) and Ratios Normalized to the Extensors  
Endurance Test Score in asymptomatic adults (mean age 21 years)

Men  
Women

Task	Mean	SD	Ratio	Mean	SD	Ratio
Extension	103	35	1.0	90	49	1.0
Flexion	66	23	0.64	84	45	0.93
RSD	54	21	0.52	58	23	0.64
LSB	54	22	0.52	65	27	0.72
Flex/Ext ratio*	0.71	0.26		1.15	0.66	
RSB/LSB ratio*	1.05	0.32		0.93	0.22	
RSB/Ext*	0.57	0.29		0.97	1.20	
LSB/Ext*	0.58	0.28		1.03	1.16	

From McGill, S. Low Back Disorders, 2<sup>nd</sup> edition 2007.  
Chapter 11 pp 212.

Workers without Back Troubles  
History of Disabling Back Troubles

# Unbalanced Trunk Endurance Ratios

Right-side bridge/left side-bridge endurance  $>0.05$

Flexion/extension endurance  $>1.0$

Side bridge (either side)/extension endurance  $>0.75$



Readiness for strength training

# References

Please find the list of references for this presentation on the ME APTA website's Ortho-Manual SIG page.