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- Call 866-782-6258 (M-F, 8 AM-8 PM ET)
- Email customerservice@PhysicalTherapy.com

Evaluation and Treatment of Posterior Pelvic Girdle Pain

Jennifer Stone, PT, DPT, OCS, PHC

1

Learning Outcomes

After this course, participants will be able to:

- Describe the anatomy and physiology of the posterior pelvic girdle
- Describe at least 3 special tests that can help to rule in or out sacroiliac dysfunction
- Describe at least 4 methods of treatment for posterior pelvic girdle pain
- Describe at least 3 options for lifestyle ergonomic counseling for patients with posterior pelvic girdle pain

2

Posterior Pelvic Girdle Pain & Dysfunction

3

Etiology

- Prevalence: 8-20% depending on the study
- Risk factors: pregnancy, postpartum, age, arthritis, previous lumbar surgery, trauma, leg length discrepancy, more common in women
- Many do not resolve with time, leading to chronic pain/dysfunction despite lack of structural abnormality

4

Pelvic Girdle Pain During Pregnancy

- The most common MSK issue during pregnancy
- Ligamentous laxity plus core muscles being stretched out=pain
- Physical therapy is the best treatment option for this, bar none
- PT treatment for pregnancy is fairly simple! Can't put into prone positioning, avoid big increases in intra-abdominal pressure, avoid supine or inverted positioning for long periods of time in 3rd trimester

5

Characteristics

- Commonly unilateral, can be bilateral
- Can switch sides
- Typically very point tender
- Often worse in weightbearing
- May be relieved with direct pressure
- May have referral of pain down the leg but stops superior to the knee

6

Differential Diagnosis

- Sacroiliac tuberculosis (infection)-usually diffuse pain worse in weightbearing
- Spondyloarthropathy
- Crystal and pyogenic arthropathy
- Lumbar dysfunction referring to SIJ region
- Pubic symphysis dysfunction
- Arthritis
- Muscle imbalance/motor control deficit
- Stress fracture

7

Posterior Pelvic Girdle Anatomy & Physiology

8

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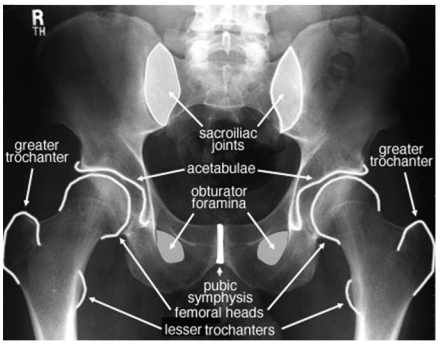
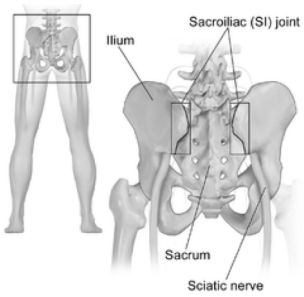
Anatomy





Sacroiliac Joint

Blausen.com staff (2014). "Medical gallery of Blausen Medical 2014". WikiJournal of Medicine 1 (2). DOI:10.15347/wjm/2014.010. ISSN 2002-4436. [CC BY 3.0 (https://creativecommons.org/licenses/by/3.0)], from Wikimedia Commons

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Sacroiliac Joint

- Purpose: translate forces across pelvis for stability
- Diarthrodal joint, more anterior movement than posterior
  - Nutation: Sacrum moves anteriorly & inferiorly, coccyx moves posteriorly
  - Counternutation: Sacrum moves posteriorly & superiorly, coccyx moves anteriorly
  - Rotation (very limited)
- Inherently stable due to shape of the joint (form closure)
- Supported by ligaments and muscles (force closure)

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Sacroiliac Joint

- Approximately 2.5 degrees rotation available in weightbearing, 0.2 degrees in nonweightbearing
- No study of the SIJ has ever identified intra-articular joint displacement
- Clinical observations of pelvic girdle positioning likely due to changes in muscle activity and positioning vs joint positioning (directional strain, not joint position changes)
- Pelvic girdle pain can result from muscle over activity as well as insufficiency

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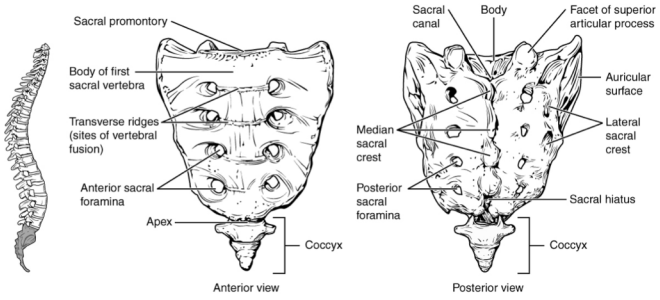
Sacrococcygeal joint

- Fibro cartilaginous joint
- Movement at this joint is noted with defecation, BREATHING, child birth and positional changes



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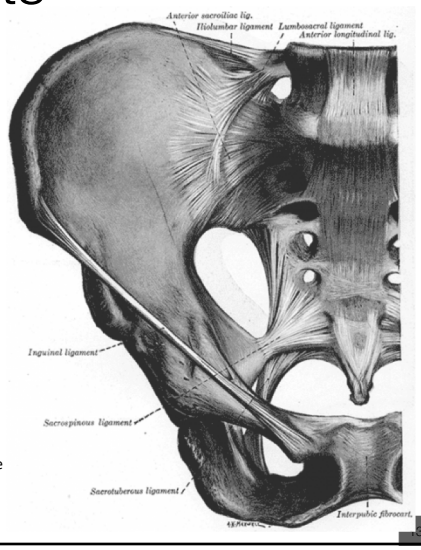
Anterior Ligaments

- Anterior sacroiliac
  - Thin, can be source of pain
- Sacrotuberous
  - Counteracts posterior/superior migration of sacrum during weightbearing (nutation)
- Sacrospinous
  - Assists sacrotuberous ligament
- Anterior longitudinal
- Anterior sacroccogyeal
- Lateral sacrococcygeal



Henry Vandyke Carter [Public domain]

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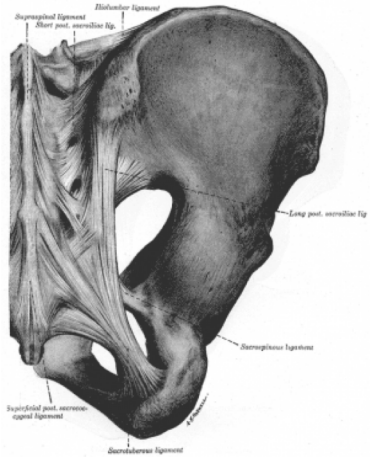
Posterior Ligaments

- Posterior sacroiliac
  - Opposes counternutation, can be pain source (palpate at PSIS)
  - Short & long branches
- Interosseous sacroiliac
  - Deep to posterior sacroiliac, major connection between sacrum and inominate
- Supraspinal ligament
- Superficial posterior sacrococcygeal



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Muscles

- No muscles attach directly to sacroiliac joint, but 37 muscles attach along sacrum and inominates, providing stability and load transfer when working correctly rather than movement
- Muscle BALANCE is equally important to muscle STRENGTH when considering impact on pelvic girdle

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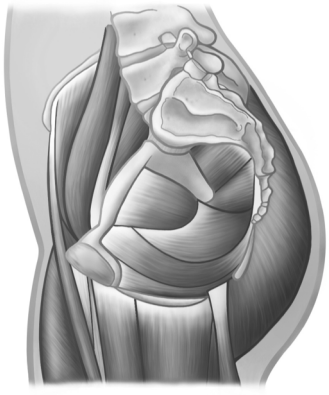
Muscles



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Sacroiliac Dysfunction Evaluation

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Subjective

- Mechanism of injury, aggravating and easing factors, pain behavior, functional limitations
- Red flags-stress fracture, cancer, infection
- Yellow flags-pain behaviors, psychosocial factors

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Objective

- Gait analysis
- Palpation-over SIJ, over PSIS, over ligaments (especially posterior sacroiliac)
- Lumbar screening
- Hip screening
- Pain reproduction screening with springing over inominates, sacrum, SIJ

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Objective-Special Tests

- There is a lack of quality evidence to support any individual tests to rule in or out sacroiliac joint dysfunction
- Many studies attempting to do so are poorly designed and have not successfully been reproduced
- Sensitivity and specificity reports vary significantly when compared to the gold standard (diagnostic nerve block)
- Current best evidence supports use of test item clusters

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Diagnostic Value of Individual SIJ Tests

	Distraction	Compression	Thigh Thrust	Gaenslen's (R)	Gaenslen's (L)	Sacral Thrust
Sensitivity	0.60	0.69	0.88	0.53	0.50	0.63
Specificity	0.81	0.69	0.69	0.71	0.77	0.75
+ LR	3.20	2.20	2.80	1.84	2.21	2.50
- LR	0.49	0.46	0.18	0.66	0.65	0.50

Note: diagnostic validity of long sitting (leg length) test is incredibly poor

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Laslett Test Item Cluster (2008)

- If 2/4 are present SIJ is likely diagnosis: compression, distraction, thigh thrust, sacral thrust (Gaenslen used to be included but was removed)

	Values (95% CI)
Sensitivity	0.88 (0.64, 0.97)
Specificity	0.78 (0.61, 0.89)
+ LR	4.00 (2.13, 8.08)
- LR	0.16 (0.04, 0.47)

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Tunosu et al, 2018

- Presence of 4 of these indicates SIJ pain (STL=sacrotuberous ligament)

Details of each item of the sacroiliac joint score

Items	Total, N=154	SIJP group, n=31	Non-SIJP group, n=123	*P*-value
One-finger test	65 (42.2)	24 (77.4)	41 (33.3)	<0.0001*
Groin pain	39 (25.3)	12 (38.7)	27 (22.0)	0.0662
Pain while sitting on a chair	67 (43.5)	20 (64.5)	47 (38.2)	0.0141*
SIJ shear test	37 (24.0)	19 (61.3)	18 (14.6)	<0.0001*
Tenderness of the PSIS	70 (45.5)	24 (77.4)	46 (37.4)	<0.0001*
Tenderness of the STL	20 (13.0)	6 (19.4)	14 (11.4)	0.2412

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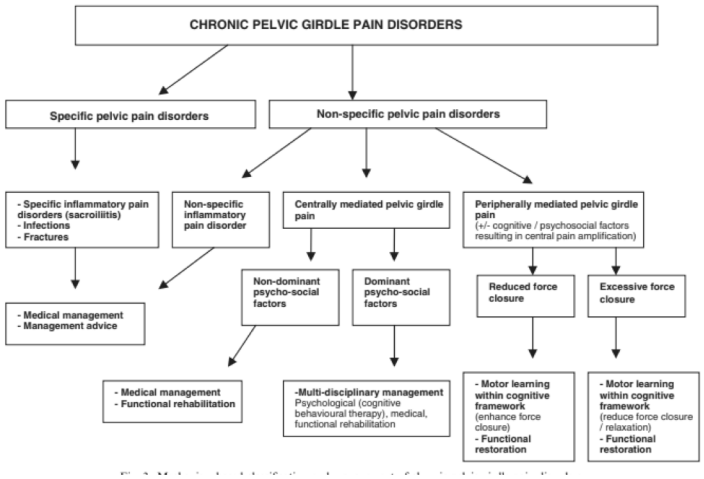
O'Sullivan, 2007, Clinical Prediction Rule



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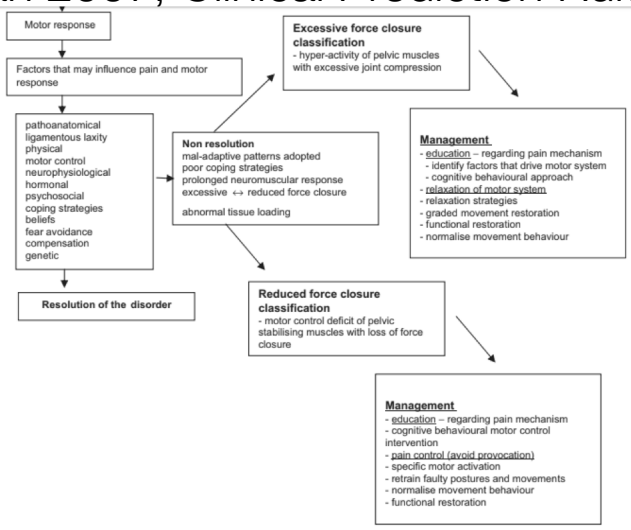
O'Sullivan 2007, Clinical Prediction Rule



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SIJ Distraction (Gapping) Test

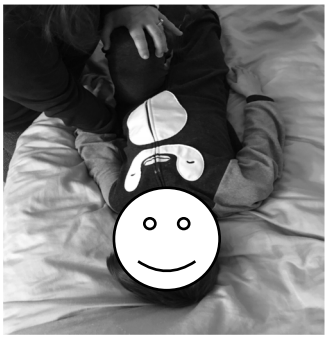
- Practitioner applies posteriorly directed force at PSIS, presumably distracting anterior portion of SIJ
- Positive test=pain provocation
- Iffy reliability alone
- Can reverse motion to gap posteriorly

Image Credit: Laslett, 2008

26

Thigh Thrust/P4/Posterior Pelvic Pain Provocation

- Patient in supine, hip flexed to 90 degrees
- Practitioner places 1 hand behind SIJ and uses the other hand to apply pressure directly down through knee/femur



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Gaenslen's Test

- Patient is supine on table with involved leg off table, uninvolved side flexed up toward chest
- Practitioner holds involved side down, presses uninvolved side toward chest
- Positive test=pain provocation

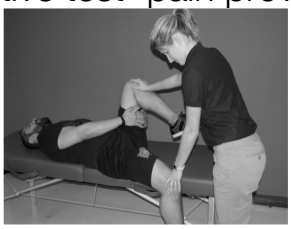

Image Credit:http://lumbar-spine-special-test.blogspot.com/2013/01/gaenslens-test.html

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Sacral Thrust Test

- Patient in prone, practitioner presses anteriorly on sacrum to apply anterior shearing force to sacrum bilaterally
- Positive=pain provocation

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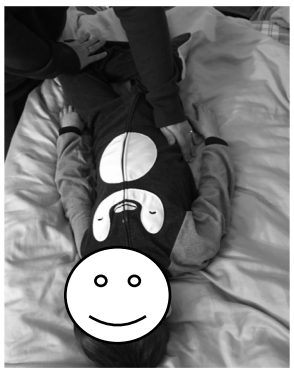
FABER/Patrick's Test



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ASLR

- Patient in supine, legs extended
- Patient lifts leg straight up one at a time 6-12 inches
- Ask if one feels heavier/harder to lift than the other,
- If yes, patient repeats while therapist applies pressure:
  - ASIS toward one another (replicates anterior force closure)
  - PSIS toward one another (increases force closure posteriorly of the SIJ)
  - Oblique (one anterior / one posterior)
- Does it feel lighter/easier compared to previously? (Replicates force closure)

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Stork Test

- Assesses ability to load transfer across pelvis
- Therapist's hands on PSIS, can wrap around to palpate muscles
- Pelvic drop
- Ability to SLS
- Assymmetry?
- Same bilaterally

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SIJ Pain Treatment

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Biopsychosocial Model

- 3 legs of evidence based practice
- We need to consider chronic pain impact on whole person
- Pain education, mindfulness, LANGUAGE
- Address tissue dysfunction with manual therapy
- Neuromotor control retraining

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Bio

Removing barriers to movement

35

Manual Therapy

- Manipulation
- Muscle Energy Techniques
- Mobilization
- Soft tissue work-muscle and ligament release

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CONTINUED

Manipulation

- "Reset" pelvis and pelvic floor
- Patient in supine, bend into a "C" shape, then rotate (don't lose the sidebend!), take out the slack, and manipulate

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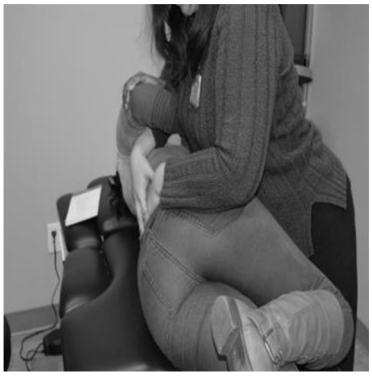
CONTINUED

Manipulation

- Patient in sidelying, bend top knee up to decrease motion in pelvis
- Pull bottom elbow down/up (J Stroke) toward ceiling
- Tummy to tummy, take out slack, can manipulate, mobilize, MET
- This can also be a gentle way to initiate lumbar/pelvic mobility for patients who do not tolerate the lumbopelvic manipulation



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Muscle Energy Technique

- Pelvic shotgun technique
- Patient in hooklying, have them abduct against you 3x8 sec hold, then adduct against fist or forearm, with or without bridge

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CONTINUED

Muscle Energy Technique

- Patient in Thomas/Gaenslen position
- Therapist places patient's foot against therapist's shoulder, holds opposite leg down
- Patient presses (cue hamstrings/press with heels) against therapist for 8-10 second holds, repeat

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Joint Mobilization

- Sidelying sacral distraction
- Patient in sidelying, “fetal position”
- Therapist provides distraction to sacrum

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Joint Mobilization

- Hip long axis distraction
- Patient with 1 knee bent, 1 knee (mobilized side) straight
- Therapist grasps around ankles or calves (or can have knee bent and hold under knee)
- Hip in open pack position (30/30/30 flx/abd/ER
- Can hold or oscillate

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Joint Mobilization

- Hip lateral distraction
- Patient in hooklying (can be reclined)
- Belt around patient's leg and therapist
- Lateral distraction with varying angles

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Joint Mobilization With Movement

- Patient in seated position
- Patient slumps, as he/she sits back up, therapist presses down on sacrum
- Can be straight line or with a rotational force

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Soft Tissue Mobilization

- Over posterior pelvic ligaments/muscles
- Supine or sidelying

45

Soft Tissue Mobilization

- Abdomen
- Abdominal wall and via superior iliac crest
- Over inguinal ligament
- Iliacus/psoas
- Options for mobilization:
  - Skin rolling
  - Circular mobilization
  - Gentle superficial gliding
  - Cross friction (scar tissue)
  - Deeper myofascial work

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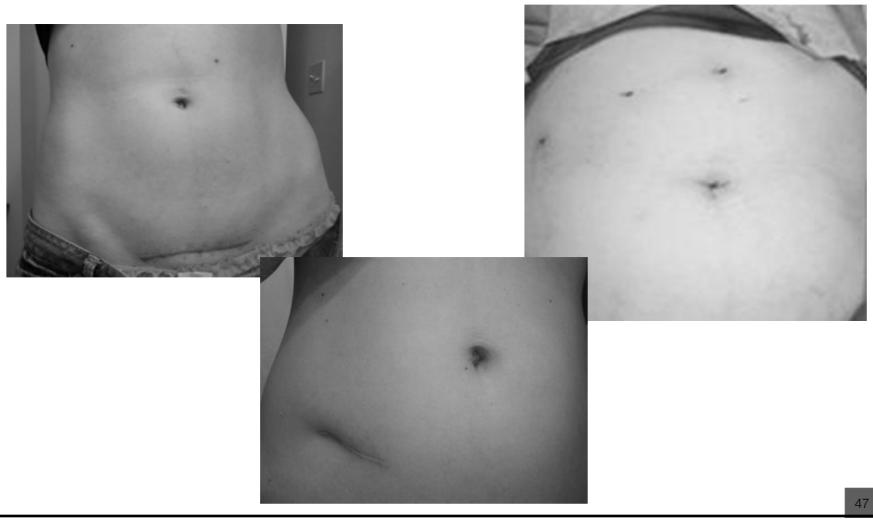
Soft Tissue Mobilization



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Soft Tissue Mobilization

- Pelvic floor, obturator internus
- Sink your fingers just interior to the ischial tuberosities for pelvic floor, angl toward ASIS for obturator internus
- Check for spasm, trigger points, soft tissue mobilization
- Supine and sidelying
- Use of hip rotation with deep pressure
- Contract-relax techniques

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Bio

Restoring motor control

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Neuromotor Retraining

- Purpose: symmetry in distribution of forces, promote ideal load transfer across pelvis especially in weightbearing….aka, restore good motor control
- Muscles involved: entire core-pelvic floor, abdominal muscles, posterior chain, hip rotators, hip flexors, hip adductors, hip abductors
- Works best if you “wipe slate blank” to get rid of guarding and iffy motor patterns first
- May need to build true strength first, may not

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CONTINUED

Motor Control

- How it should work:
  - I want to do something
  - I need to fire all these muscles to make that happen
  - I fire all the muscles and it happens
  - I get the positive feedback loop of success
- Redundancy
  - When we repeatedly do an action or activity, our brain starts to "automate" that (you don't have to think through details of how to turn your car on or brush your teeth

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CONTINUED

Motor Control

- Our brain and body do an amazing job of adjusting for non-ideal movement patterns to allow us to keep moving
- This is GOOD-how awful would it be if we stopped functioning every time our back was a little stiff?
- HOWEVER, if we are guarding an area for a long period of time (pain, surgery, a traumatic incident to the area) the brain can get confused and replace the normal motor pattern with the "protective" motor pattern

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Neuromotor Retraining

- Easiest to start with breathing (create motor pattern, involves all muscles, CNS quieting)
- Ideal pattern: 360 degree rib cage expansion, breath down into pelvis, pelvic floor and diaphragm moving together, "canister muscles" moving together as well

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Neuromotor Retraining

- Breath work
- If you can lay this foundation correctly, it will be extremely helpful through the rest of the process
- Remember that appropriate rib and diaphragm mobility are key to being able to achieve this!
- Retraining/facilitation techniques
  - "Breathe into my hands"
  - Therapist using hands to facilitate diaphragm stretch and/or rib excursion
  - Theraband or towel for feedback

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Neuromotor Retraining

- Add pelvic floor activation with breath out, then add gentle transverse abdominus activation along with that
- Use breath cycle to facilitate load transfer (more muscles are active during exhalation, so teach people to exhale with effort)
  - Example: painful activity=sit to stand
  - Use good form/posture, do a few gentle breath cycles, then do an exhale as you move from sit to stand

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Neuromotor Retraining

- Reminder: overactivity can cause just as much pain as underactivity
- For some people, learning to do less is going to be more helpful than learning how to activate more
- Should we be doing stiffening strategy retraining?
- For more: webinar “Maximizing Core Retraining”

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Psycho

Pain/Therapeutic Neuroscience Education

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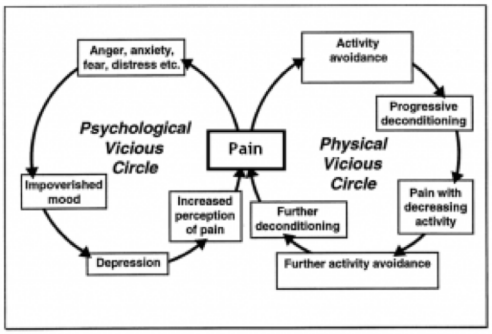
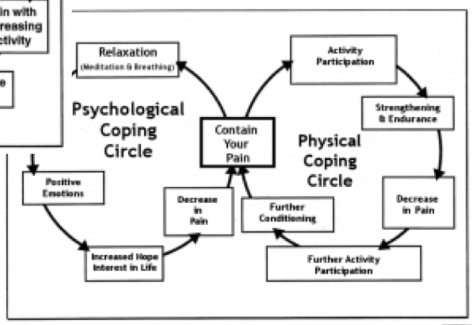
Chronic Pain





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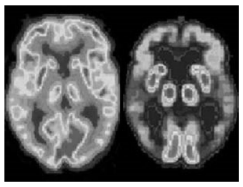
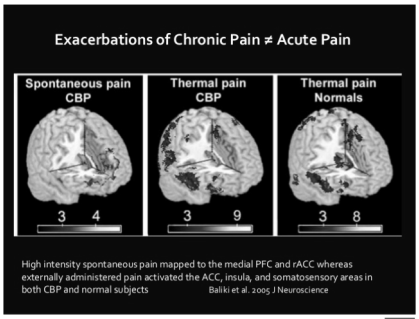
Chronic Pain

- Changes brain structurally, functionally, chemically
- Decrease in gray matter
- Changes in areas of the brain related to reward, aversion, and others
- Change in levels of neurotransmitters
- The good news: it can be rewired!





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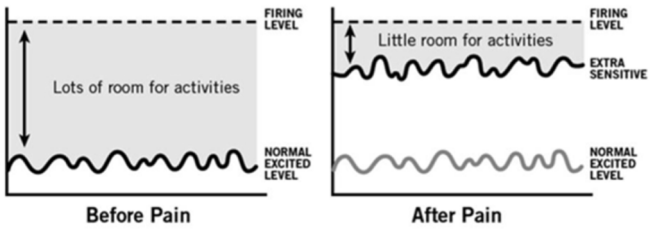
Chronic Pain

- Education is a good starting point
- Stories, word pictures, NON JUDGMENTAL
- For more-Louw, Butler, Yates
- Restoring hope!



Why Do I Hurt?; Louw 2013 OPTP

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Chronic Pain

- Things that may help
  - Aerobic activity/movement of any sort
  - Being outdoors if possible
  - Vitamin B12 helps with nervous system healing/function
  - Decreasing inflammatory substances (sugar, acid) in diet if possible
  - Increasing water intake
  - Gratitude journal
  - Breathing exercises
  - Graded exposure to activity

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Chronic Pain

- Mindfulness
  - A mental state achieved by focusing one's awareness on the present moment, while calmly acknowledging and accepting one's feelings, thoughts, and bodily sensations, used as a therapeutic technique.
  - Goal: eliminate “secondary suffering”
  - By focusing on what is, the person is able to take steps to cope with and potentially change it.

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Mindfulness and Neuroplasticity

Yang, et al: a longitudinal design investigating resting state fMRI both before and after 40 days of meditation training in 13 novices

During meditation:

- Internal consistency in the precuneus and the temporoparietal junction increased, while the internal consistency of frontal brain regions decreased.
- Reduced regional connectivity of the dorsal anterior cingulate cortex with anterior insula

After meditation training:

- Reduced resting state functional connectivity between the pregenual anterior cingulate and dorsal medical prefrontal cortex was observed.
- Significantly reduced depression/anxiety scores were observed after training. Profile of Mood States (POMS) outcome tool used.

Yang, Chuan-Chih, et al. State and Training Effects of Mindfulness Meditation on Brain Networks Reflect Neuronal Mechanisms of Its Antidepressant Effect. Neural Plasticity Vol 2016;1-14.

Mindfulness and Neuroplasticity

"The 40-day mindfulness meditation training resulted not only in amelioration of depression related symptoms but also in changes in whole brain networks towards connectivity states usually found when comparing healthy controls to major depressive disorder (MDD) patients in clinical studies."

Yang, Chuan-Chih, et al. State and Training Effects of Mindfulness Meditation on Brain Networks Reflect Neuronal Mechanisms of Its Antidepressant Effect. Neural Plasticity Vol 2016;1-14.

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Mindfulness and Neuroplasticity

Hence, these findings suggest that mindfulness meditation might be of therapeutic use by inducing plasticity related network changes altering the neuronal basis of affective disorders such as depression.

Yang, Chuan-Chih, et al. State and Training Effects of Mindfulness Meditation on Brain Networks Reflect Neuronal Mechanisms of Its Antidepressant Effect. Neural Plasticity Vol 2016;1-14.

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Mindfulness and Heart Rate Variability

Normal HRV (space between heartbeats): a balance between the sympathetic and parasympathetic nervous system so that we are able to adapt to external stressors.

High HRV: indicates a highly adaptable nervous system

Low HRV: is associated with

- chronic pain
- mood disorders
- higher rate of comorbidities
- reduced physical activity
- cardiovascular disease

Tracy LM, et al. Meta-analytic evidence for decreased heart rate variability in chronic pain implicating parasympathetic nervous system dysregulation. Pain 2016;157(1):7-29.

CONTINUED

Mindfulness and Heart Rate Variability

Breathing

- modulates the heart's rhythms
- impacts HRV
- HRV can be monitored by using a HRV monitor and is changed with diaphragmatic breathing

Timed breathing: 6 breaths a minute (5 seconds inhalation/ 5 seconds exhalation)

Tracy LM, et al. Meta-analytic evidence for decreased heart rate variability in chronic pain implicating parasympathetic nervous system dysregulation. Pain 2016;157(1):7-29.

Mindfulness Exercises

- Consciously doing something that provokes anxiety while consciously working through being aware of feelings and "talking" oneself through them (may help to develop a mantra/script)
- Working through a guided mindfulness exercise/body scan (we will do an example)
- Practicing mindfulness while doing a daily activity (a list of questions may help here)

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Mindfulness Resources

- "Youtube-many examples, you will have to screen for quality!
- Four free 10 minute tracks courtesy of Carolyn McManus, PT www.carolynmcmanus.com
- Free tracks courtesy of UCLA: http://marc.ucla.edu/body.cfm?id=22
- Headspace (app)
- Mindful Myna (app)

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Acute Injury

- If we are lucky enough to "catch" a posterior pelvic girdle pain patient in the acute stage, we can help prevent them from progressing into the chronic stage!
- Use of words that heal, working with people's motor control patterns, breathing, helping alleviate anxiety

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Social

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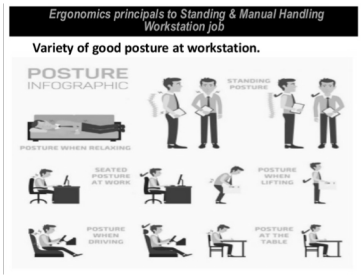
Lifestyle Ergonomics

- Some will be helped by some of the things we already covered under chronic pain
- Remember we are going for BALANCE and SYMMETRY



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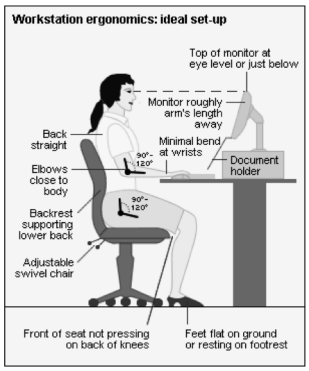
Sitting



- Don't!
- Just kidding, but really, don't sit for prolonged periods of time
- Move frequently, posture while sitting
- Driving: consider what you are doing with both legs!

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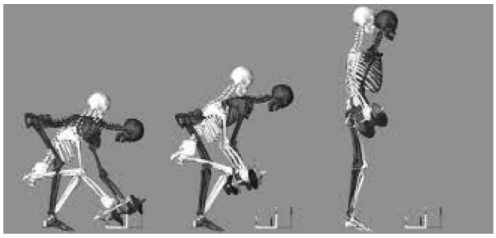
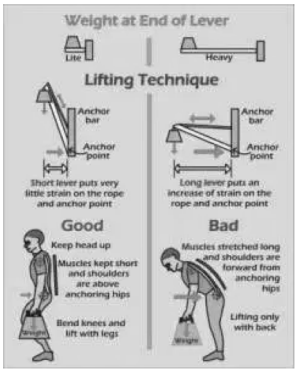
CONTINUED

Lifting

- Lift by squatting and lifting, not bending forward
- Avoid lifting unidirectionally
- Exhale on effort/lift





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Carrying

- Try to keep everything close to your center of gravity

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Activity/Exercise

- Be sure breath patterns stay good (if you have to Valsalva or you feel your form slipping, back off)
- Watch out for side dominance (do you always go up curbs or steps starting with the same side? Over the course of the day this can add up)

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CONTINUED

Bracing

- Not the first resource, but may be helpful temporarily or depending on the situation, permanently for some activities for some people (but NOT for use all the time!

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CONTINUED

Therapeutic Taping

- 4 inch elastic tape (K tape or Rock tape)
- "Tack down" in the middle of sacrum (in line with spinous processes), then 50% stretch to each end, ends should be lateral to SI joints

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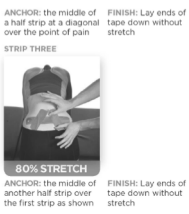
Kinesiotape

Instructions courtesy of Kinesiotape, can be found at: https://www.theratape.com/education-center/kinesiology-taping-instructions/back/si-joint-kt-tape/



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Posterior Pelvic Girdle Pain Conclusions

- Despite its prevalence, this issue is poorly studied and myths abound
- Objective exam is best done as a cluster of test items and in context
- Patients likely will do best with a combination of hands on therapy, neuromotor retraining, and psychosocial adaptations

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Case Study

- 34 year old female, 31 weeks pregnant with second child (1st was 19 years ago). Sudden onset of severe right sided posterior pelvic girdle pain with radiating pain to her foot. I received a call from her referring physician asking if I could work her in as she was in so much pain she is unable to tolerate any position besides supine. She was vomiting every few minutes and with any attempt at movement due to increased pain, though she was very cooperative and tried to assume any position requested.

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Case Study

- Objective: Unable to attempt ASLR, very point tender over L PSIS, immediate radiation of pain with passive straight leg raise. Extreme muscle spasm of all posterior musculature, extremely antalgic gait pattern, unable to attempt provocative testing.
- Patient admitted to hospital for pain control, I visited her there to treat.
- After working on soft tissues, things calmed down enough to actually evaluate.

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Case Study

- Poor fibular head mobility L, history of severe ankle sprain years ago.
- Very hypomobile and extended lumbosacral region.
- Treatment: daily care x 5 days while hospitalized, then 3/week for 1 week, then 2/week for 3 weeks, then 1/week for 4 weeks.
- Treatment: lumbosacral mobilization/manipulation, soft tissue work, fibular head mobilization, ITB mobilization.

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Case Study

- Neuromotor control retraining, gait training
- Outcomes: Pain down to 2/10 at worst just before delivery, only having pain after prolonged sitting/driving. Saw her postpartum, pain returned immediately after delivery, treated 4 times and it resolved.

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Questions?

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