LOW BACK RESILIENCE FOR THE LIFETIME

JESSICA BENTO, MS PT

kinetikos

THANK YOU!

WHO?

-Director of education at DVRT, physical therapist for over 17 years practicing in orthopedics specializing in corrective exercise.

-Presented in over 7 countries on the topic of corrective exercise and low back, shoulder, knee, and orthopedic protocols.

-Consulted with fire and police departments, US border patrol, division one programs, and US marine HIIT program instructors about performance and resilience.

-Worked and consulted with pro golfers, hockey players, and US top olympic weightlifters.

WHY THIS IS IMPORTANT TO ME

“If something doesn't affect your life, it's hard to call it important. And something changing your life means you do something different than you would have done otherwise. In other words, something important changes your motivations — it motivates you.”

-Joshua Spodek

LOW BACK STATS

- LBP is also widespread among the general population in Japan and is the fifth most frequent reason for medical consultation among outpatients.
- In Japan, the estimated economic burden of work-related LBP in 2011 was ¥82.14 billion, consisting of ¥26.48 and ¥55.66 billion for inpatient and outpatient care, respectively.
- Lifetime LBP prevalence was 83 % in Japan.

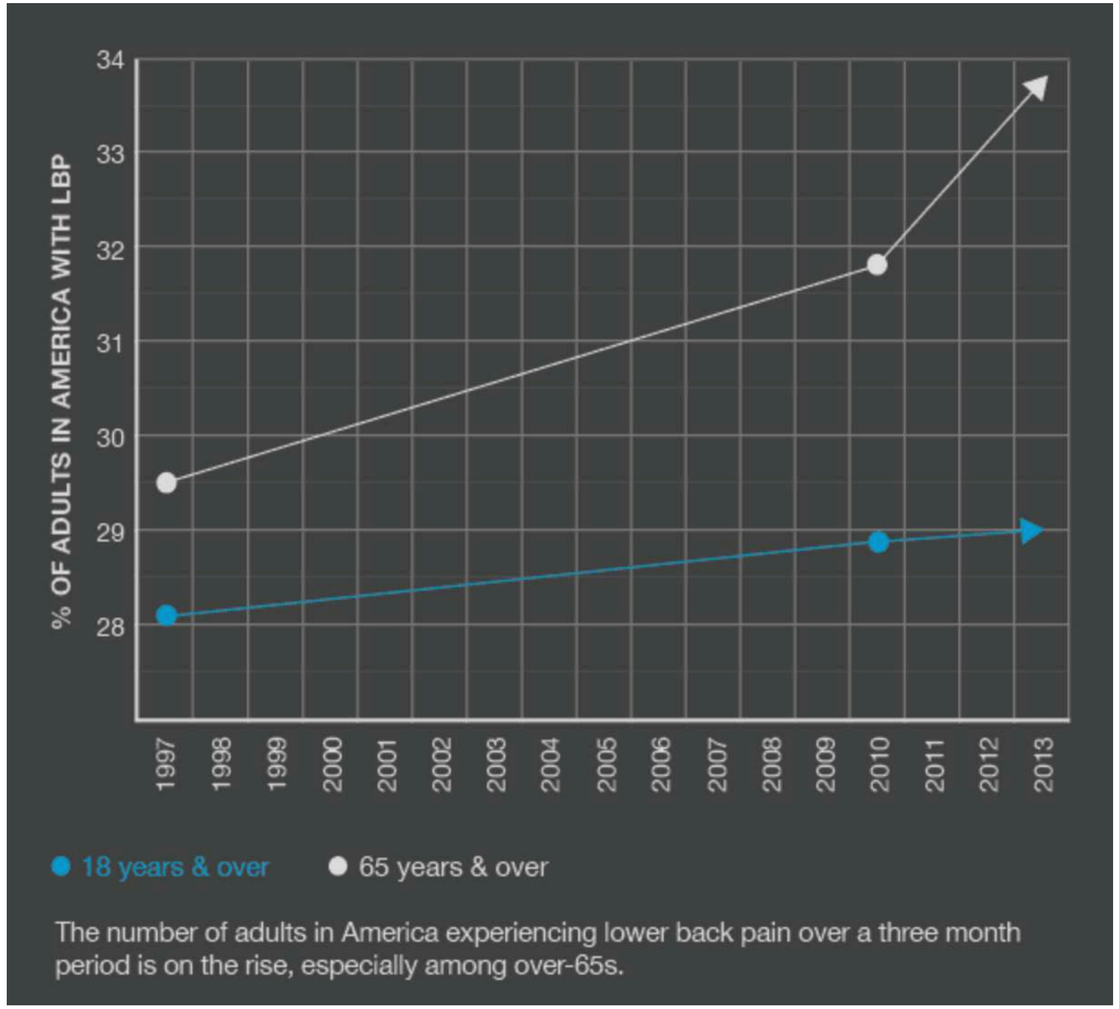
Fujii T, Matsudaira K. Prevalence of low back pain and factors associated with chronic disabling back pain in Japan. Eur Spine J. 2013 Feb;22(2):432-8. doi: 10.1007/s00586-012-2439-0. Epub 2012 Aug 7. PMID: 22868456; PMCID: PMC3555622.

LOW BACK STATS

- **The number of people with low back pain is increasing as the global population increases with age.**
- **Nearly a third of women suffer from LBP, compared to a quarter of men**
- **Only about half of people with chronic low back are prescribed exercise**

Over 20% of pain-related suicides are as a result of back pain ***In this population-based prospective cohort study of Japanese men aged 40e79 years, we found that a greater severity of pain was signif-icantly associated with an increased risk of completed suicide. (95% CI) of completed suicide for the subjects reporting back pain during the year before the baseline was 9.1***

- **Out of the 56 million Americans that have back pain, a mere 5% actually require surgery**

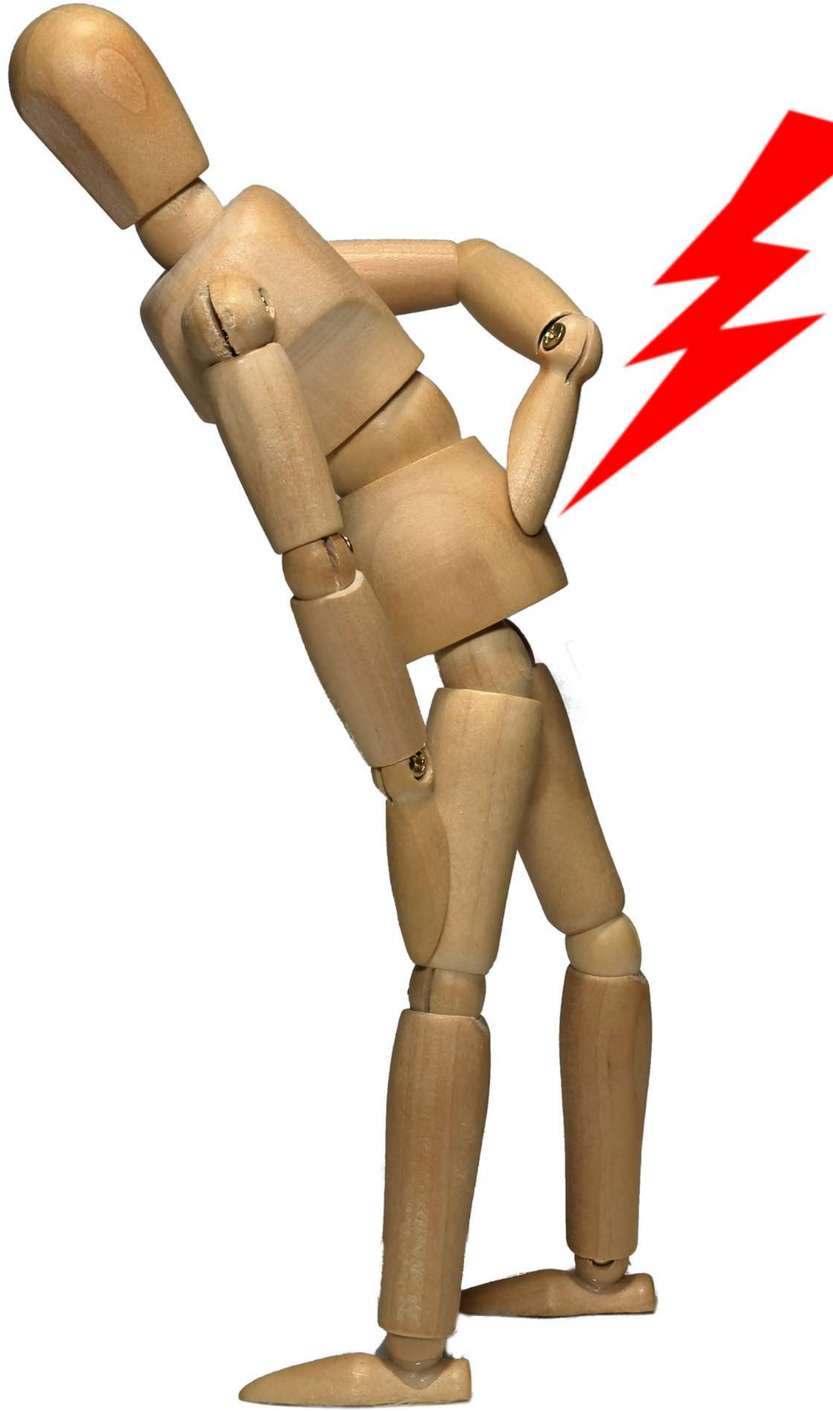


The number of adults in America experiencing lower back pain over a three month period is on the rise, especially among over-65s.

MORE LOW BACK STATS

In one study low back pain was the most common type of pain reported by patients, with 25% adults reporting LBP in the prior 3 months.

Carey TS, Evans AT, Hadler NM et al. Acute Severe Low Back Pain. A Population-Based Study of Prevalence and Care-Seeking. Spine (Phila Pa 1976). 1996 Feb 1;21(3):339-44.



EVEN MORE LOW BACK STATS

Painkillers are the number one go to technique to relieve back pain.

Statista (2017). *Percentage of adults in the U.S. who used select techniques to relieve back pain as of February 2017* [Online]. Available from: https://www.statista.com/statistics/680723/ways-to-relieve-back-pain-adults-us/ [Accessed 23 December 2021]

STATS

A LOT OF THEM

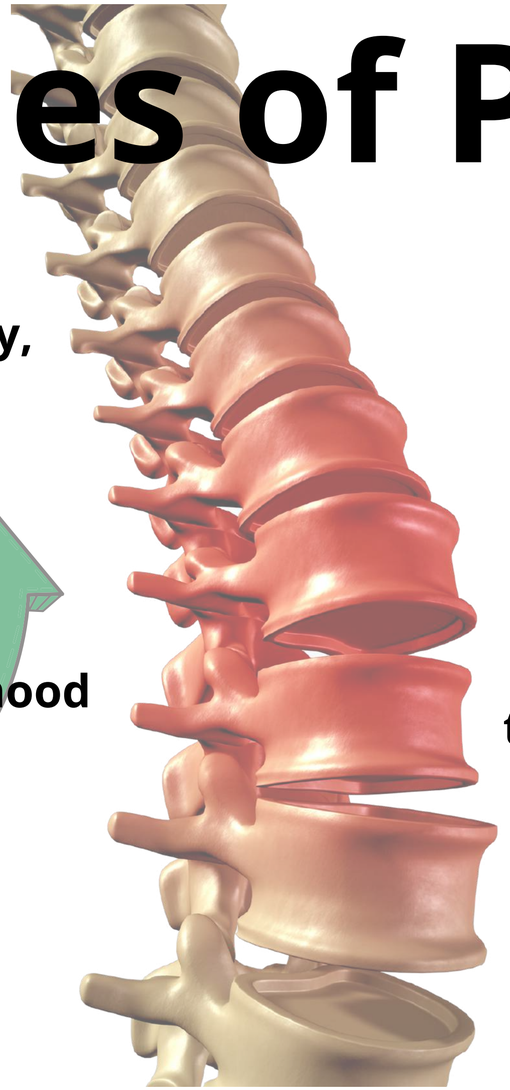
“Chronic back pain is defined as pain that continues for 12 weeks or longer, even after an initial injury or underlying cause of acute low back pain has been treated. About 20 percent of people affected by acute low back pain develop chronic low back pain with persistent symptoms at one year. Even if pain persists, it does not always mean there is a medically serious underlying cause or one that can be easily identified and treated.”

~“Https://Www.ninds.nih.gov/Health-Information/Patient-Caregiver-Education/Fact-Sheets/Low-Back-Pain-Fact-Sheet.” National Spine Health Foundation, 6 Apr. 2015, spinehealth.org/breaking-down-the-exercises-that-break-down-your-spine/. Accessed 11 May 2022.

POTENTIAL CAUSES OF LOW BACK PAIN

-Sprained ligaments
-Strained muscles
-Injury from sports, car accident, a fall, which can injure tendons and ligaments or cause compression of the spinal cord
-Herniated or ruptured discs
-Intervertebral disc degeneration
-Radiculopathy (caused by compression, inflammation, and/or injury to the spinal nerve root)
-Sciatica (a form of radiculopathy caused by compression of the sciatic nerve)
-Spondylolisthesis (where vertebrae of the lower spine slip out of position, which pinches nerves exiting the spinal column)
-Arthritis
-Poor posture
-Obesity
-Pregnancy
-Bone loss
-Psychological stress
-Abdominal aortic aneurysms (a large blood vessel that supplies the abdomen, pelvis, and legs becomes enlarged)
-Osteoporosis (progressive loss of bone density and strength)
-Fibromyalgia (a condition that causes extreme sensitivity to pain, fatigue, and muscle stiffness)
-Endometriosis (a buildup of uterine tissue outside of the uterus)
-Irregular curvature of the spine such as scoliosis (a sideways curve) or lordosis (a large arch in the lower back)
-Infections
-Tumors
-Kidney stones
-Cauda equina syndrome (a complication resulting from a ruptured disc)
-Spinal stenosis (a narrowing of the spinal column that puts pressure on the spinal column)

Cycles of Pain



Psychological

reduced social interaction

anger, anxiety, fear, panic

poor mood

depression

increased perception of pain

Physical

activity avoidance

deconditioning

lack of sleep

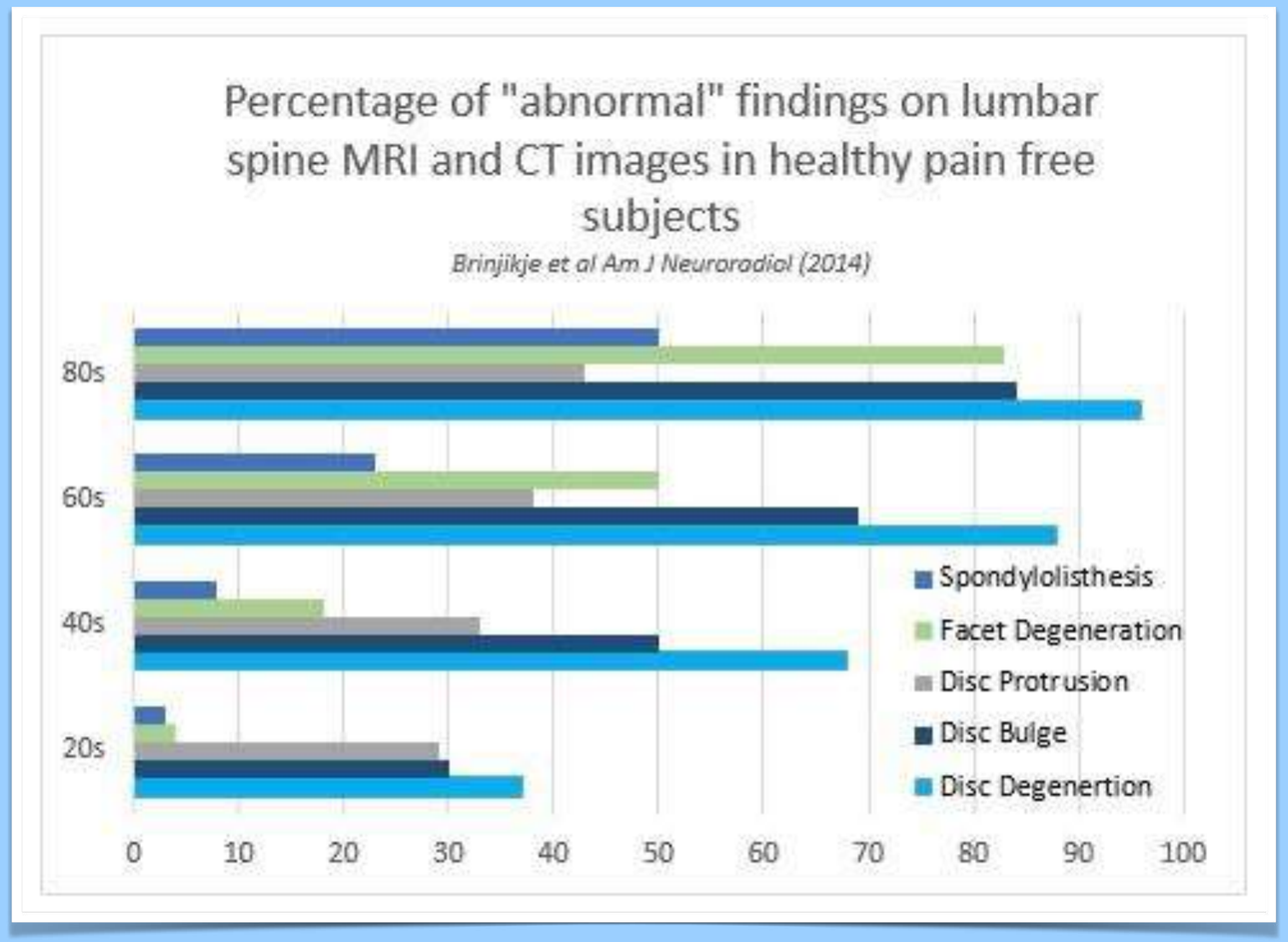
pain with decreased activity

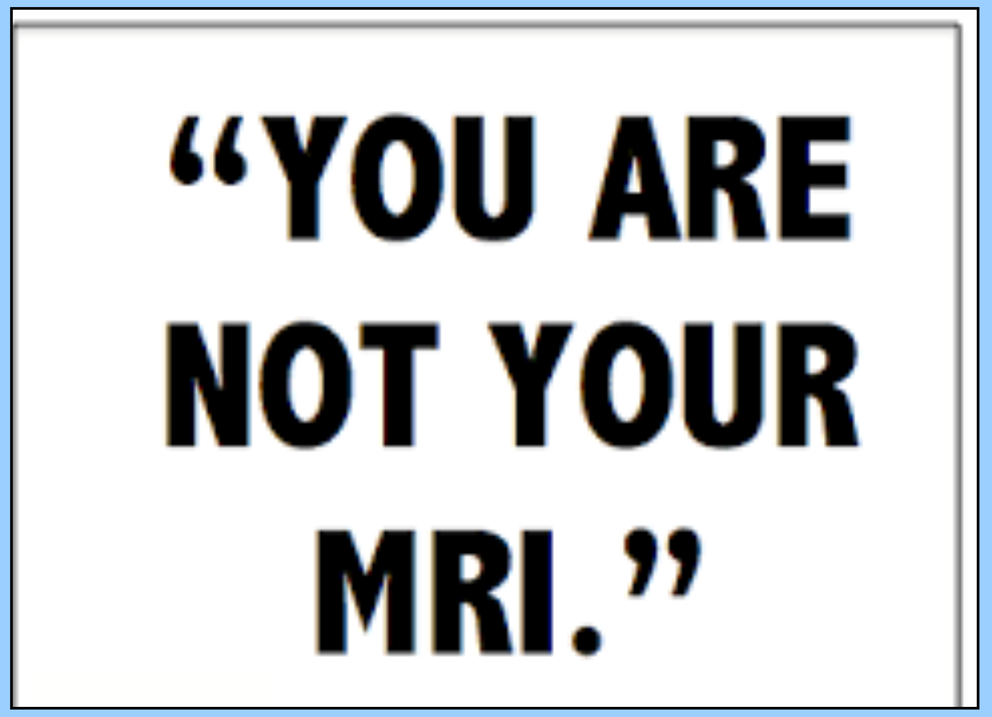
lowered pain threshold

MEME MYTH


"old school"
"the research just hasn't caught up yet"
"that's not what the research says"
"you are suppose to move"
"the body is resilient"

COMMON LOW BACK MYTHS





These imaging findings must be interpreted in the context of the patient’s clinical condition.”

“THE SPINE IS RESILIENT”

“Evidence of the process of disc herniation is repeated lumbar flexion with very little load. Callaghan and McGill (2001) consistently created disc herniations with modest load in the neighborhood of 22,000-28,000 cycles of flexion. With increased loads the number of flexion cycles required to cause a disc herniation decreased to 5,000-9,500. More recently, Tampier (2007) and Veres (2009) confirmed that the greater the load and the more repetitions, the faster a herniation will occur.”

~video graphic by Oliver Latta: Social Pressure

“Conclusion TikTok is a popular social media channel among young people. However, the most viewed TikTok videos about ANSBP are not produced by mainstream health professionals and the videos featuring the #backpain hashtag do not generally reflect contemporary evidence-based practice. There is considerable scope for mainstream health professionals to provide evidence-informed self-management and self-care content for ANSBP on TikTok.”

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

TOLERANCE AND CAPACITY

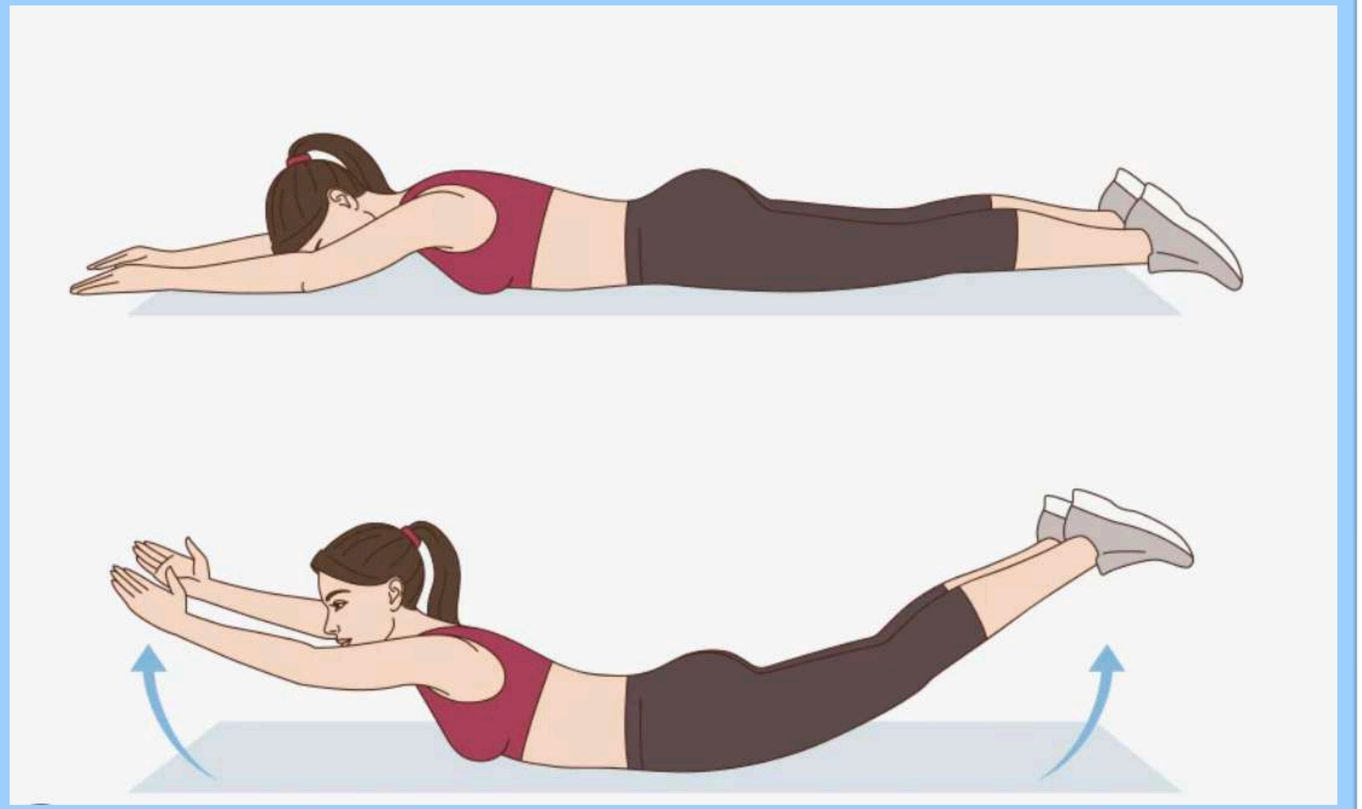
Determining the tolerance and capacity of each individual is paramount to ensure that a given exercise dosage is matched to the client. Each individual has a loading *tolerance* which, when exceeded, will cause pain and ultimately tissue damage. For example, a patient may tolerate a birddog extension posture but not a superman extension over a gym ball which imposes twice the compressive load on the lumbar spine. A person's *capacity* is the cumulative work that he or she can perform before pain or troubles begin. An example, someone who can only walk 20 meters before pain sets in has a low capacity.

DR. STUART MCGILL, "DESIGNING BACK EXERCISE: FROM REHABILITATION TO ENHANCING PERFORMANCE"

Exercise	Compression Load
Sit-up (bent knee)	3,300N (730lb)
Sit-up (straight leg)	3,506
Curl-up feet anchored	2,009
Curl-up feet free	1,991
Quarter sit-up	2,392
Bent leg raise	1,767
Hanging straight leg	2,805
Hanging bent leg	3,313
Isometric side bridge	2,585
Roman chair extension	4,000
Back extension (arms and legs)	6,000
Bird dog	2,000

Table sourced from McGill S, Low Back Disorders: Evidence Based Prevention & Rehabilitation, Human Kinetics, 2002.

TOLERANCE AND CAPACITY



Exercise	Compression Load
Sit-up (bent knee)	3,300N (730lb)
Sit-up (straight leg)	3,506
Curl-up feet anchored	2,009
Curl-up feet free	1,991
Quarter sit-up	2,392
Bent leg raise	1,767
Hanging straight leg	2,805
Hanging bent leg	3,313
Isometric side bridge	2,585
Roman chair extension	4,000
Back extension (arms and legs)	6,000
Bird dog	2,000

Table sourced from McGill S, Low Back Disorders: Evidence Based Prevention & Rehabilitation, Human Kinetics, 2002.

“ IF STRENGTH HAS A LIMIT, WHY DOESN’T RESILIENCE?”

~JOSHUA HENKIN

- **Is this a good exercises for my client?**
- **Why this exercise?**
- **What are the inherent risks or contraindications associated with this exercise (*Orthopedic Cost*).**

ORTHOPEDIC COST WHAT!?

“Orthopedic cost: Long term effect of an exercise on the body. Think of it as wear and tear.”

~Mike Boyle

- **Cardio**
- **Pulmonary**
- **Post Surgical**

EXERCISE PRESCRIPTION

- Client history
- Client goals
- Client complaints
- Predisposition to low back issues
- Individuals tolerance and capacity
- Frequency/ Dosage

THE SPINE NEEDS MORE MOBILITY

"Many therapy approaches have the objectives of strengthening muscle and increasing spine range of motion. This is problematic (Parks et al, 2003) since those who have more motion in their backs have a greater risk of having future back troubles."

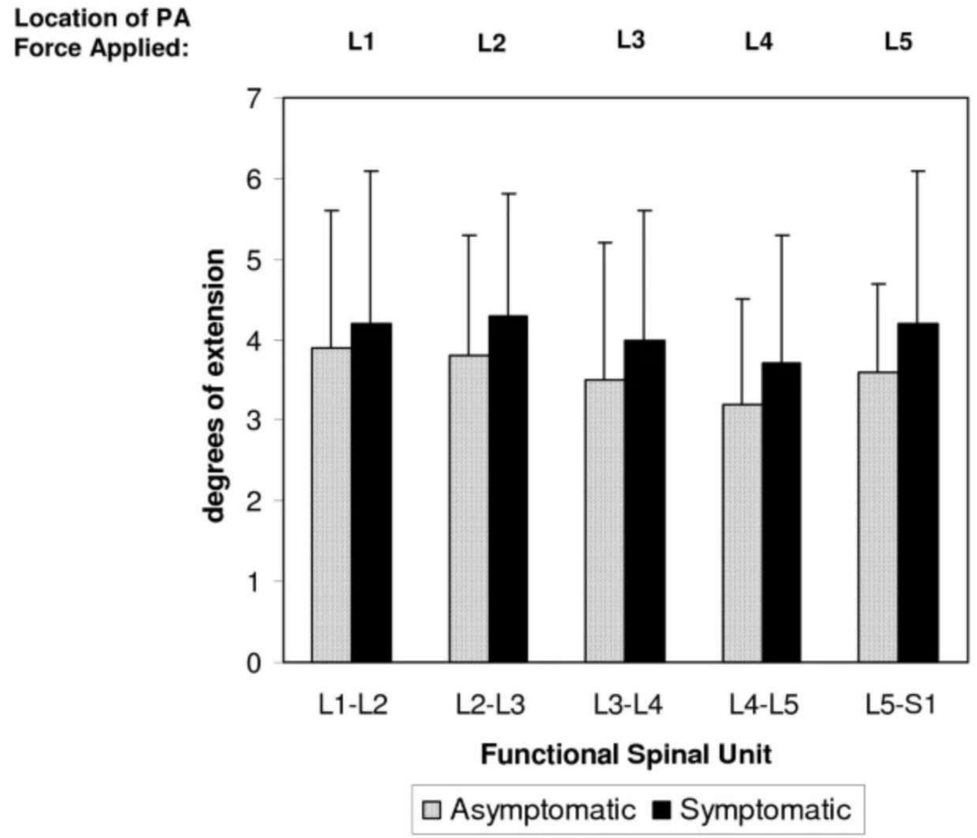
“THE MOST COMMON CAUSE OF UNRESOLVED CHRONIC BACK PAIN IS SPINAL INSTABILITY. “

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

“Sullivan et al. (2000) found no correlation in lumbar range of motion and low back pain. Parks et al. (2003) demonstrated that spine range of motion has little to do with functional activities such as walking, standing, sitting, pushing, pulling, lifting, and carrying. “

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

Figure 3



Mean segmental motion of the target lumbar segment during the posterior to anterior (PA) mobilization procedure. Error bars represent 1 SD.

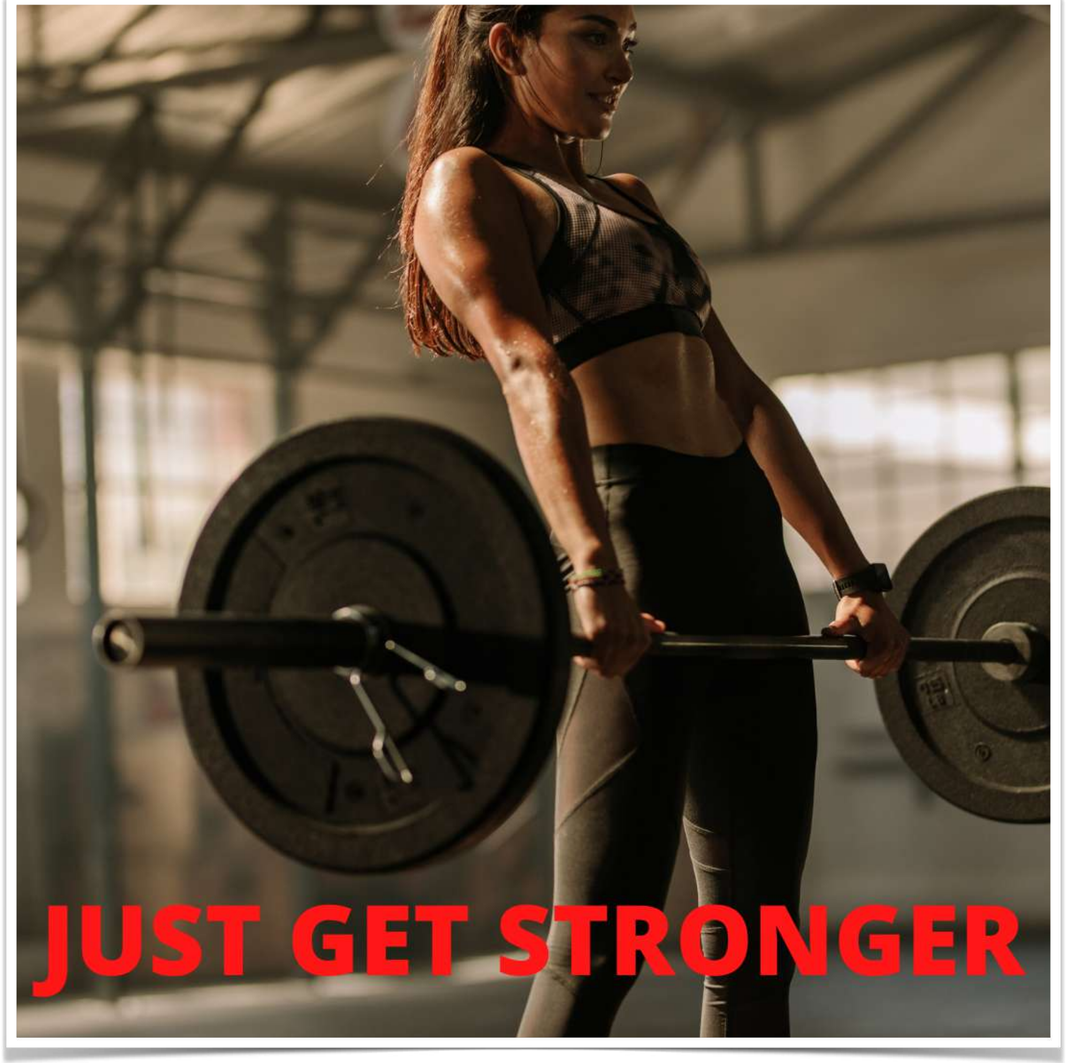
“Based on the scientific evidence, having a flexible spine does not ensure spine safety. In fact, it ensures quite the opposite. Those rehabilitating from a low back injury or those concerned with preventing low back injury would be wise to focus on deficits other than spine flexibility.”

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

JUST GET STRONGER

"A direct relationship between LBP and neuromuscular imbalance was documented in athletes with LBP. Maximum isometric trunk extension strength had no relationship to the presence of LBP or the occurrence of neuromuscular imbalance of erector spinae. Common clinical testing of spinal mobility and muscular flexibility had only limited correlation to LBP and neuromuscular imbalance."

– RENKAWITZ T, BOLUKI D, GRIFKA J. THE ASSOCIATION OF LOW BACK PAIN, NEUROMUSCULAR IMBALANCE, AND TRUNK EXTENSION STRENGTH IN ATHLETES. SPINE J. 2006 NOV-DEC;6(6):673-83. DOI: 10.1016/J.SPINEE.2006.03.012. PMID: 17088198.



“People with chronic LBP who received MST (motor skill training) had greater short-term and long-term improvements in function than those who received SFE (strength & flexibility exercise) . “

~van Dillen LR, Lanier VM, Steger-May K, Wallendorf M, Norton BJ, Civello JM, Czuppon SL, Francois SJ, Roles K, Lang CE. Effect of Motor Skill Training in Functional Activities vs Strength and Flexibility Exercise on Function in People With Chronic Low Back Pain: A Randomized Clinical Trial. JAMA Neurol. 2021 Apr 1;78(4):385-395. doi: 10.1001/jamaneurol.2020.4821. Erratum in: JAMA Neurol. 2021 Jan 19;: PMID: 33369625; PMCID: PMC7770617.

MOTOR CONTROL?

-Aims to restore coordinated and efficient use of the muscles that control the spine

-Integrated movement of the muscles, bones, & nervous system

WHAT SHOULD WE BE FOCUSING ON?

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

- What were they looking at? Trunk balance, stabilization, segmental stabilization, and motor control exercises.

- So what did they find out????? Core stabilization and motor control strategies alleviated chronic low back back pain.

“True spine stability is achieved with a “balanced” stiffening from the entire musculature including the rectus abdominis and the abdominal wall, quadratus lumborum, latissimus dorsi and the back extensors of longissimus, ilioicostalis and multifidus. Focusing on a single muscle generally does not enhance stability but creates patterns that when quantified result in less stability. It is impossible to train muscles such as transverse abdominis or multifidus in isolation – people cannot activate just these muscles.”

-McGill, Designing Back Exercise: from Rehabilitation to Enhancing Performance

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

~Gray Cook, PT

PROGRESSING STABILITY

- Who are we working with? People that don’t know how to create any stability.

- This is why body weight doesn’t always work.

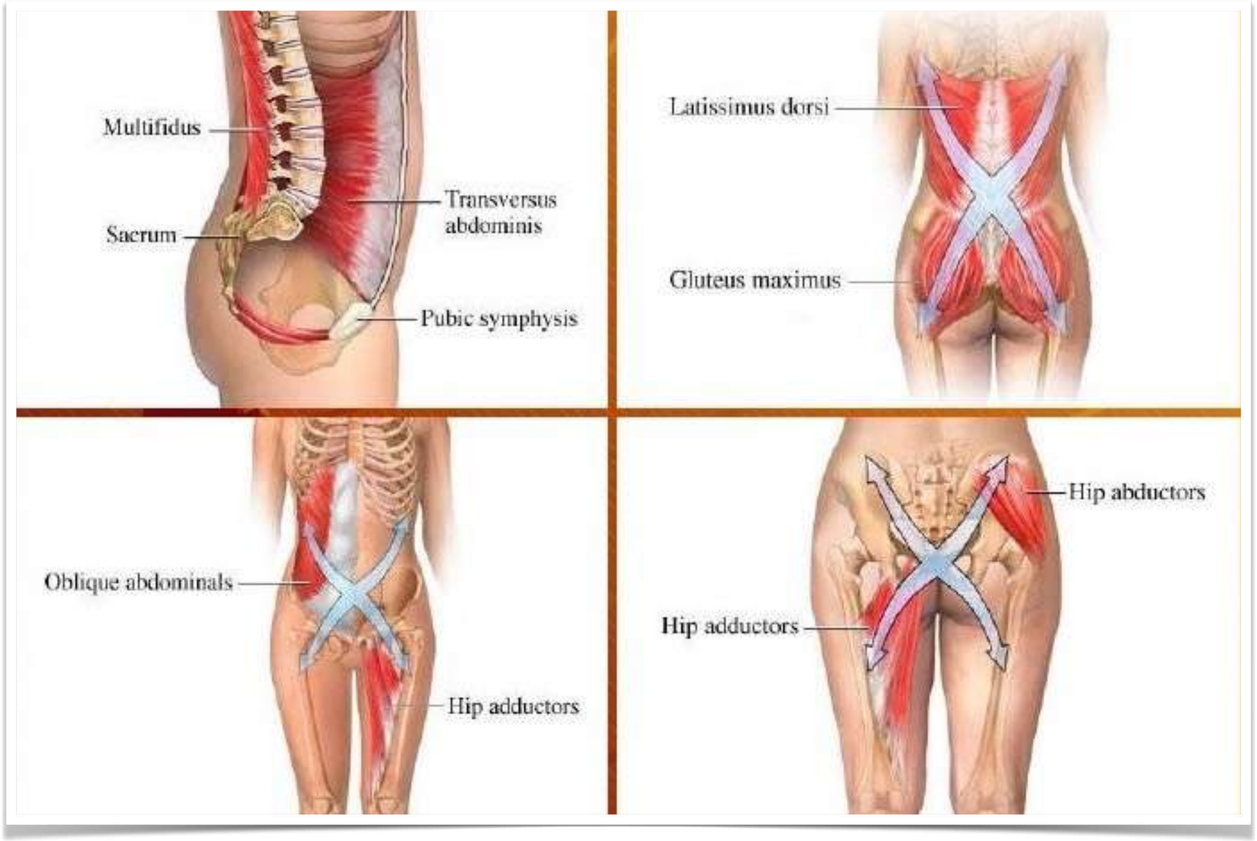
- True reflexive stability is the ultimate goal.

- Beginners need to know how to create stability and then how to progress stability.

"THE CORE HAS EVERYTHING TO DO WITH WHAT WE DO."

~GARY GRAY, PT

- **Glutes: all of them**
- **Piriformis**
- **Pelvic Floor**
- **Multifidus**
- **Transverse Abdominis**
- **Hip Adductors & Abductors**
- **Latissimus Dorsi**

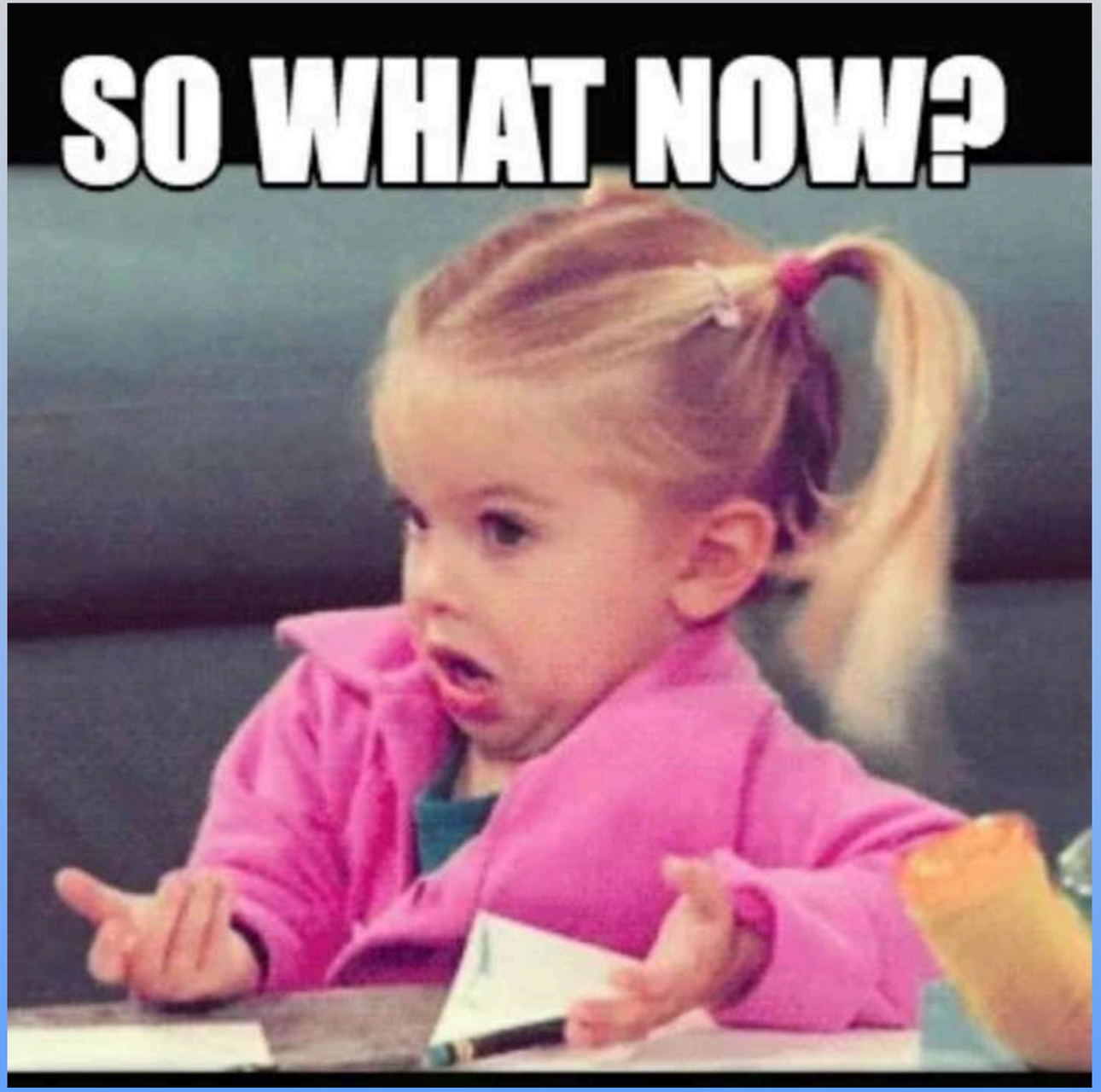


“The delayed onset of contraction of transverse abdominis indicates a deficit of motor control and is hypothesized to result in inefficient muscular stabilization of the spine.”

-Hodges PW, Richardson CA. Inefficient muscular stabilization of the lumbar spine associated with low back pain. A motor control evaluation of transversus abdominis. Spine (Phila Pa 1976). 1996 Nov 15;21(22):2640-50. doi: 10.1097/00007632-199611150-00014. PMID: 8961451.

WHAT DOES IT MEAN TO TRAIN THE CORE

- Ab crunches
- Oblique twists
- Pelvic tilts
- Transverse abdominus isolated work


SO WHAT NOW?

AN INTEGRATED APPROACH

- **"Isolating a muscle about a joint, and training it with progressive overload is purely a bodybuilding hypertrophy approach. Functional training incorporates the goal of enhancing strength throughout the body segment linkage. This means the strength be generated quickly, throughout complex motions and postures, and in an environment that preserves balance and joint stability, and avoids injury, risks, etc."-Dr. Stuart McGill**

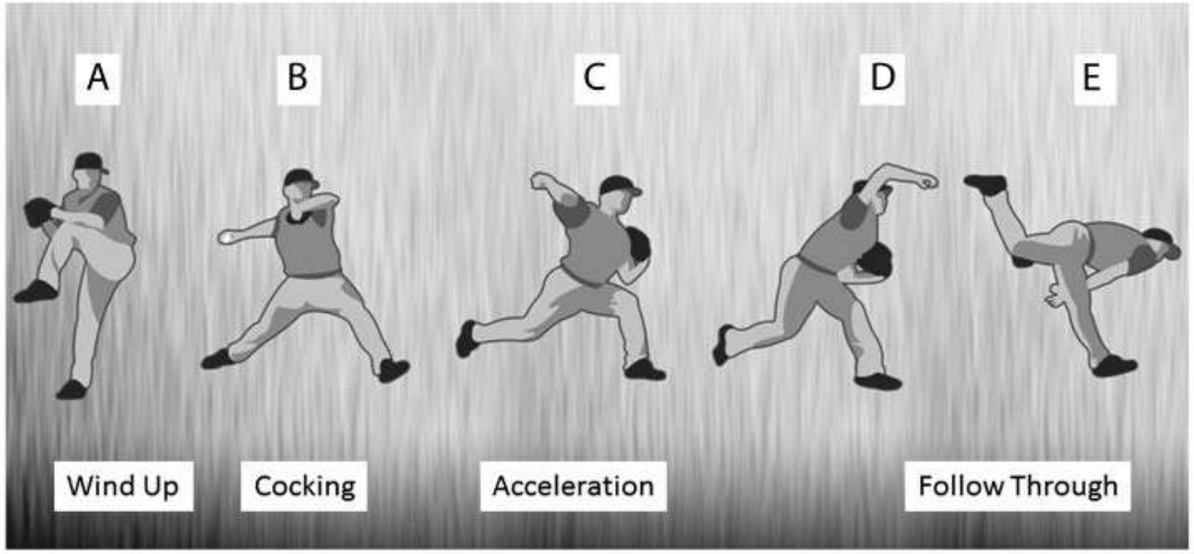


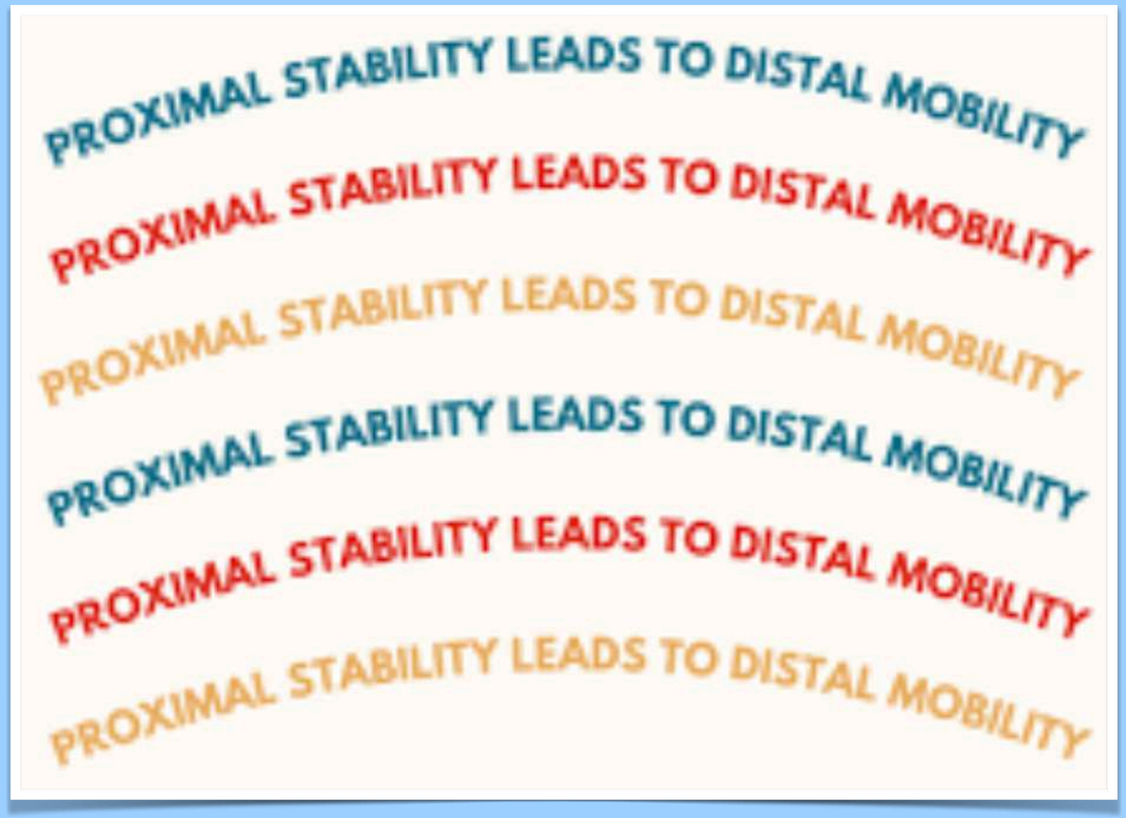
Figure 1. Notice that there is little "twisting" of the core during the entire pitching motion beginning at wind up; the core is actually "stiffened" during the cocking and acceleration phases. This stiffening allows the serape muscle and other tissues to transfer the serape's "hip power" to the shoulders and eventually the hand all the way to the follow through.

'Movement is affected by the action of muscles working in groups. [...] A muscle does not necessarily do in life what the dissected muscle, or a mechanical contrivance will do in a cadaver. Neglect of this fact has led to many errors in teaching.' (

'Movement is affected by the action of muscles working in groups. [...] A muscle does not necessarily do in life what the dissected muscle, or a mechanical contrivance will do in a cadaver. Neglect of this fact has led to many errors in teaching.' (Wood Jones 1920)

PROXIMAL STABILITY

“The muscles and joints of the hip, pelvis and spine are centrally located to be able to perform many of the stabilizing functions that the body will require in order for the distal segments (e.g. the limbs) to do their specific function, providing the proximal stability for the distal mobility and function of the limbs. In addition to its local functions of stability and force generation, core activity is involved with almost all extremity activities such as running, kicking and throwing. Therefore, the position, motion and contributions of the core must be evaluated and treated as part of the evaluation and treatment of extremity injuries.”-Kibler WB, Press J, Sciascia A. The role of core stability in athletic function. Sports Med. 2006;36(3):189-98. doi: 10.2165/00007256-200636030-00001. PMID: 16526831.

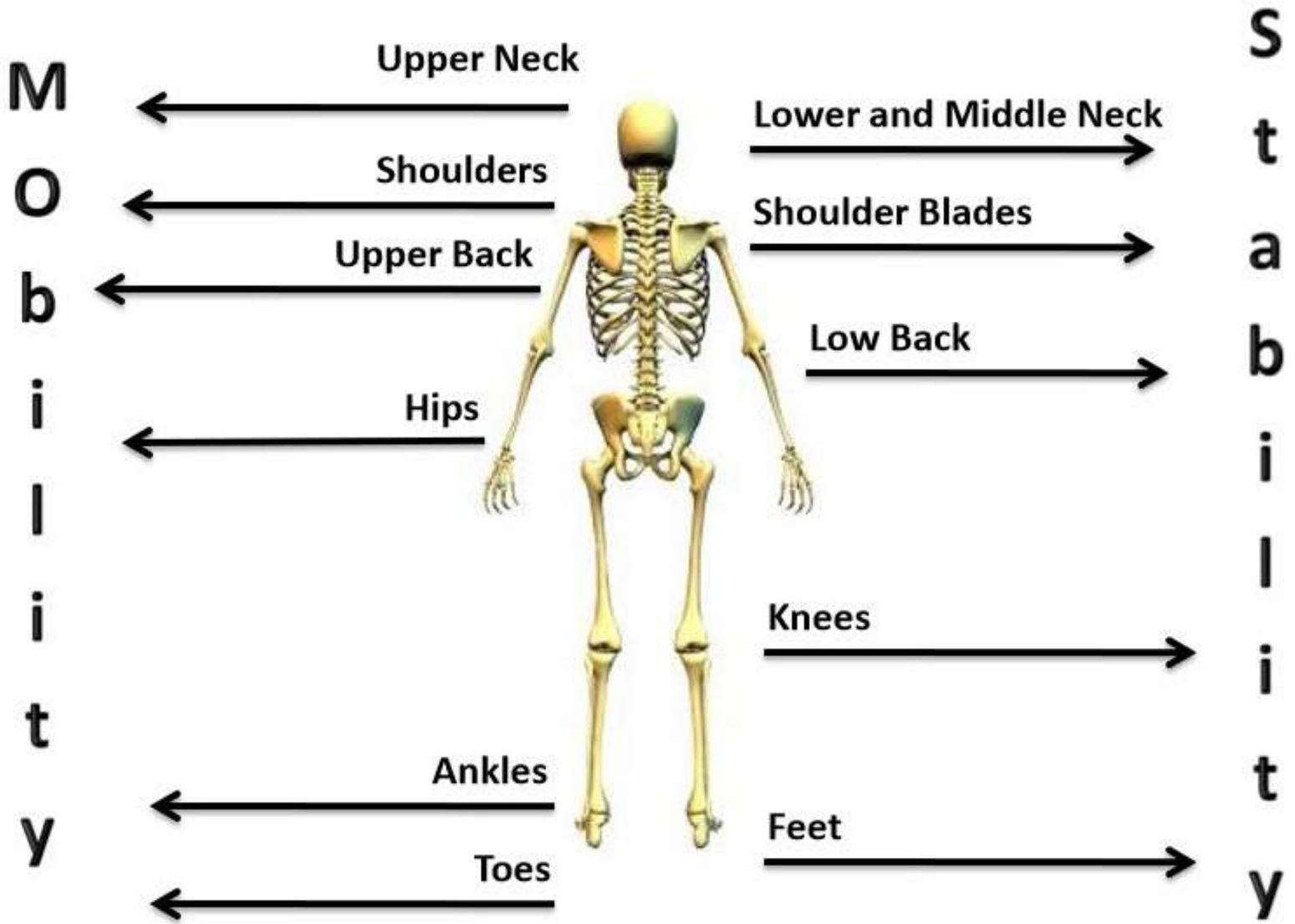


“Hodges and Richardson (12) examined the sequence of muscle activation during whole- body movements and found that some of the core stabilizers (i.e., transversus abdominis, multifidus, rectus abdominis, and oblique abdominals) were consistently activated before any limb movements. These findings support the theory that movement control and stability are developed in a core-to-extremity (proximal-distal) and a cephalo-caudal progression (head-to-toe) .”

~Okada, T., Huxel, K. C., & Nesser, T. W. (2011). Relationship between core stability, functional movement, and performance. *Journal of Strength and Conditioning Research*, *25*(1), 252–261. https://doi.org/10.1519/jsc.0b013e3181b22b3e

\

Joint By Joint Concept




GRAY COOK
"Stiffness hides a stability problem and causes a mobility problem."

IT'S ALL IN THE HIPS

"chronic low-back pain patients have limitations in the range of motion of their hips compared to healthy persons, and the patients with lumbar instability showed greater limitation than the patients with lumbar stability. When patients with lumbar instability and high levels of limitations of the hip range of motion, performed hip joint exercises including lumbar stabilization exercises, their low-back pain and disability indexes significantly decreased compared to the lumbar stability exercise and the control subgroups"

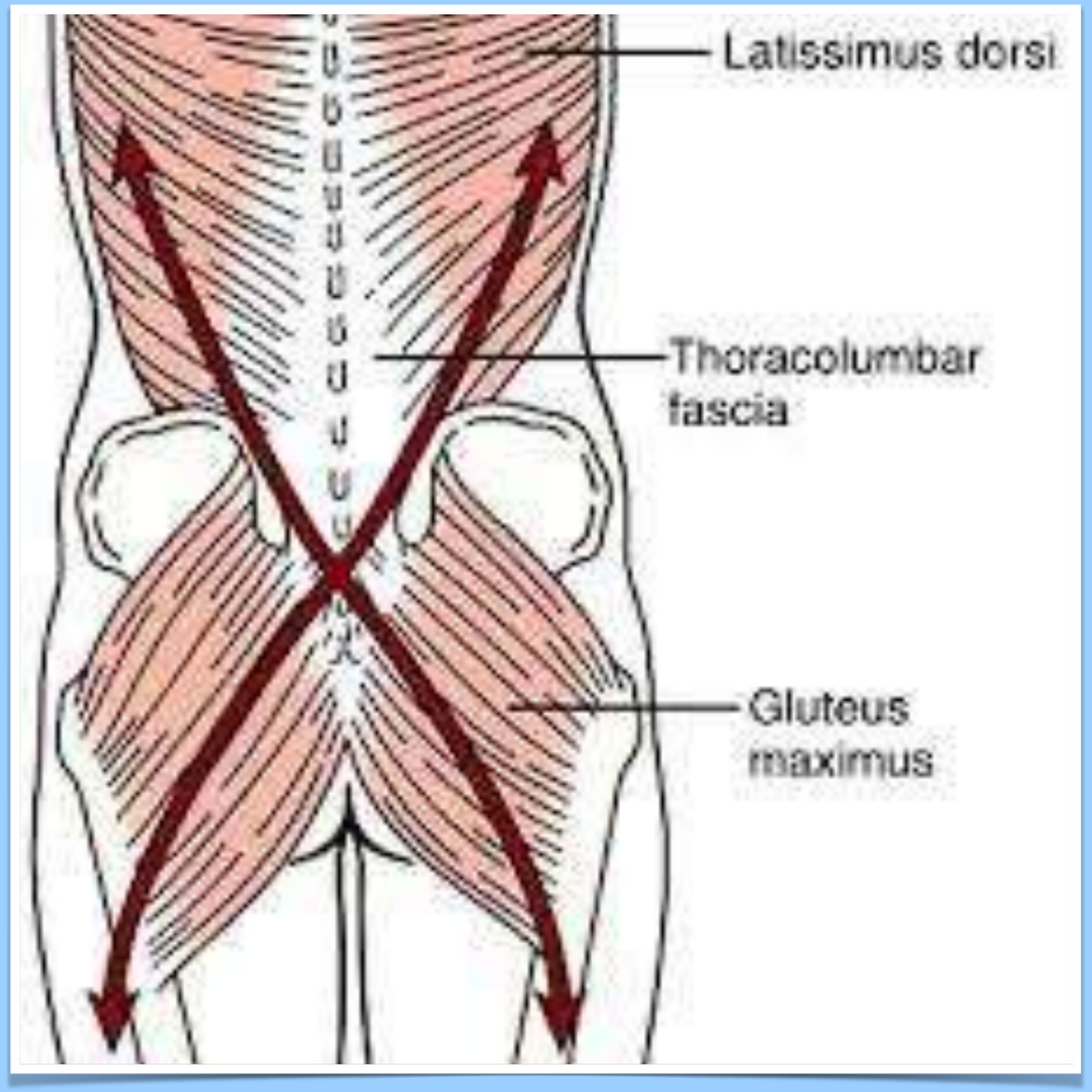
-Lee SW, Kim SY. Effects of hip exercises for chronic low-back pain patients with lumbar instability. J Phys Ther Sci. 2015;27(2):345-348. doi:10.1589/jpts.27.345


18"

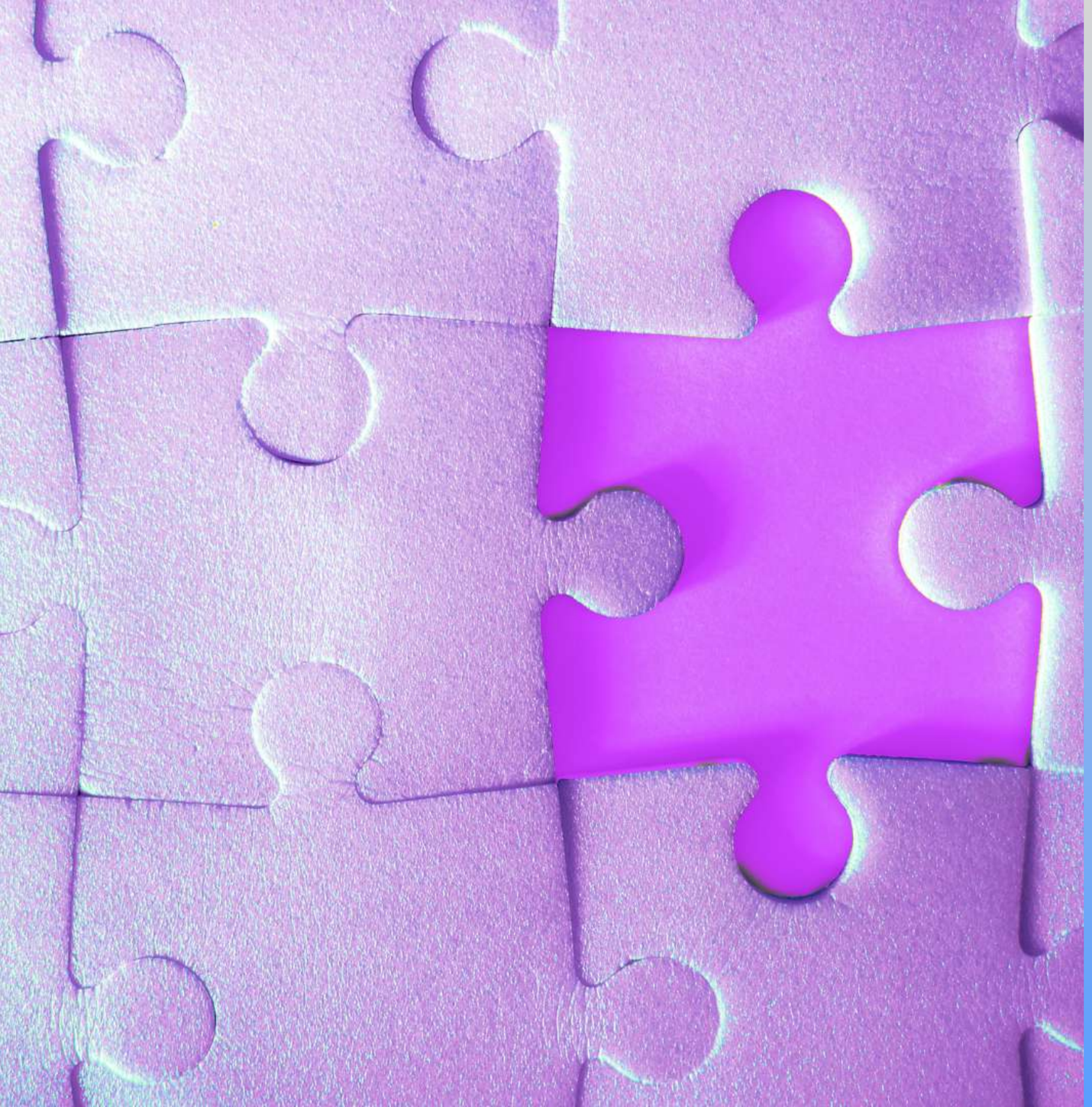
LATISSIMUS DORSI AND CONTRALATERAL GLUTEUS MAXIMUS FUNCTION TOGETHER

Gracovetsky describes this coupled action of the latissimus dorsi, through the lumbodorsal fascia to the gluteus maximus, as a key component of energy transfer in gait.

~Gracovetsky, S. Locomotion – Linking the Spinal Engine with the Legs. in Proceedings of the Second Interdisciplinary World Congress on Low Back Pain. 1995. San Diego, CA.




Thoracolumbar fascia
Latissimus dorsi
Gluteus maximus



PUTTING IT ALL TOGETHER

DEADBUG

Goal of Dead Bugs:

-Learn How To Develop Core Stiffness Relative To The Movement

-Resisting Extension & Foundational Rotation (Pelvic Control)

-Cross Patterning Of The Body: Controlling Reciprocal Motion

-Reflexive Stability (Not Relying On Tension)

BIRD DOG

Goal of Bird Dog:

-A Higher Level Dead Bug

-Greater Need To Resist Rotation

-Stability Is Gained By Pressure Into Ground

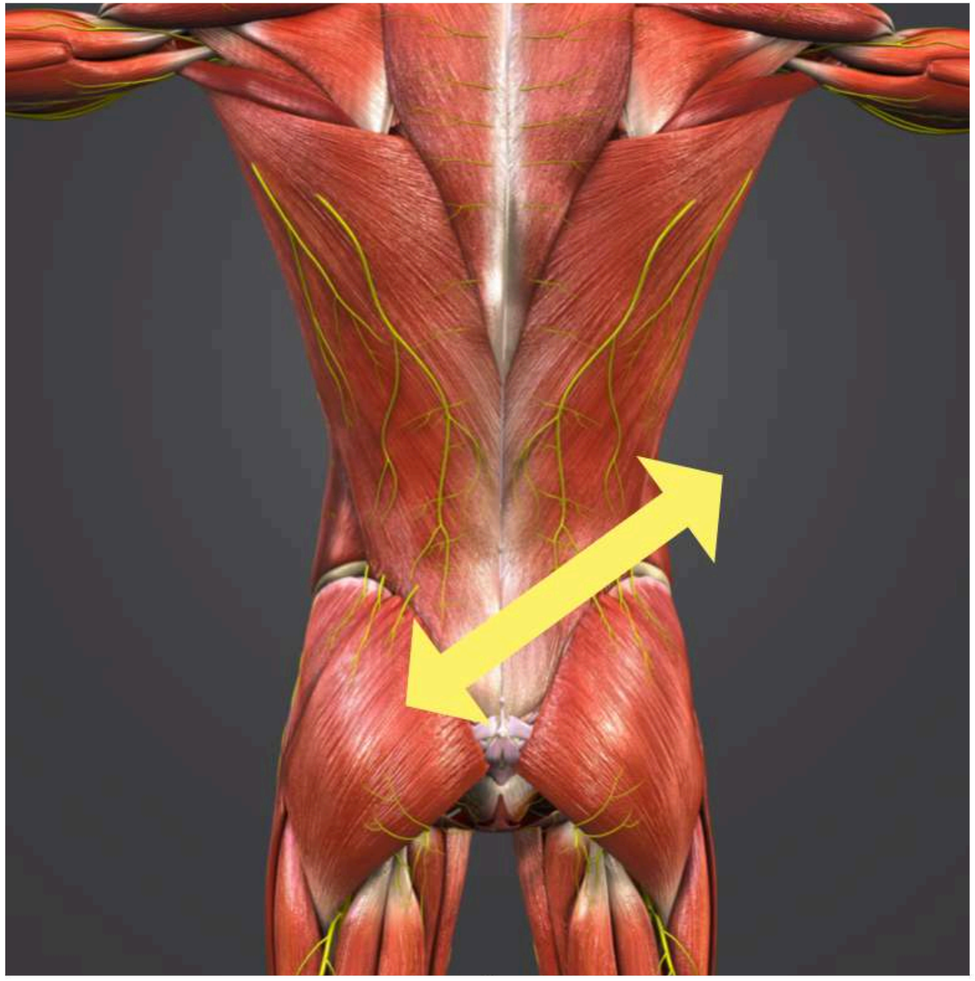
-More Shoulder Stability and Foundational Hip Extension Patterns

GLUTES & THE LOW BACK

“Chronic back pain tends to cause hip extension using the hamstrings and subsequent back extension using the spine extensors creating unnecessary crushing loads. Gluteal muscle re-integration helps to unload the back.”

POSTERIOR OBLIQUE SYSTEM

-Latissimus dorsi and contralateral
-Gluteus maximus
-Biceps femoris
-These muscles work as synergists to directly stabilize the SIJ.
-Force closure can be increased indirectly due to the anatomical connections of the gluteus maximus and the thoracolumbar facia with the sacrotuberous ligament.




Thoracolumbar fascia
Latissimus dorsi
Gluteus maximus
n Make You Better

SIDE PLANK

-Strength to resist frontal plane movement.

-Connection of hip, core, and upper body.

-Foundational to locomotive training.

-Great carryover to everyday activities and sport

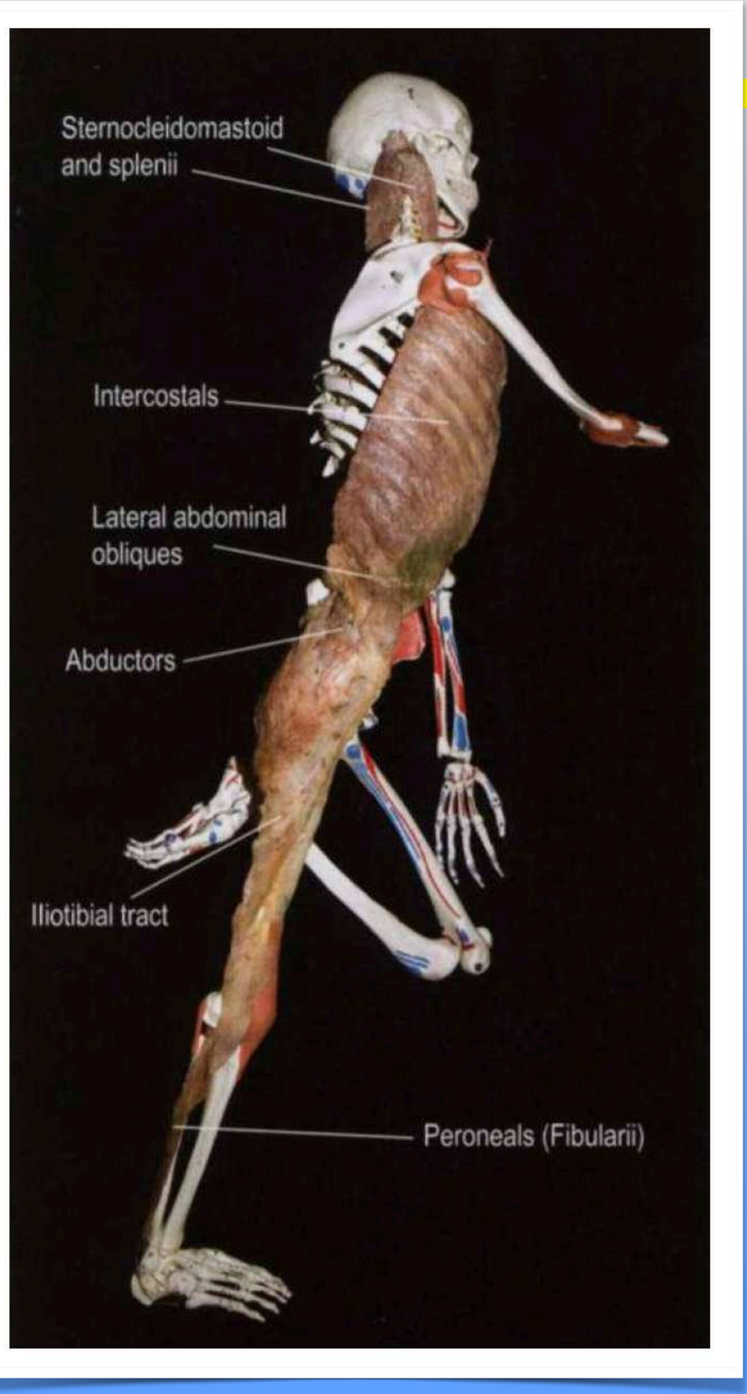
LATERAL CHAIN

-Latissimus dorsi and contralateral

-Gluteus maximus

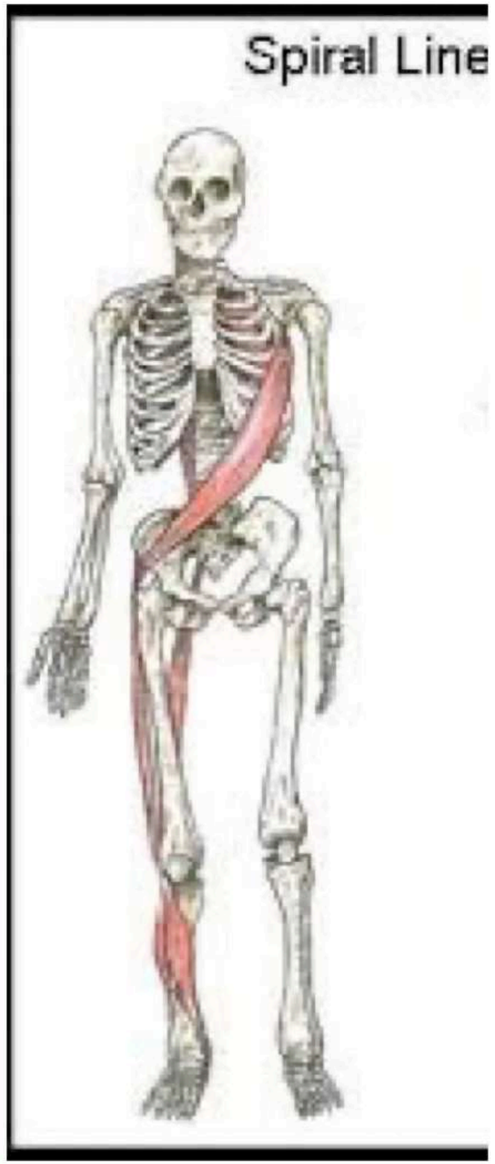
-Biceps femoris

-These muscles work as synergists to directly stabilize the SIJ.



YES. REAL PEOPLE CAN DO THIS.

“When the chop and lift patterns are used in conjunction with the half and tall kneeling developmental postures, the techniques are an excellent assessment of core stability/ instability. Combinations of the upper extremity patterns and the developmental postures can be powerful corrective training techniques. “

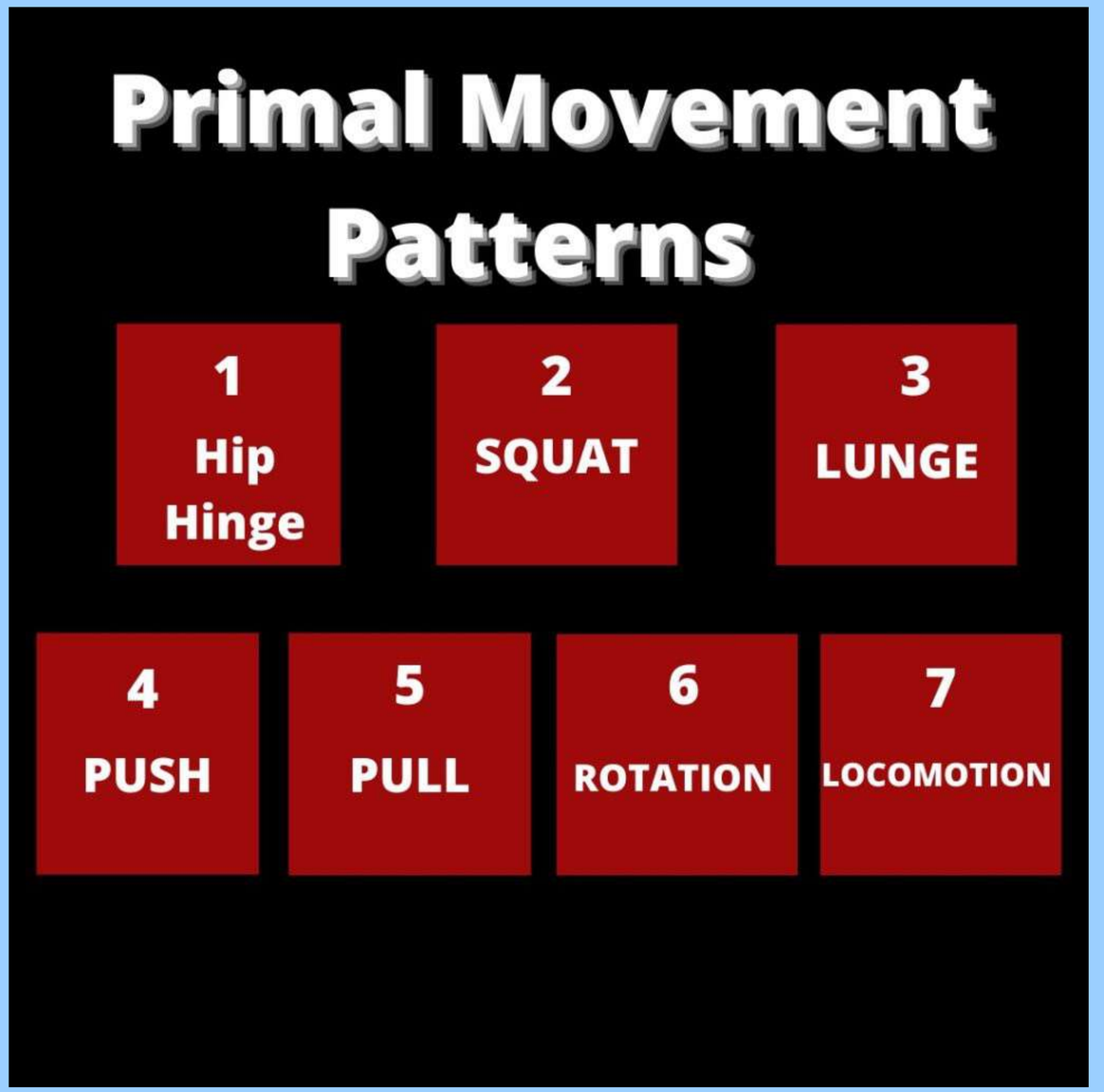


The Chop and Lift Reconsidered: Integrating Neuromuscular Principles into Orthopedic and Sports Rehabilitation.
Michael L Voight, Barbara J Hoogenboom, Gray Cook
N Am J Sports Phys Ther. 2008 Aug; 3(3): 151–159.

PROGRESSING TO MORE DYNAMIC STRENGTH TRAINING

“Functional movement is the ability to produce and maintain a balance between mobility and stability along the kinetic chain while performing fundamental patterns with accuracy and efficiency.”

~Okada, T., Huxel, K. C., & Nesser, T. W. (2011). Relationship between core stability, functional movement, and performance. *Journal of Strength and Conditioning Research*, *25*(1), 252–261. https://doi.org/10.1519/jsc.0b013e3181b22b3e



LOOK AT HOW MANY VARIABLES ARE AVAILABLE TO US...


VOLUME

DENSITY


RANGE OF MOTION


FREQUENCY


SPEED


LOAD


POSITION OF LOAD


POSITION OF BODY


PLANE OF MOTION


STABILITY OF IMPLEMENT

SQUAT

THIS

THAT

“The front squat was as effective as the back squat in terms of overall muscle recruitment, with significantly less compressive forces and extensor moments. The results suggest that front squats may be advantageous compared with back squats for individuals with knee problems such as meniscus tears, and for long-term joint health.”

-Gullett JC, Tillman MD, Gutierrez GM, Chow JW. A biomechanical comparison of back and front squats in healthy trained individuals. J Strength Cond Res. 2009 Jan;23(1):284-92. doi: 10.1519/JSC.0b013e31818546bb. PMID: 19002072.

“Compared to the front squat version, back squat exhibited significantly greater trunk lean, with no differences occurring in the knee joint kinematics throughout the movement. Results may suggest that the front squat may be preferred to the back squat for knee extensor development and for preventing possible lumbar injuries during maximum loading.”

-Yavuz HU, Erdağ D, Amca AM, Aritan S. Kinematic and EMG activities during front and back squat variations in maximum loads. J Sports Sci. 2015;33(10):1058-66. doi: 10.1080/02640414.2014.984240. Epub 2015 Jan 29. PMID: 25630691.

WHAT ABOUT


CHANGE
THE LOAD POSITION

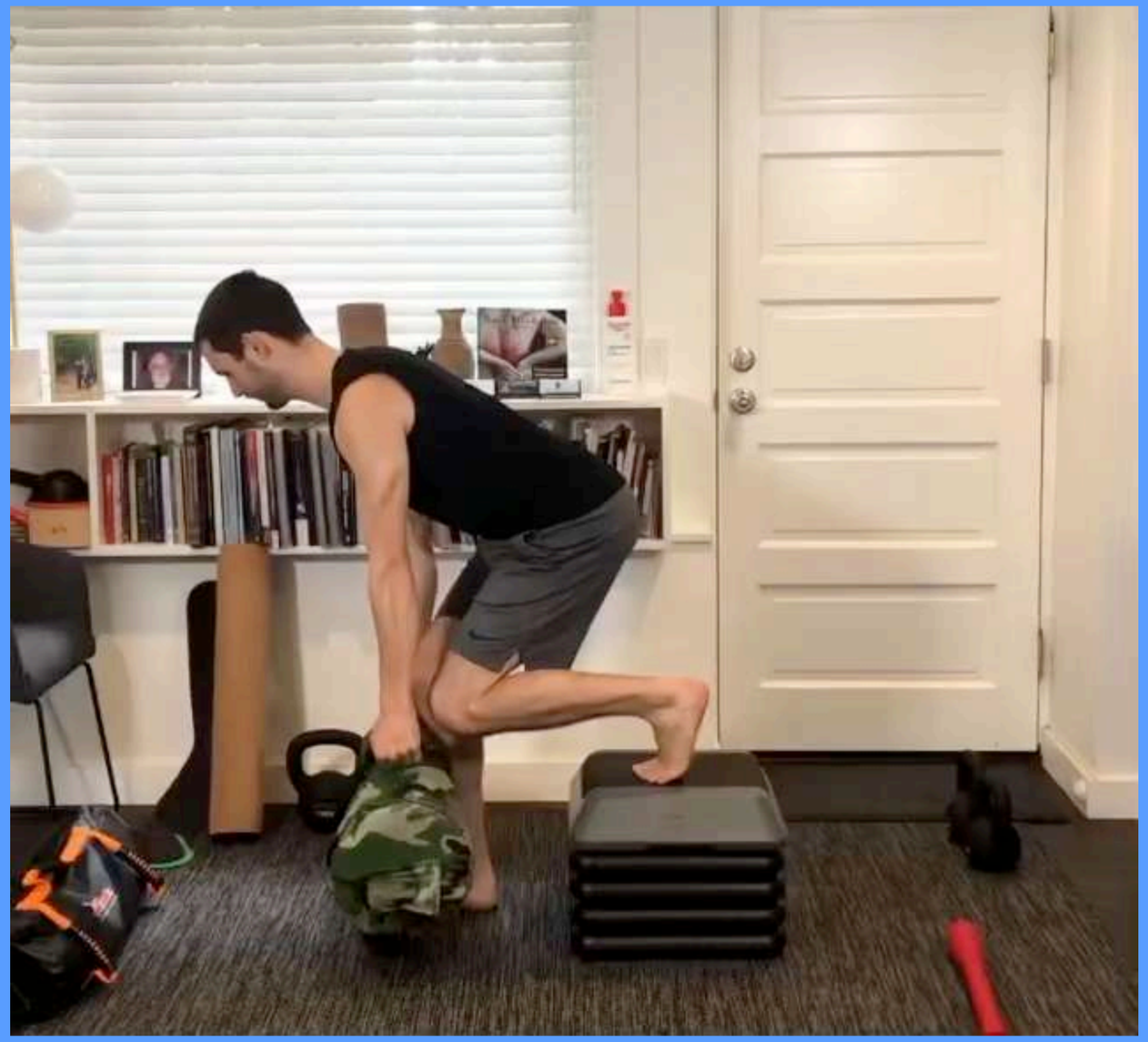

CHANGE
THE BODY POSITION

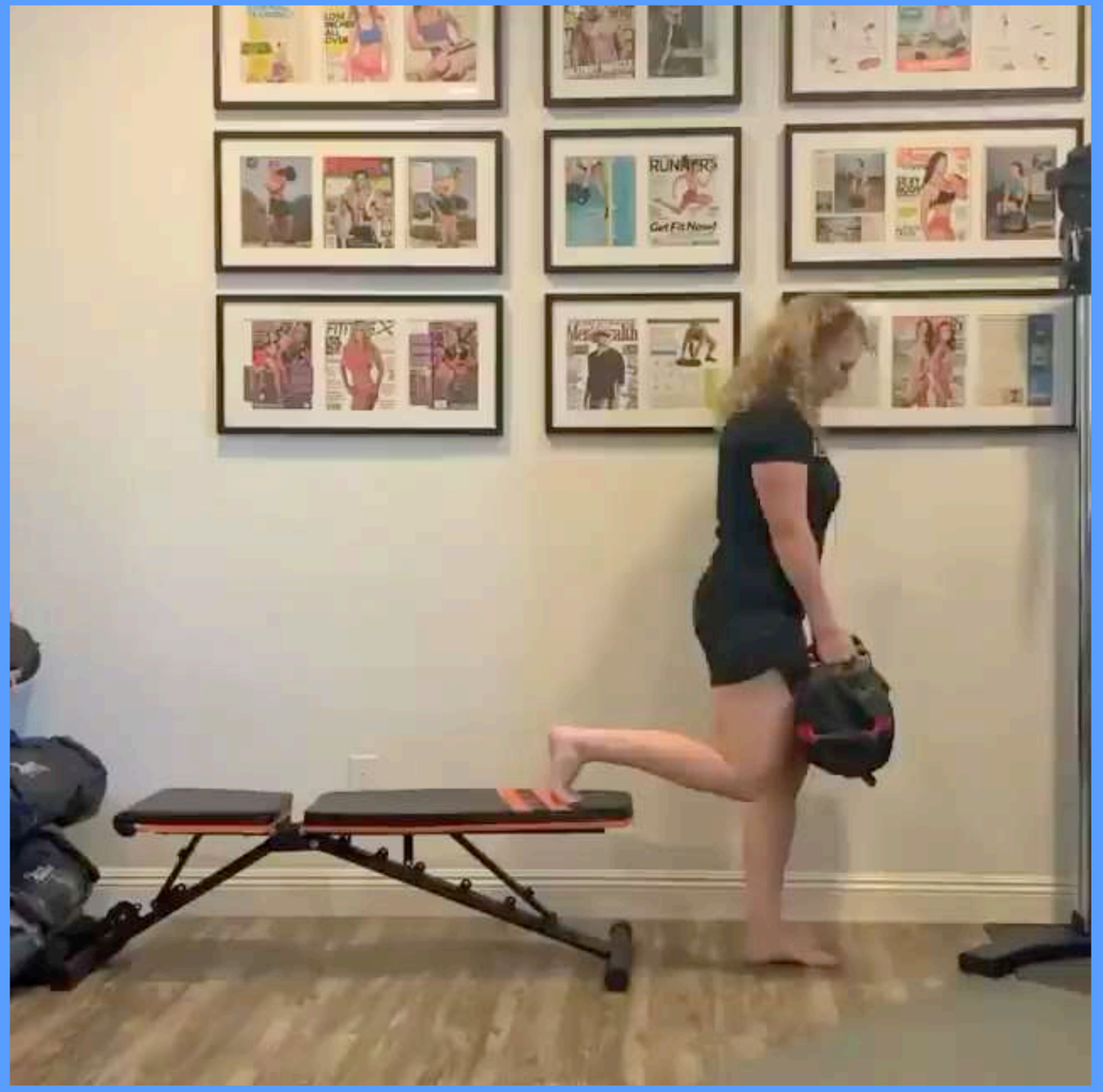

PLAY WITH
PLANES OF MOTION

HINGE

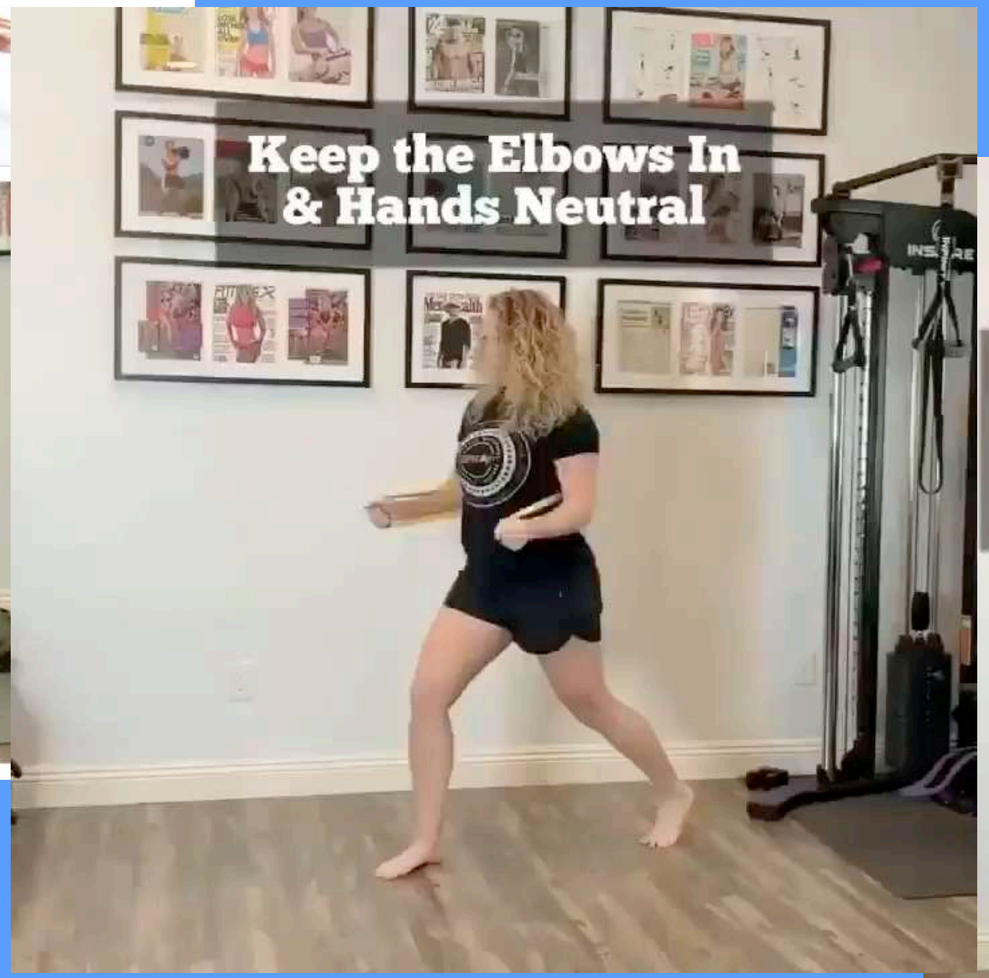

INSPIRE
INFINITY
Get Fit Now!


INSPIRE
INFINITY
RUNNERS
Get Fit Now!

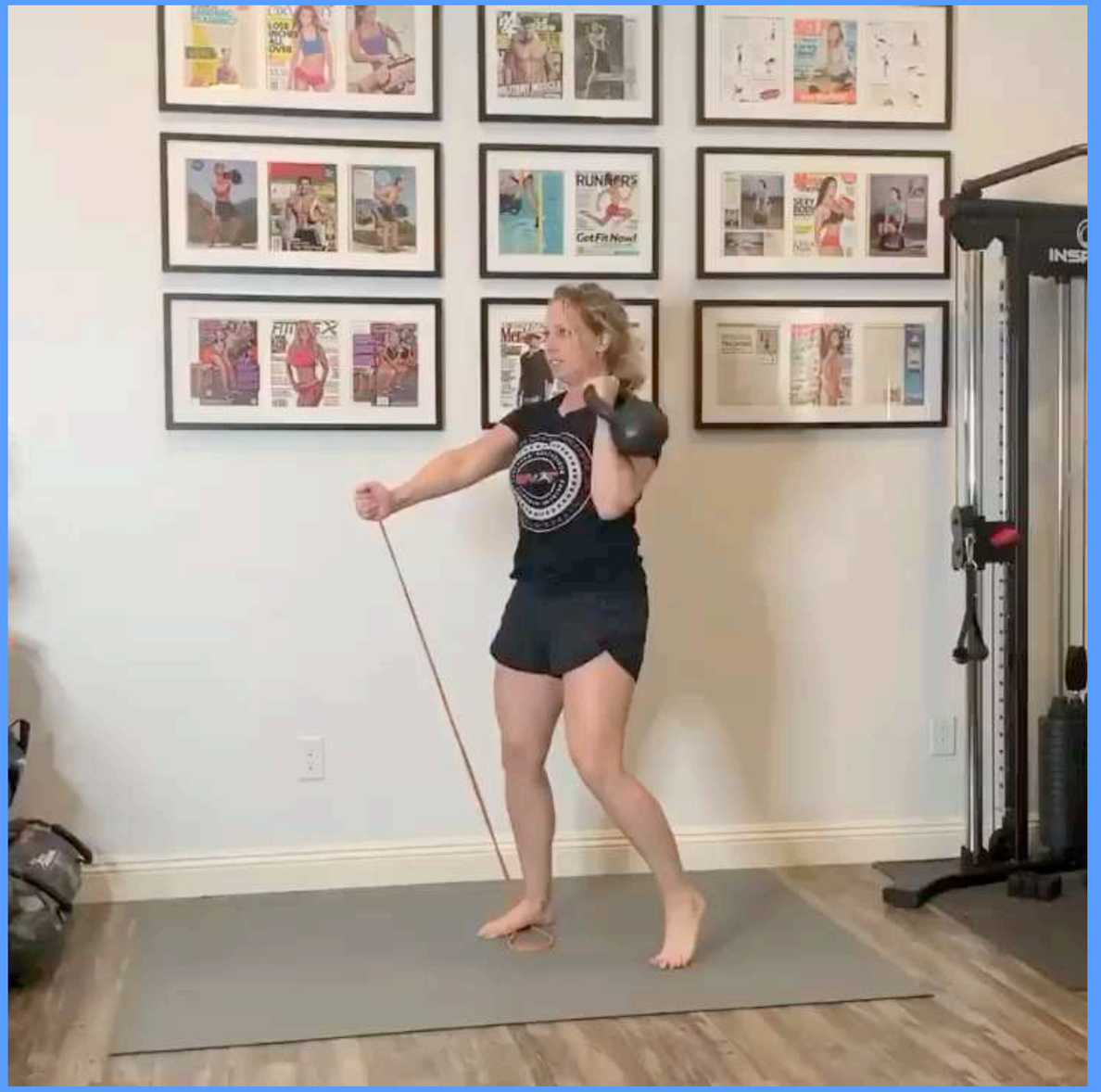



RUNNER'S
Get Fit Now!

PRESS


Keep the Elbows In
& Hands Neutral


Actively Pull Apart
The Ultimate Sandbag


RUNNERS
Get Fit Now!

LETS REVIEW

-Low back pain is multi-factorial including issues such as stress, sleep, depression, obesity, and many others.

-Low back strength and flexibility have a low correlation to improving low back pain.

-Core stability & motor control improvements seem to be the most effective in improving issues of low back pain solved by exercise.

-Exercises that create high levels of force and have relatively low benefits or are inefficient in improving the abilities of stability/control are what we reference as “bad” exercises along those that are contradictions to the injury.

-Those with structural changes may not have pain, but they are more predisposed to having issues in their low back and this must be taken into consideration in the exercise selection.

CONSIDERATIONS FOR THE LOW BACK

-REDUCE RANGE OF MOTION IF NEED BE FOR PAIN FREE MOTION

-YOU DON'T ALWAYS NEED TO GO HEAVIER TO CHALLENGE THE BODY

-YOU DON'T NEED TO GET TO CERTAIN EXERCISES

-PRINCIPLES AND CONCEPTS STAY THE SAME FOR MORE DYNAMIC STRENGTHENING

-MOVEMENT IS ABOUT TIMING AND SEQUENCING MORE THAN STRENGTH

-THE CORE IS A CONNECTOR AND COMMUNICATION SYSTEM OF OUR LOWER TO UPPER BODY

-MOVEMENT PATTERNS ARE OUR BEST OPPORTUNITY TO ENHANCE FUNCTION

-THE TOOL MATTERS

-QUALITY OF THE MOVEMENT IS KEY, POOR FORM= POOR OUTCOME

THANK YOU!

DVRTFITNESS.COM
JESSICA@ULTIMATESANDBAGTRAINING.COM
JESSBENTO_PHYSIOTHERAPIST