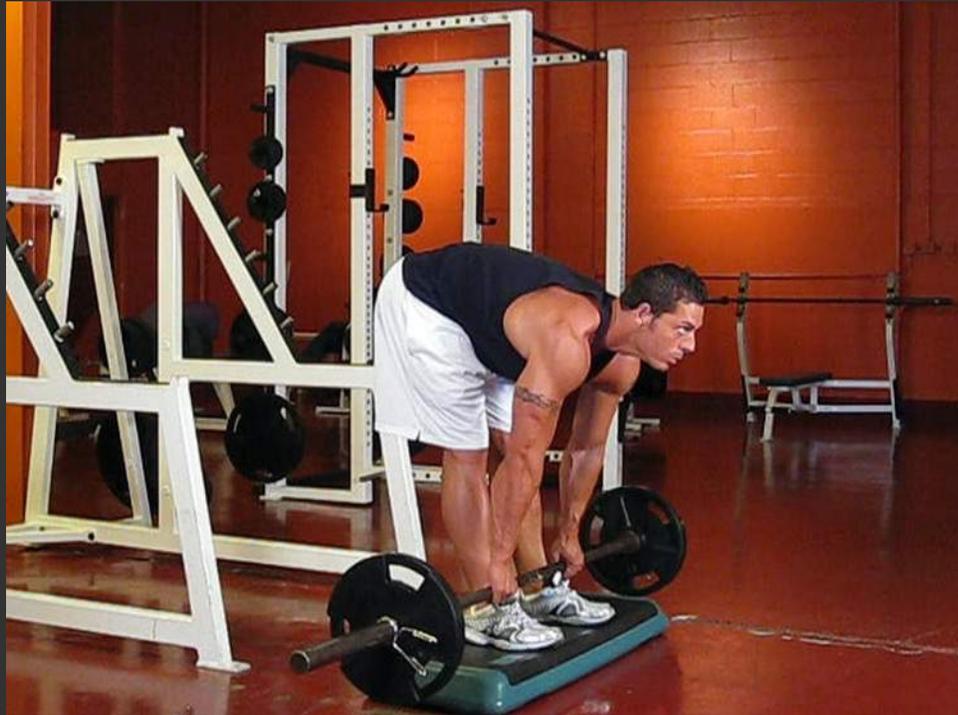


Posterior Chain Strengthening and Low Back Pain: The Low Down

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Background...



Learning Objectives

- Understand the theoretical and evidence-based framework behind strengthening the posterior chain in patients with low back pain
- Identify what patients would be appropriate for incorporating deadlifts into their plan of care
- Demonstrate 5 variations of the deadlift and explain why they place varying amounts of strain on the posterior chain
- Instruct a patient on correct deadlifting form using patient-friendly cueing

Where we are going

The “what” and “why”



When to use/NOT use



Types of Deadlift



Lab

Definitions (the “what”)

- **Posterior Chain:** muscles found within the posterior thoracic, lumbar, and hip regions
- **The “core”:** region between chest and knees involved in stabilizing the trunk and hips
- **Deadlift:** Lifting a load from the ground to the level of the hips in a safe, controlled manner
- **Low Back Pain:** Pain localized above the gluteal fold and below the costal margin

Evidence (the “why”)

Exercise vs. “other” conservative care for LBP²

- Meta-analysis of 45 studies
- Small but significant benefit of exercise compared to other interventions

Which mode of exercise is best?³

- Network meta-analysis of 82 studies
- Pilates, motor control/stabilization, resistance training, aerobic exercise

Evidence (the “why”)

Posterior Chain Resistance Training vs. General Exercise for CLBP¹

- Significantly greater improvement in PCRT than GE for **all** outcomes
 - Pain, disability, and muscular strength
- Longer duration (12-16 weeks) → greater difference between groups
- **No difference** in adverse events

Evidence (the “why”)

Free weight resistance training for CLBP (Deadlifts!!)⁴

- Cohort Study
- 30 participants (mean age = 39.6 +/- 12.4 years)
 - Chronic LBP (>3 mos), with or without radicular sx (excluded dx spinal conditions)
- 3 training sessions per week for 16 weeks (included patient education, free weight exercises and external cueing)
- Results:
 - Significant **reductions** in pain, disability, fat infiltration in lumbar paraspinals
 - Significant **improvement** in strength endurance (not max strength)

When should I use deadlifts?

When to use:

- Pain intensity <6/10
- Biering-Sorensen Test: >60 seconds
- Low level of disability (ODS)
- Indicated by functional goal

When NOT to use:

- High levels of pain or disability
- Low Biering-Sorensen Score
- High levels of fear + anxiety
- Patient unable to safely perform

Biering-Sorensen Test

- Test for back and hip extensor **endurance**
- Testing how long patient can hold neutral spine with unsupported trunk
- Subjects with low back pain have significantly decreased hold times

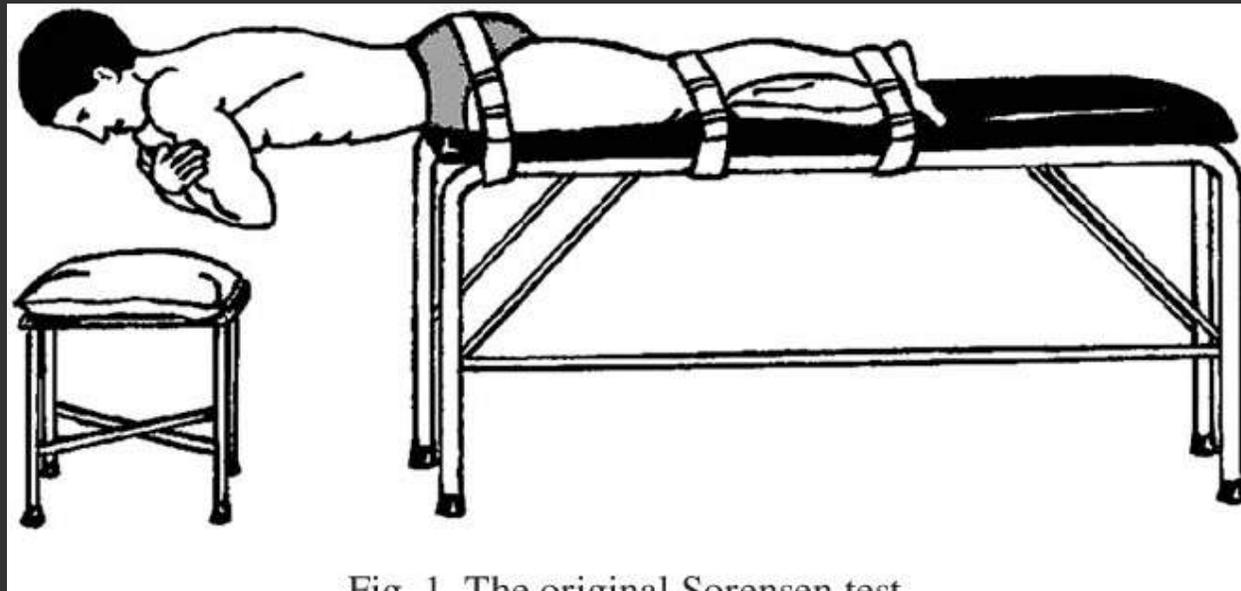


Fig. 1. The original Sorensen test

Types of Deadlifts

A spectrum of loading

The Spectrum of Deadlifts

Conventional DL



Sumo DL

Trap Bar DL

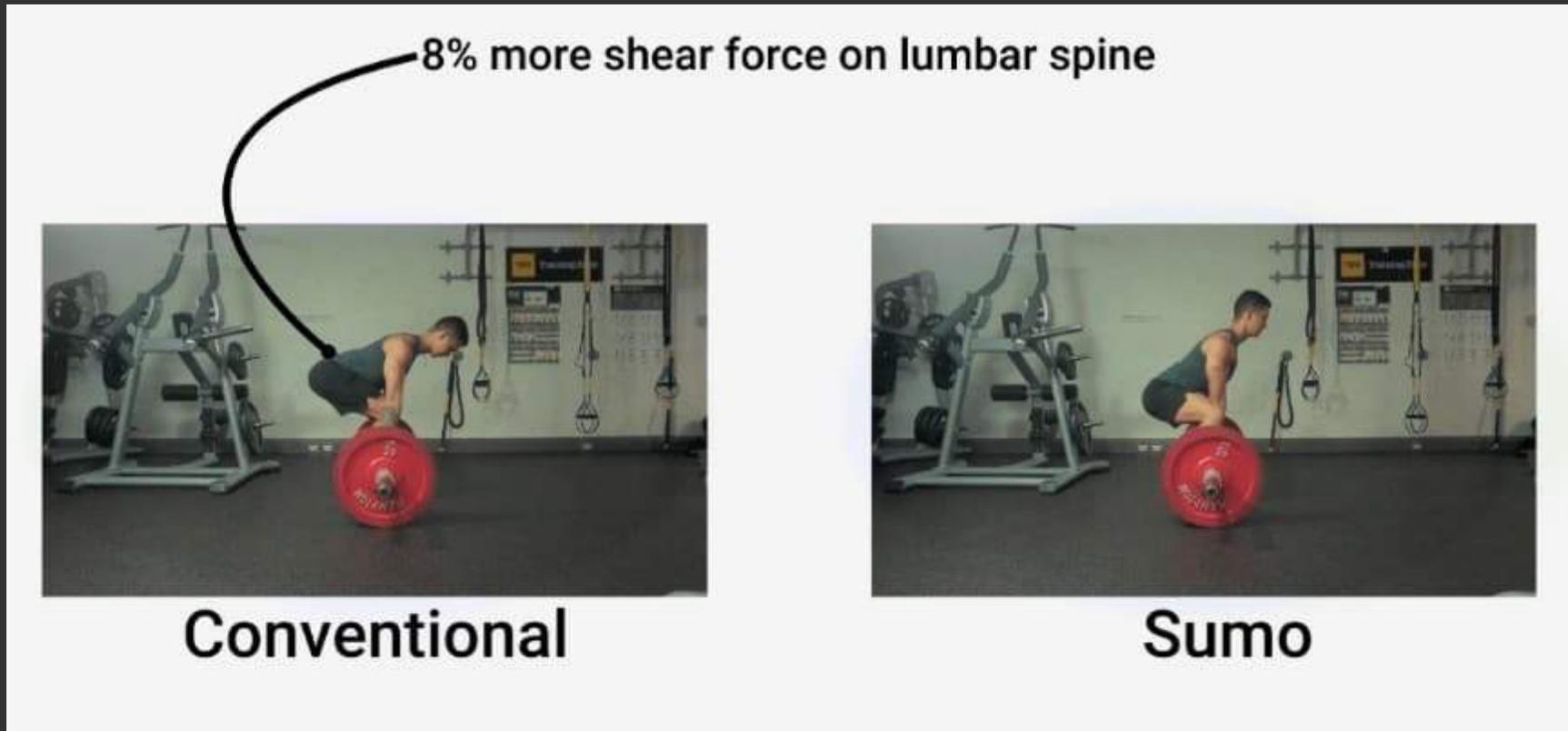
Deficit DL

Stiff Leg DL

← Lowest Stress on LB

→ Greatest Stress on LB

The Spectrum of Deadlifts



The Spectrum of Deadlifts

Sumo DL



Trap Bar DL



Conventional DL



Deficit DL



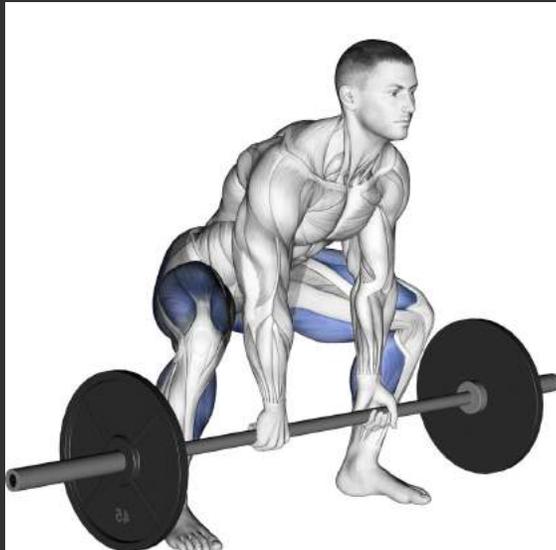
Stiff Leg DL



Sumo Deadlift

Key Features:

- Wider stance
- Arms between legs
- Maintain upright trunk



Functional Activities?



Trap Bar Deadlift

Key Features:

- Hands by your sides
- Maintain upright trunk
 - More leg-dominant



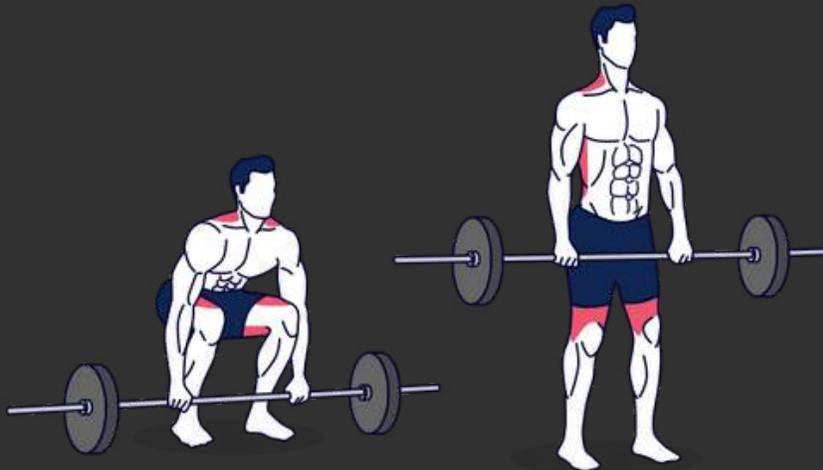
Functional Activities?



Conventional Deadlift

Key Features:

- Narrower stance
- Arms just outside of legs
- Trunk more horizontal



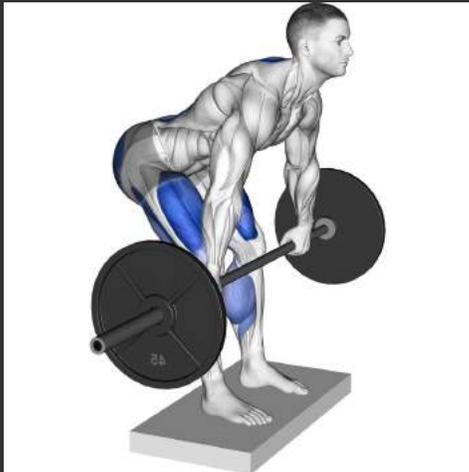
Functional Activities?



Deficit Deadlift

Key Features:

- Feet on elevated surface
- "Conventional" positioning
- Trunk significantly more horizontal to reach weight



Functional Activities?



Stiff Leg Deadlift

Key Features:

- Hinging at hips
- Legs stay “stiff”
 - Requires hamstring flexibility
- Maintain neutral spine



Functional Activities?



How else can we change loading?

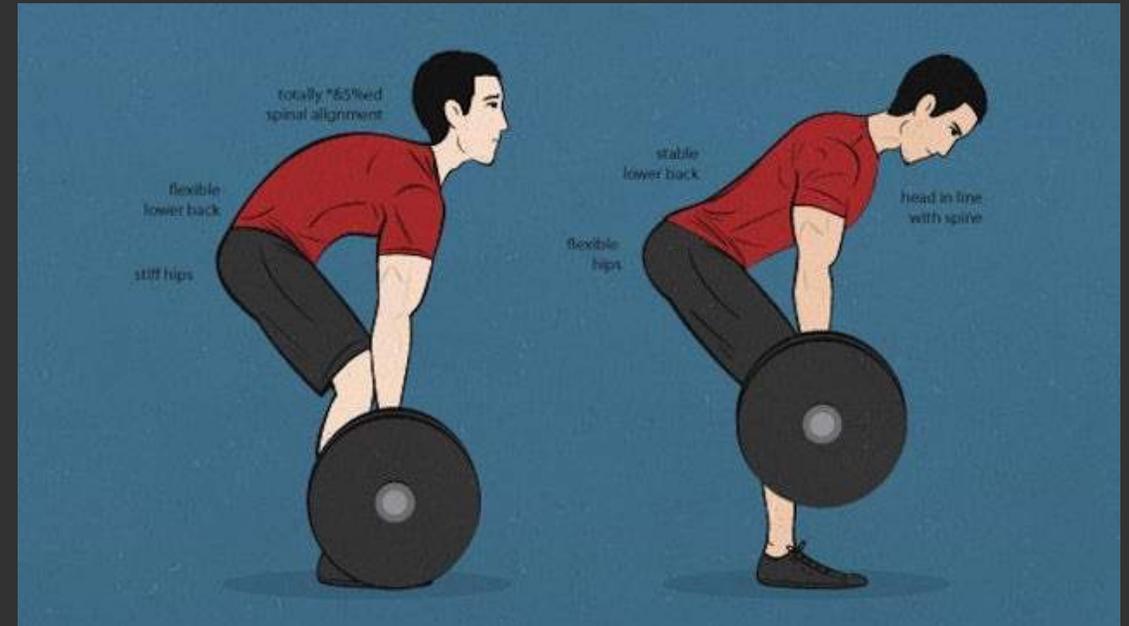
- Weight
 - Resistance bands
 - Chains
- Number of sets/reps
- Speed
- Lift different objects
- Etc.

LAB

- Biering Sorensen Test
- Try all 5 DL variations (with canes!)
- Practice cueing partner

Common Deadlift Cues

- Feet shoulder width apart, bar over midfoot
- Arms right outside of legs
- Shins to barbell
- Pull your hips down
- Shoulder blades over barbell
- Flex your armpits + take slack out of bar
- Push the floor away
- Pull your hips through



References

1. Tatarzyn N, Simas V, Catterall T, Furness J, Keogh JW. Posterior-Chain Resistance Training Compared to General Exercise and Walking Programmes for the Treatment of Chronic Low Back Pain in the General Population: A Systematic Review and Meta-Analysis. *Sports Med Open*. 2021;7(1):17. doi:10.1186/s40798-021-00306-w
2. Searle A, Spink M, Ho A, Chuter V. Exercise interventions for the treatment of chronic low back pain: a systematic review and meta-analysis of randomised controlled trials. *Clin Rehabil*. 2015;29(12):1155-1167. doi:10.1177/0269215515570379
3. Owen PJ, Miller CT, Mundell NL, et al. Which specific modes of exercise training are most effective for treating low back pain? Network meta-analysis. *Br J Sports Med*. 2020;54(21):1279-1287. doi:10.1136/bjsports-2019-100886
4. Welch N, Moran K, Antony J, et al. The effects of a free-weight-based resistance training intervention on pain, squat biomechanics and MRI-defined lumbar fat infiltration and functional cross-sectional area in those with chronic low back. *BMJ Open Sport Exerc Med*. 2015;1(1):e000050. doi:10.1136/bmjsem-2015-000050
5. Berglund L, Aasa B, Hellqvist J, Michaelson P, Aasa U. Which patients with low back pain benefit from deadlift training? *J Strength Cond Res*. 2015;29(7):1803-1811. doi:10.1519/JSC.0000000000000837
6. Latimer J, Maher CG, Refshauge K, Colaco I. The reliability and validity of the Biering-Sorensen test in asymptomatic subjects and subjects reporting current or previous nonspecific low back pain. *Spine*. 1999;24(20):2085-9; discussion 2090. doi:10.1097/00007632-199910150-00004
7. Demoulin C, Vanderthommen M, Duysens C, Crielaard J-M. Spinal muscle evaluation using the Sorensen test: a critical appraisal of the literature. *Joint Bone Spine*. 2006;73(1):43-50. doi:10.1016/j.jbspin.2004.08.002
8. Cholewicki J, McGill SM, Norman RW. Lumbar spine loads during the lifting of extremely heavy weights. *Med Sci Sports Exerc*. 1991;23(10):1179-1186.