Debunking Squat and Deadlift Myths

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Objectives
- Understand the fundamental movement patterns and differences between the squat and hip hinge
- Discuss the role of the squat and deadlift in activities of daily living
- Discuss various myths and misconceptions of each movement pattern

What is a deadlift or hinge?

What is the Deadlift?
- Deadlift – a.k.a., "Hip Hinge"
  - Most fundamental, natural and authentic way to move something heavy in a safe and effective way
  - Fundamental Exercise
    - Modifiable
    - Promotes core stability
    - Demands good posture
    - Promotes shoulder stability
    - Forces the hips to be the main driving force

What is a squat?

What is the Squat?
- Squatting ≠ exercise
- Squatting = movement pattern
- Natural movement used to investigate things and transition from the floor <> standing
  - Culture has changed the squat from a Pattern to an Exercise
  - Moving weight has become more important than moving well
  - Modern solution = modify it to fit our limitations
Squat vs. Deadlift

**Deadlift**
- Hips Back
- Vertical Tibia
- More horizontal trunk

**Squat**
- Hips Down
- Angled Tibia
- More vertical trunk

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**Squat vs. Deadlift**

- Deadlift
  - Not a huge amount of stress onto joints
  - High tension onto fascial slings/muscular system
  - Primary movement for lifting, moving objects and acquiring a good athletic position

- Squat
  - Maxes out a few joints
  - High mobility demand
  - Transitional activity

- “Train the Deadlift; Maintain the Squat” — Gray Cook

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**Myths and the Research**

**The Controversy Begins**


  - Hypothesis:
    - The deep squat exercise will stretch ligaments of the knee and cause knee instability
  - Methods:
    - 128 experienced weightlifters who did full squats and 386 subjects who did not compete in weightlifting nor did full squatting
    - The study used a device, which Klein had built, to measure the amount of medial or lateral give in the knee

  - Results
    - Greater MCL and LCL instability in weightlifters when compared to controls
  - Conclusions
    - Deeps squats will cause increased instability of the knee
    - Parallel squats should be used in place of deep squats

- "Squats have a debilitative effect on the ligament structures of the knee..."
The Klein Fallout

- Highlights of the study were published widely in lay-journals
- Thousands of coaches who were suspicious of weightlifting felt vindicated
- General acceptance in the medical community of Klein’s data
- U.S. Marine Corps recommended the removal of squats from the physical fitness program

Assumption:
Klein’s tests are reliable and valid

- Henning et al., (1985)
  - “The squat generated lower ACL strain compared with walking or jogging, it was concluded that the squat was a low risk exercise in rehabilitation of the ACL”
- Steiner et al., (1986)
  - “In conclusion, basketball players and distance runners experienced a transient increase in anterior and posterior laxity during exercise. Powerlifters doing squats did not demonstrate a significant change in laxity”
  - No increased laxity in powerlifters
  - Increased laxity in basketball players and runners

Shear and Compression?

- Anterior and Posterior shear forces increased with depth of squats but within tolerable limits for intact PCL/ACL
- Shear and compressive forces on the knee increase with speed of descent, load and fatigue
- Shear and compressive forces are reduced in experienced lifters
  - Escamilla et al., 2000
- Higher relative posterior shear forces are the result of initiating the turning point of the squat at 80-90 degrees as compared with the deep squat at 130 degrees

When to avoid training the squat?

- Mobility restrictions
  - Restrictions of the ankle, knee or hip
- Pathologies
  - Meniscus injuries
  - PCL involvement
  - Hip impingement (labral tear or bone spur)
  - Chondromalacia patella (depending on location)
  - Advanced symptomatic osteoarthritis
All squats should look the same, right?

No, not really...

- Phylogenetics
  - Evolutionary history of our species
    - The way our bodies have evolved over time has resulted in the movement pattern of the deep squat

- Ontogenetics
  - Developmental history of an individual
    - Interaction of genetics, developmental programming, and environment on physical form throughout a lifespan
    - Culture plays a huge role on whether we can squat effectively

Example

2-year old
Phylogenetics

70-year old
Ontogenetics

“Squatting is not bad for your knees; the way you are squatting is bad for your knees”

Squat Variations

- All the same pattern but different variations:
  - “Natural” Bodyweight Squat
  - Goblet Squat
  - Split Squat
  - Barbell Back Squat – hi and low bar
  - Barbell Front Squat
  - Box Squat
  - Safety Bar Squat
  - Belt Squat
Squatting Hurts! Can I just do machines instead?

- Double or Single-leg Squat
  - Increased co-contraction of Quad:HS
  - Increased neuromuscular adaptation and stability demands
    - Increased performance in speed-strength tests as compared to machine strengthening
- Leg Press / Smith Machine
  - Increased ease of use with less stability demands
  - Quadriceps dominant activity
  - Similar tibiofemoral compressive and shear forces as compared to squatting
  - Less posterior shear forces noted – PCL rehabilitation

I’m pretty sure deadlifting will hurt my back

- Partially False
  - Lifting with inadequate mobility/stability, technique and preparation or readiness will injure the back

Lifting with pre-requisite abilities can provide protection for those who have previously injured their back

- Psychological assistance
  - Final step in back rehab program
  - Assist with regaining confidence in their back
  - Feel a load distributed across the tissues of the back, hips, and legs.
Squatting and deadlifting are not appropriate for a person my age!!

- **False**
  - **Wolff’s Law**: if you never load you never grow
  - **Osteogenesis**
  - **Critical automatic balance reactions**
    - Increased fall risk without the ability to hinge at the hips (squatting, lunging, deadlifting)
    - Improvement in:
      - Ankle Balance strategy = squat
      - Posterior weight shift = deadlift
      - Single leg weight-shift or step-strategy = lunge
  - **Reduces movement substitution and compensations**
    - Increased movement compensation = repetitive micro-trauma to joints

Grandma’s purse, suitcase or grandchild is heavier than most of the weights that we get them to lift

**TRAIN FOR DAILY LIFE – NOT LIFTING COLORFUL WEIGHTS**

**Summary**

- Negative attitudes towards squats are the result of generations of misinformation and “meathead” approaches to teaching squat and deadlift technique
- Hip hinging and squatting are movements before they are exercises
- Safe when trained appropriately
- Appropriate for all ages if proper progressions or modifications are made

Questions, Thought, Concerns, or just want to Chat?

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**References**

References


“Squatting is not bad for your knees; the way you are squatting is bad for your knees”

The Klein Fallout

• Klein’s findings were not valid, accurate or reliable
• Klein’s findings have been handed down through generations of coaches, doctors, PE instructors and everyday people
• Once something is in print, no matter how inaccurate it may be, it can take years to remove the damage that it may cause

Restriction of forward knee displacement increases anterior shear force on intervertebral discs and tensile force on intervertebral ligaments.

— Potvin, McGill

• Ankle
  — Weakness of medial gastroc, tib. Anterior, or tib. Posterior may decrease ability to control knee valgus and foot pronation motions
  — Mobility deficits into DF can lead to a heels elevated squat leading to increased ACL strain and dynamic valgus of the knee

• Hip
  — Forward trunk lean significantly increases hip torque during squatting (302.7N vs. 28.2N)

• Spine
  — Squatting with a flexed lumbar spine decreases the moment arm for the lumbar erector spinae, reduces tolerance to compressive load, and results in a transfer of the load from muscles to passive tissues, heightening the risk of disc herniation
  — Flexed lumbar spine increases shear forces of intervertebral vertebras
  — Increased IAP = Decreased lumbar load and improved spinal stabilization