Weightlifting Derivatives: Technique, Variations, and Practical Application

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Objectives

• Weightlifting (WL) movements introduction

• Technique and coaching of WL pulling derivatives

• Speed development example using WL pulling derivatives
Introduction

- Weightlifting (WL) movements
  - “Olympic lifts”
  - Catching derivatives
  - Pulling derivatives

- Pulling derivatives
  - Remove the catch phase
  - Performed from different starting positions (floor, knee, mid-thigh)
  - Similar (Comfort et al., 2011a; 2011b) or greater (Suchomel et al., 2014a; 2016) force, velocity, power, etc. compared to catching derivatives
Technique and Coaching of WL Pulling Derivatives

Hands-On
WL Technique Literature

- Countermovement shrug (DeWeese et al., 2012a)
- Hang high pull (Suchomel et al., 2014b)
- Jump shrug (Suchomel et al., 2014c)
- Mid-thigh pull (DeWeese et al., 2013)
- Pull from the floor (DeWeese et al., 2012b)
- Pull from the knee (DeWeese et al., 2016)

*Each pulling derivative may be part of the teaching progression for the full WL movement*
Mid-Thigh Pull

• **Advantages**
  - Low complexity
  - Small load displacement
  - May use > 100% 1RM of catching derivative
  - Performed from strongest WL position

• **Disadvantages**
  - Predominantly a concentric-only movement
  - Upright postural strength

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Mid-Thigh Pull

Begin at mid-thigh/power position using clean or snatch grip

- Bar resting between upper thigh and hip crease
- Upright torso, shoulders back, and elbows rotated out and locked
- Brace trunk before extension

Extend hips, knees, and ankles aggressively and “pop” the shrug

- Shoulder shrug should be upward and slightly behind the ears
- Athletes should be taught to slightly flex wrists to keep bar close to body
- Elbows should remain “long and locked”

Flex knees and absorb the weight when returning the bar to mid-thigh
Countermovement Shrug

• Advantages
  • Low complexity
  • Small load displacement
  • May use > 100% 1RM of catching derivative

• Disadvantages
  • Postural strength during countermovement
Countermovement Shrug

Begin standing in an upright position with knees completely extended
  • Upright torso, shoulders back, and elbows rotated out and locked
  • Brace trunk before descending into mid-thigh/power position

Drop into the mid-thigh/power position
  • Maintain upright torso and locked elbows

Extend hips, knees, and ankles aggressively and “pop” the shrug
  • Shoulder shrug should be upward and slightly behind the ears
  • Athletes should be taught to slightly flex wrists to keep bar close to body
  • Elbows should remain “long and locked”

Flex knees and absorb the weight when returning the bar to mid-thigh
Clean / Snatch Pull from Knee

• **Advantages**
  • Decreased load displacement
  • May use > 100% 1RM of catching derivative

• **Disadvantages**
  • Requires large postural strength
  • May require additional apparatuses such as lifting blocks
Clean / Snatch Pull from Knee

Starting position: knees slightly bent, hip flexion, flat back, arms locked, and chest elevated

• Bar positioned in front of the patellae, but not touching
• Bar positioned over the mid-foot of athlete
• Shoulders of athlete positioned over the bar
• Brace torso before transition to mid-thigh/power position

Transition bar to mid-thigh/power position

• Hips and knees move forward at same tempo as the torso becomes upright
• Bar should move “up and into” the body

Extend hips, knees, and ankles aggressively and “pop” the shrug

• Shoulder shrug should be upward and slightly behind the ears
• Athletes should be taught to slightly flex wrists to keep bar close
• Elbows should remain “long and locked”

Flex knees and absorb the weight when returning the bar to mid-thigh
Hang High Pull

• **Advantages**
  • High velocity movement
  • Emphasizes triple extension

• **Disadvantages**
  • Moderate complexity
  • Large load displacement
  • Load may be limited to 1RM of catching derivative
Hang High Pull

Begin at mid-thigh/power position using clean or snatch grip

- Bar resting between upper thigh and hip crease
- Upright torso, shoulders back, and elbows rotated out and locked
- Brace trunk before countermovement

Countermovement: lower bar to above the knee and transition to mid-thigh/power position

- Flex forward at the hip while maintaining knee angle, elevated chest, and locked elbows and lower bar to just above the patellae
- Return to mid-thigh by shifting hips and knees forward (double knee bend movement) at same tempo as the torso becomes upright
- Bar should move “up and into” the body

Extend hips, knees, and ankles aggressively and “pop” the shrug

- Shoulder shrug should be upward and slightly behind the ears
- Athletes should be taught to slightly flex wrists to keep bar close
- Elbows should remain “long and locked”

Elevate the bar to chest height

- Lead with the elbows and keep the bar close to the body
- The bending of the arms should be a continuation of the triple extension movement
- Avoid flexing the hips and knees (i.e. dipping) to reach chest height
- “Finish tall”

Flex knees and absorb the weight when returning the bar to mid-thigh after reaching chest height
Jump Shrug

• Advantages
  • Most ballistic WL derivative in nature
  • Emphasizes triple extension

• Disadvantages
  • Moderate complexity
  • Load may be limited to 1RM of catching derivative
  • The individual must land
Jump Shrug

Begin at mid-thigh/power position using clean or snatch grip

- Bar resting between upper thigh and hip crease
- Upright torso, shoulders back, and elbows rotated out and locked
- Brace trunk before countermovement

Countermovement: lower bar to above the knee and transition to mid-thigh/power position

- Flex forward at the hip while maintaining knee angle, elevated chest, and locked elbows and lower bar to just above the patellae
- Return to mid-thigh by shifting hips and knees forward (double knee bend movement) at same tempo as the torso becomes upright
- Bar should move “up and into” the body

Extend hips, knees, and ankles aggressively

- “Jump as high as possible” and shrug
Clean / Snatch Pull from Floor

• **Advantages**
  • Foundational exercise
  • May use > 100% 1RM of catching derivative

• **Disadvantages**
  • Moderate complexity
  • Moderate load displacement
  • Requires large postural strength
Clean / Snatch Pull from Floor

• Starting position: flexed hips and knees, elevated chest, elbows turned out and extended, and hips raised slightly above the knees
  • Shoulders should be slightly over (i.e. covering) the bar
  • The bar should be positioned over mid-foot
  • Brace trunk before initial pull off of the floor

• First pull to knee
  • Knees should extend and be pushed back while hips rise minimally and are pushed back
  • Back angle should remain similar to the starting position with the shoulders remaining slightly over the bar

• Transition bar to mid-thigh/power position
  • Hips and knees move forward at same tempo as the torso becomes upright
  • Bar should move “up and into” the body

• Extend hips, knees, and ankles aggressively and “pop” the shrug
  • Shoulder shrug should be upward and slightly behind the ears
  • Athletes should be taught to slightly flex wrists to keep bar close
  • Elbows should remain “long and locked”

• Flex knees and absorb the weight when returning the bar to mid-thigh
Speed Development Using WL Pulling Derivatives

Demonstration and Practical Application
Using Pulling Derivatives for Speed Development

**Acceleration**
- Strength Endurance
  - Clean/Snatch Pull from Floor*
  - Clean/Snatch Pull to Knee
  - Clean/Snatch Grip Shrug

**Maximal Strength**
- Maximal Strength
  - Clean/Snatch Pull from Floor
  - Clean/Snatch Pull from Knee
  - Mid-Thigh Pull

**Absolute Strength**
- Absolute Strength
  - Clean/Snatch Pull from Floor
  - Clean/Snatch Pull from Knee
  - Mid-Thigh Pull
  - CM Shrug
  - Hang Power Clean/Snatch
  - Power Clean/Snatch

**Strength Speed**
- Strength Speed
  - Clean/Snatch Pull from Floor
  - Clean/Snatch Pull from Knee
  - Mid-Thigh Pull
  - CM Shrug
  - Jump Shrug
  - Hang Power Clean/Snatch
  - Power Clean/Snatch

**Competition Speed**
- Competition Speed
  - Clean/Snatch Pull from Floor
  - Clean/Snatch Pull from Knee
  - Mid-Thigh Pull
  - CM Shrug
  - Jump Shrug
  - Hang High Pull
  - Hang Power Clean/Snatch
  - Power Clean/Snatch
  - CM Clean/Snatch

Modified from DeWeese et al., 2014

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Acceleration

• Knee angles in the starting blocks or 3 point stance
  • 90° (front foot) and 120° (back foot) (Mero et al., 1983)
  • Angles mimicked by WL derivatives that start from the floor (Kipp et al., 2012)

• Given the speed development goals, it is important to consider which derivatives are foundational

• Must consider fatigue during strength-endurance phase
  • WL pulling derivatives may serve as better alternatives
  • Technique during catching derivatives may break down after 4-6 reps (Häkkinen et al., 1984; Hardee et al., 2012)
Acceleration

• HOLD ON! What about the horizontal component?
  • Consider the position and movement sequence of the athlete
    • Horizontal to ground, but vertical relative to athlete
Transition

• Amount of knee flexion during ground contact becomes smaller as the athlete becomes more upright

• Important to implement WL derivatives that train through the angles specific to the transition phase
  • Forward lean position
  • Upright position

• Consider purpose of maximal and absolute strength phases
  • High force production
  • Begin RFD development
Transition

- High force production
  - Use of heavier loads
  - Movement specific

- Begin RFD development
  - Moderate-heavy loads
  - Higher velocity
  - Movement specific
Max Velocity

• Knee angle at top speed
  • 120-140° (Mann, 2013; Mero et al., 1992)

• Upright position with a short ground contact time requires implementing derivatives that produce high magnitudes of force and RFD

• Strength training goals require moving heavy and light loads quickly (i.e. higher velocities)
  • Combination loading (Haff & Nimphius, 2012)
Max Velocity

• Strength-Speed
  • Moving heavy loads quickly
  • Angle specificity

• Speed-Strength
  • Moving light loads quickly
  • Angle specificity
  • Most ballistic in nature

• Load absorption component
Take Aways

• WL pulling derivatives are less complex with regard to technique compared to catching derivatives

• WL derivatives can be implemented effectively to improve sprint speed

• A sequenced progression of WL derivatives may be implemented based on:
  • Goals of resistance training and speed development phases
  • Force-velocity characteristics of each derivative
  • Movement characteristics of speed phase
    • Angle specificity of joints
    • Movement pattern (i.e. coordination)
Thank you!