Wrestling: Biomechanics and Related Injuries

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NO DISCLOSURES
Objectives

• Brief history, popularity, terminology and relevant rules
• Evaluate wrestling specific movements via motion analysis as they relate to common injuries
• Applying general concepts to treatment plans
Wrestling Basics

YA BASIC!
Wrestling Basics: Brief History

• Considered the oldest sport
• Can be traced to artwork from Babylonia and Egypt in 3000 BCE
• Most popular from ancient Greeks; part of the first Olympic games in 776 BCE
Wrestling Basics: Popularity

• 2017-2018 USA stats:
  – Boys 245,564 (+0.5%)
    • 7th most popular
  – Girls 16,562 (+13.5%)
    • 8th most popular
Wrestling Basics: Terminology

• Positions:
  – Neutral
  – Referee’s position
    • Top
    • Bottom
Wrestling Basics: Terminology

• Styles:
  – Greco-Roman: upper body only; Olympic, international
  – Freestyle: collegiate, Olympic, international
  – Folkstyle: high school and youth
Wrestling Basics: Relevant Rules

• Kansas rules:
  – Alpha Weigh In: establishes initial weight prior to start of season
  – Hydration assessment: at Alpha weigh in, must submit urine sample proving adequate hydration
Wrestling Basics: Relevant Rules

• 8 Percent Rule:
  – May not lose more than 8% of the Alpha Weight, unless cleared by physician
  – Must still pass hydration assessment

• Growth allowance: 2lbs above certified weight after Jan. 1st
Wrestling Biomechanics
Wrestling Biomechanics: Disclaimer

• 3D motion analysis is limited due to data collection process
• Lack of opponent effects affects accuracy of joint measurements
Wrestling Biomechanics: Disclaimer

- Cervical biomechanics not discussed but are a very important aspect in wrestling
- Zuckerman et al. (2015) found wrestling to have the highest concussion rate
Wrestling Biomechanics: Elbow

Move:
2 on 1

Joint of interest:
Elbow (defense)
Wrestling Biomechanics: Elbow
Wrestling Biomechanics: Elbow

- Thomas et al. (2018) found the UE injury rate to be 24-31%
- Elbow injuries tend to be less common but more severe
  - 8% of all injuries
  - Most common: UCL sprain
Wrestling Biomechanics: Hip and Trunk

Move: Sprawl

Joint of interest: Hip and trunk
Wrestling Biomechanics: Hip and Trunk
Wrestling Biomechanics: Hip and Trunk

• Trunk/hip flexion goes through near 110 degrees of total ROM
  – Starting approx. 90deg of flexion finishing at approx. 20deg of extension

• Low back pain: typically chronic in nature due to flexed posture and repeated movement patterns
Wrestling Biomechanics: Hip and Trunk

• Limited research on lumbar/hip injuries of wrestlers
• Estwanik et al. (1980) found that 25% of wrestlers with reported LBP had spondy
• Rossi & Dragoni (1990) found 29.8% with reported LBP had spondy
Wrestling Biomechanics: Knee and Ankle

Move:
Double leg takedown

Joint of interest:
Ankle and knee
Double Leg Takedown: Knee and Ankle
Wrestling Biomechanics: Knee and Ankle

- Max knee flexion 147 degrees
- Thomas et al. (2018) states the most frequent injuries are to the lateral meniscus and medial collateral ligament.
Wrestling Biomechanics: Knee and Ankle

• Hewett et al. (2005) found ankle injuries range from 3.2-9.7% of all injuries
• Max knee ankle dorsiflexion is approximately 31 degrees
• If a wrestler is lacking proper ankle mobility, high likelihood of increased stress to knee/foot
Wrestling Biomechanics: Shoulder

Move:
Fireman’s carry – straight line

Joint of interest:
Shoulder
Wrestling Biomechanics: Shoulder
Wrestling Biomechanics: Shoulder
Wrestling Biomechanics: Shoulder

• Hewett et al. (2005) states 24% of all injuries
• Approx. 95 degrees of shoulder external rotation – unopposed!
• Internal reaction forces from opponent
Wrestling Biomechanics: Shoulder

• While in 95 degrees of external rotation transitions into combined 90/90
• Again this is UNOPPOSED
Clinical Applications

Science is whatever we want it to be.
Clinical Applications

• Unique postures and positions require specific treatment programs
• Understanding the physical demands wrestlers endure helps to guide treatment
Clinical Applications

- Inverse relationship of injury risk and experience
- Pasque & Hewett (2000) found that injured wrestlers had 32% more experience
Clinical Applications

• A passion sport
• Because so much invested, injuries can seem more devastating
THANK YOU
Sources