LEARNING OBJECTIVES

- Define medicine ball training and list the four primary components

- Identify and describe each sub-component within the four primary components of medicine ball training

- Describe the performance and injury prevention benefits associated with medicine ball training

- Identify and design effective medicine ball programming relative to individual differences and session demand
What do we think about when we hear rotational power and kinetic linking?

Transfer to light objects...
Transfer to heavier objects...

Transfer through an implement...
Transfer into an opponent...

01

MEDICINE BALL: DEFINED
DEFINING MEDICINE BALL TRAINING

Drills involving implement propulsion, aimed at linking optimal strength and speed during fundamental movement patterns

Characterized by the projection of an implement in a ballistic manner

Ballistic movements involve the transfer of force into an object, implement, or opponent
Ballistic movements are dependent on the generation and transfer of force from proximal segments to distal segments.

**MEDICINE BALL COMPONENTS**

- **STANCE**: Dictates the complexity of the motor task and magnitude of force that can be generated.
- **DIRECTION**: Dictates the dominant force vectors and sequence of force transfer through the body.
- **INITIATION**: Dictates contraction type and the resulting speed-strength quality adaptation.
- **BALL**: Load/type of ball is associated with the initiation and speed-strength quality adaptation.
MEDICINE BALL: STANCE

**TALL KNEELING**  Action takes place from a kneeling position where both knees are on the ground

**HALF KNEELING**  Action takes place from a position where the back knee is on the ground and the front foot is on the ground in a linear orientation

**BASE POSITION**  Action takes place from a position where feet are parallel and shoulder width apart

**SPLIT POSITION**  Action takes place from a split squat position where the feet are split forward and back

**SINGLE LEG**  Action takes place with one leg on the ground an the free leg in a flexed position

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**STANCE**

Tall Kneeling Horizontal Chest Pass  Base Position Horizontal Chest Pass
**01 STANCE**

Split Position Horizontal Chest Pass  
Single Leg Horizontal Chest Pass

**MEDICINE BALL: DIRECTION**

- **LINEAR**  
  Action takes place within sagittal plane with an emphasis on vertical or horizontal motion

- **ROTATIONAL Parallel**  
  Action takes place within transverse plane with a parallel orientation to a wall and horizontal emphasis

- **ROTATIONAL Perpendicular**  
  Action takes place within transverse plane with a perpendicular orientation to a wall and horizontal emphasis
02 DIRECTION: LINEAR HORIZONTAL

Tall Kneeling Lin-Horiz Overhead Pass

Base Position Lin-Horiz Overhead Pass

02 DIRECTION: LINEAR VERTICAL

Squat to Lin-Vert Throw

Lin-Vert Granny Toss
02 DIRECTION: ROTATIONAL-PARALLEL

Base Position Parallel Rot-Horiz Throw

Split Position Parallel Rot-Horiz Throw

02 DIRECTION: ROTATIONAL-PERPENDICULAR

Base Position Perpendicular Rot-Horiz Throw

Split Position Perpendicular Rot-Horiz Throw
MEDICINE BALL: INITIATION

- **NON COUNTER-MOVEMENT**: No lengthening action prior to shortening action (Concentric only)

- **COUNTER-MOVEMENT**: Rapid lengthening action prior to an immediate shortening action (SSC)

- **CONTINUOUS**: Linking multiple SSC repetitions together in quick succession

MEDICINE BALL: BALL

- **LOAD**: Impacts speed of movement and resultant speed-strength adaptation

- **NON-REACTIVE**: Ball type that has minimal reactive qualities and is best used for concentric dominant progressions

- **REACTIVE**: Ball type that has strong reactive qualities and is best used for SSC dominant progressions
List the 4 primary components of medicine ball training and the associated 3-5 sub-components

Write down 3-5 different medicine ball training movements using the appropriate labeling
MEDICINE BALL: Primary Goal

Develop three dimensional power using integrated upper body and total body movements that emphasize the ability to generate and resist rotational forces.
MEDICINE BALL: PERFORMANCE BENEFIT

- Improved coordination in movements demanding high rate of force development in three planes of motion (i.e. rotational power)

- Improved ability to control and decelerate rotational forces in a diversity of positions

- Improved kinetic linking through enhanced ability to generate and transfer force through the body

Force: 7000N (1500lbs)

Velocity: 7.1m/s (16mph)

(Sidthilaw, 1996)
180lbs = 81.81kgs = 800N

Bat Speed: 31m/s (69mph)

Shoulder: 937°/s

Hip: 714°/s

$F_T = 984N$ (221lbs)

Adding total body/rotational med-ball training to a periodized resistance program results in superior rotational strength and rotational med-ball throwing performance compared to the same program without

(Welch et al., 1995)

(Szymanski et al., 2007)
During conventional barbell training the last 24-52% of the movement can be spent decelerating the bar. This does not occur during medicine ball training due to the ballistic nature and the ability to release the ball. (Newton & Kraemer, 1994; Newton et al., 1996)
**MEDICINE BALL: SECONDARY GOAL**

Decrease risk of injury through increased tolerance to stretch loads at various speeds, loads, and directions

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**MEDICINE BALL: INJURY PREVENTION BENEFIT**

- Improved ability to transfer energy through the joints and minimize energy leaks
  - Prevents movement compensations and optimizes sustainability
- Improved ability to control rotation and decelerate during total-body rotational movements
  - Striking, Throwing, Kicking, Cutting, Running

(Boden et al., 2000 and Stodden et al., 2009)
↓ Energy leaks = ↑ kinetic linking
(optimal transfer of force)

Trunk control and the ability to re-stabilize after a lateral force has been removed is predictive of knee injuries in collegiate athletes

(Zazulak et al., 2007)
CHECK FOR LEARNING

- Write down 3-5 sentences describing the role of medicine ball training in improving performance in rotation dominant movements (ex. throwing)

- Write down 3-5 sentences describing the role of medicine ball training in preventing non-contact injuries (ex. ACL injury)
### PROGRAMMING CONSIDERATIONS

- **Frequency**
- **Volume**
- **Intensity**
- **Movements**

### FREQUENCY, VOLUME & INTENSITY

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>VOLUME</th>
<th>INTENSITY</th>
<th>MOVEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly: x2</td>
<td>Throws (L/R):</td>
<td>Sets/Reps:</td>
<td>Mov/Stance: 3-5</td>
</tr>
<tr>
<td>(15-20min)</td>
<td>90-120/session</td>
<td>2-3sets/8-10reps</td>
<td>Directions: 1-2</td>
</tr>
<tr>
<td>Focus:</td>
<td>Total: ≤240/wk</td>
<td>Rest Set/Session: &lt;90s/72hrs</td>
<td>Initiations: 1-2</td>
</tr>
<tr>
<td>Speed-Strength</td>
<td></td>
<td></td>
<td>Ball: NR or R</td>
</tr>
</tbody>
</table>

| Weekly: 4x  | Throws (L/R):   | Sets/Reps:                | Mov/Stance: 2-3            |
| (5-15min)   | 50-60/session   | 1-2sets/8-10reps          | Directions: 1-2            |
| Focus:      | Total: ≤ 240/wk | Rest Set/Session: <90s/24hrs | Initiations: 1-2          |
| Activation  |                 |                           | Ball: NR or R              |
### METHODS

<table>
<thead>
<tr>
<th>INTENSITY</th>
<th>LINEAR Vertical to Horizontal</th>
<th>ROTATIONAL Parallel</th>
<th>ROTATIONAL Perpendicular</th>
</tr>
</thead>
</table>

### EXAMPLE PROGRAMMING: MEDICINE BALL

#### MED-BALL: Linear Emphasis

**Novice Athlete (4x per week)**

- **Movement 1:**
  - Lin-Vert Squat to Throw
  - CM/Non-Reactive Ball
  - 2 x 10 repetitions

- **Movement 2:**
  - Base Position Lin-Horiz Chest Pass
  - Single/Reactive Ball
  - 2 x 10 repetitions

- **Movement 3:**
  - Split Position Lin-Horiz Chest Throw
  - NCM/Non-Reactive Ball
  - 2 x 5 repetitions each

**Total Throws: 60**

#### MED-BALL: Rotational Emphasis

**Advanced Athlete (2x per week)**

- **Movement 1:**
  - Base Position Parallel Rot-Horiz Throw
  - NCM/Non-Reactive Ball
  - 2 x 10 repetitions each

- **Movement 2:**
  - Split Position Parallel Rot-Horiz Throw
  - Continuous/Reactive Ball
  - 2 x 5 repetitions each

- **Movement 3:**
  - Base Position Perp. Rot-Horiz Throw
  - Continuous/Reactive Ball
  - 2 x 10 repetitions each

**Total Throws: 100**
CHECK FOR LEARNING

+ Create a single 10 min medicine ball program with a rotational emphasis based on 4x week volume load considerations
(Note: Only create the medicine ball portion and include as much detail on volume and intensity as possible)
GUIDELINES

- Stance (Tall Kneeling – Base – Single Leg)
  - More Stable to Less Stable
- Direction (Linear – Parallel - Perpendicular)
  - General to Specific (Vertical & Horizontal)
- Initiation (NCM – CM – Continuous)
  - Low Force to High Force (Progression & Continuum)
- Ball (Non-Reactive Ball – Reactive Ball)
  - Low Load (4-6lbs) to High Load (18-20lbs)

Stance is selected based on the level of athlete and the specific movement characteristics in need of development (movement skills & sport).
Movement directions are selected based on the level of athlete (linear to rotational) and the specific directional force characteristics in need of development (movement skills & sport).

Movement initiations (NCM to Continuous) and ball (Non-Reactive to Reactive) are selected based on the level of athlete and the specific speed-strength characteristics in need of development (strength & movement skills).
APPENDIX


