The Dancer's Hip

Andrea N. Lasner, MSPT

Pilates Certified Practitioner

Performing Arts Physical Therapy Program Coordinator

The Johns Hopkins Hospital

I have nothing to disclose regarding potential conflict of interest in this presentation

Objectives

- Common Hip Injury Prevalence in dancers
- Biopsychosocial considerations when working with dancers
- Basic review of hip anatomy and biomechanics
- Pathogenesis of the dancer's hip
- Why is hip turnout so important to the dancer
- Evaluation and examination of the dancer
- Dance Movement Analysis of the hip with basic dance movement
- Pilates- based treatment intervention

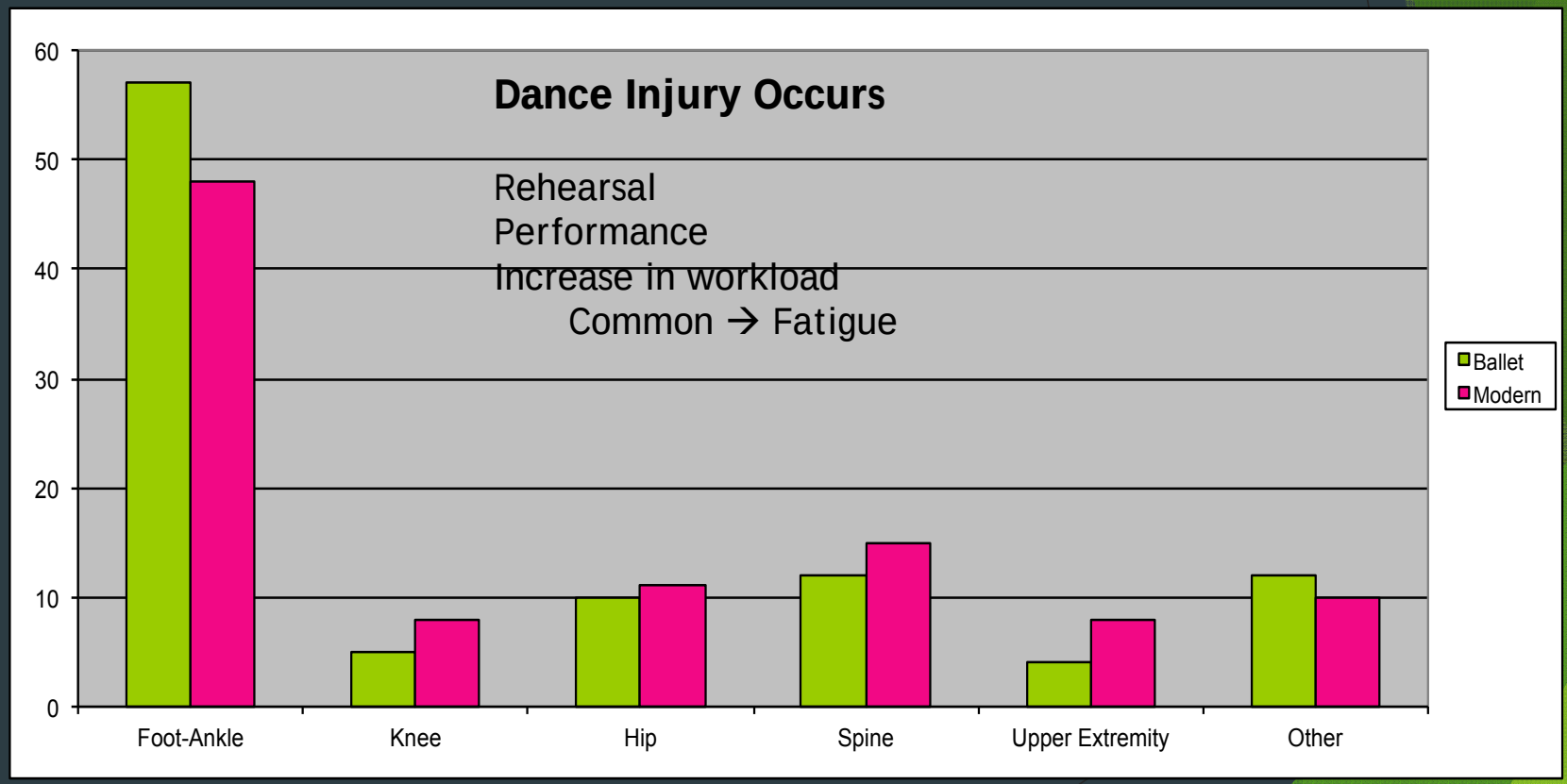
Dancer as an Artist & an Athlete

"Ballet ranks with football as the most demanding of all physical activities & sports"

(Nicholas, 1975)

Injury Prevalence

Liederback, Dilgen and Rose, 2008



Injury and Joint Hypermobility in Ballet Dancers

- High Prevalence of hypermobility in dancers
- Found in males and females
- Chronic Injury → increases injury

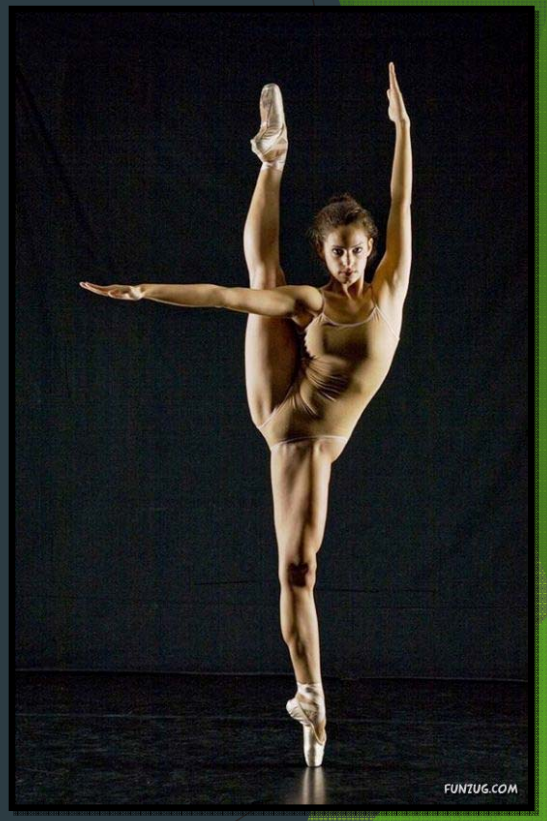
Hip Problems in Dance

Literature Review

- 10% (Garrick et al 86)
- 10% (Reid et al 88)
- 7-14% (Stretanski et al 02)
- 8-11% (Liederbach et al 08)

7 – 14% Range of Hip Injuries

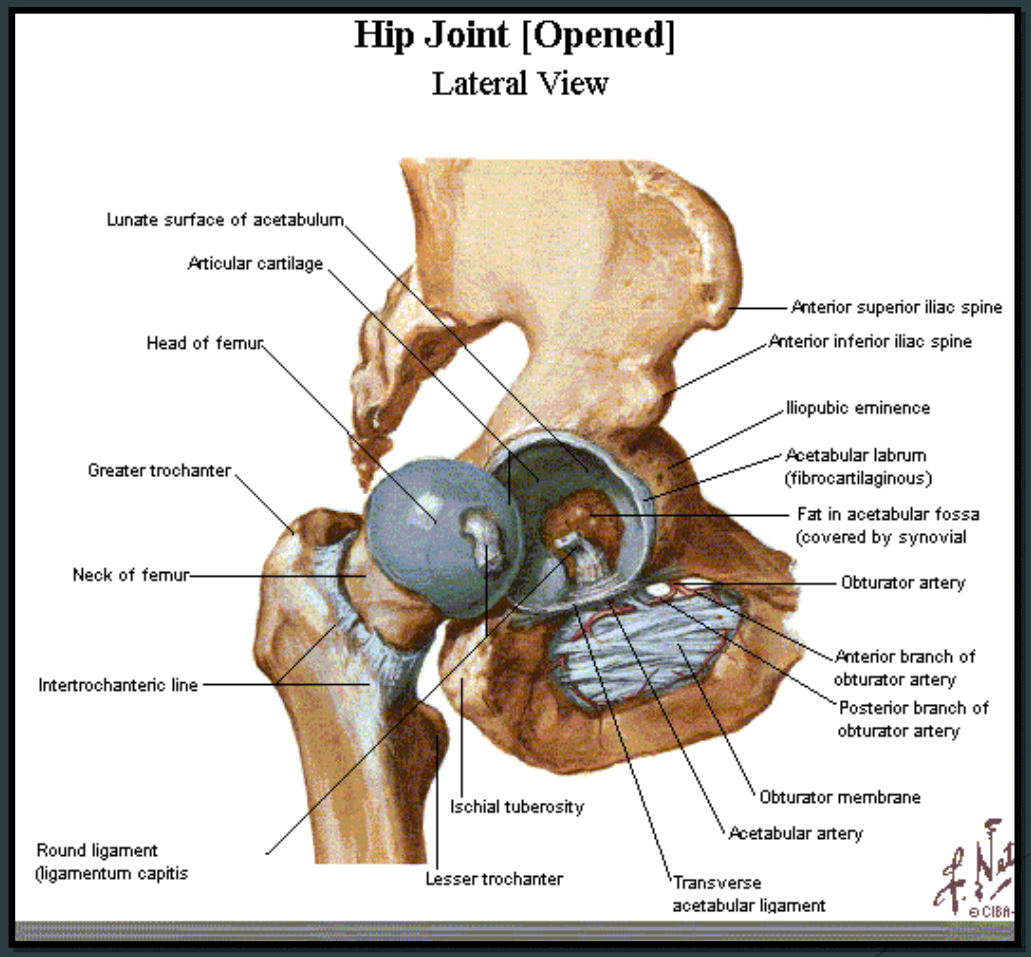
Biopsychosocial Considerations



Types of Injuries

- Anterior Hip Pain
  - ‘Snapping’ Hip Syndrome
- Labral Tears
- Iliacus tendonitis
- Trochanteric Bursitis
- SIJ Dysfunction

Hip Anatomy


Hip Joint [Opened]
Lateral View
Lunate surface of acetabulum
Articular cartilage
Head of femur
Greater trochanter
Neck of femur
Intertrochanteric line
Round ligament (ligamentum capitis
Lesser trochanter
Ischial tuberosity
Anterior superior iliac spine
Anterior inferior iliac spine
Iliopubic eminence
Acetabular labrum (fibrocartilaginous)
Fat in acetabular fossa (covered by synovial
Obturator artery
Anterior branch of obturator artery
Posterior branch of obturator artery
Obturator membrane
Acetabular artery
Transverse acetabular ligament

Biomechanics

- Hip Flexion:
  - Posterior glide of femoral head
- Hip External Rotation: (ER)
  - Anterior and medial glide of femoral head
  - Limited by tension of anterior capsule & iliofemoral ligament
- Hip Internal Rotation: (IR)
  - Posterior and lateral glide of femoral head in acetabulum
  - Limited by tension of posterior capsule & ischiofemoral ligament
- Hip Abduction:
  - Inferior glide of femoral head
- Hip Extension:
  - Anterior glide of femoral head

Pathogenesis of the Dancer's Hip

- Turnout
- Extensive ROM
- Repetitive Flex, Ext with abduction & ER

Hip ER > Hip IR
External Rotation is the "supernormal" and IR is limited

Turnout

- As turnout increases the stress of the anterior structures increases
- Excessive hip ER is related to increased mobility of capsule-ligamentous restraints and is indicative of hypermobility and instability
  - in the absence of osseous or articular geometry.
- Instability
  - Excessive stretching of capsulo-ligamentious structures

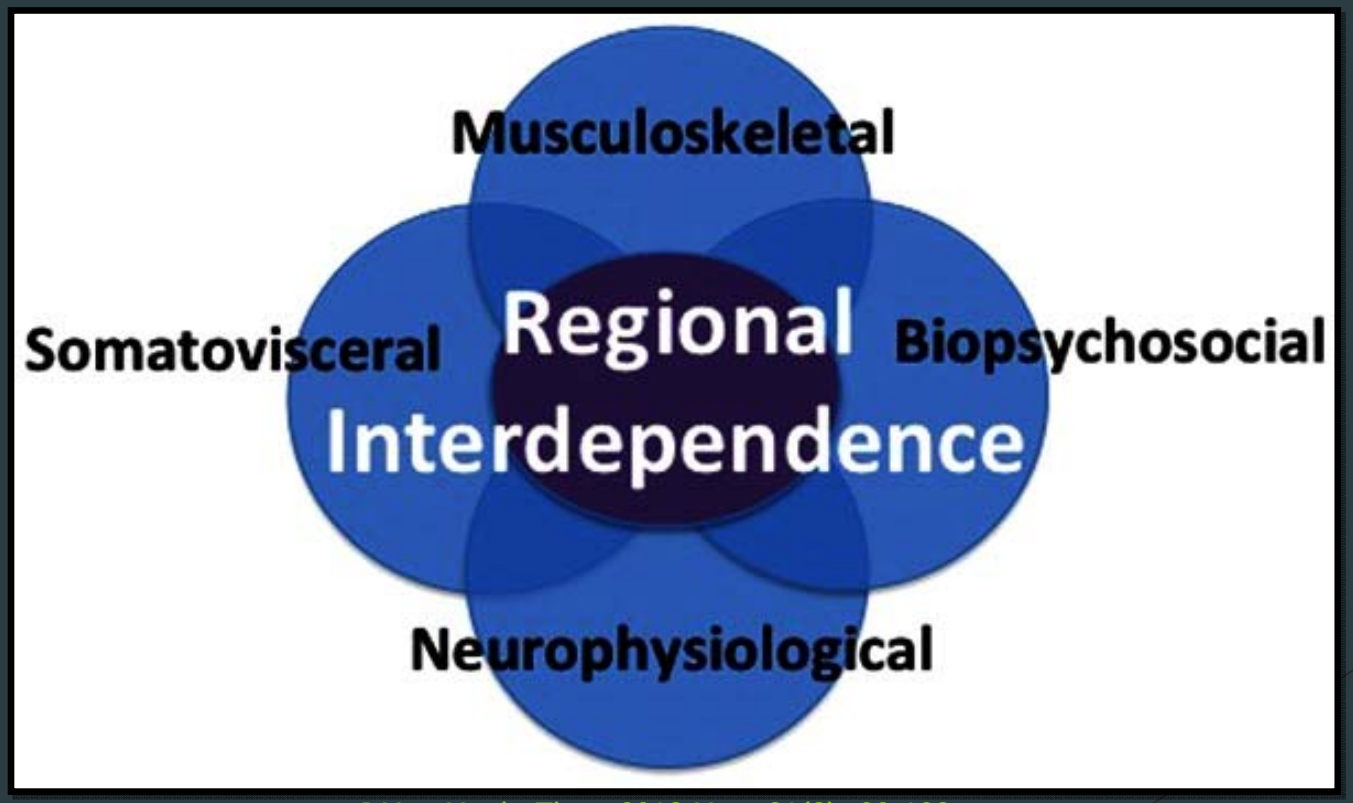
Differential Diagnosis

… is it the hip or not the hip ? …

- Etiological source
- Local OR referred phenomenon (O'Kane Am Fam Phys 1999, Lewis et al Phy Ther 2006)
  - Multiple structures: musculoskeletal and other systems
  - Deeper structures (non-palpable)
  - Lumbar Spine

Evaluation

Regional Interdependent Approach



J Man Manip Ther. 2013 May; 21(2): 90–102.

Examination

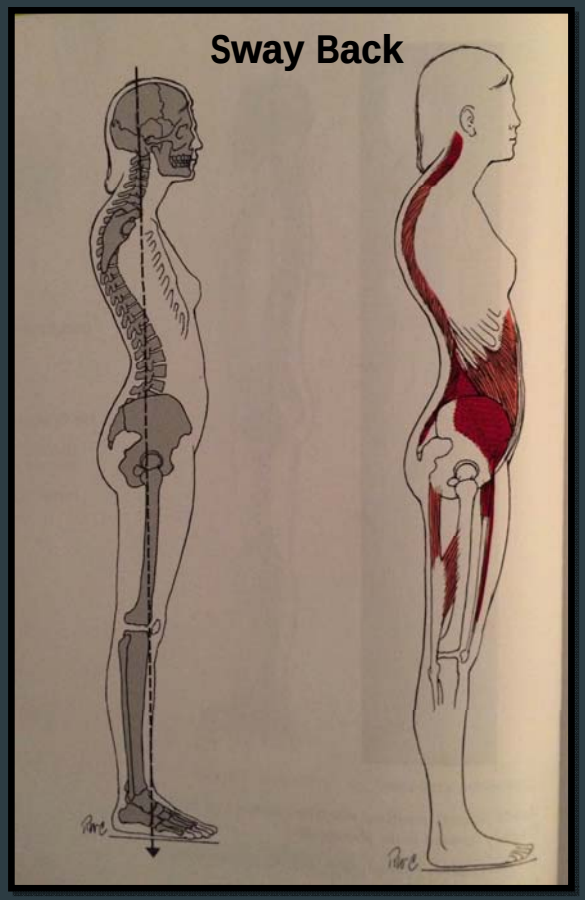
Objective Measurements

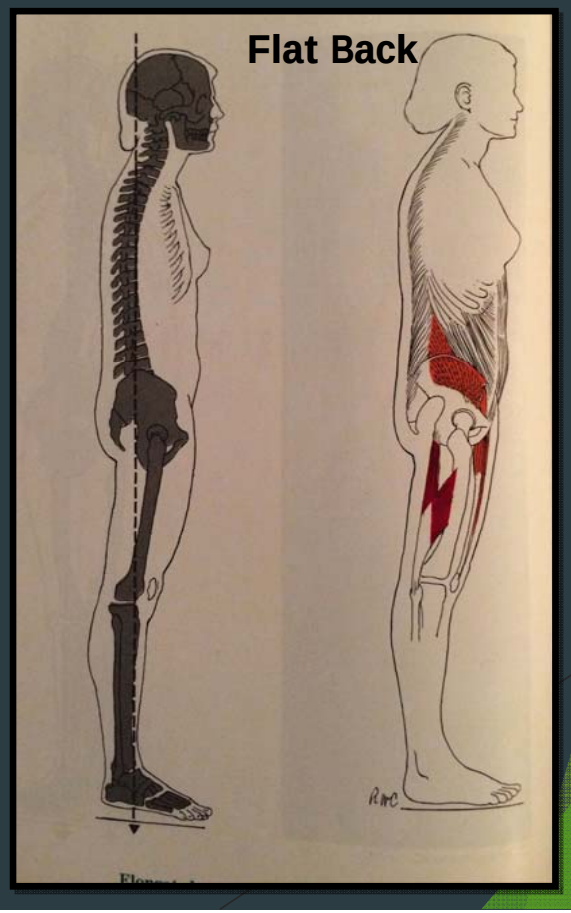
- Posture
- ROM
- MMT
- Special Tests
- Functional Tests
- Dance Movement Analysis

Examination

Objective Measurements: Posture

Kendall F, McCreary E, Provance P. Muscles: Testing and function, 4th ed, Philadelphia, Lippincott, Williams & Wilkins; 1993.





Examination

Objective Measurements: ROM

- Lumbar ROM
  - Apparent motion
- Hip ROM
  - Measuring Turnout
    - Active
    - Functional Feet

At least 70 degrees of active ER comes from each hip, knee contributing 5 degrees and the ankle/foot with the remaining degrees

Examination

Objective Measurements: MMT

- Hip Strength
  - Gluteal Maximus
  - Lateral rotators
  - Gluteal Med/Min
  - Hamstrings
- Abdominal strength and endurance
- Ankle Strength

*Altered muscle activation patterns & hip abductor weakness found after a single ankle sprain (Bullock-Saxon et al, Beckman and Buchanan, Nicholas et al)

*Maximum gastrocnemius PF power is generated by use of the hip muscles

*26% more activation can occur in the ankle if proximal muscles are activation

(Van Ingen et al, *J Anatomy*. 1987;155:1-5)

Examination

Objective Measurements: Special Tests

- Scour test
  - non-specific hip pathology such as femoral acetabular impingement or labral tears
- FABER
  - Screens for intra-articular hip pathology, hip, lumbar or sacroiliac dysfunction, or iliopsoas spasm
- FABIR
  - screens for anterior-superior impingement syndrome, anterior labral tear and iliopsoas tendinitis
- Clusters to rule out SIJ dysfunction/instability

Examination

Objective Measurements: Functional Tests

- Balance & LE dynamic alignment
  - Airplane Test
  - Single leg squat/step down (neutral)
  - SL Balance (neutral)
    - Even surface
    - Uneven surface
    - Eyes open
    - Eyes closed

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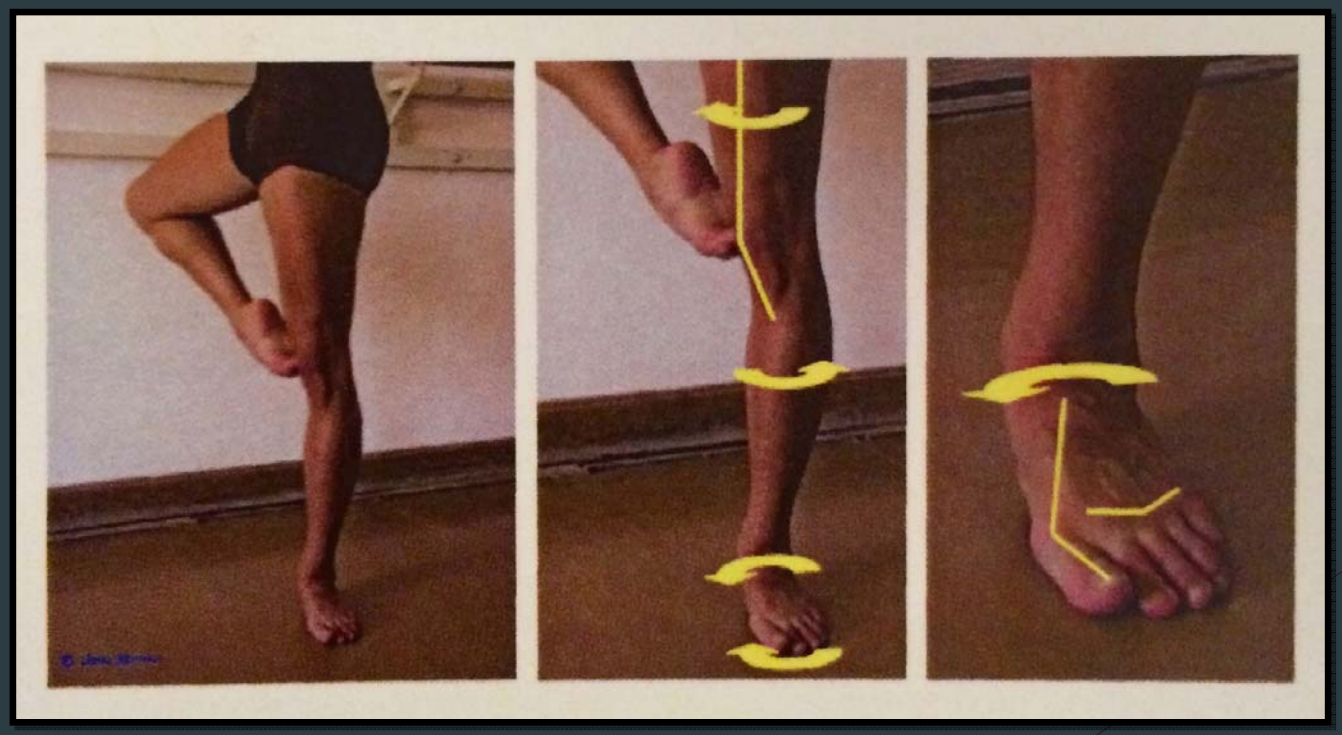
Examination

Objective Measurements: Dance Movement Analysis

- Leg/hip alignment affects the foot … the foot affects the hip
  - 1st sprain occurs by age 13
  - Reoccurrence rate > 80%



Dance Movement Analysis

Parallel

- Plie
  - Lumbar spine: natural lordosis, observe for lateral shifts
  - Pelvis: neutral
  - Femur: neutral in terms of abd/add & IR/ER; equal degrees R <>L; femur glides posteriorly upon descent

Common Dysfunction:
Descent: flexion of L-spine, "butt gripping" with PPT, limited posterior glide of femoral head

Ascent: shearing forward of femoral head

*Seen in dancers with superficial glut max dominance with associated poor motor control of sacral fibers from glut and TFL dominance; poor motor control of iliacus

Dance Movement Analysis

Parallel

- Releve
  - Lumbar spine: natural lordosis throughout movement
  - Pelvis: Neutral
  - Femurs: remain parallel in neutral abd/add & IR/ER. Minimal extension of hip upon descent

Common Dysfunctions

Ascent: L-spine extension, anterior shear/extension of femurs, knee hyperextension, increase in ankle DF

Descent: L-spine extension, excessive extension of hips and knees

*Seen in dancers with L-spine hypermobility, anterior hip impingement/instability & labral tears

Dance Movement Analysis

Turnout

Turnout should come from the hip down, NOT the floor up

Malalignment can occur as result of:

- TFL dominance
- Poor standing posture
- Weakness n deep ER of hip

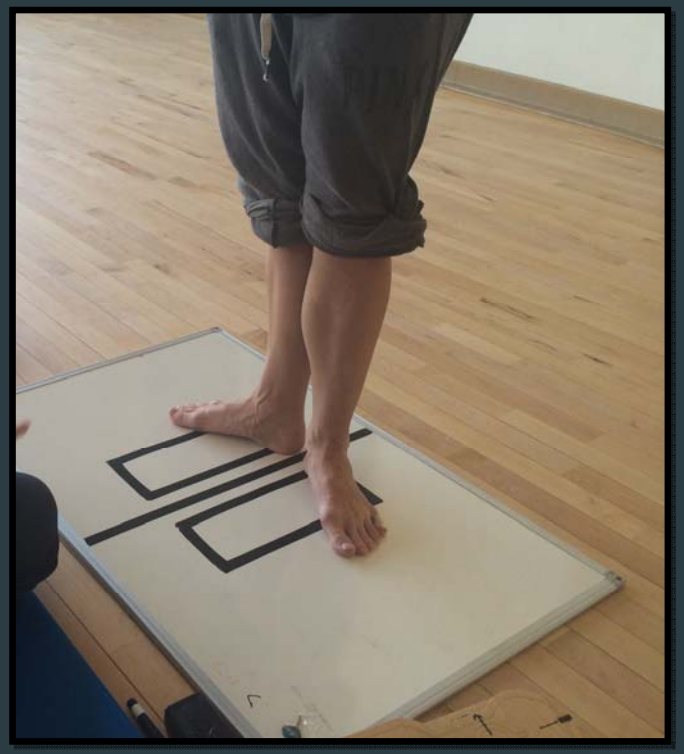
Common Faults:

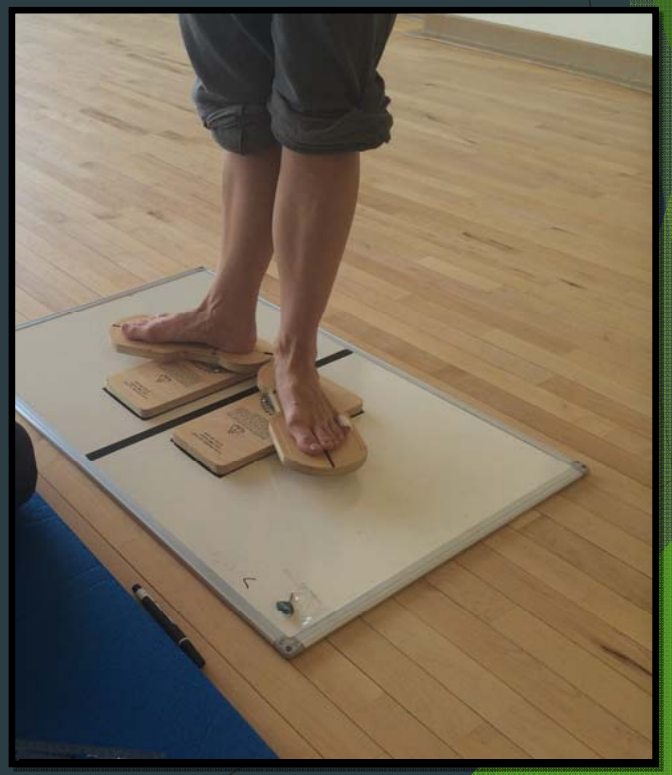
- Anterior Pelvic Tilt (common)
- Posterior Pelvic Tilt (butt gripping)
- Excessive tibialfemoral ER/femoral IR
  - Patella medial to 2nd MET
- Inability to maintain neutral WB in foot
  - Medial WB ("rolling in")
  - Lateral WB ("rolling out")

Dance Movement Analysis

Turnout

- Measuring/Observing Turnout

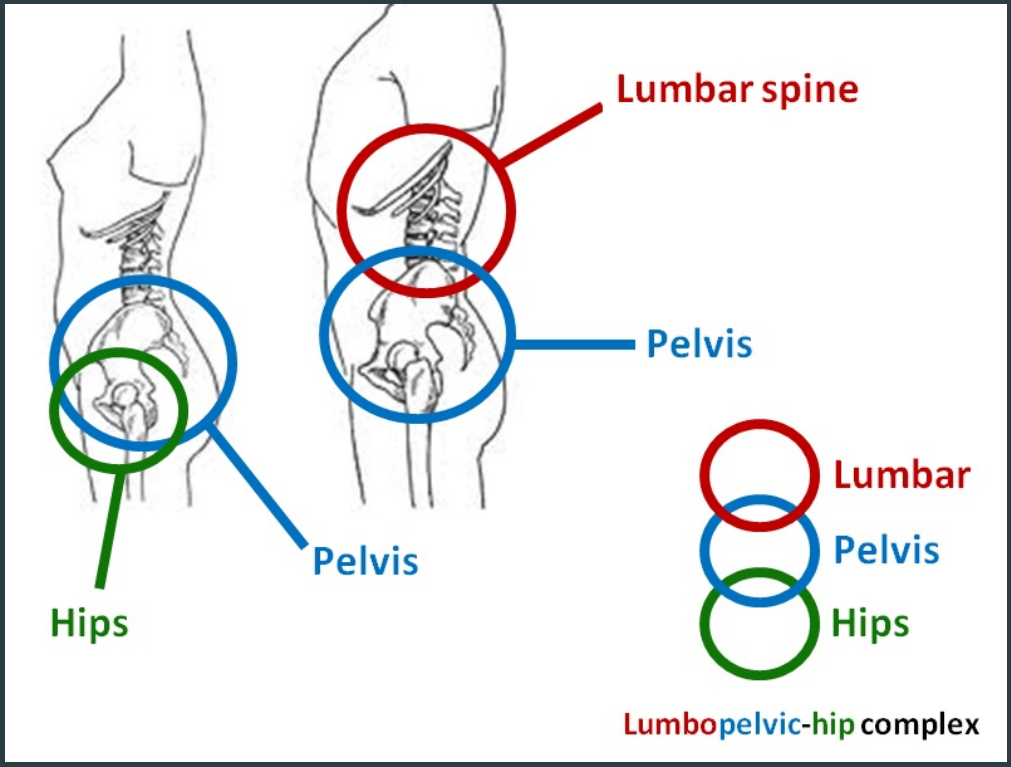




Physical Therapy Intervention

Physical Therapy Intervention

Lumbo-Pelvic Hip Complex



Triad of Muscles of Turnout:

Abdominals: activate from pubic bone to rub cage; lumbar spine is in neutral, back and gluts relaxed

Adductors: inside thigh forward

Deep Rotators: Turnout hip without changing pelvic alignment

Proper elongation of appropriate postural muscles (iliopsoas and erector spinae)

Physical Therapy

Pilates Based Rehabilitation

- Initial stage:
  - Management of pain
    - Restricting height and/or movement
    - Manual therapy - mobilization
  - Biomechanical Counseling
    - Standing posture
    - Gait
  - Neuromuscular Re-education
    - Lumbar Stabilization: Core, TrA, Pelvic floor
    - Hip Dissociation

Physical Therapy

Manual Techniques

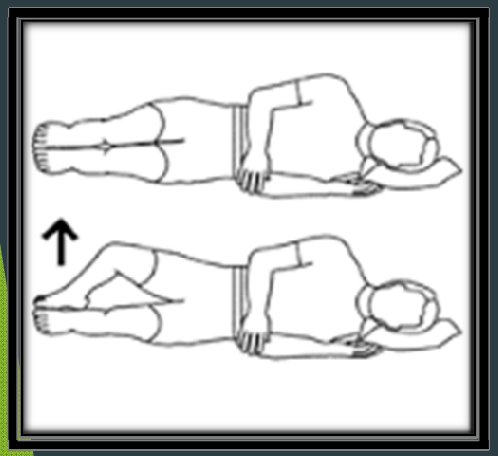
Physical Therapy

Pilates Based Rehabilitation

Anterior Hip Glide MWM with mob belt:

Physical Therapy

Pilates Based Rehabilitation



Physical Therapy

Pilates Based Rehabilitation
Functional Retraining of Turnout

- Neuromuscular Re-education on proper functional turnout
  - Parallel > Turnout
  - Straight leg > Plie
  - Double leg > Single leg
  - Flat foot> releve

Made by Jean Claude West & Marika Molnar, PT

Physical Therapy

Pilates Based Rehabilitation

Towson University Dance Department

In Summary in dancers:

- Hip pain is multifactorial accompanied with postural-behavioral movement impairment syndrome that defines one common diagnostic label
- Postural Re-education and teaching of turnout with proper lumbar stabilization and deep lateral rotator activation
- Remembering the value of aesthetic ideals in the dance world within the individuals limits

Thank you

alasner1@jhmi.edu

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