A Psychosocial Perspective to Return to Sport Training for Runners with Musculoskeletal Pain

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1. Goal: Introduce perspective that considers psychological and social/contextual factors as potentially important prognostic factors and/or treatment moderators for patients who are returning to running after musculoskeletal injury.

2. Narrative development in the treatment of runners with musculoskeletal pain
   a. What are narratives and how do they develop?
   b. Benefits
      i. Quick and efficient information storage and recall
      ii. Allows PTs to select appropriate treatments based on prior experience
   c. Pitfalls
      i. Highly sensitive to biases that develop as a result of experience, education, mentorship, etc.
      ii. Constrain thought and treatment options based on familiarity and/or bias
   d. Narratives are commonly constrained within pathways that are biomedically-oriented, leading to sub-optimal care for those who may have psychologically-mediated pain or disability.
      i. As a result – poor outcomes, high costs, excessive healthcare utilization, poor satisfaction
      ii. Lessons learned from those with ACL reconstruction

3. Shifting perspective – the psychologically-informed Physical Therapist
   a. The complex relationship between pain, psychology and movement – what does it mean for rehabilitation of runners?
      i. Pain and psychological distress influence quality of movement
      ii. If our goal is to optimize movement pattern and quality prior to returning to run, we must consider pain and psychological distress
   b. Re-conceptualizing how we classify patients and what we target through Physical Therapy
i. Classify patients based on sport vs. diagnosis vs. psychological distress
ii. Evidence that classifying based on psychological distress may improve outcomes and reduce costs in patients with low back pain
iii. Opportunities to take the same approach in runners?

4. Barriers to Psychologically-Informed practice
   a. Recognition of psychological and social factors as a potential issue
      i. Need to change narratives to include psychological and social factors as potential contributors to pain and disability
      ii. Return to sport planning that considers psychological and social factors needs to begin at initial evaluation – early screening is important
      iii. May not be a significant factor for all patients
   b. Assessment tools for screening/evaluating psychological distress
      i. STarT back tool – generic
         1. Under development (Keele University)
      ii. OSPRO-YF tool
      iii. Full length questionnaires
   c. Interpretation of screening/assessment measures
      i. Who do we target?
   d. Developing psychologically-informed treatment approaches
      i. Special issue *Physical Therapy,* May 2011
      ii. Specific suggestions for what may be beneficial in the management of runners in return to sport training
   e. Treatment monitoring
      i. Not enough to provide intervention and assume it will work – importance of monitoring progress and changes in distress
   f. Limitations in what we know
      i. Little research on psychological factors and running
      ii. Little consensus on most effective treatments for patients with psychological distress, especially in runners
      iii. No established criteria for what is considered high psychological distress in runners
      iv. Limited information on the role of social and contextual factors in returning to run

5. Putting it all together – psychologically-informed assessment and treatment is an adjunct to other approaches that address impairments, biomechanics, and training.
Returning to Running after Injury: Can I Change my Mechanics?

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Benefits of Running
• Cardiovascular
  ↑ left ventricular size (Fagard, 1997)
  ↑ VO2max (Skinner et al, 2003)
• Strength
  Endurance training delays decline in strength loss (Tarpenning et al, 2004)
• Psychological
  Exercise increases BDNF gene expression in mice (Duman et al, 2008)
  Elevated serum BDNF in humans (Rabei et al, 2014)
• Decreased disability & mortality
  “Ever ran” vs. “Never ran” (Chakravarty et al, 2008)
  Reduced “all cause mortality” with as little as 5 minutes of running (Lee et al, 2014)

Risks of Running
• More than 50% (19-79%) of long distance runners are injured yearly (van Gent et al, 2007)

Reasons for running injuries
• Training errors (O’Toole, 1992)
• High mileage
• Rapid change in training
• Lack of rest
• Lower extremity structure-questionable
• Running mechanics
  Which variables are most important?
  What can we do about it?
  What is most effective?
    Biomechanically
    Clinically
Methods of intervention

- Auditory (Metronome)
- Step rate manipulation (Heiderscheit et al, 2011)
- Step length
- Peak knee flexion
- Foot inclination angle
- Vertical excursion of COM
- Visual (Real-time video or mirror)
- “Run with your knees out” (Willy et al, 2012)
- “Don’t cross over midline
- Hip adduction

Knee valgus

- Cross-over
- Verbal cues (Form)
- Bend forward (Teng & Powers, 2014)

Auditory

- Metronome
- Free apps available
- Music apps
- Spotify
- Running with music?

Step rate with audio feedback

- With a 5% increase in step rate:

Visual feedback

- Cross over
- Hip adduction
- Video monitor in front

Cross over

- “Keep your feet on either side of the line”

Cross over
“Push your knees toward the outside”

Visual feedback
- With 2 different feedback options:

Verbal cueing
- Forward lean
  - From the ankles (Pose, Chi running)
- Consistent with midfoot strike mechanics (Goss & Gross, 2012) reducing knee torque
  - From the waist (Teng & Powers, 2014)
- Reduces patellofemoral joint stress

Verbal cueing
- Sagittal Plane moment changes with verbal cueing feedback

Summary
- Athletes easily respond to auditory feedback
- Visual feedback may be more specific to joint/region of focus
- Verbal cueing for forward lean results in desired changes at knee and additional changes at hip and ankle
- Experimental changes GENERALLY result in similar clinical changes
Musculoskeletal Preparedness for the Runner Returning to Running

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- Goals: Assess musculoskeletal areas affecting return to running success
- Describe the association between different musculoskeletal regions of the body and how they may impair or enhance the return to running process

1. MSK > Biomechanics?

2. Musculoskeletal Assessment Streamlined for the Runner and How these areas affect return to running success
   a. Strength
   b. Mobility
   c. Neuromuscular control

3. How the Runner’s Body Parts Work Together
   a. Screens, Functional Assessments
      i. What works
      ii. What doesn’t for runners
Training Errors In Runners, A Huge Problem We Can Avoid!!

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- Goal: To understand the integration of physiological energy systems to help determine the most efficient training methods and incorporating it into the periodization program thus minimizing overtraining and limiting injury potential

1. Importance
   a. How big of a problem are training related running injuries

2. Program Design
   a. Periodization
      i. Macrocycle
         1. Periods (pre and comp)
         2. Periods
            a. General prep
            b. Specific prep
            c. Precomp
            d. Comp
         3. General to specific
         4. Simple to complex
         5. Capacity to power
      ii. Mesocycle
         1. 4-6 weeks in length
         2. themed
      iii. Microcycle
         1. 7-10 days
         2. Need to allow adequate rest between the energy systems

3. Training Parameters
   a. Volume vs Intensity

4. Energy Systems
   a. CP system –
      i. No lactic acid is produced
      ii. No oxygen is required
      iii. Energy for 7-10 seconds
   b. Anaerobic glycolytic
i. Exercise bouts of 30 seconds – 2 min
ii. Energy from breakdown of sugar (glycolysis)
iii. Lactic acid and hydrogen ions produced
iv. Adaptations to exercise - buffering

c. Aerobic
   i. ATP produced
   ii. Oxygen is required
   iii. Krebs cycle and oxidative phosphorylation

5. Events and energy system usage
   a. 800m, 1600m, 3200m, 5000m

6. Training run classification and intensity
   a. Easy Runs
   b. Marathon Pace
   c. Lactate Threshold
   d. Intervals
      i. 1:1 ratio VO2 max

7. Models to determine training intensity/ Application
   a. VO2 Max
      i. What is VO2 max
   b. VVO2- Vdot
   c. Heart Rate
   d. Blood Lactate
      i. Lactate accumulation
   e. Respiratory Quotient
      i. Fat vs glycogen as energy source

8. Benefits of Specific Training Runs
   a. Easy Runs
      i. Build a base
      ii. Heart development
   b. Marathon Pace
   c. Lactate Threshold Pace
      i. Improved lactate clearing
   d. Interval Training
      i. Aerobic power
9. Take Home Message: Those who fail to plan, plan to fail. Train smarter and not necessarily longer. Importance of efficient training to limit excessive wear and tear.

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