Common Running Training Errors

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RRCA AND USATF-1 COACH
Give Clinicians Better Tools to:

- Identify common running training errors
- Educate clients/patients on modifications
- Understand the basics of running coaching principles
Introduction

Why Running?
Introduction

Coaching
Introduction

**Goals**

- Introduce more people to running
- Prevent running injuries or manage them early
- Running longevity

Ed Whitlock 1931-2017
Running Injury Rates

What are the Main Running-Related Musculoskeletal Injuries (Lopes et al, Sports Med 2012)

- Medial tibial stress syndrome – 9.5%
- Tibial stress fracture – 4.5%
- Achilles tendinopathy – 6.2-9.5%
- Plantar fasciitis – 5.2-17.5%
- Patellar tendinopathy – 12.5%
- Patellofemoral syndrome – 5.5%
- Ankle sprain – 9.5%
- Iliotibial band syndrome – 10.5%
- Hamstring muscle injury – 6.7%
- Hamstring tendinopathy – 12.5%
Common Running Errors

- New Runners/Return to the Sport
- High School Freshman
- No Variety
- Hills, Speed, and Pacing
- Mileage Build-Up
- The Race Ladder
- Missed Workouts
- Race Mistakes
- Recovery
New Runners / Return to the Sport

- **At Risk:** Elementary and Middle School Runners, Freshman in HS, “Couch to 5k” runners
- **Common injuries:** Shin splints (posterior and anterior), Achilles, plantar fasciitis
- **Why?:** Lower body is not prepared for the increase in shock and stress. Improper shoewear and a big jump in mileage.
New Runners / Return to the Sport

A 2 – Year Prospective Cohort Study of Overuse Running Injuries (Messier et al, 2018)

- 300 novice participants running avg 20 miles/week, 199 injuries... (73% injury rate in women, 62% rate in men)
- Not significant predictors: shoe type, previous injury, Q-angle, arch height, flexibility, hip/knee/ankle strength, and weekly mileage
- Significant predictors: Gender (women>men), and knee stiffness in participants with higher body weight (>176 lbs)
- Cited variability in stride length among novice runners as possible contributor
Gait Retraining for the Reduction of Injury Occurrence in Novice Distance Runners (Chan Z et al, Amer JoSM 2018)

- 320 novice runners randomly assigned to gait retraining or control groups. Gait retraining group received 2 weeks (8 sessions) of training and visual feedback of their ground reaction force on treadmill.

- 12 month follow-up injury tracking revealed 16% injury in gait retraining versus 38% injury in control group

- A significant reduction as found in vertical loading rates in gait retraining groups
New Runners / Return to the Sport

- New runners need to slowly introduce impact, especially if they have not been active for years.
- Run:walk ratios are a great way to start
- 2 min walk, 2 min run to start. Add one minute to run interval each week
- Have a plan, write it down, adjust accordingly
- Get feedback from a coach, video analysis
### New Runners / Return to the Sport

**Example:** New Adult Runner or Return to Running following Injury

<table>
<thead>
<tr>
<th>Week</th>
<th>Run : Walk ratio (minutes)</th>
<th>Total time per workout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1 (2-3x/week)</td>
<td>2 : 2</td>
<td>20 minutes (5 cycles)</td>
</tr>
<tr>
<td>Week 2 (2-3x/week)</td>
<td>3 : 2</td>
<td>25 minutes (5 cycles)</td>
</tr>
<tr>
<td>Week 3 (2-3x/week)</td>
<td>4 : 2</td>
<td>30 minutes (5 cycles)</td>
</tr>
<tr>
<td>Week 4 (2-3x/week)</td>
<td>5 : 2</td>
<td>28 minutes (4 cycles)</td>
</tr>
<tr>
<td>Week 5 (2-3x/week)</td>
<td>6 : 2</td>
<td>32 minutes (4 cycles)</td>
</tr>
<tr>
<td>Week 6 (2-3x/week)</td>
<td>7 : 2</td>
<td>36 minutes (4 cycles)</td>
</tr>
<tr>
<td>Week 7 (2-3x/week)</td>
<td>8 : 2</td>
<td>40 minutes (4 cycles)</td>
</tr>
<tr>
<td>Week 8 (2-3x/week)</td>
<td>9 : 2</td>
<td>44 minutes (4 cycles)</td>
</tr>
<tr>
<td>Week 9 (2-3 x/week)</td>
<td>10 : 2</td>
<td>48 minutes (4 cycles)</td>
</tr>
</tbody>
</table>
### New Runners / Return to the Sport

#### Example: New young runner

<table>
<thead>
<tr>
<th>Week (2-3x/week)</th>
<th>Run : Walk ratio (minutes)</th>
<th>Total time per workout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1 (2-3x/week)</td>
<td>4 : 1</td>
<td>25 minutes (5 cycles)</td>
</tr>
<tr>
<td>Week 2 (2-3x/week)</td>
<td>6 : 1</td>
<td>28 minutes (4 cycles)</td>
</tr>
<tr>
<td>Week 3 (2-3x/week)</td>
<td>8 : 1</td>
<td>27 minutes (3 cycles)</td>
</tr>
<tr>
<td>Week 4 (2-3x/week)</td>
<td>10 : 1</td>
<td>33 minutes (3 cycles)</td>
</tr>
<tr>
<td>Week 5 (2-3x/week)</td>
<td>15 : 1</td>
<td>32 minutes (2 cycles)</td>
</tr>
</tbody>
</table>
Summer Training Factors and Risk of Musculoskeletal Injury Among High School Cross-country Runners (Rauh MJ, JOSPT 2014)

- Indicates injury risk in first month of season can be decreased with a gradual increase in mileage over the summer

- Injury risk increased when athletes did not alternate long and short mileage runs on different days, or if they trained <8 weeks

- For Girls
  - Risk was increased if training less than 8 weeks before season, higher % of time on hills.
  - Risk was decreased with reduced mileage and training on irregular terrains
“Runners. Yeah, we’re different”
No Variety

- **At Risk:** Streakers, Winter Warriors, 169ers, Marathan Maniacs, “Running is my therapy” runners
- **Common Injuries:** Anything overuse (ITB syndrome, PFPS, proximal HS, lumbopelvic) and stress reactions/fractures
- **Why?:** Running is exclusive exercise. Few rest days. Frequent racing. Same pace, same activity, same stress
- **Example:** Mrs. Rule of Fives
To become a better and faster runner, you need to run, but...

- Cross training should focus on the running motion (strength training imbalances, mobility/flexibility)
- Need variety in distance and pacing to improve efficiency or movement and challenge different patterns of movement
- “Every run has a purpose” (Recovery, lactate threshold, race pace training, etc)
Cumulative Loads Increase at the Knee Joint With Slow-Speed Running Compared to Faster Running: A Biomechanical Study (Petersen J et al, JOSPT 2015)

- 16 subjects run 1000 meter trials at 3 different speeds. Ground reaction and kinematic force data recorded.
- Though a decrease in negative (heel strike) and positive (toe off) work was identified with slower running groups, the cumulative loads on the knee joint was increased due to the higher number of strides required to cover the same distance.
For your clients / patients:

- Periodize your training (by season, by month, by race schedule)
- Introduce different gears to change the stress on joints/muscles with different paced runs
- Educate the value of rest days and down weeks
- Incorporate cross training to focus on imbalances
- With the right balance of quality workouts and recovery, it is possible to improve without the high mileage (3-4 day training weeks)
Hill Work / Speed Work

- **Hills:** Uphill running improves your running economy/VO2 max, and knee/hip drive. Downhill works on turnover. Both shift stresses on joints and muscle groups.

- **Speed work:** Improves leg turnover and running efficiency. Boosts mitochondrial growth and increases lactate threshold

- All things are good in moderation

  - **Example:** Mr. Early Morning Triathlon
Pacing

- Train at the fitness level you are currently at; not the level you want to be
  - If you are training to run a 3:00 marathon, don’t spend all of your miles at a 3:00 marathon pace
- Calculate your appropriate paces and utilize them correctly
- VDOT Calculator, RW Training Pace calculator, McMillan or Hanson training pace calculators
Example: John Doe finished a recent 5k in 20:00.

<table>
<thead>
<tr>
<th>Type of Run</th>
<th>Pace (per mile)</th>
<th>Workout distances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy (~60% VO2 Max)</td>
<td>8:16 - 8:46</td>
<td>Any distance &lt;3 hours</td>
</tr>
<tr>
<td>Threshold (~85% VO2 Max)</td>
<td>6:52</td>
<td>Up to 20 min efforts</td>
</tr>
<tr>
<td>Interval (~95% VO2 Max)</td>
<td>6:19</td>
<td>Up to 5 min efforts</td>
</tr>
<tr>
<td>Repetition (100+% VO2 Max)</td>
<td>5:55</td>
<td>Up to 2 min efforts</td>
</tr>
</tbody>
</table>

Calculated with Daniel’s Formula VDOT Calculator

- Paces determined by % of VO2 Max
Workout Breakdown

<table>
<thead>
<tr>
<th>Pace of Workout</th>
<th>Percentage of weekly miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy Pace</td>
<td>60-70%</td>
</tr>
<tr>
<td>Threshold Pace</td>
<td>10-15%</td>
</tr>
<tr>
<td>Interval Pace</td>
<td>10%</td>
</tr>
<tr>
<td>Repetition Pace</td>
<td>5%</td>
</tr>
</tbody>
</table>

- Don’t underestimate the value of time on your feet.
- Don’t forget the negative effect of sitting all day
- Beginner runners should focus more time on easy paced running, and gradually add in each new gear over time.
- Strides or short hills can be good introduction to speed
Mileage Build-Up

- **At Risk:** HS Freshman, College Freshman, first Half/Full/Ultra Marathoners
- **Common Injuries:** Repetitive overuse and stress injuries
- **Why?:** The mileage, and long run distance, increase exceeds the body’s ability to adapt and recover.

- **Example:** Mr. Ultra Mileage
Mileage Build-up

No Effect of a Graded Training Program on the Number of Running-Related Injuries in Novice Runners (Buist et al, Amer JoSM, 2008)
- 532 runners training for a 4 mile run: 8 week (20-47% grade) vs 14 week graded (10%)
- No significant decrease in injury incidence (20% injury risk for both groups)

The Association Between Changes in Weekly Running Distance and Running-Related Injury: Preparing for a half Marathon (Domsted et al, JOSPT 2019)
- 261 runners participated in a 14 week running program. 21.5% sustained injury
- Within first 3 weeks, significant increase in injury (22.6%) noted in participants who increased weekly distance by 20-60% compared to those who increased by less than 20%

Excessive Progression in Weekly Running Distance and Risk of Running-Related Injuries: An Association Which Varies According to Type of Injury (Nielsen RO, JOSPT 2014)
- 874 healthy novice runners, 1-year prospective cohort study
- 202 injured runners. Runners increasing distance by greater than 30% were more vulnerable to PFPS, ITB, medial tib stress, trochanteric buritis compared to runners who increased less than 10% weekly.
Mileage Build-Up

- Body needs time to adapt to stress of mileage
  - Caution with a >10% increase in mileage week over week (especially novices)
- Body needs to recover at regular intervals as you increase in mileage
  - Have a recovery or “down” week every 4 weeks
- The long run is important, but can’t define your training
  - Long run should comprise no more than 30% of your total weekly mileage.
  - Time on your feet!
- Always assess how you feel and be patient
  - Keep a running log
  - “Better to be consistently undertrained than over-trained and injured”
Race Ladder

- **At Risk:** 5K > 10K > ½ Marathon > Marathon, One-and-Done runners
- **Why?:** “If you can do an “X”, you can definitely do an “X times 2”!

- **Example:** Couch to Marathon runners
Work to improve running mechanics before increasing distance
  - Improve training to finish same distance faster

Body cannot tolerate constant increase in stress. Patience! Running can be a lifetime sport!
  - 1 month of training per mile of racing distance since starting running
  - ~3 months for 5K, ~1 year for ½ marathon, ~2 years for full marathon
Missed Workouts

Adding in extra mileage after missing a workout in their training program or after an injury

- No training plan is perfect or set in stone
- An option, during injuries, is to have the patient work on allowable workout for comparable time as their workout would have been
- Example: 30 min on elliptical rather than 30 min run
- Most common injuries are seen in the last month of training with last few long runs
- Cumulative fatigue (Hansons Method)
Racing Mistakes

- Racing too often; Not tapering properly
- Going out too fast
- Not practicing hydration and fueling during training
  - Example: Andrew’s first marathon

- Running with someone who is not your speed
  - Example: Achilles pacer, Pace Group Leader
Respect the effort

- The harder the workout, the longer the recovery. An active recovery is ideal.
- A race can typically be both the furthest and hardest ‘workout’ in your training.
- Many injuries occur in the return to training.
- Recovery after a race can vary tremendously based on your symptoms and your experience.
Bonus Tips

- Running Drills: The most under-utilized part of training.
  - High Knees, Skip Variations
- Core Strengthening and Hip Stability: Not just crunches
- Mobility: Hip flexors, spine, and calves are most neglected
- Track shoe mileage and work in new shoes before old ones are retired
- Give yourself an off-season. You deserve it!
Novice Runners: Build slow, get feedback from professionals and listen to your body
Seasoned Runners: Find more gears and don’t just climb ladders
Train at the level of your fitness
Make a plan and ‘write it down in pencil’
Usually the thing you hate doing (stretching, rolling, core strength), is the one thing you really need to be doing
Just like any other sport, running takes practice; and you can’t practice if you’re injured
Training Plan Resources

- Daniel’s Running Formula (VDOT Calculator)
- USATF – USA Track and Field
- RRCA – Road Runners Club of America
- Hanson’s Marathon Method
- Hal Higdon training programs
References

Thank you! Happy Running!