

Introduction to Running Assessment

Running for exercise is a very enjoyable, rewarding and effective way to get fit. Although it is not without its downfalls, especially when it comes to injuring oneself.

A survey from runnerworld.com showed that 66% of runners had at least one injury in 2009 alone

As you know to run well you need to have a number of key body parts and systems working as one. What we intend to do today is highlight some common issues relating to the onset of injury in runners and how we/you can help to correct them.

It is important to consider the differences between men and women when considering what injuries could affect each gender. Some key differences in incidence rates are;

- Women are twice as likely to develop PFPS and ITB friction syndrome
- Women are also twice as likely to develop metatarsal stress # (Should women forefoot run??)
- Men's gastroc injuries make up 70% of all calf tears (Poor hip E/ more lower leg propulsion in men)

Most common injuries in runners are:

- 1) PFPS (32.2%)
- 2) Tibial Stress syndrome (17.3%)
- 3) LBP (7%)
- 4) Achilles tendonitis (7.2%)
- 5) Plantar Fasciitis (6.7%)
- 6) ITBFS (6.3%)
- 7) Patella Tendonitis (5.7%)

(Van Mechten 92 & Ballas et al 97)

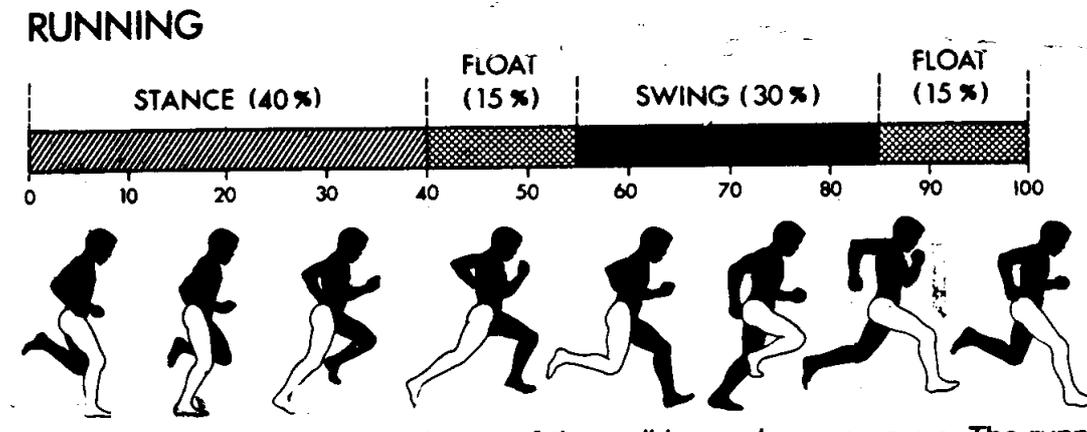
Intrinsic factors

- Poor foot mechanics
- Weak core strength
- Poor pelvic control and stability
- Poor deep hip muscle activation and strength
- Inconsistent or inefficient stride rates
- Excessive lateral or rotational trunk movements
- Gender

Extrinsic factors

- Poor footwear
- Improper exercise prescription
- Environmental conditions
- Running surface

Gait analysis checklist



Check each level at heel strike, mid stance and toe off in stance phase and throughout swing for each side

- Lateral view
 - Vertical displacement
 - Pelvic position (ant/post rotated)
 - Knee E (heel strike should be around 15-20 deg and not collapse more than 10 deg throughout stance)
 - Dorsiflexion (excessive DF indicative of excessive knee collapse)
- Coronal View (anterior and posterior)
 - Trunk position (excessive lateral flexion/extension)
 - Rotation
 - Elbow swinging freely
 - Pelvic position (+/- tredelenberg)
 - Knee position (Varus or valgus position)
 - Foot position (Pronation and stepping over midline)

OVER PRONATION

Excessive 'rolling in' of the foot where there is asymmetry or pain.

Things to look for:

- Knee rotation inwards
- Achilles tendon and calcaneus alignment
- Asymmetrical drop of the navicular with single leg stance
- Navicular Drop Test
- Whilst watching someone run, asymmetry between sides is considered abnormal.

Not everyone needs orthotics, there are exercises that can help to strengthen the muscles that support the arch and subsequent pronation of the foot. Be careful advising footwear it is very person dependent and remember pronation is a vital component of shock absorption.

Assessment:

- Assess the navicular drop with single leg stance and compare left to right.
- Look at calf range of motion; both soleus and gastrocnemius
- Time how long they can stand on one leg with neutral ankle position

Muscles:

Abductor Hallucis, Adductor Hallucis, Flexor Digitorum brevis, Tibialis Posterior
Gluteus Medius,
Soleus

These intrinsic foot muscles help to support the medial longitudinal arch. Working these muscles appropriately without compensatory use of other extrinsic muscles is important with the exercises.

Retraining the foot can be tedious but the stability is key as it is the first point of shock absorption whilst running. Slow the task down with a focus on control and higher exercise frequency of these muscles during the day.

Basic retraining:

- Staggered stance, partial weight bearing
- Static single leg balance and ankle stability

Functional Training:

- Dynamic single leg balance and ankle stability

When to send to us:

- With persistent pain and discomfort in their foot or knee
- If these exercises exacerbate their symptoms

TRENDELENBERG

- One of the main things to watch for when someone is running is that their pelvis is staying level each time either leg hits the ground.
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- Landmarks to watch are the PSIS's
- The Trendelenberg sign is said to be positive if, when standing on one leg, the pelvis drops on the side opposite to the stance leg.
- When watching someone run, anything more than a 7-8 degree tilt of the pelvis from parallel with the floor, on the side of the stance leg is considered abnormal.
- The main pelvic stabiliser during the stance phase of running is the gluteus medius.
- It is the biggest abductor of the hip, but here its biggest concern is working its posterior fibres to keep the pelvis level and prevent the hip from rolling inwards.
- Testing the glute med:
 - Hip external rotation
 - Hip abduction – strength and static endurance
 - Single leg dip – watching for control
- Good tip is to keep hands on the area you're assessing so you can be sure there is no cheating going on!
- These can be used as tests, and they are also basic exercises to teach your client how to find their glute med.
- You have to walk well before you can run!!! Slow running down to a walk and make sure your client is perfectly stable walking before progressing to a run again.
- Break it right down:
 - Stepping forward ensuring good hip control
 - Increase length of step forward
 - Hold one side in single leg dip while moving the other leg
 - Add resistance bands
 - Progress to hop and hold
 - Continuous hopping
- At this stage, your client should have a good idea of how to keep their hip stable and what it feels like to work their glute med. They can now gradually start back at running.

OVERSTRIDING

- A technical running fault, which occurs when the lead foot makes contact with the ground in front of the knee and centre of mass.
- This is considered an inefficient technique, where we over reach our foot in pursuit of more speed. When this occurs the ground reaction force counteracts the forward momentum and places pressure on the foot, shin, knee and hip.

Diagnosis

- Best diagnosed through side on treadmill video analysis
- Slow down frame rate to look at where the foot strikes in comparison to the knee and centre of mass.
- Listen for heel striking which is indicated by a heavier sounding landing
- Count the stride rate. Optimum stride rate is considered 180 per minute (90 foot falls per side). A 10% reduction in this (which when running at the same speed will cause a in stride length) has been associated with an increased risk of injury. This is not a hard and fast rule for overstriding but should be considered or may be of use if video analysis is not available.

Basic re-training

- Standing, flex knee of one foot while still keeping legs together (like a quads stretch). Allow foot to drop back down to floor. You should notice the mid foot land either before or at the same time as the heel under your centre of mass.
- Practice 'pawback'. Flex knee and hip in front of you, both to 90 degrees. 'Cycle' your foot back to the floor as you would if you were cycling a bike where the foot hits the ground mid foot first and directly under knee. This is an exaggerated version of the last action we should adopt as he make ground contact
- Strengthen Gluts, hamstrings, quads and calves to cope with technique change.

Functional re-training

- Walk focussing on landing mid foot and 'soft knees'
- Run shorter distances focussing on quiet landing with quick light strides. A Foot 'slap' can mean excessive heel striking and possibly overstriding
- Build pawback style landing into running technique by jump-rope running or pushing yourself on a scooter