Considerations when selecting running footwear

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We know that running is a popular form of exercise, and is extremely effective for fitness gains, weight loss and toning muscles. However, what is the best running footwear advice for your clients and participants? Identifying the most appropriate running shoe requires a little more than a basic understanding of footwear componentry and suitability. The following information will help you identify the running footwear needs of your clients and participants.

1. Determine their foot type

a. What is their foot width (broad/normal/narrow)?
b. What is their foot length (cm)?
c. What is their foot arch type (flat or no arch/normal/high)?

2. Identify their running technique characteristics

a. What foot function do they have (under pronator - ankle rolls outwards/neutral/over pronator - ankle rolls inwards/over pronator with splayed feet - feet turn outwards)?
b. What is their foot strike pattern (forefoot striker/midfoot striker/heel striker)?

1. What is their foot type?

Your client's or participant's foot type is basically determined by the foot's width and arch shape. Is their foot width broad, normal or narrow and do they have a high, normal or flat arch shape? This is important information for achieving overall comfort within the shoe and, which we know scientifically, has an overall effect on footwear function. This means, if the running shoe your client purchases is not comfortable, then it's likely it is not suitable for their foot and will therefore not function effectively during running.

Some of the leading running footwear companies have a variety of true width and depth sizes to their running footwear range. Most broad feet will suit a '4E' width for males and 'D' width for females; however, these width sizes will be too broad for most normal and narrow feet. Such feet widths are better suited to a 'normal' or '2E' width for males and 'normal', 'A' or 'B' width for females. A professional measurement of your foot should be recommended to determine correct shoe size, but if the local store does not offer this service then a simple method is to ensure there is a thumbnail's length of space from the end of the large toe to the shoe's edge.

For years it was thought that a particular footwear shape (curved, semi-curved, semi-straight, straight) would suit a certain foot arch shape. However, this is not entirely correct from a functional anatomy perspective. In fact, particular

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arch types have a variety of different foot widths and running technique characteristics. Today, footwear comfort and function for different arch types can be influenced by technologies throughout the shoe (e.g. the material, type of stitching and construction of the shoe upper, the lacing technique, the compound and shape of the shoe sockliner).

2. What are their running technique characteristics?

There are three categories to describe the way in which you make contact with the ground while running:

- Forefoot striker - contacts the ground with the balls of the feet first
- Midfoot striker - the whole foot contacts the ground at once
- Heel striker – the heel makes contact with the ground first.

In conjunction with each foot strike pattern there is a certain degree of rolling inwards or outwards of the ankle, as well as some twisting inwards or outwards of the foot. Due to the speed of lower limb movement during running, specific biomechanical variables can be difficult to correctly identify through observational methods. One of the most reliable methods is by capturing video footage via motion analysis software.

A large percentage of runners are heel strikers and make contact with the ground too far in front of their body. This foot strike pattern creates a braking effect on the body and momentarily interrupts forward movement. The result is increased stress on the ankle, knee and hip joints and it can be further exacerbated by the ankle rolling in and the foot twisting out excessively. Identifying whether your client's footstrike is too far in front of their body requires a measurement method using a vertical line drawn from the runner's centre of gravity down to the ground (called line of gravity) and a horizontal line which is measured to where the foot contacts the ground. This diagnosis should be left to professionals with expertise, so individual modification to your client's technique can be accurately devised.

Some specifically designed footwear technologies can accommodate for heel strike inefficiencies. Some may also enhance foot function for a range of individual running styles. In fact, runners who heel strike can benefit from heel clefts and a bevelled angle on the rear outsole of a shoe. This can influence the foot angle during ground contact, and the amount of ground force being applied up through the lower leg. In turn, this decreases the chance for lower limb injuries such as shin splints. Heel strikers may also benefit from higher density carbon rubber material on the outsole of the shoe. These compounds provide additional traction and durability in heel area.

Other technologies more advanced in decreasing the applied ground forces are the cushioning technologies. These are spongy foam and silicone based compounds that function to absorb shock, improve midsole durability and enhance rebound energy from the shoe to the foot. The silicone based compounds are the most effective for rebound energy which can help minimise energy exertion and improve running performance. Runners who are characterised as forefoot and midfoot strikers, and have a foot placement close to their line of gravity or underneath their body, will be more effective at exploiting this rebound energy from silicone based compounds.

Foot function and foot strike patterns will determine the amount of stability and cushioning required in your clients, and participants' running footwear. Runners who

over-pronate after the foot contacts the ground apply additional pressure from around the rear arch position of the foot. Appropriate running footwear will incorporate effective stabilising components that allow for a more natural foot function and load reduction for this mechanical inefficiency. Higher density foam compounds accommodate for additional pressure being applied to this area of the shoe. These compounds are usually grey in colour, enhance durability, maintain the integrity of the shoe and may also fulfill a stabilising role, enhancing foot function.

Running footwear should not be excessively rigid through the middle area, as this can directly impact upon the functioning of the foot. The design and positioning of a thermoplastic device is important to the overall structure of a running shoe. These components are moulded and, depending on the shoe's specific function, are usually positioned under the midfoot area. During midstance (when the foot is flat on the ground) a thermoplastic device can provide additional stability which will help prepare the foot for propulsion. For your clients who are forefoot and midfoot strikers, the thermoplastic device should not be too hard, or positioned too far forward, of the shoe. Most of your clients and participants who have these particular running techniques require functional flexibility in the forefoot of the shoe, not rigidity. Excessive rigidity in the forefoot of a running shoe can restrict efficient foot mechanics during propulsion, which can affect the overall responsiveness.

Most performance running footwear models will have components that enhance cushioning, stability and durability. However, if they are working independently of one another within the shoe, they will not help enhance motion and responsiveness. The most appropriate running footwear for your client or participant must incorporate a system that immediately responds to the altered position of their running technique, and work with the complex functions of the foot. This is footwear customisation, and it facilitates efficient running mechanics.

Unsuitable running footwear may impact on running biomechanics and cause injuries. Determining foot type and running technique characteristics is an effective method of identifying the running footwear needs of your clients or participants. The most effective approach is through a biomechanical assessment of running technique, which involves a needs analysis, anatomical marking, videography, running technique analysis, footwear analysis and technique modification. This process not only takes out the guesswork of footwear selection, but reduces the chances of your clients or participants sustaining a running related injury. ◆