

Natural Running may offer both Athlete and Therapist a dual opportunity i.e. aspects of improvement in Sports Medicine & Sport Science

Abstract

As professional Therapists we have a moral obligation and duty-of-care to protect our athletes by offering a safe and professional service based on evidence and clinical reasoning, this applies to new ideas like natural running. However, in athletics, at times there may be a need to be proactive – balance the evidence and take controlled informed risks if seeking to achieve those elusive marginal-gains. Thus, the aim of this short article is to stimulate interest in the potential dual benefits that natural running may have to offer while giving due consideration to associated risks and practical issues based on the current level of evidence.

Background

Natural running, often described as forefoot striking gait (FFS) (forefoot running) is rapidly growing in popularity amongst competitive runners and triathletes alike. Additional to being a natural form of running, forefoot

running is postulated to reduce the risk of overuse injury and promote a faster and more efficient running style – compared with conventional heel-strike running.



Arguably, the growing popularity towards natural running was initially fuelled by the bestselling book *Born to Run* and by a rapidly growing body of evidence that suggests forefoot running may offer the athlete dual benefits. Current evidence with supporting references can be found in the very comprehensive article '*The (Re-) Evolution of Barefoot Running*' recently published in the April 2012 issue of *sportEX medicine* (1).

Provocative or proactive

Following on from '*The (Re-) Evolution of Barefoot Running*', the purpose of this short article is to further stimulate interest and provoke Therapists to give due consideration to the potential dual benefits that forefoot running may have to offer i.e. Sports Medicine (injury reduction and/or prevention) and Sports Science (enhanced performance). Whilst we have a duty-of-care to protect



all our patients, competitive athletes often have different objectives "to win" or "achieve a personal best". In an ever-increasing competitive world of sport – the athlete is often in search of those elusive marginal-gains. Therefore, providing that current evidence and associated risks are discussed and clearly assimilated and common objectives agreed by all parties concerned (e.g. athlete, coach, trainer, manager, and therapist) – there should be no reason not to proceed and experiment.

The foot

The foot is a masterpiece of engineering and a work of art (Leonardo da Vinci, 1452 – 1519), comprises 26 bones, over 30 joints, and 10 major extrinsic muscle tendons; it must be able to absorb shock on ground contact, remain stable during mid-stance, and form a rigid lever during push-off (2). Although not fully substantiated, the growing body of evidence is indicative that the foot performs more efficiently unshod. However, for most forms of outdoor running – some level protection is required from the hazardous and often contaminated surfaces we run on. Therefore, one question we should consider is how much or how little underfoot protection is required to deliver both Sports Medicine and Sports Science benefits?



How much evidence is required?

It has been demonstrated, for whatever reason, the fastest endurance runners tend to be FFS runners (3). Although not conclusive, the evidence in favour of natural running (FFS) is becoming more compelling. When compared to rear-foot strike (RFS), recent studies suggest that FFS



running may reduce the risk of some overuse injuries i.e. plantar fasciitis (4) tibial stress fractures (5) and reduce symptoms of anterior shin pain (6,7). In addition to significantly reducing ground impact forces, FFS running may reduce rearfoot eversion, thus reduce pronatory forces, often associated with tibialis posterior dysfunction (1). It is purported that ground impact forces are much lower in FFS runners compared with RFS runners (0.5 versus 2.0 times body weight) respectively (8). For more information on these studies – refer to Jones et al (1).

We are constantly reminded to administer only those interventions clearly established as *evidence-based practice* (EBP), which, admirably defined by Sackett et al. (9) EBP “is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of our patients”. Yet, Watson suggests if one looks critically at the full range of physiotherapy interventions, there is simply insufficient evidence to support or reject many of them in all known circumstances (10). Thus, just how much evidence do we need? Naylor suggests, at times, evidence alone may be insufficient to guide our actions; therefore interventions may need to be based on inference, experience and sound clinical reasoning, to transverse grey zones of practice (11).

Evolution of the conventional elevated heel cushioned running shoe



Humans have engaged in endurance running for millions of years, initially for reasons of survival, barefoot (unshod) or wearing minimalist footwear such as sandals or moccasins. The modern-day running shoe was introduced in the early 1970s, primarily designed for: motion control (control of pronation); and elevated heel cushioning – aimed to reduce injury rates. Thereafter, the running

shoe market rapidly transcended itself into a multi-billion pound industry; success in on-going sales has continued for 40 years - despite no apparent reduction in the incidence of overuse injury rates.....and incidentally with limited robust evidence in support of their efficacy (12).

Differences between conventional and FFS running shoe

Compared with the conventional elevated heel cushioned running shoe which tends to facilitate RFS, the FFS shoe enable a more plantarflexed foot strike, thus better facilitates FFS running (8, 13). The FFS shoe has a reduced weight compared with the conventional elevated heel shoe, thus not in dispute, the mass effect provides improved running economy (13, 14).



Conventional shoes have more underfoot protection (cushioning) than FFS shoes – which arguably diminishes proprioception (8). More crucially, in addition to the thick cushioning, conventional shoes have a substantial internal height differential between the forefoot and rearfoot due to the elevated heel; this differential can be as much as 12 mm. This height differential makes FFS running more difficult to achieve, particularly at slower running speeds.

In contrast, the height differential in barefoot runners is zero, similarly for the Vibram Five Finger (image on left) and other minimalistic shoes. Some manufacturers produce transitional shoes which reduce the height differential in 3mm amounts e.g. 12mm, 9mm, 6mm, 3mm and 0mm. This enables each individual runner to progress through the transition journey from RFS to FFS in their own time.



Risks and practical issues

If necessary, a Risk Assessment can help identify and subsequently control injury risks. For optimum outcomes, it is crucial to monitor transitional periods, especially changes in tissue conditions....and if possible, potential changes in running economy. In addition to a Risk Assessment, a clinical **SWOT** analysis is helpful to identify and explain the Strengths, Weaknesses, Opportunities and Threats when switching to FFS running - see Table 1 below.

Key point

When working with competitive athletes, proactive Therapists should seek opportunities to deliver marginal-gains. However, this must be achieved through agreed objectives, using appropriate strategies which should involve balancing the evidence guided by clinical reasoning and controlled risk.

**Table 1 SWOT analysis to assist with Patient Education
(identifying risks, potential benefits and agreed strategy)**

Strengths	Weaknesses
<ul style="list-style-type: none"> ▪ Opportunity for dual strategy approach (Sports Medicine & Sports Science) ▪ Proactive, but managed strategy ▪ Undisputed improvement in running economy from reduced mass of FFS running shoes ▪ Potential for reduced / prevention in overuse injuries? ▪ Potential for improvement in running economy from changes in gait patterns? 	<ul style="list-style-type: none"> ▪ FFS is a contentious issue and remains unsubstantiated
Opportunities	Threats
<ul style="list-style-type: none"> ▪ Risk assessment ▪ SWOT analysis ▪ Patient education & informed risk ▪ Rehab plan and structured transition ▪ Gradual switch from 12mm down to 6mm or 3mm internal height differential ▪ Agreed 'team' objectives and strategy ▪ Ongoing monitoring of injury & performance 	<ul style="list-style-type: none"> ▪ Uncontrolled risk ▪ Achilles & Calf injury ▪ Forefoot injury ▪ Inadequate transitional period ▪ Too great a change in internal height differential

Although limited robust information exists, FFS running appears to place more stress on the posterior structures – soreness in the Calf/Achilles complex is common and requires careful monitoring during the transitional period. A rehab plan of stretching, strengthening, manual therapy and rest is advisable during a structured progressive transitional period. Athletes adapt to FFS running at different rates, ranging from several weeks to one year. Some runners progress from 12mm to 0 mm in height differential in one leap – which is often problematic and risky. The authors' own clinical experience has been to move down from a conventional 12mm shoe to a 6mm or possibly a 3mm height differential in one switch. Although anecdotal and based on our own experiences, a shoe with 3mm height differential appears to provide protection, some cushioning, significant mass reduction and facilitates FFS running – in most cases with limited injury problems

Conclusion

Although the authors are in favour of promoting a proactive approach towards FFS running, especially in athletes willing to take controlled risks in search of marginal-gains, FFS running may not be beneficial and appropriate to all athletes. Developing science and personal improvement is about adopting a proactive approach, balancing current evidence with informed controlled risk. The authors' belief and personal strategy is that both Sports Medicine and Sports Science issues be considered as an inseparable package in the case of FFS running.

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