Keep It safe!

SPORTS SHOES

INTRODUCTION

Since time immemorial, shoes have protected feet against hazardous surfaces and the cold. Over the years, they have also become fashion accessories and indicators of group membership and social status.

Since the 1970s, even athletic footwear has succumbed to fashion and aesthetics, as designers have tried to respond to growing consumer demand for stylish products. The past 20 years alone have brought about an explosion in technological developments. Hoping or claiming to reduce the risk of injury, manufacturers have designed and incorporated increasingly complex cushioning, support and stability features into sports shoes. These technologies, combined with eye-catching designs, achieved one essential goal: to sell shoes.

Québec

SPORTS SHOES

Despite the millions of dollars that multinationals invest every year in the promotion of new, so-called “protective” technologies, there have been very few published studies and no solid evidence to back up these technological advances. The cushioning of running shoes, for example, has no impact whatsoever on the skeletal system, despite clever attempts by manufacturers to incorporate such features into increasingly elaborate products *(*Ethylene Vinyl Acetate, Polyurethane, Gel, Air, Adiprene, Wave System, Shox, etc.). Not only has cushioning never been shown to prevent injury, but it has also been known to disrupt the natural dynamics and proprioceptive mechanisms of the foot. Thus, in their attempts to reduce injury, shoe manufacturers have made sports shoes increasingly heavier, bulkier and pricier.

Some researchers today believe that these changes may even be responsible for certain pathologies such as *hallux valgus* (bunions) and Achilles tendinitis, which are much less frequent in barefoot populations. In short, despite the modern technological advances and complex manufacturing processes that go into sports shoes, athletes keep getting injured. Given these observations, it is essential that we ask whether the claims made by those who promote such lucrative technologies (shoe manufacturers, sports magazines, retailers, etc.) really are accurate.

1. CHOOSING SPORTS SHOES

There is a considerable lack of consensus and scientific evidence concerning which criteria a professional should use to recommend a given type of sports shoe. Nevertheless, choosing athletic footwear should be based on two basic principles:

1) **The right fit**
   The size, width and shape of the shoe should fit the shape of the foot, without causing pressure points or deforming the toes. The shoe should feel comfortable as soon as you put it on.

2) **Simplicity**
   The shoe should interfere as little as possible with the natural protective biomechanics of the foot. (For example, shoe cushioning increases instability, heel height increases the risk of ankle sprain and alters running biomechanics, wide soles disrupt pronotation dynamics).

   Other sport-specific criteria may also serve as a guide for choosing appropriate sports shoes:

SPORTS SHOES

Grip
The shoe should provide adequate grip. The design and type of material used in the outsole of a shoe or the addition of spikes under the shoe can maximize grip depending on the surface. For example, certain types of rubber outsoles may provide better grip on certain gym surfaces. The same applies to the spike length and type of outdoor soccer shoes and the type of field; the type of spikes on sprinting shoes and the type of track; the type of crampons on hiking boots and the type of surface conditions.

Stability and sports involving lateral movements
The shoe should adequately support the foot in order to provide lateral stability to the ankle and the foot in sports that involve a lot of quick lateral movements (e.g. soccer, basketball, tennis, physical fitness training).

Many strategies are used to provide stability, including straps on the instep or the upper part of the shoe, lateral reinforcements of the quarter (high cuts), optimal lacing systems, wider soles or heel stiffeners. The most important criteria, however, is the height of the sole, which should be as low as possible to decrease the lever effect.

Lightness and endurance sports
The weight of a shoe has an important effect on oxygen consumption. Several studies on runners have shown that a 1% increase in shoe weight can cause a 3% increase in oxygen consumption. In other words, for all sports where performance is influenced by an “endurance” factor, i.e. sports such as running, soccer, boxing or basketball, shoes must be lightweight in order to reduce cardiovascular requirements and consequently improve physiological performance.

Flexibility and certain specific sports
A flexible shoe that does not interfere with the foot’s natural dynamics is recommended for long-distance running, while a shoe with a very rigid sole may improve performance in sprinting and jumping, according to certain authors. Shoes for dancing, rock-climbing or gymnastics should be flexible enough to allow certain specific dynamics necessary for performance.

Anti-pronation features and running shoes
Despite the fact that there is no clear scientific evidence to support their effectiveness, anti-pronation features (the denser and darker-coloured section of the midsole) are incorporated into running shoes in an attempt to reduce overpronation.

Thus, runners and walkers whose arches fall abnormally when their feet hit the ground could benefit from purchasing shoes with anti-pronation features.

Depending on the requirements of a sport or activity, certain secondary criteria may also influence the choice of shoe. Breathability of the sole and shoe upper may prove useful in hot weather as it helps reduce perspiration; a waterproof upper may be useful in hiking shoes and in rainy or damp conditions; light reflectors on running shoes will make a runner visible at night; the rigidity and snugness of a downhill ski boot support the ankle and foot, allowing immediate and optimal control of skis; padding in cross-country ski boots keeps feet warm in cold weather, etc.

2. SPECIAL SHOES AND NEW TECNOLOGIES

Based on the assumption that the foot has what it takes to protect itself against injury and that the dynamics of bare feet are the benchmark of proper walking and running biomechanics, an impressive number of new shoes have appeared on the market in response to this paradox (e.g. Biom, Five Fingers Vibram, Nike Free, MBT Shoes, Newton Shoes).

Even though the design of these shoes is based on interesting theories, it is nevertheless important to critically assess these new trends and marketing influences. It is also important to proceed gradually when changing from one type of shoe to another, particularly if the new shoe involves a significant change in biomechanics (such as a substantial difference in the thickness of the sole).

3. SPECIFIC POPULATIONS

Diabetics suffering from peripheral neuropathies (loss of sensitivity in the extremities) should pay particular attention to foot comfort. The fit and comfort of their sports shoes is of the utmost importance since diabetics are advised to minimize the risk of skin lesions caused by irritation. Cushioning and foot orthoses could prove essential features in this regard.

SPORTS SHOES

1. Shop for shoes **at the end of the day**, after you've been active (your feet will be at their widest, since they swell slightly with activity).
2. Shop in a store that offers a wide range of shoes and choose a shoe **based on the type of sport and its requirements**.
3. **Try on** both shoes inside the store; wear sports socks and lace the shoes up properly.
4. Do a few **dynamic moves** such as running and jumping.
5. Make sure the shoes feel **comfortable** as soon as you put them on (good fit, no pressure points, heel doesn't slip, etc.).
6. Leave one centimetre of space between the **toes** and the end of the shoe (you should be able to wiggle your toes freely inside the shoe, except in certain types of shoes such as dancing or hiking shoes).
7. The **price** of a shoe is not an indication of quality and definitely not one of protection against injury.
8. Sports shoes have a limited **lifespan**. However, contrary to popular belief, it is not the shoes' cushioning that should be monitored but rather the amount of wear and any deformations that could increase the risk of injury.
9. Your **weight** should not determine the size or cushioning of your shoes, only the quality of the shoes' uppers, which should be a little sturdier.
10. **Break in your shoes gradually** to give your body time to adjust to the new biomechanics.

The protective qualities of footwear have always been prized. Since the beginning of time, leather sufficed to shield us against sharp rocks, cold and snow. With the advent of new manufacturing technologies and the discovery of new materials, engineers, influenced by marketing departments, have gotten carried away with new designs. In the last 20 years alone, sports shoes have evolved as much as they had in the previous 4000. However, despite all the technological advances, we now realize that choosing good sports shoes should depend on two simple criteria: **comfort** and **simplicity**.

SPORTS SHOES

Written by: Blaise Dubois, B.Sc. P.T. RCAMT, Sports physiotherapy, Conseil de médecine du sport du Québec (CMSQ)

CONTACT US

Please contact us if you would like more information or copies of our publications.

By mail: Ministère de l'Éducation, du Loisir et du Sport
Direction de la promotion de la sécurité
100, rue Laviolette, bureau 306
Trois-Rivières (Québec) G9A 5S9

By telephone: 819-371-6033 or **1-800-567-7902**
By fax: 819-371-6992

By e-mail: promotionsecurite@mels.gouv.qc.ca

Web site: www.mels.gouv.qc.ca

Éducation, Loisir et Sport
Québec