

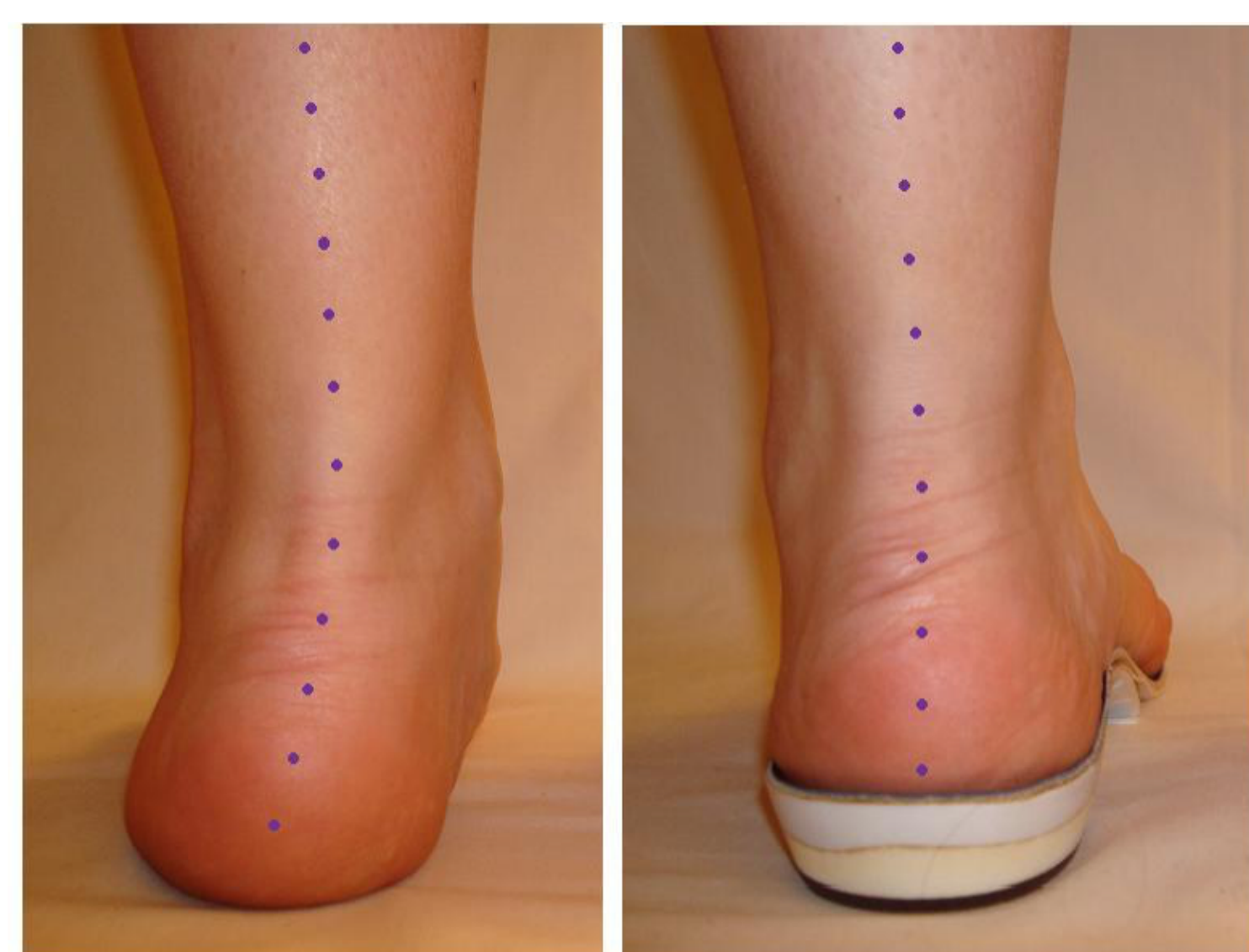
# Foot Orthoses and the Effects on Athletic Performance: A Literature Review

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## Introduction

When it comes to athlete performance, research and sports industries have attempted to discover the best method to enhance the performance, improving the athlete's overall capabilities while reducing the energy expenditure. Many methods have been approached to achieve this goal, including improvement in equipment (i.e., the material of a bat), accessories for performance (i.e., protectors, helmets), and attire (i.e., shirts, shoes). Narrowing down to the importance of an athlete's shoe, one can interpret that it can greatly affect their performance even with just the cushioning insert in their shoe. When it comes to shoe insert, athlete's can have the ability to realign and correct the positioning of their foot while providing correct proper support (Figure 1). Research has shown that with proper foot alignment body mechanics, that have once been non-existent, can now re-established for the performing athlete.

A type of orthotic are inserts that have the purpose not only to align the foot, but also to improve pressure point over the foot. Unbalance pressure points are main cause for pain and early fatigue in athletes (Figure 2).



**Figure 1.** Representation of foot alignment through the use of an orthotic.

## Purpose

The purpose of this study was to review literature and bring awareness to athletes about the enhancement that can be achieved in sport performance by using orthoses.



**Figure 2.** Compares pressure points of balanced and unbalanced foot.

## Methods

While composing research on effects of foot orthoses for athlete's sport performance, data research was comprised of search engines such as TWU library database as well as Google Scholar. Certain keywords that were used to gather information were words such as orthotics, sport, performance, and biomechanics. The research was limited the literature that exclusively are about foot inserts or orthoses, and the effects on overall athlete's performance. This study had a primary focus of athletes between that ages of 18-27 years old who performed in their desired sport or exercise training while using a foot orthoses.

In this review, 13 articles were used to gather information involving foot orthoses and the effects they have on athlete performance. Articles included in the review had to consist of knowledge involving orthotic foot inserts, body mechanics, and sport performance.

## Results

After reviewing main orthotic principles, one may become informed of the material, benefits, and limitations these cause during exercise. Materials used to comprise the foot inserts are as followed:

- Composite carbon fibers
- Subortholen Family
- Polyethylene Foams
- Flexible pad
- Thermoplastic
- Polypropylene
- Acrylic
- Cork
- Leather

These components in conjunct with the use of heat are vital when constructing a foot orthotic insert. The reason for different materials and the structure of the orthotic is to be able to: 1) provide enough support to resist the forces generated in the foot; and 2) be able under excessive heat to conform to the individual's foot shape, maintaining comfort. These materials and design has to be personalized to each individual and to each pathology presented to the specialist. A material that is comfortable for a specific pathology might not be suitable to a different individual.



**Figure 3.** 3D Foot Scanner used to calibrate pressure points in foot.

## Results

A 3D plantar scanner is a precision optical imaging device designed to specifically calibrate the shape of an individual's plantar characteristics to create custom insoles (Figure 3). Hillman (2013) manifest that to prescribe orthotics, athletes have to be measured the foot arch and length, since is unique for each individual. Podiatrist Daniel Gibbs have debated the need of orthosis in athletes and manifest that the athlete should handle the forces applied to the body through the foot. He also mention that orthotics should provide stability to the foot allowing a movement avoiding fatigue.

## Discussion

Overall, studies have shown the greater effects and benefits when it comes to wearing foot inserts to enhance the athletes capabilities during sport performance. The main area of sport researched about orthotic is marathon and long distance running. Evidence have suggested that the use orthotics can improve performance due to their action on foot motion in the frontal and transverse plane, which have been associated with the etiology of chronic injuries which may be present in runners. These benefits only can be achieved performing a correct assessment of the athlete and their needs.

## References

References available upon request