



## TRADITIONAL VERSUS MINIMALIST FOOTWEAR— INJURY CONCERNS

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Minimalist footwear in its most basic form, bare feet, has existed in training for thousands of years. Only recently has the footwear industry transformed it into the current saturated and complex state it is in now. The number of footwear options grows annually, and traditional footwear is no longer the only option. A recent editorial detailed the sudden surge of interest in minimalist footwear, attributing a number of studies published in the early 2000s along with the best-selling book, *Born to Run*, as major causes for this trend (8).

Today, a debate centered on whether or not traditional footwear has contributed to an increased risk of injury continues to rage throughout the scientific and footwear communities. Recent research provides support for both sides of the discussion and remains somewhat inconclusive. This article will focus on interpreting the current literature in order to provide strength and conditioning professionals with useful information that can be used for their clients.

First, a few basic definitions of traditional and minimalist footwear should be reviewed. Traditional footwear has been defined as “having a cushioned elevated heel, arch supports, and a stiff sole,” (11). On the other hand, minimalist footwear features “smaller heels, little to no cushioning, more flexible soles, and no built-in arch supports,” (9). Similarly, minimalist footwear has also been defined as simply lacking the primary characteristics of traditional footwear (11).

### FOOT STRIKE CONCERNS

Foot strike is an area of concern when considering the potential injury risk of minimalist footwear. Research examining collegiate cross-country runners found that those who used a rearfoot strike, as opposed to a midfoot or forefoot strike, had a significantly higher rate of injury (4). Additional studies have quantified some possible reasons for this potential increase in injury risk. Regarding compressive loading forces at various joints, one such study found that forefoot strikers, in addition to experiencing higher ankle joint moments during the initial portion of the stance phase, received a 41.7% increase in contact forces at the ankle and a 14.4% increase at the knee (12). In a study comparing various foot strike options, those utilizing a barefoot midfoot and barefoot forefoot strike experienced significant increases in medial gastrocnemius electromyography (EMG), peak tibial shock forces, and minimum angle of knee flexion (10).

When transitioning from traditional to minimalist footwear, it is always recommended to use a cautious approach. As far as foot strike is concerned, clients should be aware of the possibility that their current foot strike pattern may not be as biomechanically efficient with minimalist footwear as with traditional shoes, especially if using a rearfoot strike pattern. This sudden change with a rearfoot strike may increase the risk of injury due to the increased muscle activity and pressures. Clients should understand that foot strike patterns other than rearfoot do not necessarily

come with a higher inherent risk of injury, but that a sudden transition may cause complications and compensations.

## ACHILLES TENDON FORCES

Aggravation of the Achilles tendon region is another major concern for users of minimalist footwear. Some research has quantified the prevalence and possible underlying mechanisms of Achilles tendon injuries. In three case studies involving runners transitioning to minimalist footwear, two experienced Achilles tendinopathy and were forced to spend several weeks in rehabilitation (3). Though reductions have been shown in patellofemoral reaction forces, Achilles tendon forces have been shown to increase significantly with minimalist footwear (14). A similar study reported greater ankle plantar flexion moments, as well as an increase in positive work and peak power at the ankle joint, supporting the need to pay specific attention to the ankle complex and Achilles tendon region when using minimalist footwear (2). However, other research in this domain has provided some contradictions. In a survey of runners, more than half of the 500 respondents reported increased pain around the Achilles tendon during the transition from traditional to minimalist footwear, but participants also mentioned that this pain decreased over time and eventually ceased completely (6).

Strength and conditioning professionals should explain to their clients that minimalist footwear lacks the raised heel of traditional footwear and places the foot in a flatter position on the ground, forcing the plantar flexors to work harder and more forcefully. This puts additional strain on the Achilles tendon and is a likely factor in the many instances of Achilles tendon overuse injuries reported in the literature. It is possible that upon making the transition of using minimalist footwear, a sudden increase in related pain occurs before the body adapts and the pain subsequently decreases. Strength and conditioning professionals should remind their clients that a slow and steady transition strategy is likely the best route to take until the body is sufficiently adapted to the new demands.

## FOREFOOT PRESSURE

Other research has looked into the possibility of force increases with minimalist footwear by examining forefoot pressure differences between minimalist and traditional footwear. One study found that minimalist footwear, regardless of foot strike, created greater peak and mean pressure across the forefoot region (1). Another study found greater peak pressures in the medial forefoot of minimalist runners participating in a 50-km race (7). This increase in pressure across the forefoot has been linked to reports of metatarsal stress fractures in runners using minimalist footwear. One case study featured a male marathon runner who experienced a metatarsal stress fracture upon transitioning to minimalist footwear (3). Additional reports of metatarsal stress fracture incidence in runners have been reported in other studies examining minimalist footwear runners (5,13).

Forefoot injury concerns may be some of the most pressing for new minimalist footwear users. Greater forces and pressures have been found across the forefoot region for minimalist runners, which could potentially lead to metatarsal stress fractures over time. Some arguments point to too short of a transition period and too quick of a return to normal mileage or activity. As with the other injury concerns previously detailed, these findings suggest

the need for a cautious approach by new users of minimalist footwear. Making the transition without reducing intensity or frequency of the activity may increase the risk of developing stress fractures in the foot.

## LIMITATIONS

As the scope of literature on this subject is constantly increasing, it was impossible to attain information from every single research article published on this subject. The research presented here represents some of the more prominent findings, but is certainly not exhaustive. Additionally, it should be understood that much of the research presented considers minimalist footwear concerns from the perspective of runners, as they seem to be the largest user group of minimalist footwear. It is possible that this knowledge can be generalized to other sports, activities, and even casual wear, but this is not a given.

## CONCLUSION

These numbers may appear to bode poorly for those in favor of using minimalist footwear, but they are neither definitive nor conclusive. It seems as if each study that demonstrates an increased risk of injury with minimalist footwear has another study that refutes it. The primary considerations for injury risk appear to include the period of time during which the transition occurs, how quickly the individual returns to the levels of activity achieved with traditional footwear, and whether or not foot strike patterns are altered during the transition. However, some of these considerations are highly individualized and may not necessarily lead to injury. Given this information, strength and conditioning professionals should make sure their clients know that a level of caution is highly advisable when it comes to using new minimalist footwear, especially when first starting. At the same time, it is important to point out that there are limitations to the current literature and that definitive evidence is still minimal.

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### ABOUT THE AUTHOR

Andy Chassé has been involved in the fitness field since 2007 and just completed his Master's degree in Kinesiology at the University of Texas-Pan American. For his Master's thesis, he investigated the general population's perceptions and preferences of personal trainers from a personality perspective. Chassé received his Bachelor's degree in Kinesiology in 2007 and holds multiple certifications through the National Academy of Sports Medicine (NASM) and the American College of Sports Medicine (ACSM).



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