



## Original Research

# A Survey of Runners' Attitudes Toward and Experiences With Minimally Shod Running

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## Abstract

**Objective:** To investigate the characteristics, perceptions, motivating factors, experiences, and injury rates of runners who practice minimally shod running.

**Design:** Survey.

**Setting:** web-based questionnaire.

**Participants:** Five-hundred sixty-six members of the Chicago Area Runner's Association.

**Methods:** A link to a 31-question online survey was e-mailed to members of Chicago Area Runner's Association. Questions covered demographic information, use of minimalist-style running shoes (MSRS), injury rates, and change in pain.

**Main Outcome Measures:** Use of MSRS, occurrence or improvement of injury/pain, regions of injury/pain, reasons for or for not using MSRS.

**Results:** One-hundred seventy-five (31%) respondents had practiced minimally shod running, and the most common motivating factor was to decrease injuries and/or pain. Fifty-one respondents (29%) suffered an injury or pain while wearing MSRS, with the most common body part involved being the foot. Fifty-four respondents (31%) had an injury that improved after adopting minimally shod running; the most common area involved was the knee. One-hundred twenty respondents (69%) were still using MSRS. Of those who stopped using MSRS, the main reason was development of an injury or pain. The most common reason that respondents have not tried minimally shod running is a fear of developing an injury.

**Conclusion:** This survey-based study demonstrated that the use of MSRS is common, largely as the result of a perception that they may reduce injuries or pain. Reductions and occurrences of injury/pain with minimally shod running were reported in approximately equal numbers. The most common site of reported injury/pain reduction was the knee, whereas the most common reported site of injury/pain occurrence was the foot. Fear of developing pain or injury is the most common reason runners are reluctant to try minimally shod running.

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## Introduction

Barefoot running has received a lot of attention recently in the field of sports medicine, most notably because of the theory that it can cause changes in gait, resulting in reduced collision forces between the foot and the ground [1], which may protect runners from some impact-related injuries. Our ancestors would run long distances without any footwear and clearly were able to tolerate this for millions of years before modern running shoes were invented. Today's highly supportive, high-heeled, and cushioned running shoes encourages heel-strike, whereas habitually barefoot endurance runners tend to land on their forefoot [1].

Lieberman et al [1] demonstrated, in their seminal article in *Nature*, that forefoot striking reduces ground reaction forces on impact compared with rearfoot striking. This outcome suggests that barefoot running may lead to fewer running-related injuries. Many runners who want to take advantage of the implications of this theory may choose to wear pared-down, minimalist footwear that is purported to mimic running barefoot but provides them protection against the modern realities of running on roads with glass, rocks, sticks, and other hazards. A large industry has been developed on minimalist-style running shoes (MSRS), which are loosely defined as ultra-lightweight or barefoot-style shoes with a low or eliminated heel-to-toe drop. Examples of MSRS

include Vibram FiveFingers (Vibram SpA, Albizzate, Italy) and Nike Free (Nike, Inc., Beaverton, OR).

There is mixed evidence regarding the kinematics and kinetics of minimally shod running compared with true barefoot running, and it is unclear whether minimally shod running mimics running barefoot. Minimally shod running has been shown to reduce the amplitude of the impact peak vertical force and encourage initial foot strike more anteriorly on the foot. In addition, the foot and ankle angle (the angle of the plantar surface of the foot relative to horizontal) during minimally shod running is similar to running barefoot [2]. Minimally shod running has been found to be more economical than traditionally shod running [3,4] and not metabolically more demanding than barefoot running [5]. Other studies, however, have demonstrated that running in minimalist shoes with a rear-foot strike is no different kinematically than standard running shoes and differs significantly from true barefoot running [6].

With regard to the downside of minimally shod running, a recent study on rearfoot-striking runners who were naïve to minimalist footwear demonstrated increased loading of the lower extremity [7], and magnetic resonance imaging analysis has demonstrated increased bone marrow edema in runners who have been using MSRS [8]. A recent prospective trial followed runners training for a 10K with either neutral, partial-minimalist or full-minimalist footwear and found increased injury and pain in the shin and calf in the full-minimalist group [9]. There are also multiple case reports detailing injuries observed in minimalist runners but no large population studies. Injuries reported include stress fractures of the metatarsals and calcaneus, plantar fascia pain and rupture, and achilles tendinopathy [10,11]. Experienced barefoot runners using MSRS demonstrate increased plantarflexion at contact and landing on the fore- or midfoot [2]; this helps rationalize, but does not prove, why most of the case reports detail injuries of the foot and ankle compared with other body parts. Importantly there also are data that minimally shod running in people who are naïve to MSRS do not have the increased plantarflexion at contact that is seen in experienced barefoot runners [7].

The evidence is even more limited in the area of injury and pain reduction after adoption of minimally shod running [12]. It is thought that barefoot running improves proprioceptive ability, reducing foot position errors and thus resulting in fewer lateral ankle sprains [13]. It is unclear whether this protective proprioception extends to those who employ minimally shod running.

Our study aimed to better explore and describe the characteristics and experiences of a large population of runners who have used MSRS. We were particularly interested in both injuries that are sustained with their use and also reduction in injuries or pain with minimally shod running. Similar to a previous study of runners who

practice barefoot or minimally shod running (the 2 styles were conflated) [14], we also aimed to explore interest in minimally shod running and barriers to adopting this type of shoe wear.

## Methods

### Survey Design

An electronic survey was created by the authors via SurveyMonkey (SurveyMonkey, Palo Alto, CA). The anonymous survey consisted of a total of 31 questions in closed-question format. Demographic data such as gender, age, average weekly mileage, self-perceived running level, predominant running surface, longest race distance completed in the previous 12 months, and longest race distance planning to complete in the next 12 months were collected. All participants were asked the question: "Have you ever tried running with minimalist shoes (ultra-lightweight or barefoot-style running shoes with low or very low heel-to-toe drop, eg, Vibram Five Finger, Nike Free, New Balance Minimus Zero)?" Those who answered "yes" to the aforementioned question were piped to questions related to why they chose minimally shod running, how often they use MSRS, with whom they consulted before starting minimally shod running, how they prepared for the transition, any injuries experienced, and any injuries or pains that improved with minimally shod running. Those who experienced injuries or pain with minimally shod running or had injuries/pain that improved with MSRS were asked to specify what body parts were involved and were able to choose all that applied. Those participants who had never tried minimally shod running were piped to a series of questions regarding if they were interested and reasons why or why not.

### Subjects

Five-hundred sixty-six people participated in the survey. All the subjects were informed of their choice to voluntarily participate and freedom to stop the survey at any time. The study protocol was reviewed and approved for conduct as exempt from the requirement for obtaining written informed consent from the Northwestern University Institutional Review Board.

### Procedures

A brief description of the study and link to the survey was included in the Chicago Area Runner's Association e-newsletter, which is sent to 7020 members. As an incentive, all participants were eligible to enter a random drawing for a \$100 Amazon.com gift card. Contact information for use in the prize drawing was collected separately and was not linked to the subjects'

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