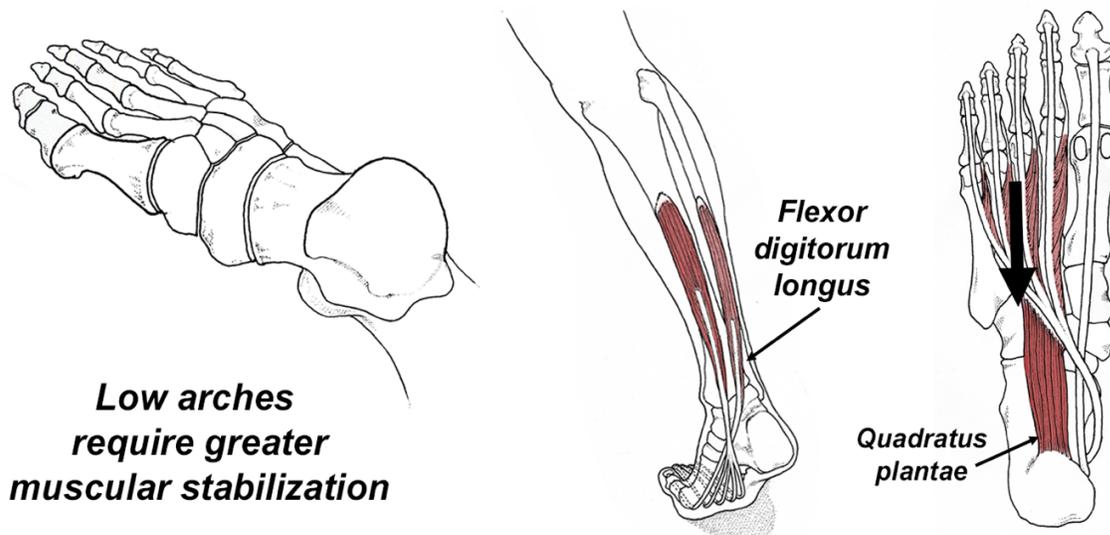


Strengthening Your Feet Reduces Injury Risk and Enhances Athletic Performance

Especially for Those With Low Arches

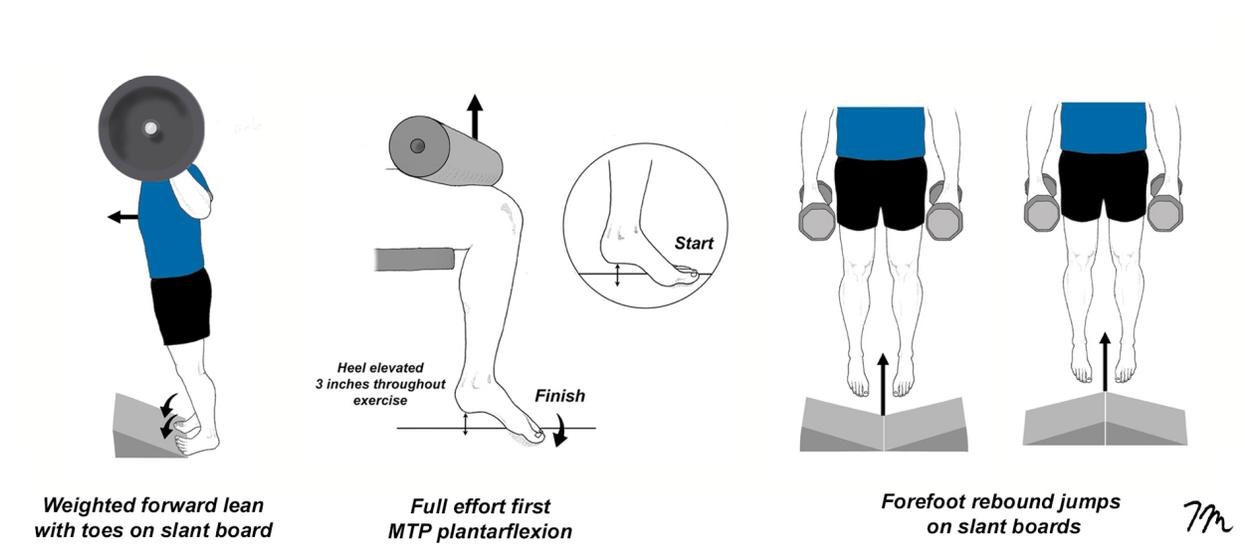
In a recent randomized controlled trial conducted in Brazil, 118 runners were divided into two groups: one group performed foot and ankle strengthening exercises overnight weeks, while the other served as the control group (1). Both groups maintained their usual running schedules over a 12-month period. **By the study's conclusion, the control group of runners were 2.42 times more likely to experience a running related injury than the runners performing foot strengthening exercises. The authors point out that a noticeable decrease in injury rates only appeared after four to eight months of regular foot strengthening.**



In addition to reducing injury rates, **foot strengthening can also improve performance, especially in athletes who pronate excessively.** Researchers from Poland took 47 long-distance runners and divided them into **two groups: those with neutral arches, and those with low arches (2).** Both groups were given the same foot/ankle strengthening exercises which they did daily for six weeks. At the end of the study, while both groups became stronger, **the low-arched runners had greater improvements in running performance, specifically sprint performance.** The results of this study should not have come as a surprise, because people who pronate

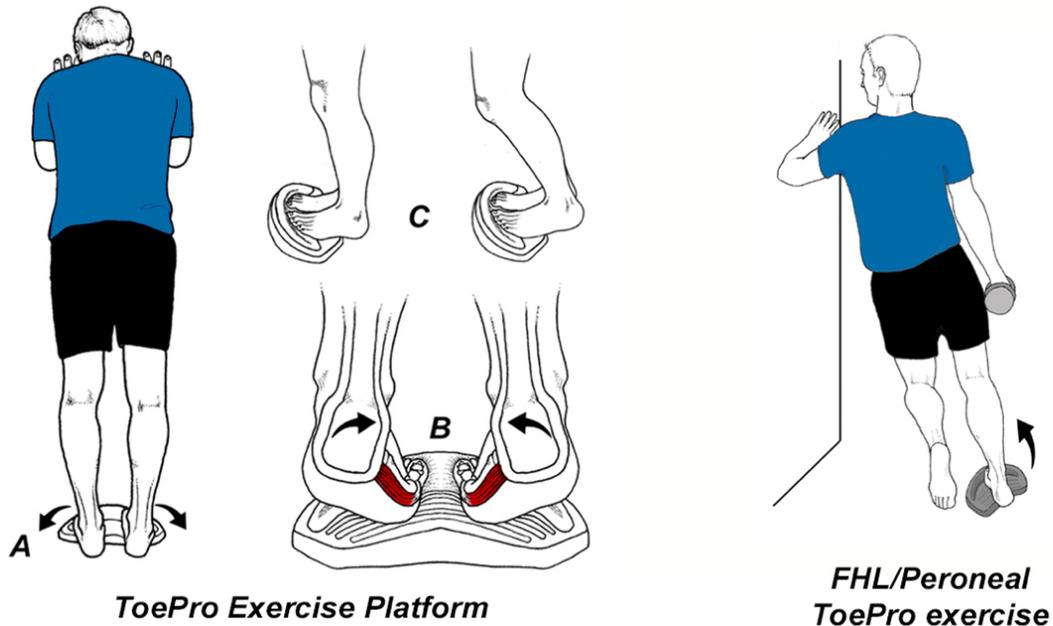
excessively are more dependent on muscular restraining mechanisms to channel energy through their arch during propulsion. **This research also explains why flat-footed people with weak arches are significantly more likely to be injured than their stronger peers (3).**

It's not just runners who benefit from foot strengthening. In a 2025 open access paper, **Tourillon et al. (4) divided 28 highly-trained athletes into a foot strengthening group and a control group.** The athletes practiced at a regional or national level and participated in either soccer, rugby, track and field, basketball, handball, or tennis. The foot strengthening exercises were performed twice a week for 8 weeks. **By the conclusion of the study, athletes who engaged in foot strengthening exercises showed marked progress in their ability to make rapid lateral cutting movements.** With the typical soccer player changing direction around 700 times per game, this boost in agility could greatly influence performance on the field.



To determine which foot strengthening exercises produced the best outcomes, **Osborne et al. (5) assessed EMG activity and torque generated at the forefoot with 16 commonly prescribed foot and ankle exercises.** Their findings revealed an intriguing paradox: certain exercises elicited substantial muscle activation, yet these EMG increases did not correspond to greater force output beneath the forefoot. Specifically, the **short foot, squat, and toe spread exercises, which are frequently prescribed to improve performance and prevent injury were particularly ineffective at increasing force output beneath the toes.** The authors state the mismatch between muscle activation and force output occurs because the muscles are exercised in their shortened positions, which greatly impairs force production. **Following this logic, other commonly prescribed foot exercises, such as towel curl and marble pickup**

exercises, would also produce negligible changes in force output beneath the toes and should therefore be avoided.



As demonstrated by Goldman et al. (6), **optimal effectiveness in strengthening the toe muscles occurs when the toe muscles are exercised in their lengthened positions. These authors found that performing exercises with the toes extended produced nearly 4 times greater strength gains than those achieved with conventional exercises.** One of the most effective ways to exercise foot and arch muscles in a lengthened position is with the ToePro platform. A pilot study from Temple University (7) demonstrated that **performing ToePro exercises three times a week for six weeks led to a 35% increase in force generated beneath the great toe, with improvements in single-leg balance. The peroneal/FHL exercise using the ToePro is particularly effective at increasing force output beneath the medial forefoot.** The intensity of these exercises gradually increases and as strength increases, prolonged isometric contractions are added at the end of each set, which in addition to improving tendon strength, also act as a natural analgesic (8). **A video of advanced ToePro exercises is available at humanlocomotion.com, while the article by Tourillon et al. (4) is open access and has a series of videos and images that outline the entire foot strengthening program.** The exercises illustrated in figure 2 were drawn from photographs in the Tourillon et al. paper.

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