

## 2012 Study Shows ChiRunning Technique Reduces Impact

A recent 1-year study at University of North Carolina at Chapel Hill shows that the ChiRunning technique was found to produce less impact and higher efficiency, when compared with three other common styles of running.

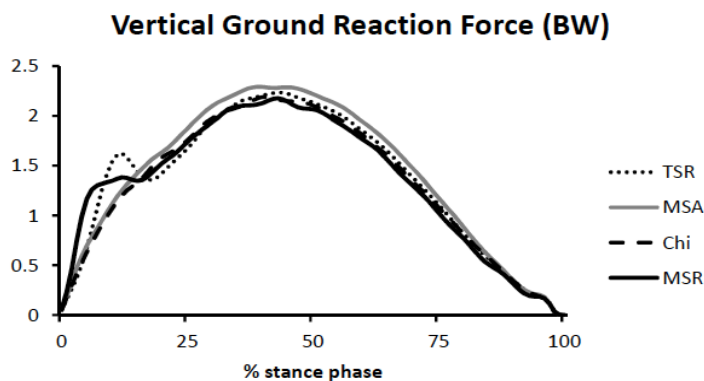
The study, **A Comparison of Lower Extremity Joint Work and Initial Loading Rates Among Four Different Running Styles**, (Goss, 2012) compared four common types of running styles:

- TSR – Runners with a rearfoot strike and wearing traditional running shoes.
- MSR – Runners with a rearfoot strike and wearing minimalist shoes
- MSA – Runners with an anterior (forefoot) strike and wearing minimalist shoes
- CHI – Runners in this group were proficient in the Chi Running technique with a midfoot (full-foot) landing in both traditional *and* minimalist shoes

**Of the four running styles studied, participants practicing ChiRunning showed the following:**

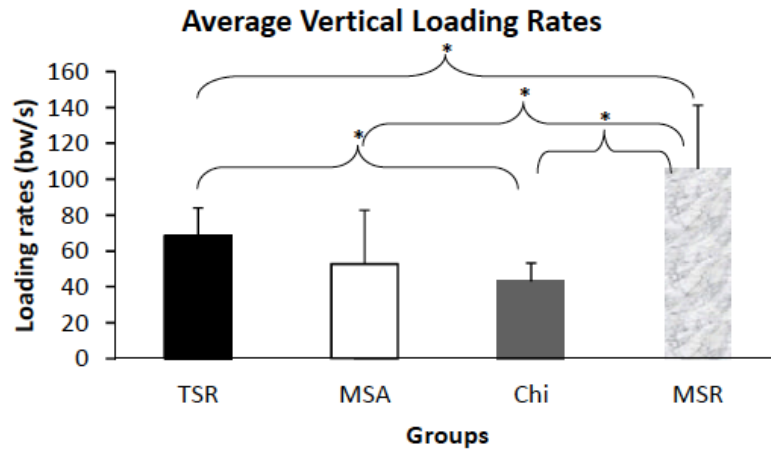
- **Lower Impact Forces:** They experienced the least amount of impact (shown as the lowest average vertical ground reaction force VGRF). Lowering the impact a runner has when their foot strikes the ground directly lowers the impact to the knees, helping to counteract the cause of the most common running injury, “runner’s knee.” (Fig. 4-7)

**Figure 4-7:** Vertical Ground Reaction Force Curves. Data are multiples of body weight (BW) as a function of % stance phase. TSR = traditional shoe wearing rearfoot strikers, MSA = minimalist shoe wearing anterior foot strikers, Chi = Chi trained runners, MSR = minimalist shoe wearing rearfoot strikers, BW = body weights.



- **Greater Attenuation of Impact:** They experienced a smoother landing without the jarring most commonly attributed to heel striking (shown as the smallest Average Vertical Loading Rate AVLR). This means that impact with the ground is spread out over a longer period of time, thus helping the runner to eliminate sudden impact to the bones and joints which can commonly lead to stress fractures in the bones of the feet, lower legs and hips. (Fig. 4-6)

**Figure 4-6: Average Vertical Loading Rates.** TSR = traditional shoe wearing rearfoot strikers, MSA = minimalist shoe wearing anterior foot strikers, Chi = Chi trained runners, MSR = minimalist shoe wearing rearfoot strikers. \* denotes significant pairwise comparison.



- Less Knee Extension Eccentric Work:** They landed closer to their center of gravity (shown as Knee Extension Eccentric Work KEEW), thus reducing the common problem of overstriding which produces the “braking effect” and is generally referred to as the culprit behind “runner’s knee,” one of the most common running ailments. (Fig. 4-8) Because the knees of ChiRunners are bending less than runners in the other groups, there is less loading to the quadriceps which translates into less work done and greater efficiency during the support stance.

**Table 4-8: Knee Extension Eccentric Work ANOVA (Joules / BH\*BW).** TSR = traditional shoe wearing rearfoot strikers, MSA = minimalist shoe wearing anterior foot strikers, Chi = Chi trained runners, MSR = minimalist shoe wearing rearfoot strikers. \* denotes significance ( $p < 0.05$ )

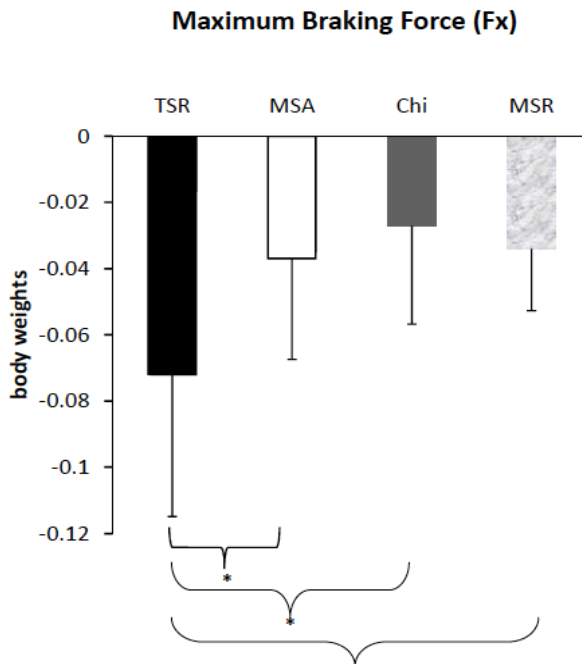
Groups	Count	Sum	Average	Variance	SD
TSR	22	-7.294	-0.332	0.012	0.111
MSA	23	-3.566	-0.155	0.017	0.131
Chi	12	-1.722	-0.144	0.006	0.078
MSR	17	-3.851	-0.227	0.019	0.138

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.442	3	0.147	10.249	< 0.001*	2.736
Within Groups	1.005	70	0.014			
Total	1.447	73				

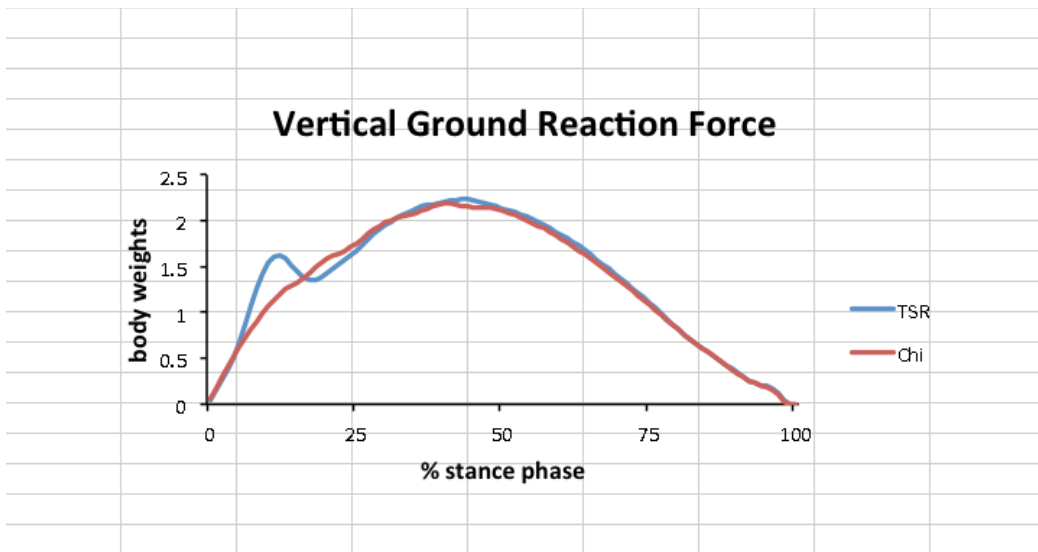
- Less Braking Force:** The ChiRunners showed the least amount of Maximum Braking Force upon impact with the ground. This is measured as a multiple of the runner's body weight. (Fig. 4-15) Running with less braking force means that your feet are not stopping your forward momentum with every foot strike. This makes you a much more efficient runner. Being a heel striker is akin to driving a car with one foot on the brake pedal and one foot on the gas pedal. With a heel strike you're pushing with one leg while stopping yourself with the other, a highly inefficient way to run.

**Figure 4-15:** Maximum Braking Force (body weights). TSR = traditional shoe wearing rearfoot strikers, MSA = minimalist shoe wearing anterior foot strikers, Chi = Chi trained runners, MSR = minimalist shoe wearing rearfoot strikers.



Of the four running styles studied, the Chi Running technique was shown to be the most effective at reducing both the overall impact *and* the rate of impact. These two attributes of good running form have been shown to reduce overuse injuries in runners, in a [study](#) published in the Journal of the American College of Sports Medicine.

Here's a graph from the study comparing the impact curves of ChiRunners and Traditionally shod Rearfoot runners. This clearly shows the dramatic difference between landing with a heel strike (spike in the blue-line graph) and landing on your midfoot (or full-foot) with ChiRunning. The Chi Running graph shows a gradual increase in force instead of a sudden spike, which is much easier on the joints, bones and leg muscles.



This study confirms what some doctors have already known. “The recent UNC study scientifically confirms years of our clinical experience.” says Dr. William Mullins at the Center for Rheumatic Diseases and Osteoporosis in Bethesda, Maryland. “Chi Running is a unique running style that causes less stress for lower extremity joints and supporting structures than any other running technique. Chi Running reduces the risk of running injuries, and increases the chance that we can continue running into our 80s. I routinely recommend the ChiRunning workshops or DVDs for my patients who run for exercise.”

In 2008 and 2010 we conducted two large *anecdotal* peer-reviewed studies (3500 and 2500 responses respectively), but this is the first peer-reviewed, scientific study showing what we’ve believed all along; that Chi Running actually creates less impact than other running styles.

Additionally, and contrary to some running experts’ beliefs, this study also shows that low-impact, more efficient running technique *can be learned*, and that runners can improve their technique to reduce the potential for injury. This paves the way for many runners experiencing difficulty, discomfort or pain in their running, to learn how to lower their impact with the ground and thus lower their injury-rate.

The study was conducted on 74 runners divided into four study groups by running style. The study was conducted over a 1-year period. We’re thrilled at these findings and we plan to do a much larger study with the military in the near future.

One of the biggest events to happen in the running world in the past 5 years has been the introduction and explosion of minimalist running shoes and barefoot running. Proponents of this wave of interest say that a shoe with less material underfoot allows a more natural running gait because of the increased proprioception of the runners foot. I agree that having a more minimal shoe can help you run better. But, I also believe that it’s not about the shoe as much as the runner’s gait. Poor running technique is the culprit and efficient running form is the solution to the high rate of running injuries. The interesting thing about the ChiRunners in this study is that they showed lower rates of impact across the board, regardless of the shoes they were wearing.

(This study was conducted at the University of North Carolina at Chapel Hill by Lt. Col. Don Goss, PT, PhD, OCS, ATC – Assistant Professor, US Army / Baylor DPT Program, Ft. Sam Houston, TX)