

Lower Extremity Review

# ler: FOOT HEALTH

October 2015



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Central Florida Foot and Ankle Center



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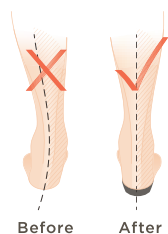
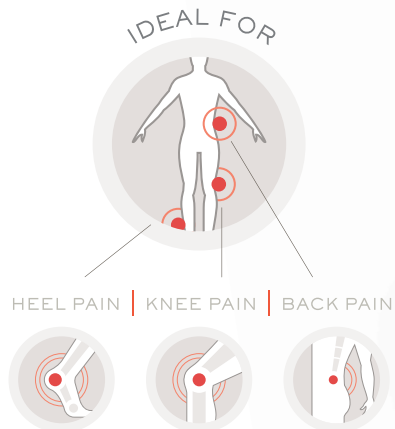


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By Shalmali Pal

**21 Bunion surgery: evolution of postoperative protocols**

Research is starting to reveal that early weightbearing, physical therapy, or both after hallux valgus surgery is not as risky as some lower extremity practitioners once thought, and such new postoperative protocols appear to be associated with improved outcomes.

By Barbara Boughton

## From the editor: Survey says: Minimalist risks persist



A survey isn't the most rigorous of scientific methodologies, but survey-based studies can provide the kind of real-world perspective that's missing from research done in a controlled laboratory environment. And, when biomechanists are as divided on a topic as they are on minimalist running shoes, a fresh perspective can be a very good thing.

One such recent study, which surveyed 566 Chicago-based runners about their experience with minimally shod running (see "Survey finds 31% of runners have tried minimalist

footwear," page 9), revealed a number of clinically useful findings.

First, despite signs of a backlash in recent years amid false advertising claims and scientific skepticism, minimalist running shoes have not gone away. Nearly one third of runners surveyed said they had tried minimalist shoes, and two thirds of those runners were still using them; another 25% of survey respondents said they hadn't yet tried minimalist shoes but were interested in doing so. And if these runners are still interested in minimalist shoes, your patients probably are too.

Of even greater concern, the survey found that only one third of the minimalist shoe users transitioned gradually to the new shoes—something that even the most avid minimalist shoe advocates say is essential to avoid injury. And fewer than half of the minimalist shoe users had consciously focused on changing their foot strike pattern when switching shoes, even though a forefoot strike pattern to reduce impacts and loading rates is one of the stated goals of both barefoot and minimally shod running.

So, runners are still interested in minimalist running, but many of them are unlikely to do it safely. These findings are valuable to clinicians, both for treating the injuries that result and for educating runners who haven't yet made the switch. And they're things we would never have learned in a laboratory.

Jordana Bieze Foster, *Editor*





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# Shoes, orthoses improve muscle activation onset in unstable ankles

## Custom insoles have greatest effect

By John C. Hayes

A study of patients with chronic ankle instability (CAI) suggests the onset of knee and ankle muscle activity occurs significantly earlier when shoes and orthoses are worn than when the patients are barefoot.

If borne out in further research, the July 2015 report in the *Journal of Athletic Training* may provide validation for the idea that patterns of muscular activation can be improved by shoes and orthoses and provide patients with CAI added protection against an ankle “giving way” during sports and other activities.

The study conducted by Belgian researchers included data from 15 students at the Faculty of Kinesiology and Rehabilitation Sciences at KU Leuven in Belgium, all of whom had at least two lateral ankle sprains and symptoms of CAI and who had worn foot orthoses for at least six weeks. They were young (21.8 years + 3 years) and active, but were not athletes, said lead researcher Bart Dingenen, PhD, PT, a sports physiotherapist in KU Leuven’s Musculoskeletal Rehabilitation Research Group.

Investigators collected data via surface electromyography and a force plate as the participants shifted from a double-leg stance to a single-leg stance. They repeated the process under four conditions: barefoot, shoes only, shoes with prefabricated “standard” foot orthoses, and shoes with each patient’s custom foot orthoses.

Each participant received a pair of standardized neutral running shoes and a pair of prefabricated ethylene vinyl acetate foot orthoses. The height of the medial arch support of the standard foot orthoses was based on the correction of half the navicular drop excursion; rearfoot posting was added as necessary.

Muscle activation onset occurred later in the barefoot condition than when the participants wore shoes, either with or without orthoses. Shoes with custom orthoses outperformed shoes alone or shoes with standard orthoses. The study also found that the improvements in muscle

activation times extended from the ankle through the knee.

Muscle activation timing is a significant issue in CAI. An ankle sprain can occur within 80 to 100 milliseconds after ground contact, Dingenen said. An electromechanical delay in muscle activation limits the muscles’ ability to counter the ankle’s tendency to roll.

“Anticipatory muscle activation is essential to protect against ankle sprains,” he said. “These types of experiments can improve our understanding of neuromuscular control during functional tasks and its difference in contributing to outcomes.”

The observed improvements in muscle activation onset associated with shoes and foot orthoses extended from the ankle through the knee.

Dingenen hypothesized that, when patients wore the custom foot orthoses they were used to, the distal sensory information is more reliable for the central nervous system, leading to earlier motor output compared with the other conditions.

Previous research, including a 2001 study in *Clinical Biomechanics* and a 2008 study in *Foot & Ankle Specialist*, has suggested that shoes and orthoses may improve proprioceptive input to the central nervous system by increasing contact area between the foot and the supporting surface.

But it also may be that shoes and orthoses, by separating the foot from the ground, actually decrease proprioceptive input, said Gregory M. Gutierrez, PhD, an assistant professor of Physical Therapy & Rehabilitation Sciences at the University of South Florida in Tampa. This may make muscles activate earlier, becoming primed for a destabilizing event when sensation is



In the KU Leuven study, participants shifted from a double-leg stance to a single-leg stance. (Photo courtesy of Bart Dingenen, PhD, PT)


poor; for example, when one is navigating a snowy or icy street.

“We cannot directly measure proprioception, we can only measure its ramifications, and in this case, the results would be the same,” said Gutierrez, a biomechanist who has done activation studies and whose primary interest is CAI.

“The study is another building block in our understanding of how persons with ankle instability interface with the world and how we can improve outcomes for them,” he said.

For Dingenen, the path ahead involves longitudinal studies to see how activation onset changes over time. He would also like to look at specific pathological populations and perhaps obtain prospective activation onset data from noninjured persons to see which are more likely to get ankle and knee injuries.

As the field progresses, one challenge will be determining how to obtain dynamic data during tasks that more closely resemble activities associated with ankle sprain, something that is difficult with current technology, Gutierrez said.

“People don’t sprain their ankle when they are going from a double-limb to a single-limb stance. They sprain their ankle when they are walking, running, jumping, cutting, or other dynamic activities,” he said. 

John C. Hayes is a freelance writer based in San Francisco.

#### Sources:

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# Survey finds 31% of runners have tried minimalist footwear

## Some report more pain, some less

By Chris Klingenberg

A significant percentage of avid runners have tried running in minimalist shoes, according to a recent survey-based study in which runners reported both positive and negative responses to making the switch in terms of pain and injury.

Although some users reported that switching to minimalist shoes relieved their existing running-related pain, others said they had to stop wearing the shoes due to associated pain or injury. Runners' pain-related responses tended to be dependent on the site of pain.

Marissa Cohler, MD, a physiatrist at Schwab Rehabilitation Hospital in Chicago, and Ellen Casey, MD, an assistant professor in the Department of Family, Community & Preventive Medicine at Drexel University College of Medicine in Philadelphia, conducted a survey of runners' attitudes toward and experiences with minimally shod running.

Of the 560 people who responded to the survey, most were female (71%) and aged between 30 and 39 years (37%). Most (80%) described themselves as competitive amateurs, while 20% reported they were recreational runners and less than 1% said they were elite runners.

Of the 175 runners (31%) who said they had tried minimally shod running, 55% were women and 41% were aged between 30 and 39 years.

"Runners who were male and younger in age were more likely to have tried minimally shod running," Cohler said.

Nearly a third (29%) of those who had tried minimalist running shoes reported they had experienced an injury or pain while using the shoes. The most common body part involved was the foot. Most (61%) of those reports involved a new injury or pain, 22% involved recurrences of old problems, and 18% were a combination of both old and new musculoskeletal problems.

More than two thirds (69%) of those who had tried minimally shod running said they were still using minimalist running

shoes at the time of the survey, but nearly half of those who had stopped said they did so because of an injury or pain. The most common sites of pain or injury that caused survey participants to discontinue minimally shod running were the foot (56%) and the leg (44%).

While some runners who tried minimalist running shoes suffered some pain and discomfort, a greater percentage (54%) said they had pain that improved after making the switch. The anatomical area most often associated with improvement was the knee. The results were published in the August issue of *PM&R*.

Pain or injury associated with minimally shod running was most common at the foot, while pain relief was most common at the knee.

"The findings were consistent with a previous population survey as well as published case reports and kinetic studies that have demonstrated foot and ankle problems related to stress to be associated with use of minimalist footwear," Cohler said. "The injury improvement in those with knee problems was also consistent with prior research demonstrating reduced patellofemoral kinetic parameters and reduced collision forces in forefoot strikers [which is the pattern of running that minimalist footwear encourages]. It should be emphasized that we suspect this potential benefit is not necessarily a result of the shoes themselves, but rather the impact the shoes have on a runner's foot strike pattern."

Reed Ferber, PhD, CAT(C), ATC, an assistant professor of kinesiology and nursing and director of the Running Injury Clinic at the University of Calgary in Canada, noted that changes in loading patterns associated




with different foot strike patterns may help explain the findings.

"From a mechanical standpoint, landing with a forefoot strike decreases loading to the knee and hip joints, but the load is then shifted and results in a significant increase in strain to the Achilles tendon, plantar fascia, and foot. So you're trading one injury for another," Ferber said. "Minimalist shoes do not 'cure' running-related injuries, but rather result in different types of injuries."

Joseph Hamill, PhD, professor of kinesiology at the University of Massachusetts Amherst, concurred.

"Running with a forefoot pattern does not decrease injury risk. The rate of injury risk is the same as running with a rearfoot pattern. What does change is the site of the injury," Hamill said. "My advice to clinicians and thus to runners is that you should not use minimalist shoes exclusively. Use different types of shoes and cycle their use."

Of those who had tried minimalist footwear, 35% said they had done "nothing in particular" to prepare for minimally shod running, whereas 43% said they had consciously focused on changing their running style to a midfoot or forefoot strike. Less than one third of the respondents said they had used a gradual adoption program, which Cohler said is what she would recommend.

"Runners should start with a strengthening program for the foot intrinsic and calf muscles," Cohler said. "They then should very slowly and gradually build up their mileage." 

*Chris Klingenberg is a freelance writer based in Massachusetts.*

*Source:*

Cohler MH, Casey E. A survey of runners' attitudes toward and experiences with minimally shod running. *PMR* 2015;7(8):831-835.



# Shoe Showcase: *Help your patients step out in style*

## **Birkenstock Arran**

Birkenstock is no longer just sandals and clogs. The Arran leather sneaker, available in white (pictured) or black, updates the original iconic Birkenstock footbed with a genuine leather upper, an ethylene vinyl acetate outsole, and traditional lacing for a secure fit. The suede-lined, contoured cork footbed is designed to mirror the shape of a healthy foot, ensuring optimal arch support, stability, and weight distribution. The raised toe bar is designed to encourage a natural foot grip during gait, and the heel cup design helps to center the natural padding of the foot under the heel. Available in women's sizes 36-42 and men's sizes 40-46.



Birkenstock USA  
800/867-2475  
[birkenstockusa.com](http://birkenstockusa.com)

## **Dr. Comfort Athletic Shoes**

Dr. Comfort's newest athletic shoes for men and women with diabetes feature bold colors, a virtually seamless design, breathable mesh uppers, and lightweight construction. Men's styles Jason and Chris come in an array of colors, including red, green, blue, black, and grey. Women's styles Meghan and Katy are multicolored; the Meghan comes in turquoise or purple, while the Katy comes in green/turquoise, turquoise, purple, or pink. The Jason and Katy styles come with standard laces; the Chris and Meghan styles come with standard laces and elastic no-tie laces. Women's shoes are available in sizes 5.5-11, men's shoes in sizes 7.5-14; all come in three widths.

Dr. Comfort  
800/728-9917  
[drcomfort.com](http://drcomfort.com)



## **Branier BR-4 Athletic Shoe**

Branier's BR-4 is a custom low-top athletic-style shoe that is tailor-made to address the needs of individual patients. Designed with a cosmetic semisurgical opening and padded tongues and collars, the BR-4 has been engineered to mitigate issues with bulky fit that are characteristic of deep lasted diabetic footwear. Extended heel counters of high quality celastic are designed for rearfoot stability. Individually contoured rocker soles, manufactured from lightweight orthopedic midsoles, provide forefoot relief. The BR-4 is available in 10 colors (including cordovan, pictured), with either lace or Velcro closure and three liner options. One pair of custom-molded inserts is included in the base price.

Brainer Orthopedic  
863/314-0016  
[branier.org](http://branier.org)



## **Vionic Cozy Juniper**

Vionic is excited to announce the arrival of its new autumn/winter line of shoes with refreshing arch support in the warm colors of fall. Vionic's top seller is the company's newest addition, the Cozy Juniper for women, a luxurious option for the patient/consumer who desires structural security for her feet along with the pampering of a house slipper. A faux fur lining provides warmth while the closed back provides extra coverage. The rubber sole allows the wearer to transition from indoor to outdoor wear in relaxing comfort. Available in women's sizes 5-11, and in black, chestnut, tan leopard, or red plaid.

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[vionicshoes.com](http://vionicshoes.com)





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Suitable for work, travel, and everywhere in between, Arcopédico's top-selling L19 bootie offers comfort, support, and style in one great daily wear boot. Made with the company's Lytech fabric, these boots offer a flexible fit, conform to the foot's natural shape, and are water-resistant, breathable, and washable. Offered in two styles – leather-like or suede-like – these boots feature a generous toe box for pinch-free wear and dual arch supports for an even distribution of body weight over the entire foot surface. An inside zip offers easy entry and exit. Available in women's sizes 35-43 and in nine colors.

Arcopédico USA  
775/322-0492  
[arcopedicousa.com](http://arcopedicousa.com)



## Ped-Lite Megan

Ped-Lite's newest shoe, Megan, is an all-leather dress sandal that brings the latest unique look to an industry thirsty for style. Offered in black, the Megan's high quality leather and contrasting stitching will have a fashionable appeal for any woman. The wide opening at the tongue provides ample room for the patient's foot to slide in and out of the shoe, while the Velcro closure across the instep ensures security during gait. The Megan is available in women's sizes 6-11 and in three widths, with double depth to accommodate a greater range of foot shapes without sacrificing comfort. Available now.

Ped Lite  
219/756-0901  
[pedlite.com](http://pedlite.com)



## Anodyne Men's Casual Dress Shoe



The No. 52 men's casual dress shoe from Anodyne is designed to embody the definition of an anodyne, bringing customers a sense of soothing and comfort. This lightweight (8.8 oz) shoe features an oiled leather upper, a microfiber lining treated with an antimicrobial and antifungal

protectant, a Velcro closure, extra depth to accommodate edema and orthotic devices, a protective toe box, and a strong shank and heel counter. The construction is almost completely seamless and involves no metal, reducing the risk of irritation or damage to the skin. Available in whiskey (pictured) or black, in men's sizes 7.5-14 and in three widths.

Anodyne  
844/637-4637  
[anodyneshoes.com](http://anodyneshoes.com)

## Mephisto Hawaii

The Hawaii casual oxford for women offers the features that customers have come to expect from the Mobils by Mephisto collection, but adds contemporary design features and styling, including a trendy zipper accent. A key feature of Mobils footwear is the all-over soft padding—cushioning between the lining and the soft leather upper that is designed to softly pillow the feet and prevent them from feeling cramped, pinched, or rubbed. Mobils also feature an elastic Soft-Air midsole to minimize shock during gait, anatomically designed removable footbeds, and a Comfortemp lining for temperature regulation. The Hawaii is available in black (pictured) or wine, in sizes 6-11.

Mephisto USA  
800/775-7852  
[mephistousa.com](http://mephistousa.com)



## Apex Men's Classic Moc – Open to Toe

The Men's Classic Moc, the newest Biomechanical Ambulator from Apex, has ½" removable depth in three layers for easy adjustment when patients need more room to accommodate edema or ankle foot orthoses. The fully functional vamp opens to the toe and comes with strong hook and loop fasteners for ultimate flexibility. Patients with limited ankle joint motion can put this shoe on with ease. The wide SmartGrip polyurethane soles have excellent traction and stability. The soft, full grain leather upper has breathability and a foam-backed, moisture-wicking fabric lining to keep feet dry. Available in sizes 6.5 to 16 and in three widths.

Apex  
800/252-2739  
[apexfoot.com](http://apexfoot.com)





# Althea's Footwear Solutions:

## Collaborative staff provides stable foothold for growing company

By Catherine M. Koetters



**A**t Althea's Footwear Solutions in Everett, WA, teamwork is key to building loyal customers and an expanding company.

With eight certified pedorthists on staff, including one retired competitive skier, Althea's gives patients access to practitioners offering a wide range of experience.

"If you come in and you're having a problem, many times we'll put more than one head together to come up with the best possible option for you," said owner Althea Schlumpf, CPed.

This emphasis on collaboration also served as a driving force when Schlumpf redesigned her store after moving it a mile down the road in October 2014. In its previous location, the shop spanned two floors, so when one area became very busy, staff members in another part of the store couldn't see it to help. The new Althea's Footwear Solutions occupies more than 4000 square feet of wide-open space.

"Everybody works to the center so they can see each other and help each other," Schlumpf said.

This is especially important at Althea's Footwear Solutions because many clients there come in with tough-to-solve problems.

"We don't get a lot of the really easy stuff," Schlumpf said of her 15-year-old company. "We get the stuff that is challenging

and difficult, and it doesn't necessarily fit into the little slots that insurance companies want to put it in."

For many of these customers, the store makes shoes from scratch at its onsite manufacturing facility.

"When I opened this store, I made the decision that I wasn't going to compromise," said Schlumpf, whose shop offers a wide range of pedorthic services and supplies, including custom foot orthoses, shoe modifications and lifts, and compression garments. "I wasn't going to give a person the cheapest product. I was going to give the person the product they needed, because if I can't do it right, I don't want to do it."



That isn't always easy.

"Sometimes it's been hard. Sometimes I have to do it at my cost. Sometimes I have to do it at a loss," said Schlumpf, who also owns The Footwear Place, a similar but smaller store 65 miles away in Lakewood, WA.


Despite the challenges, Althea's Footwear Solutions seems to be on the right track. Since moving, business has grown more than 40% with almost no advertising, Schlumpf points out. The company has a website and a Facebook page, but that's about it. She attributes the store's increased success to satisfied customers, physician referrals, and improved street exposure and parking.

The shop's annual Open House, always

held the first Wednesday in September, brings about 400 customers into the store, many of them for the first time. Attendees, including local lower extremity clinicians, get a chance to see how the shop operates, talk to vendors, enjoy 20% off all purchases, and get a sneak peek at new products arriving in 2016, all while enjoying a little wine and dessert. Schlumpf also holds two trunk shows each spring so customers can get to know a couple of her most popular vendors.

Schlumpf says exchanging ideas with other company owners through the Small Business Accelerator program at Everett Community College has proven "over the moon helpful" in solving problems using a fresh perspective, an advantage also offered by her store's new operations manager, Jim Schmoker. He brings with him more than 40 years of experience with companies in various industries, including Microsoft. Over the next five years, Schmoker sees Althea's Footwear Solutions growing its retail business, as well as increasing work with the US Department of Veteran's Affairs and the state prison system, which now accounts for about 20% of its output.

In the end, Schlumpf says, it's all about making life better.

"Almost every day, we have somebody coming in who's limping or hurting, or they've had it," she said. "They're at their wits' end, and we can do something to make it better. That's why we do what we do." 

*Catherine M. Koetters is a freelance writer in the Los Angeles area.*



# Central Florida Foot And Ankle Center:

## Podiatry practice adds retail component for one-stop service

By Nancy Shohet West | Photos by Denise Budde

Like most podiatrists and podiatric surgeons, Tatiana Wellens-Bruschayt, DPM, and Maria Jaramillo-Dolan, DPM, of the Central Florida Foot and Ankle Center in Winter Haven spend a lot of time counseling patients with diabetes on proper foot care. Traditionally, that meant directing them to a source for special shoes designed for people with diabetes.

Then, in 2009, the doctors had an inspiration. Why not have an on-site shoe store to which they could direct their patients?

As shoe store manager Steve Fletcher explains it, this was really a matter of extrapolating an idea used by a similar business and custom-fitting it to their own industry. He points to the popular eyeglasses chains often found in shopping malls.

"The optometrist examines you and says you need glasses; then the business takes care of the product you need," Fletcher said. "We were sending patients away to buy the shoes our doctors prescribed, and our marketing director recognized that it would be better customer service to provide them right here."

The idea quickly expanded from shoes for people with diabetes to any kind of footwear that might help someone with a foot problem: orthopedic sandals, running shoes, and footwear appropriate for business dress.

The relationship between the medical practice and the store is symbiotic,

Fletcher says. Some people arrive at the practice for medical advice and are advised by the doctors to go shoe-shopping; others are first drawn into the retail space and, when they describe their particular foot problem to a sales associate, learn they would be wise to schedule an appointment with one of the podiatrists.

"A customer might say she is having heel pain and wants a shoe that will alleviate the discomfort," said Fletcher. "But, when I help fit her for a shoe, I can see that it's actually a symptom of a more significant foot problem. So I'll send her on over to the medical side of the building."

Fallon Dann has been manager of the



flip-flops," Dann said. "We wanted something available to meet that need, but it had to be something that our podiatrists could personally endorse. Dr. Wellens-Bruschayt did a lot of research and a lot of reviewing to come up with the products we currently offer. We do tell our patients that most flip-flops are bad for your feet, but the ones we offer have sufficient built-in arch support and are backed by the American Podiatric Medical Association [APMA]."

As marketing director for the practice, Rich Mattsson is happy to be on the front lines of both patient care and fashion retail. Although prices for high-quality, orthopedically beneficial shoes may be higher than those found at a bargain shoe outlet, that doesn't seem to bother most of their customers, Mattsson says.

"Instead of flimsy twenty-dollar shoes from a big box discount store, we provide shoes that are approved by the APMA, and make people's feet feel good," Mattsson said.

It's a winning formula—for the practice, for the customers, and, most of all, for the customers' feet. (ler)

*Nancy Shohet West is a freelance writer in the Boston area.*



medical practice for 15 years and has witnessed firsthand how enthusiastic patients are about the on-site shopping option. It's not only the convenience that impresses them, Dann said; it's the variety of options that belie the stereotype of clunky shoes as the best for foot care.

"Throughout much of our lives, we pick style over comfort when it comes to footwear," Dann said. "But, with our range of styles, people don't need to choose one or the other. Even our younger patients are happy with what's available to help them feel stylish as well as comfortable."

To the surprise of many first-time customers, this range extends even to flip-flops.

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## Seeking shoe closure: laces vs alternatives

The footwear industry is teeming with alternatives to traditional shoelaces—including Velcro, no-tie elastic systems, and clutch reel technology—that may offer advantages for certain individuals. But for many people, experts say, laces will work just as well.

By Shalmali Pal

In 2013, a study conducted by a UK department store had some people tied up in knots. The report by the retailer Littlewoods indicated that school-aged children learned to tie shoelaces closer to age 10 than the usual ages of 6 to 8 years.<sup>1</sup>

The main reason for this was the growing popularity of footwear with alternative closure systems, such as Velcro, straps, no-tie shoelace replacement systems, and slip-ons, according to the retailer. The “data” had some healthcare professionals lamenting the delay of a basic life skill—one podiatrist was quoted<sup>2</sup> as saying, “We are fitting shoes to kids who are five, six, seven, eight, and are on their iPads and have no interest in the [shoe tying] process.”

Regardless of the age at which the skill is mastered, in the grand scheme of things, anything having to do with footwear fastening is “fifty one on our list of the fifty most important things we need to think about,” said David Armstrong, DPM, MD, PhD, director of the of Southern Arizona Limb Salvage Alliance at the University of Arizona in Tucson. “We have so much going on in our lives—why would we pay attention to something like our shoe laces?”

Yet the average person is probably taking several thousand steps a day, leading to a fair amount of repetitive stress across the foot. And closure systems can play a role in ensuring that footwear is effectively doing its job, Armstrong pointed out.

The footwear industry has made an effort to encourage people to pay more attention to shoe closures by offering alternatives to lacing, including the ones mentioned above. But are these types of closures destined to replace shoelaces, or is there still a place in the footwear world for the traditional lace-up?

LER took a closer look at the oft-forgotten shoe closure, focusing on three populations: children, adults with and without foot health issues, and perhaps the pickiest group of all, athletes.

### Laces for learning

The findings of the Littlewoods research need to be taken with a grain of salt—the company never released details on the number of partic-

Children should be able to tie their own shoes when they are aged around 6 years and have the right fine motor and cognitive skills, but that's no longer the norm.





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Velcro closures are convenient not just for children who don't know how to tie laces, but also for elderly patients with arthritis and other comorbidities that affect their manual dexterity.

Participants who took part in the report or the methodology used to draw the publicized conclusions. Littlewoods did not respond to requests from *LER* for specifics on the report.

But the suggestion that kids learn to tie laces later in life didn't come as a surprise to Russell Volpe, DPM, a professor at the Foot Center of New York, an affiliate of

the New York College of Podiatric Medicine in New York City. He agreed that children should be able to tie their own shoes by when they are aged around 6 years, when they have the right fine motor and cognitive skills, but that's no longer the norm.

"My sense is that they are just asked to begin learning this skill at an older age because parents opt for the Velcro closure for the inherent convenience and ease of dressing and getting out of the house with these simple closures," Volpe explained.

Learning to tie laces may be a boon for fine-tuning cognitive and motor skills, and but how important is the closure to the overall value of a shoe in terms of a child's foot development? Are alternative closure systems any worse or better for foot health?

For Volpe, the type of closure isn't as important as how "firm" the closure is—as long as the closure does its job and secures the shoe to the foot, it's very unlikely to cause a child harm or injury.

"I have seen issues where the Velcro closure wears out and the shoe does not stay closed," he said. "But most of the time, children will outgrow a shoe before the closure wears out." However, if parents go the hand-me-down route with shoes, they should be advised that worn-out closures can be a problem.

While laces are best for keeping the shoe firmly placed on the foot, a good Velcro or other closure type, such as elastic no-tie shoelace replacement systems, can do the job just as well, Volpe said. However, he does advocate for laces on shoes for children who require foot orthoses.

"Foot orthoses require room in a shoe, even with an insole removed, as they raise the position of the foot in the shoe," he explained. "Because of this, a good, firm closure of the shoe over the foot-orthosis unit is important for the orthosis to function optimally and to keep the foot in the shoe during gait."

Even if a child has undergone corrective surgery for conditions such as clubfoot or Charcot-Marie-Tooth disease, there are no special shoe requirements once the postsurgical recovery and rehabilitation period has ended, according to Peter Salamon, MD, a pediatric foot and ankle surgeon at Alpine Orthopaedic Medical Group in Stockton, CA.

"The goal with the surgery is to make them like a typical child, so no special footwear is needed," said Salamon, a spokesperson for the American Academy of Orthopedic Surgeons. "As long as the shoe is comfortable and offers protection, I would suggest a shoe that the child is willing to wear, whether that's a laced shoe, Velcro, or slip-on."

As for more high-tech closures, such as the clutch reel system, they are not a requirement for kids, even those whose wear orthoses, Volpe said, though he noted that there could be exceptions.

"Moving to a clutch reel closure may be an option in a child who is having difficulty keeping a simple laced shoe on with an orthosis in it," he acknowledged. "The additional anchor of the clutch reel closure may be enough to ensure a good fit."

## Clutch reels and the diabetic foot

Clutch reel closure systems feature steel laces, nylon guides, and a mechanical reel that allows the user to adjust the fit by turning a knob. One benefit of this system is that it gives the wearer a better idea of whether the shoe is on too tight or not tight enough, especially if the optimal level of tightness is preset by a foot health professional, Armstrong said.

That's exactly what Armstrong and his colleagues, including Bijan Najafi, PhD, are doing in an ongoing study that compares shear stress on the feet of patients with diabetic peripheral neuropathy with an orthopedic shoe outfitted with a clutch reel closure versus a regular shoe with laces. Their theory is that a reduction in shear force associated with the clutch reel technology will ultimately translate to better foot health, especially in patients with diabetes who are at risk for ulceration.<sup>3</sup>

The researchers used a thermal response to stress test to assess shear force, and compared three shoe closure conditions: loose laces, tight laces, and optimal with the clutch reel, explained Najafi, director of the Interdisciplinary Consortium on Advanced Motion Performance (iCAMP) at the University of Arizona.

In the study, a clinician predetermined the level of optimum shoe fit. The wearer had only to turn the knob to the set level of tension. If they went past the predetermined setting, the knob would simply spin, but wouldn't cause the shoe to tighten excessively, Armstrong explained.

"Our results suggest that too-loose and too-tight conditions significantly increase thermal response to stress when compared to optimum shoelace closure, but when using the clutch reel we could even reduce thermal response compared to what our subjects thought to be optimum shoe lace tightness," Najafi said.

The diabetic foot and the clutch reel closure would seem to be a perfect match. Patients with diabetes often have circulatory restrictions in the lower extremities, which increase the risk of foot ulcerations. The clutch reel system would theoretically eliminate the guesswork that goes with adjusting laces, according to Najafi.

"Having the opportunity to adjust to an optimum closure, retain it during daily physical activities, and ensure that patient cannot make their shoelace either too tight [which may limit skin perfusion] or too loose [which may increase shear force] could revolutionize diabetic footwear and contribute to reducing the risk of diabetic foot ulcers," Najafi said.

However, the researchers have only analyzed two patients thus far, and Najafi

Clutch reel systems have become popular with athletes and may have benefits for patients with diabetes and other conditions. (Photo courtesy of venturethere.com.)

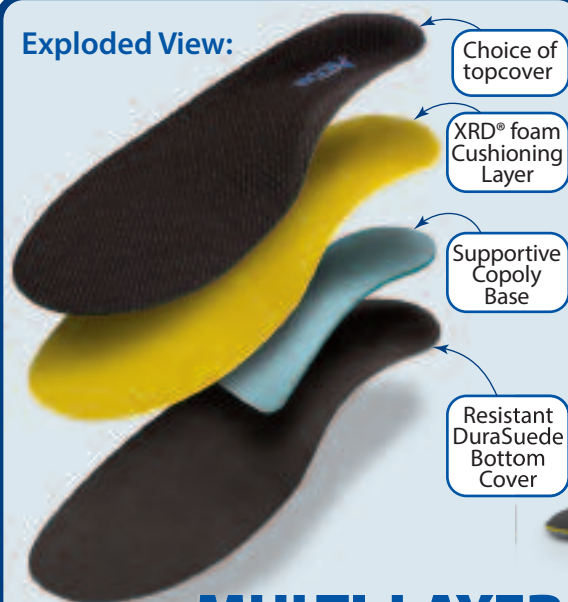


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A heel lock modification, sometimes called a runner's loop or lock, utilizes the top two shoelace holes for a better fit. (Photo courtesy of Rob Conenello, DPM.)

stressed that more study is needed to confirm this theory.

In the meantime, the patient feedback on the clutch reel has been positive, reported study co-author Ana Enriquez, an iCAMP research assistant.

"We've gotten comments that the shoes are comfortable and that the reel closure made it easier to don and doff the shoes," Enriquez said.

Ease of wear, ease of fastening, and limited effort to maintain a consistent fit are major factors in ensuring patient compliance with prescribed footwear, Najafi added.

"Our ongoing study tries to address this. We will assess perception of benefit, user-friendliness, ease of use, as well as patient adherence in our study," he said.

## Complicating the simple?

Use the terms "shoelaces and running" or "shoes and biking" in an online search engine and one thing becomes very clear—many athletes are obsessed with shoe fastening devices. There are discussions of lace alternatives, blogs reviewing those alternative closures, and YouTube videos with instructions on making the most of a chosen fastening system.

Of course, athletes have good reason to be captivated by closures—a good footwear fit can enhance an athlete's function, while a less than ideal shoe fit may spell trouble.

"You want a shoe that is going to optimize performance, so the closure should enhance the shoe's fit and function," said Rob Conenello, DPM, immediate past president of the American Academy of Podiatric Sports Medicine, and a podiatrist with Orangetown Podiatry in New York. "You don't want a closure that's new and trendy if it takes away from performance."

Over the years, athletes have moved away somewhat from traditional lacing, gravitating toward other options, such as elastic-covered lock laces or clutch reel systems. Conenello said he understands the appeal of these fasteners, but he's not entirely convinced that they offer more bang for the buck.

"Sometimes we like to complicate simple things," he said.

No-tie elastic shoe laces or clutch reels offer some advanced technology, but it's unclear whether they are improving biomechanics, Conenello pointed out.

"I don't think they give the same form-fitting feel that you get from going eyelet to eyelet with traditional laces. I find those [alternative closures] are good for individuals who need a quick in and out, like triathletes, or those who have difficulty getting in and out of the shoes on their own," he said.

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An example of the latter would be some of the athletes who participate in the Special Olympics International, for which Conenello is a global clinical adviser. Many of them are given lock laces—featuring a sliding, spring-activated device that holds the laces in place—because they don’t have the manual dexterity to tighten and tie laces, he explained.

For Conenello, traditional shoelaces are the best bet, but he says most people don’t know how to use them properly.

“Why not stick with laces, but change up the way the lacing is done? That can be a simple solution with a great benefit,” he said.

Athlete or otherwise, the goal is to achieve what Conenello referred to as “a neat fit.” Everyone learns to tighten shoes up from the distal aspect of the shoe and pull hard until the shoe feels tight, but that isn’t necessarily ideal.

“You don’t want to crank it up like that,” he said. “The shoe should feel secure—comfortable but not tight. There should be what I call a ‘neat fit’ around the forefoot. Also, a lot of people don’t know what the extra lacer holes at the top of the shoes are for so they don’t use them properly. If the heel feels like it’s slipping out of the shoe a bit, you can thread the lace through those holes and cinch the shoes.”

That technique is sometimes called a heel lock modification, sometimes called a runner’s loop or lock.

Kevin Fraser, CPed(C), president-elect of the Pedorthic Association of Canada in Winnipeg, also said he stresses the fit of the shoe overall, rather than the closure style. He often sees people being fitted with the wrong type of shoe for their foot type, which can reduce the effectiveness of the shoe’s closure system.

“An example of that would be a person with a very high arch who is fit with a shoe that is too shallow and, as a result, the opening of the shoe doesn’t close and secure the foot properly in the shoe,” said Fraser, who is a pedorthist at Sunnybrook Health Sciences’ Centre for Independent Living in Toronto. “Conversely, in the same type of patient if the opening is too narrow, it puts too much pressure on the foot.”


Fraser is also a fan of a laced shoe because it offers more options for adjustment than a Velcro closure. Velcro may be quicker, but doesn’t necessarily provide the type of customized fit that laces do, he said.

“With a lace shoe, you can control the pressure over the foot better than you can a shoe with one or two Velcro strap because you can tighten or loosen the laces,” he explained. “You also have more options in the way you thread and tie the laces.”

However, Fraser did acknowledge that some people may not have the capacity for or even interest in dealing with laces, and practitioners need to take that into consideration. For example, if a patient is given a pair of laced shoes, but then proceeds to don the shoes by “stamping” down the back of each one and turning into a slip-on, it will ultimately destroy the footwear and render it ineffective.

“In those cases, we might sacrifice the better adjustability with the laces by giving them a Velcro shoe, because it’s simpler to use, and that increases the likelihood that they will wear the shoes,” he said.

If a shoe no longer seems to fit properly, Conenello suggested changing the laces instead of changing the shoes, or even seeking out a different closure type.

“If the shoe is in perfectly good shape and hasn’t broken down in other ways, but you’re looking for a better fit, then maybe just consider new laces. Or change the way you are lacing the shoes,” he said. “Again, sometimes we complicate something that is really quite simple.” 

*Shalmali Pal is a freelance writer based in Tucson, AZ.*

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## Bunion surgery: Evolution of postoperative protocols

Research is starting to reveal that early weightbearing, physical therapy, or both after hallux valgus surgery is not as risky as some lower extremity practitioners once thought, and such new postoperative protocols appear to be associated with improved outcomes.

By Barbara Boughton

Although bunion surgery is often effective at correcting underlying bone deformities, patients are frequently frustrated with the postoperative recovery—which can involve prolonged pain, swelling or periods of nonweightbearing in a cast or boot. In an effort to improve postoperative symptoms and enhance patient satisfaction, recent research has investigated the results of early weight-bearing and physical therapy protocols in the first few months after surgery.

Experts say there's no cookie-cutter approach, since every patient's deformity, surgery, and postoperative symptoms are different. Yet research is starting to reveal that using early weightbearing, physical therapy, or both is not as risky as some practitioners once thought. And although research has yet to conclude that early weightbearing or physical therapy improve long-term outcomes, recent studies do show these protocols can improve short-term symptoms and other outcomes.

Depending on the surgery, early weightbearing in patients who have stable fixations with osteotomy can be a viable postoperative treatment option, according to Donald R. Bohay, MD, FACS, professor of orthopedic surgery at Michigan State University in East Lansing and director of the Grand Rapids Foot and Ankle Fellowship program.

"There is some skepticism about early weightbearing after surgeries such as tarsometatarsal fusions," Bohay said. "But even in these patients, early weightbearing may be a sound choice since it can help to reduce swelling and hasten recovery."

Recent studies, including one presented by Bohay and colleagues in July, indicate that early weightbearing after tarsometatarsal fusions can reduce symptoms without affecting union rates or complications during postoperative recovery. Patients who use early weightbearing are also more comfortable during postoperative recovery than those who are in a cast for a longer period.

"Historically, the fear was that early weightbearing risked nonunion or delayed union. But recent studies show that early weightbearing can be done within reasonable limits," Bohay said.

Early weightbearing after hallux valgus surgery can provide a quicker recovery and return to normal footwear than extended periods of nonweightbearing.



## Evidence for early weightbearing

In 2010, a study in the *Journal of Foot and Ankle Surgery* was the first to demonstrate that early partial weightbearing after approximately two weeks after a modified Lapidus arthrodesis did not compromise outcomes.<sup>1</sup> In the study, 76 patients who underwent modified Lapidus arthrodesis on 80 feet were allowed protected weightbearing after the first postoperative visit. All 80 feet achieved successful union, and the mean time to union was just over 44 days. The duration of time to bone healing was, in fact, similar to rates reported in previous studies describing Lapidus procedures with longer durations of initial postoperative nonweightbearing, the researchers noted. There were no complications requiring surgical revision and no hardware was broken before solid bony fusion occurred.

“This study demonstrates that early weightbearing of the Lapidus arthrodesis can be performed without compromising correction or the rate of osseous union,” the researchers concluded.

A more recent study investigated immediate weightbearing after Lapidus procedures for severe hallux abductovalgus deformity with first ray hypermobility.<sup>2</sup> The surgeons used an external fixation device on 19 patients for a mean postoperative duration of 12 weeks. The most common complication was pin-tract infection in five patients, which was treated with oral antibiotics. Only one foot required early hardware removal. Most importantly, the mean patient pain score decreased significantly from 8.2 to .83 on a visual analog scale over the 37 weeks following surgery.

At the annual meeting of the American Orthopaedic Foot and Ankle Society, held in July in Long Beach, CA, Bohay and colleagues presented the preliminary results of a prospective, randomized controlled trial comparing early weightbearing and nonweightbearing after modified Lapidus arthrodesis.<sup>3</sup> All patients were nonweightbearing for two weeks following surgery. The 48 patients who began weightbearing in a fixed ankle support boot at two weeks demonstrated a greater decrease in pain from baseline to 12 months than the 36 patients who began weightbearing six to eight weeks after surgery.

With today’s improved and more stable surgical technologies, such as locking plates, early weightbearing after Lapidus procedures is possible without compromising hardware. Scientific literature<sup>2,4</sup> has also shown early weightbearing can provide a quicker recovery and return to normal footwear than extended periods of nonweightbearing, according to Keith Cook, DPM, director of Podiatric Medical Education at University Hospital in Newark, NJ. Early weightbearing also reduces the risks associated with prolonged nonweightbearing, such as deep venous thrombosis, joint stiffness, muscle atrophy, and osteopenia.

“The complications associated with weightbearing too early are usually seen when the fixation isn’t solid, and in those cases, there’s a risk of nonunion, delayed union, malunion, or hardware failure,” Cook said.

## Considerations

Often decisions about whether to recommend early weightbearing after a bunion procedure depend on the severity of the deformity, the type of surgery and fixation used, as well as individual patient characteristics, according to podiatrists and orthopedic surgeons.

“Early weightbearing is more possible with bunion surgeries that involve just soft tissue work or stable bone cuts. Certainly, with

today’s locking fixations, there’s a trend toward getting patients on their feet and walking sooner,” said Alan MacGill, DPM, FACFAS, a certified foot and ankle specialist in Boynton Beach, FL.

Patients who undergo soft tissue procedures and stable bone cuts made in the distal metatarsal head may be able to bear weight immediately. Yet, most patients minimize their walking until the pain and swelling have improved over a few days, MacGill said.

More proximal metatarsal procedures, including the Lapidus arthrodesis, are different, MacGill noted.

“If I have used locking fixation, I will keep these patients non-weightbearing for two weeks, and then let them ambulate in a CAM boot for another four to six weeks. Clinical and radiographic improvement dictate how fast I can transition them into a walking shoe or sneaker,” he said.

In MacGill’s clinical experience, patients who put weight on the foot too early can increase postoperative pain and swelling, as well as risk loss of correction and possible delayed bone healing, he said.

Yet patient characteristics also need to be kept in mind when deciding on postoperative weight-bearing protocols. An earlier return to function may improve patient satisfaction, said Daniel Guss, MD, MBA, an instructor at Harvard Medical School and an orthopedic surgeon on the Foot and Ankle Service at Massachusetts General Hospital and Newton-Wellesley Hospital, all in the Boston area.

“It’s difficult to be nonweightbearing for an extended period of time. The foot is simply geared to walk, and wants to bear weight,” Guss said. “For many patients having to be nonweightbearing for a prolonged period will make a huge impact on their daily lives. And for some patients, this type of postoperative recovery is just not realistic.”

## Postoperative physical therapy

Postoperative protocols after bunion surgery also include exercises to improve range of motion and strength and to decrease stiffness and uncomfortable scarring. In the past, referring a patient to physical therapy was often a highly individual matter—a choice that relied just as much on the surgeon’s preference as the type of bunion surgery and the patient’s postoperative symptoms.

“Even today there are a fair number of patients who are not referred to rehabilitation after bunion surgery,” said Judith Gelber, PT, OCS, assistant professor of physical therapy and neurology at Washington University in St. Louis, MO.

In her clinical experience, postoperative physical therapy has the potential to shorten the recovery period after surgery by decreasing pain and increasing strength, range of motion, and mobility more rapidly, Gelber said.

“With physical therapy, we can often get patients on their feet sooner and back to their lives sooner,” she said.

Physical therapy after bunion surgery can help decrease stiffness and swelling and the patient’s return to a normal gait pattern in the short term,<sup>5,6</sup> but there needs to be more scientific research about the long-term outcomes before any definitive conclusions can be made about its benefits, Guss said.

A well-trained physical therapist can also help desensitize the foot after surgery and decrease scarring through warm and cold baths and postoperative massage. Whether physical therapy is needed to help ease pain often depends on the individual patient and his or her postoperative symptoms, Bohay said.

“Pain is very idiosyncratic,” he noted. “Some patients don’t need physical therapy at all to help with pain, while others will need it three times a week after surgery.”

Another advantage of physical therapy is that it encourages postoperative exercise in a structured environment, MacGill said.

“Some patients will participate actively in exercising their foot after surgery, while others need a physical therapist to enhance range of motion and strengthen the foot through targeted exercise. I recommend physical therapy on a case-by-case basis. If patients aren’t progressing and experiencing significant improvements through postoperative home exercise after four weeks, then I’ll refer them to physical therapy,” he said.

## Functional benefits

Physical therapy can be important for returning patients to functional mobility, according to Suzanne Hawson, PT, MPT, OCS, a physical therapist at the University Foot and Ankle Institute in Valencia, CA, and a part-time faculty member in the Physical Therapy Program at California State University, Northridge. As well as aiding in postoperative recovery, physical therapy may help correct improper foot function that may have resulted from walking with a bunion over an extended period—and which may persist even after the corrective surgery.

“With really bad bunions, patients tend to avoid putting weight on the medial side of the foot. With physical therapy, we can restore normal forefoot motion by reducing pain and swelling there,” Hawson said.

Limited range of motion is one of the most common reasons for referral to physical therapy after bunion surgery, according to Hawson. As well as pain, symptoms that can restrict range of motion after bunion surgery include effusion, edema, scarring, and connective tissue restriction in the joint capsule and impaired tendon gliding, according to a review article authored by Hawson and published in *Clinics in Podiatric Medicine and Surgery* in 2014.<sup>7</sup>

In Hawson’s clinical experience, physical therapy can effectively improve pain and range of motion and decrease muscle guarding through joint mobilization techniques. Other physical therapy modalities that improve pain and range of motion after bunion surgery include transcutaneous electrical nerve stimulation, ultrasound, cryotherapy, and low level laser therapy.<sup>8-10</sup> Hawson said.

Incisional scarring can also affect joint function and can be persistently painful for more than 30% of patients after bunion surgery,<sup>11</sup> she said. Yet, techniques such as manual therapy, low level light therapy, and use of a combination of silicone gel and vitamin C can be used to reduce scarring and mobilize scar adhesions,<sup>12-14</sup> Hawson said.

Persistent swelling is another common complaint after bunion surgery. Such edema can significantly affect range of motion and function after bunion surgery.

“When fluid starts to build up in the foot, there’s not a lot of room for it to drain because the foot is usually in a dependent position,” she said. “Edema can be very uncomfortable and can keep the muscles from functioning properly. As a result, it’s more difficult for the foot joints to move normally, which affects gait.”

Physical therapy techniques that can be successfully used to decrease edema after bunion surgery include massage that promotes lymph drainage, and application of electrical stimulation, ultrasound, cryotherapy, and taping.

Decreased strength can also be a persistent problem after bunion surgery,<sup>15</sup> and this loss of strength can affect the patient’s gait,<sup>4</sup> Hawson said. Normal gait requires not only good range of motion but also strength and proper muscle timing, she noted. Although hallux valgus correction typically is associated with a more normal distribution of plantar pressures during gait, postoperative plantar loading often is not completely restored.<sup>16-20</sup> All of these

functions can be improved with physical therapy exercises aimed at a patient’s specific weaknesses and foot dysfunction.


Are there any risks in using physical therapy after bunion surgery? Progressing too quickly and mobilizing a joint too aggressively can result in discomfort and soreness, Hawson noted.

“Most patients will notice this kind of soreness during therapy or shortly afterward, so it’s important for the patient and therapist to maintain good communication throughout the rehabilitation process,” she said.

One of the most important roles for the physical therapist, however, is education about the type of shoe to wear after surgery, she said.

“To enhance normal gait pattern and to walk without pain, a patient often needs a stiff-bottomed shoe during the recovery period. Often patients do well with athletic shoes with stiff soles which can be adjusted as swelling decreases,” Hawson said.

Physical therapists and other lower extremity clinicians can also provide advice about suitable orthotic devices—as well as shoes—that can address biomechanics and aid in the recovery process after bunion surgery. Even after bunion surgery, Hawson said, some patients will require custom orthoses to address poor foot biomechanics, while other patients can derive significant benefit from over-the-counter devices.

Without expert advice on shoes or foot orthoses, patients will often experiment on their own, she noted. As a result, patients may end up with products that may not be helpful for their recovery, which can be costly and lead to frustration, she said. 

*Barbara Boughton is a freelance writer based in the San Francisco Bay Area.*

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