

Stronger hips improved running mechanics, lessened knee pain

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Hip strengthening exercises performed by female runners not only significantly reduced patellofemoral pain -- a common knee pain experienced by runners -- but they also improved the runners' gaits, according to Indiana University motion analysis expert Tracy Dierks.

"The results indicate that the strengthening intervention was successful in reducing [pain](#), which corresponded to improved mechanics," said Dierks, associate professor of [physical therapy](#) in the School of Health and Rehabilitation Sciences at Indiana University-Purdue University Indianapolis. "The leg was going through more motion, suggesting that the (pain) guarding mechanism was reduced, and coordination or control of many of these peak or maximum angles in the leg were improved in that they were getting closer to occurring at the same time."

Only in recent years have researchers begun studying the hips as a possible contributor to patellofemoral pain (PFP). This study is the first to focus on hip strength and gait changes during prolonged running. Dierks, director of the [Motion Analysis](#) Research Laboratory at IUPUI, discussed his findings on Wednesday at the American College of [Sports Medicine](#) annual meeting in Denver.

The runners in Dierks' study received no training or coaching on proper running form, which makes the improvements more notable. The improvements in mechanics resembled those of uninjured runners, when muscles, joints and limbs move economically and in synch with each other.

The study involved four runners and a control group comprised of another four runners. Hip strength measurements and kinematic data -- minute measurements of how the women's hips, knees and shin bones moved and rotated while they ran -- were taken before and after the runners in the control group maintained their normal running schedule for six weeks. The measurements were repeated for all of the runners before and after the next six-week period in which they all performed the hip-strengthening exercises.

The exercises, performed twice a week for around 30 to 45 minutes, involved single-leg squats and exercises with a resistance band, all exercises that can be performed at home. This study is part of an ongoing study involving hip exercises and PFP pain, with 10 runners successfully using the intervention.

After the six-week program, the movement of the [hips](#) and knees in relation to each other improved for both groups of runners, demonstrating increases in joint angles between the foot, shin and thigh.

The study used a pain scale of zero to 10, with 3 representing the onset of pain and 7 representing very strong pain -- the point at which the runners normally stop running because the pain is too great. The injured runners began the six-week trial registering pain of 7 when they ran on a treadmill and finished the study period registering pain levels of 2 or lower; i.e. no onset of pain.

PFP, one of the most common running injuries, is caused when the thigh bone rubs against the back of the knee cap. [Runners](#) with PFP typically do not feel pain when they begin running, but once the pain begins, it gets increasingly worse. Once they stop running, the pain goes away almost immediately. Dierks said studies indicate PFP essentially wears away cartilage and can have the same effect as osteoarthritis. His study participants showed many of the classic signs of PFP, the most

prominent being their knees collapsing inward when running or doing a squat exercise move.

Provided by Indiana University

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