

# Are ACL tears really more common in women?

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It may be hard to remember a time when it was uncommon for girls and women to play competitive sports, but it's not exactly ancient history. The 1972 passage of Title IX, which mandated equal access for women

to participate in sports and other educational activities that receive federal funding, gets credit for dramatically increasing the number of girls and women playing sports. In 1974, fewer than 300,000 girls played high school sports. By 2018, that figure skyrocketed to 3.4 million.

Unfortunately, that bump may have also increased the number of orthopedic injuries among girls and women. In fact, certain injuries, including ACL ([anterior cruciate ligament](#)) tears, [ankle sprains](#), and [stress fractures](#), turn out to be even more common in [female athletes](#) than they are in males.

The reasons why are not clear—and more research is needed—but prevailing theories point to the anatomical differences between men and women, hormones, and other factors.

"There is not nearly as much research and data about gender differences as we would like in medicine in general, and in sports and injuries in particular," says Elizabeth Gardner, MD, a Yale Medicine orthopedic surgeon and sports medicine specialist.

## **So why is there a difference?**

Anatomically, men and women are not created equal. The female pelvis is wider, which changes the mechanics of how the [thigh bone](#), tibia, and femur function, says Dr. Gardner. This puts more stress on the soft tissues that support your joints, she explains.

This higher stress can lead to either a chronic (overuse) or acute (sudden) injury. According to research, an ACL tear is one acute injury that female athletes are two to eight times more likely to experience than males. The ACL, a ligament in the knee that connects the femur to the tibia, is extraordinarily strong, yet has little elasticity, Dr. Gardner says. "It absorbs a huge amount of stress until it can't hold on anymore, and

then it tears," she explains, adding that tears are especially common in sports that require pivoting and jumping, including soccer, basketball, lacrosse, and skiing.

Additionally, women have less muscle mass around their knees than men, says Samantha Smith, MD, a Yale Medicine primary care sports medicine specialist. "That, too, can lead to instability and a higher chance of tearing a ligament if it is overstretched," she adds.

This is where a combination of additional stress and hormones might come into play. Compared to men, women have less testosterone, a key hormone for increasing muscle density. Women also have much more estrogen than men. Essential to bone growth, this hormone fluctuates during a woman's menstrual cycle. Estrogen may also cause greater laxity (looseness) in tendons and ligaments, which can make women more prone to injury.

"A balance between your muscles and your ligaments controls where and how your bones move," Dr. Gardner explains. "Any force absorption or stability your muscles can't provide gets passed along to the ligaments. If those are too loose or weak, that can hurt you."

## **What can women do to lower injury risk?**

While the shape of a woman's pelvis or her hormone levels can't be easily changed, there are steps women can take to better protect themselves. "Much of this has to do with strength and coordination," Dr. Gardner says. "We want to make sure we are building balanced strength to impart stability to the joints."

Women, she says, tend to be "quad dominant"—meaning the quadricep muscles are stronger than the hamstring muscles. There's nothing wrong with having strong quads, but the hamstring helps stabilize the knee as

well, and if it's weak, that can increase the risk of injury not only to the knee, but also to the lower leg, ankle, and foot.

Specific strength programs that balance the two are a good idea for all female athletes, something [physical therapists](#) and many personal trainers can help address. It is also important to develop good core and hip muscle strength.

Once their muscles are well balanced, female athletes who play sports closely linked to ACL injury and other leg and ankle injuries should also fine tune their coordination, or "neuromuscular control," says Dr. Gardner, who is the head team orthopedic surgeon for Yale University Athletics.

When women jump, they tend to bend their hips and knees less than men do and, therefore, land harder and more flat-footed, she explains. "As a result, women don't absorb the shock as well," she says. "But, there are neuromuscular training programs that work on jumping, hopping, pivoting, and other movements that teach you how to quickly stabilize your body."

ACL injury prevention programs, typically offered as a multi-week course, are often taught by athletic trainers, physical therapists, or physicians.

While the risk of ACL injury isn't as high for runners, they can also benefit from strength and mobility training, as deficiencies in these can lead to overuse injuries such as shin splints and [plantar fasciitis](#) (pain in the band of tissue that connects the heel to the toes). Runners should also make sure they are wearing proper sneakers, Dr. Gardner says.

"Your foot is literally where the rubber hits the road," says Dr. Gardner, noting the high rate of ankle sprains, stress fractures, and plantar fasciitis

among females. "Women's feet tend to be flatter, which can tie into plantar fasciitis, and if their ankles have more laxity to them, that makes them less stable, adding to the risk of injury."

She suggests strengthening the ankle and lower leg with wobble boards and calf raises, in addition to considering the shoes worn every day and for exercise. For example, if someone has extremely flat or high arches that appear to lead to imbalances, she may want to choose a shoe that best addresses those issues or try a corrective shoe insert.

## **Knee pain: A popular complaint**

Speaking of runners, knee pain—officially known as patellofemoral pain syndrome, and sometimes as "runner's knee"—is also more common in females than in males.

Symptoms include pain and stiffness in the front and around the kneecap that make it difficult to climb stairs, squat, kneel, or do other everyday activities. A number of factors can contribute to patellofemoral pain syndrome, including overuse, Dr. Smith says.

"There often isn't a surgical solution, and many patients are prescribed physical therapy, but that doesn't always help if it doesn't truly address underlying problems like muscle imbalances," she adds.

As a child active in various sports, Dr. Smith experienced chronic knee pain that didn't respond to physical therapy. "Patients may be told this isn't a serious knee problem, but it is serious when it stops you from doing what you want to," she says.

It wasn't until Dr. Smith was treated by a knee specialist who taught her proper strengthening activities that she was able to get rid of her knee pain. Now, she wants to share the same practices with her patients and

get them back to doing what they enjoy.

If someone is too sore to start physical therapy—maybe because of inflammation in their knee—Dr. Smith says she may first do a steroid injection to calm it down. "You first want to address the inflammation, because an inflamed knee can inhibit your ability to strengthen the quadriceps," Dr. Smith explains.

In cases where there is no inflammation, just pain, Dr. Smith says she will prescribe home exercises for a patient, or, if needed, physical therapy to work on balancing muscle strength and flexibility. "We want to get their joints moving in a more balanced way," Dr. Smith says. "Often, people need to increase strength in their quadriceps and hips. The hips are often forgotten, but the muscles that stabilize them are pretty small and not activated by normal exercises. Maybe you run five days a week, but that might not be enough to keep the hips strong."

Strengthening, Dr. Smith explains, is the best way to alter the biomechanics of your joints. "Medications and injections can be helpful for inflammation and acute pain, but are never the long-term answer," she says. "If you don't change how your joints are moving, the symptoms will come back."

## **Avoiding stress fractures**

Studies show that female athletes sustain more stress fractures (a tiny crack in the bone caused by overuse and repetitive activity) than their male peers. One reason may be a condition called "female athlete triad," which encompasses three related health problems: menstrual dysfunction, low energy availability (sometimes caused by an eating disorder), and decreased bone mineral density.

A female athlete who is intensely training may not be eating enough (or

the right foods) to keep up with the calories she is burning, which can cause her menstrual cycle to become irregular or stop. This disturbs her hormonal balance, which is key to supporting bone growth, and can therefore lead to an increased risk of fracture.

"If you don't take in enough calories, you can't power your body and muscles for exercise, and repair any damage you have sustained," Dr. Gardner explains. "Plus, if you are deficient in calcium and vitamin D, you aren't protecting your bones."

Identifying and correcting energy imbalances in female athletes and restoring a normal menstrual cycle is key to improving bone mineral density and preventing fractures. A team approach with support from caregivers, including a primary care physician, sports medicine doctor, nutritionist, therapist, coach, and family is often necessary, researchers say.

Forty-eight years after the landmark Title IX ushered millions of girls into high school, collegiate, and professional sports, such resources are now much more readily available.

Provided by Yale University

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