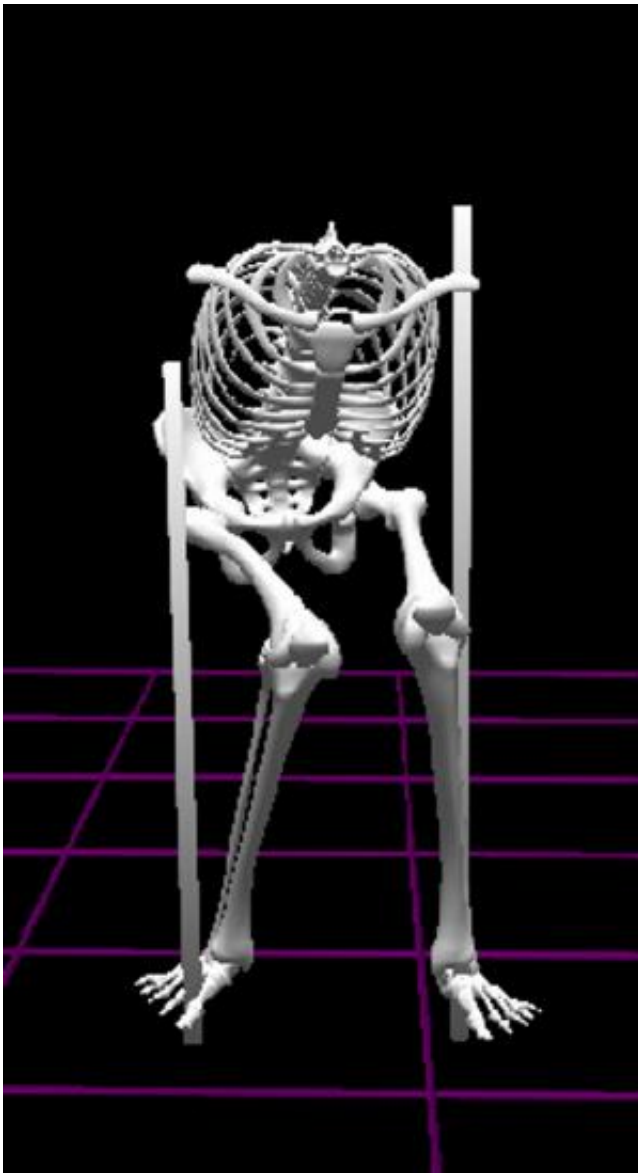


ACL injuries may be prevented by different landing strategy

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This image shows a biomechanical model of a female using a "knock-kneed" technique and experiencing high frontal plane knee loading during a jump

landing. Credit: Oregon State University

Women are two to eight times more likely than men to suffer a debilitating tear of the anterior cruciate ligament (ACL) in the knee and a new study suggests that a combination of body type and landing techniques may be to blame.

In two new studies published online this week in the *Journal of Athletic Training*, lead author Marc Norcross of Oregon State University documents how [women](#) who were asked to undergo a series of jumping exercises landed more often than men in a way associated with elevated risk of ACL injuries.

Both men and women tended to land stiffly, which can lead to ACL injuries, but women were 3.6 times more likely to land in a "knock-kneed" position, which the researchers say may be the critical factor leading to the [gender disparity](#) in ACL tears.

"We found that both men and women seem to be using their quad region the same, so that couldn't explain why females are more at risk," Norcross said. "Using [motion analysis](#), we were able to pinpoint that this inability to control the frontal-plane knee loading—basically stress on the knee from landing in a knock-kneed position—as a factor more common in women.

"Future research may isolate why women tend to land this way," he added, "but it could in part be because of basic biology. Women have wider hips, making it more likely that their knees come together after jumping."

Norcross, an assistant professor of exercise and sport science in OSU's

College of Public Health and Human Sciences, is a former collegiate athletic trainer dedicating his research to the prevention of ACL tears.

"You see ACL injuries in any sport where you have a lot of jump stops and cuts, so basketball, soccer, lacrosse, and volleyball are high-risk sports," said Norcross. "We know that people who hurt themselves tend to look stiff when they land and that the combined 'knee loading' from multiple directions is likely causing the injury event. But it wasn't clear initially why women had more injuries than men."

The researchers used motion analysis software to monitor the landing strategies of 82 physically active men and women. They found that both males and females had an equal likelihood of landing stiffly—likely from tensing the muscles in their quads before landing—putting them at higher risk of ACL tears. Women, however, were more likely to land in a "knee valgus" position, essentially knock-kneed.

Norcross said his next research project will focus on high school athletes, looking at a sustainable way to integrate injury prevention into team warm-up activities through improving landing technique.

"We are trying to create a prevention strategy that is sustainable and will be widely used by high school coaches," he said. "A lot of athletes do come back from an ACL injury, but it is a long road. And the real worry is that it leads to early onset arthritis, which then impacts their ability to stay physically active."

More information: dx.doi.org/10.4085/1062-6050-48.4.09
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