

Personal Injury

The laws of traction: Athletic footwear and risk of injury

By Brittany Sinclair and Kathleen Denbeigh



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Kathleen Denbeigh

(January 9, 2018, 8:38 AM EST) -- The morning after the Toronto Argonauts defeated the Calgary Stampeders for the 2017 Grey Cup, the CFL published an article titled "*Shoe change helps Argos 'sneak' up on Stamps,*" highlighting the impact a change in footwear had on the Argos' play.

In true Canadian fashion, the Grey Cup was hosted during the first snowstorm of the year. The Argos got off on the wrong foot in the first half of the game, while players slipped and slid on the snow-covered field. But many of the players changed their footwear for the second half, which the CFL's Don Landry emphasized as a pivotal moment in the game.

This may have left fans wondering: if the Argos had cleats with better traction, why wouldn't they always wear them?

Cleat design considers two primary movements performed by athletes: linear movement, which involves moving forward, backwards or side-to-side, and rotational movement such as planting the foot and pivoting to change direction. While cleats should provide enough traction for players to perform such manoeuvres without slipping, too much traction can actually increase an athlete's risk of injury.

Research shows that increased traction leads to more force applied through the knee and ankle and an elevated risk of injury at these joints. In a study comparing cleat designs, researchers found that the design with significantly higher rotational traction was associated with increased ACL injury rates. This type of injury may occur when an athlete plants their foot and turns abruptly. Cleat designs that increase rotational traction cause the foot to become essentially fixed to the ground during this manoeuvre, resulting in higher forces through the knee.

Footwear design, playing surface and traction

Cleat design, including the material, number, location, shape and height of the cleat's studs, can influence the risk of slipping. Studs with some directionality (i.e., angled studs) can help increase linear traction, while taller studs increase both linear and rotational traction. Studs placed farther apart and around the perimeter of the sole may also increase the amount of rotational traction. Metal studs will dig deeper into the playing surface than rubber studs, increasing traction overall.

Footwear design is not the only factor that influences traction — the field surface and conditions also have an impact. Research shows that artificial surfaces (i.e., turf) have higher traction than natural surfaces (i.e., grass). As such, turf cleats tend to have shorter rubber/plastic studs to reduce how far they go into the ground and limit traction compared to cleats designed for use on grass, which typically have metal studs.

When the playing surface is wet or, in the case of the Grey Cup game, covered in snow, footwear designed to increase traction may be a better choice. The equipment manager for the Argos said the team switched from their typical footwear to "a conical-shaped shoe (cleats) that dig down into the turf." He continued with, "They're great for wet turf, or snow on the turf, compared to your regular, dry, field turf shoes. We've won Grey Cups with these exact same shoes on grass and now on field

turf.”

A player may not want to wear footwear that increases their traction too much, due to the potential for injury. However, when the surface conditions call for it, a change in footwear may be necessary — just ask the Argos following their Grey Cup victory.

Traction and injury

Footwear plays a key role in performance for both professional and non-professional athletes. However, there remains a risk of injury if the footwear and playing surface are mismatched. When an injury occurs, here are some things to consider:

- Playing surface: artificial turf may provide increased traction compared to natural grass fields.
- Field location: outdoor fields have the potential for wet playing conditions, which provide less traction compared to a dry field.
- Stud material: metal studs typically provide more traction than rubber or plastic studs.
- Stud height: taller studs can dig into the playing surface more than shorter studs, increasing traction.
- Number of studs: as the number of studs increases, so does the amount of traction.
- Location of studs: studs that are spaced out will provide greater traction compared to closely grouped studs.

Due to the risk of injury, it is important that the participant has the right footwear for the sport, experience level, playing surface and conditions.

Brittany Sinclair is an associate with 30 Forensic Engineering and has specialized expertise in injury biomechanics related to motor vehicle collisions and personal injury assessments. Kathleen Denbeigh is an intermediate associate who has specialized expertise in personal injury incidents including slips, trips and falls. Both are with the firm's biomechanics and personal injury assessment group.

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