

Barton Journal

The Role of Outdoor Playing Surface Quality on Injury Prevention and Performance: A Narrative Review

CONFERENCE ABSTRACT

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CITATION

Robinson, Kathryn; Biscardi, Lauren; & Ottinger, Charlie. (2026). The role of outdoor playing surface quality on injury prevention and performance: A narrative review [Conference abstract]. *Barton Journal*, 1(1), 207–208. <https://bartonjournal.org/vol-1-no-1/2026-cat4-article-no-044>



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Abstract

Anterior cruciate ligament (ACL) injuries commonly occur during noncontact movements like landing and jumping, making biomechanics a key factor in injury risk. The Landing Error Scoring System (LESS), along with research on playing surfaces and athlete perceptions, highlights how environmental and movement factors influence injury likelihood. The purpose of this study was to examine differences in athletes' Landing Error Scoring System (LESS) scores and perceived risk of lower-extremity injury when performing on natural grass versus artificial turf surfaces, as well as to determine how the playing surface may influence injury risk among athletes. Twelve female collegiate soccer athletes (21 ± 3 yrs) completed a modified questionnaire (Mears et al., 2018) on perceived injury risk. Participants then performed three jump-landing trials from a 12-inch box on both surfaces. Trials were recorded and scored using the 19-point Landing Error Scoring System analysis tool, validated to reliably measure potential injury risk (Padua et al., 2015). The data were analyzed using a Wilcoxon signed-rank test to assess differences in LESS scores between the artificial turf and the natural grass surfaces.

Statistical significance was defined as $p < .05$. All participants believed field conditions increased injury risk, and 75% reported a surface-related injury, with 50% citing grass as the increased risk, and 50% citing turf. Bumpy, hard, and inconsistent conditions were most frequently cited as conditions that may increase injury risk. The Shapiro-Wilk test showed the data were not normally distributed, $W = 0.78$, $p = .006$. A Wilcoxon signed-rank test indicated there was a significant difference in LESS scores between turf and grass playing surfaces, $z = -3.06$, $p = .002$, $r = -1.00$. LESS scores on the turf ($Mdn = 4.0$) were lower than LESS Scores on the grass ($Mdn = 5.5$). According to LESS criteria, 83% scored in a worse category on natural grass, while 17% remained in the same category. Both perceived and measured injury risk were influenced by surface type. Natural grass, particularly when poorly maintained, was associated with worse landing mechanics and higher perceived risk. These findings suggest alignment between subjective and objective measures and highlight the need for improved field maintenance and further research on surface properties.

Keywords: ACL, Anterior cruciate ligament, athletes

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