

# LOWER EXTREMITY KINEMATICS OF ACL-REPAIRED AND NON-INJURED FEMALES WHEN USING KNEE SAVERS®

Whitley J. Stone, PhD<sup>1</sup>

Scott W. Arnett, PhD, CSCS<sup>2</sup>

Donald L. Hoover, PT, PhD, CSCS<sup>3</sup>

## ABSTRACT

**Background:** Knee Savers® (KS) are an ergonomic aid purported to lessen the risk of injuries linked to deep squats. While widely used in sports such as baseball and softball, KS have not been tested to determine their effect upon lower extremity kinematics in any population.

**Purpose:** The purpose of the study was to determine if KS influenced the lower extremity kinematics when females with previous anterior cruciate ligament (ACL)-reconstruction and healthy participants completed an end-range squat.

**Study Design:** A repeated measures, counter-balanced laboratory study design was used.

**Methods:** Twenty female participants (mean (SD) – age: 21.65 (2.06) yrs, height: 175.26 (9.29) cm, weight: 64.66 (7.72) kg) with a history of ACL-repair (n = 10) or non-injury (n = 10) completed this study. Participants completed a standardized trial of three deep squats with and without KS. Movement was analyzed using 2D video analysis methods increasingly available in clinical environments.

**Results:** During the ascending phases of a squatting motion, there was significantly greater medial ( $p = .009$ ) and lateral ( $p = .005$ ) motion of the patella in the frontal plane for non-injured participants, when compared to the ACL-repaired group. No significant differences were found in sagittal plane lower extremity kinematics when squatting with and without KS. Ascending angular velocity was slower in ACL-repaired than non-injured females ( $p = .008$ ) and slower with the KS than without KS for non-injured females ( $p = .007$ ).

**Conclusions:** When squatting with and without KS, the non-injured group experienced more frontal plane motion at the knee, compared to the ACL-repaired group. However, while KS are purported to influence lower extremity joint positions during the bottom phase of a deep squat, the data from the current study did not support this claim. Additionally, KS appear to slow ascending velocity for those without a history of ACL-repair. These findings may have clinically meaningful implications for athletes who use KS during sport activities.

**Level of Evidence:** Level 2

**Key words:** Functional movement assessment, Knee Savers®, softball, varus, valgus

<sup>1</sup> Department of Nutrition and Kinesiology, University of Central Missouri, Warrensburg, MO, USA

<sup>2</sup> School of Kinesiology, Recreation and Sport, Western Kentucky University, Bowling Green, KY, USA

<sup>3</sup> Department of Physical Therapy, Western Michigan University, Kalamazoo, IN, USA

This study was approved by the university's institutional review board and an approved informed consent form was signed by each of the participants prior to testing. There were no sources for grant support.

## CORRESPONDING AUTHOR

Donald Hoover

Department of Physical Therapy,

Western Michigan University, Kalamazoo, MI,  
49008

E-mail: don.hoover.pt.phd@gmail.com