

**Abstract****THESIS:** The effects of a Soccer-Specific Vertical Jump on Landing Mechanics**STUDENT:** Sophia Mancini**DEGREE:** Master of Science**COLLEGE:** Health**DATE:** July 2021**PAGES:** 104

**Background:** Anterior cruciate ligament (ACL) injury frequently occurs in female soccer athletes during deceleration movements such as landings. In soccer, landings mostly occur following jumping headers. Little research has been done to determine the mechanics that follow and how they compare to standard drop vertical jumps (DVJ). The purpose of this study was to analyze differences between jumps and landings in kinematics, kinetics, and muscle activation patterns in female soccer athletes to better assess the sport-specific risk for ACL injury. It was hypothesized that more biomechanical tendencies associated with ACL risk factors would emerge from soccer-specific vertical jumps (SSVJ) compared to DVJs and second landings (L2) compared to first landings (L1).

**Methods:** 8 female participants ( $20.88 \pm 1.17$  years;  $1.68 \pm 0.06$  m;  $58.77 \pm 7.65$  kg) performed DVJs and SSVJs. Motion capture, force, and electromyography (EMG) data were collected to calculate joint motion, loading, and muscle activation throughout landing phases. Data were analyzed using RM-ANOVA, collapsed across jump (DVJ vs. SSVJ) and landing (L1 vs. L2).

**Results:** Significant findings were revealed in all categories, however, kinematic variables were the most profound results. Significantly higher jump height was achieved in DVJs ( $p=0.008$ ). SSVJs and L2s produced less peak hip ( $p=0.03$ ;  $d=0.817$ ) ( $p=0.007$ ;  $d=1.566$ ) and knee

( $p=0.002$ ;  $d=0.732$ ) ( $p=0.002$ ;  $d=1.476$ ) flexion during landing, respectively. A significant interaction was present for trunk flexion at initial contact ( $p=0.034$ ). Follow-up tests revealed no significant differences following headers.

**Discussion:** SSVJ-L2s displayed a more erect landing at the hip and knee, a known ACL risk factor, however, it is unclear whether these results are due to trunk movement during heading. Limited results in kinetic and EMG variables may be explained by the difference in jump height achieved, therefore further investigation in a more elite population is required. Additionally, SSVJs may be a good sport-specific screening tool.