

## Abstract

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**THESIS:** The Effect of Landing Type on Kinematics, Kinetics, and Muscle Activity during Landing

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**Purpose:** Several different types of landings are used in research to simulate the activities athletes are exposed to during sport participation. An isolated landing is commonly used, but the activities performed before and after the landing may impact landing mechanics. Therefore, the purpose of this study was to compare landing kinetics and kinematics of single-leg drop landing (DL), drop jump (DJ), and countermovement jump (CMJ) landing activities and to determine whether landing mechanics changed as a function of the participants' sex. **Methods:** Twenty-five recreational athletes (14 males and 11 females) performed single-leg DL, DJ, and CMJ landing activities from 80% of maximum jump height, with impact forces, joint kinematics, and moments measured during each landing. **Results:** Findings revealed that when a jump was performed either before or after the landing, kinematic and kinetic variables were altered. In general, the CMJ landing was performed with a more extended lower extremity at ground contact, less hip and knee motion in the frontal and transverse planes, and with larger joint

moments compared to the other landing types ( $p < .01$ ). Conversely, DJ were performed with increased joint flexion and decreased impact forces paired with large angles and range of motion in the frontal and transverse planes ( $p < .05$ ). Across all landing types males landed with larger impact forces and joint moments ( $p < .01$ ), and females landed with frontal plane kinematics placing the lower extremity at a greater injury risk than males ( $p < .05$ ). **Conclusions:** These changes suggest that activities surrounding the landing directly impact landing mechanics. Therefore, landing type should be matched to sport specific landings when researching and assessing injury risk factors and when implementing training or rehabilitation programs.