

## GENDER DIFFERENCES IN KNEE PROPRIOCEPTION IN TRANSVERSE PLANE

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**Context:** Afferent proprioceptive signals from mechanoreceptors play a vital role in achieving functional joint stability of the knee. Previous research has demonstrated that female athletes have a decreased ability to perform sagittal plane knee threshold to detect passive motion (TTDPM) into extension compared to their male counterparts. The ACL becomes taut with knee extension, internal rotation (IR), and valgus. As the mechanism of non-contact ACL injuries is likely multi-planar, with a significant rotational component, we hypothesized that females might exhibit decreased proprioception in the transverse plane. We have developed a method to test knee TTDPM in the transverse plane, and found good intersession and intrasession reliability (ICC=0.68-0.95) and precision (SEM=0.11-0.38°). **Objective:** To investigate TTDPM in the transverse plane and compare between genders. **Design:** Cross-sectional. **Settings:** University sports medicine laboratory. **Patients or Other Participants:** Twenty healthy collegiate individuals who participate in at least 20-30 min of exercises 3 times a week (10 males: Age: 24.7 ± 4.2 yrs; Height: 183.1 ± 8.2 cm; Mass: 81.4 ± 9.3 kg, 10 females: Age 21.7 ± 2.1 yrs; Height: 166.4 ± 9.0 cm; Mass: 59.7 ± 8.2 kg). **Interventions:** All TTDPM tests were performed on an isokinetic dynamometer. Subjects sat in the chair with the knee and hip positioned at 90° flexion, and wore a compression boot, blindfold, and headphones playing static noise. Initially, the knee was positioned at IR and ER terminal end-range (10° less than the maximum active IR and ER). The dynamometer initiated the movement toward either IR or ER direction at 0.25°/s at unannounced time. Subjects were instructed to press a stop-button when they first felt limb movement and were then able to detect the direction of movement. The arc between the initial and final positions was reported as TTDPM. Subjects performed a total of five trials for each direction (order of direction was randomized). The average of the middle three trials was used for statistical analyses. Independent t-tests were used to compare genders across all variables (alpha level = 0.05). **Main Outcome Measurements:** TTDPM toward IR and ER at both IR and ER positions. **Results:** Females had significantly decreased ability to perform the TTDPM toward IR at the IR position (Males: 0.77° ± 0.15°, Females: 1.18° ± 0.46°, p = 0.02). **Conclusions:** Gender differences in TTDPM were specific to the joint position, plane, and direction of motion. The results are in accordance with previous research. Females exhibited the decreased proprioception toward extension at the near

terminal extension position and IR at near terminal IR position which are a position of potential ACL injury. Additionally, females exhibited decreased ability to perform TTDPM in all variables, suggesting that an intervention program to train multi-planar proprioception should be evaluated. **Word Count:** 450

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