

ABSTRACT
GENERALIZED JOINT HYPERMOBILITY AND LOWER EXTREMITY
MUSCULOSKELETAL BIOMECHANICS IN FEMALE ATHLETES

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Generalized Joint Hypermobility (GJH) affects 5 to 43 percent of the population. In severe forms, GJH impacts many systems across the body. GJH is also present in less severe forms with individuals functioning normally in day-to-day activities. GJH is also present in similar proportions in the athlete population. However, athletes with GJH are more likely to be injured while participating in activities and when injured, experience greater time-loss. There are few investigations focusing on the biomechanics of athletes, especially during high intensity movements. The purpose of this dissertation was to investigate the movement characteristics of athletes with GJH to identify characteristics that increase their risk for injury. This work will inform future injury preventive interventions in athletes with GJH.

Thirty-six athletes from a single collegiate Division 1 women's Lacrosse team were examined for GJH. Seven athletes with GJH were identified and evaluated during athletic-like tasks, with control participants from the same collegiate team without GJH. In the first study, players performed maximal countermovement jumps while ground reaction force data were used to evaluate differences in performance between groups. In the second study athletes performed a bilateral drop jump (a lower intensity task) and a single-leg land and cut maneuver (a higher intensity task) while data were collected to assess task-dependent differences in biomechanical variables. For the third study a musculoskeletal model was used to estimate and compare anterior cruciate ligament (ACL) strain during the strenuous task.

The primary findings of this dissertation were that female athletes with GJH demonstrated 1) equal maximal effort performance, 2) task-dependent increases in "at-risk" biomechanics where they adopted a pattern of less knee flexion and a greater plantarflexor moment on their dominant leg, and 3) no difference in ACL strain during the strenuous task. These findings suggest that differences in injury risk are not related to differences in strength or performance capabilities, but may result from a movement pattern associated with higher ACL injury risk, that was adopted only during the more strenuous activity. Lastly, the at-risk movement pattern does not appear to be an attempt by those with GJH to minimize ACL strain.