How Does the Secondary Task of Heading a Soccer Ball Impact Jumping Kinematics and Kinetics Between Men’s and Women’s Dll Soccer Players?

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Introduction

Noncontact anterior cruciate ligament (ACL) injuries are increasing in the US, with over 127,000 ACL reconstructive surgeries being performed annually. Soccer has not been immune from the this and has seen a gender gap where females are twice as likely to tear their ACL. In competition, women soccer players tend to commit fewer fouls but play at the same intensity as males. This trend makes us believe there is a significant biomechanical difference between male and female soccer players. Due to this, research needs to be done to understand the difference in biomechanics between males and females.

Methodology

Research has previously been conducted to examine how jump landing mechanics can assess ACL tear risk. Typically, countermovement jumps and drop jumps are used for such assessments. These tests have had some success in stratifying ACL tear risk of athletes but may be lacking in external validity due to many not having a game related aspect. Many ACL tears are noncontact and occur while playing in a game or practice, meaning the athlete is likely not focusing on movement technique. This prompts us to want to examine the biomechanics of movement while performing the secondary task of heading a soccer ball. Given the discrepancy in ACL injury rate between male and female soccer players, we wanted to examine if a secondary task alters the jump mechanics of females more than males. Research has been conducted to assess how the secondary task of counting and retaining numbers impact jumping performance. The findings showed that a secondary task did impact jump landing kinematics, identified as movement patterns that increased the risk of an ACL tear. The present study will examine how the secondary task of heading a soccer ball will impact jumping and landing kinematics and kinetics between male and female soccer players, and how this may affect variables associated with increased ACL injury risk.

Results and Discussion

This research data has been collected and is currently being analyzed. Previous research has identified increased knee valgus, knee internal rotation, hip adduction, and decreased hip and knee flexion during landing as the variables which are strongly associated with injury15. To assess these variables, participants performed eight jumps in an eight-Vicon camera motion lab. Fourteen-millimeter diameter reflective markers were placed on the participant's lower body following the Conventional Gait Model 2.3 landmarks and trials are collected via Vicon NEXUS software. The trials performed include two jumps with and without the secondary task of heading a soccer ball, and two drop jumps (from a 0.3m box) with and without the secondary task of heading a soccer ball. Ground reaction force data was collected using AMTI force plates. Each foot is on a different force plate, allowing for the identification of any asymmetries between limbs. If the findings of this study demonstrate differences between gender in the aforementioned variables with the addition of a secondary task, this may show why there is a gap in the difference in ACL tears per gender and how to address the issue.