Anterior cruciate ligament (ACL) injury is common, costly, requires a lengthy rehabilitation, and results in increased risk of osteoarthritis. For these reasons, prevention of ACL injury is critical. While the mechanism for non-contact ACL injury is unclear, injuries normally occur with the knee near full extension. Therefore, increasing knee flexion at ground contact may dramatically reduce ACL injury rates. One factor that may contribute to landing with an extended knee is knee extensor weakness, as an extended knee reduces demand on knee extensors. PURPOSE: To determine the relationship between knee extensor strength and knee flexion angle at landing. METHODS: Healthy, active participants (10M 11F) were asked to perform landings from 64cm. 3D kinematic data was recorded and knee flexion angle was calculated at the instant of ground contact. Knee extensor strength was measured during maximum, 60º/s isokinetic contractions. Correlations were calculated between strength and knee angle at landing. RESULTS: Strength was significantly related (p<0.05) to knee angle at landing in male subjects. In female subjects a similar trend existed between the two variables. However, the relationship was not significant. CONCLUSION: A relationship exists between knee extensor strength and knee flexion angle at landing in male subjects. Additional testing is needed to confirm this finding in female subjects. A significant relationship between these variables does not prove a causal relationship. However, knee extensor weakness is a logical cause for landing with an extended knee. If additional testing confirms this relationship, knee extensor strengthening should be tested as a simple intervention for ACL injury prevention.

**Results**

Strength was significantly related (p<0.05) to knee angle at landing in male subjects (Figure 2). In female subjects a similar trend existed between the two variables (Figure 3). However, the relationship was not significant.

**Discussion**

There is a clear relationship between knee extension strength and knee angle at ground contact in males. However, additional testing in this area is needed. The relationship is unclear in females and even in males there is still a considerable amount of variance unexplained. One possibility is that strength should not have been the variable of interest, but perhaps the capacity to generate muscle power is more important. To control landing, it is not sufficient for a muscle to be able produce high isometric strength, but also must do so at relevant velocities associated with jump landing. Additionally, the relationship between strength and knee angle does not prove causation. Experimental manipulation of strength and demand on the knee extensors are needed to determine if knee extensor weakness is a cause of landing with extended knees.

**Conclusion**

If additional testing determines knee extensor strength is a cause of landing with extended knees, knee extensor strengthening should be tested as a simple intervention for ACL injury prevention.

**References**


