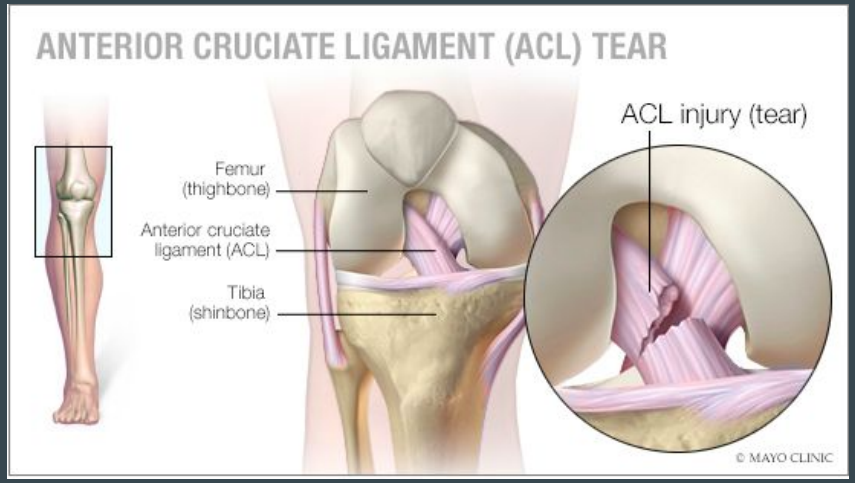
Reducing Non-contact ACL injuries with Kinesiology Taping

Lexus Morris and Kiara Myers

What is an ACL injury?

Sprain or tear of the anterior cruciate ligament (ACL)



ACL Injury

Symptoms:

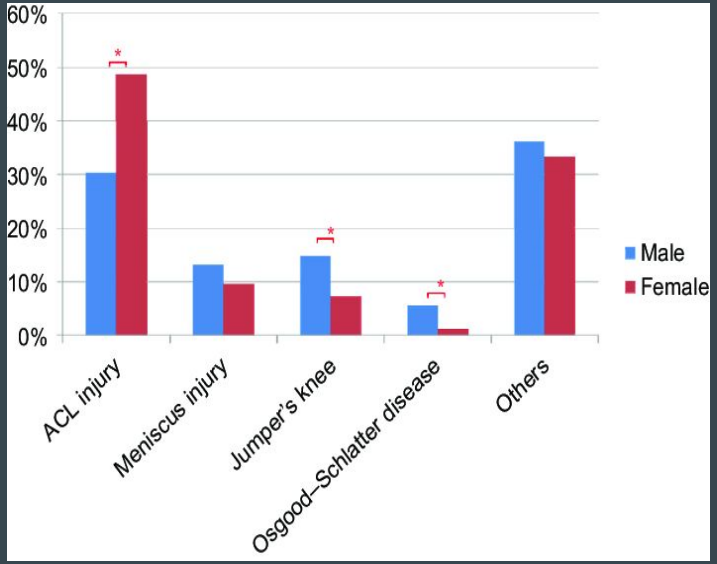
- Loud “pop” sensation
- Severe pain and inability to continue activity
- Rapid swelling
- Loss of range of motion
- Instability while weight bearing

Causes:

- Suddenly slowing down and changing direction
- Pivoting while foot is planted
- Landing awkwardly
- Stopping suddenly
- Direct collision to the knee

Why study ACL injury?

- Estimated 200,000 ACL ruptures per year
- Most common injury among football players: 54%
- 70 percent of injuries are non-contact
- 100,000 reconstruction per year
- Estimated surgery cost : $20,000
- Postoperative physical therapy : $1,000 - $3,000



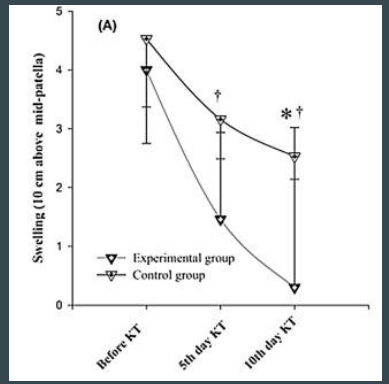
What is Kinesiology Taping?

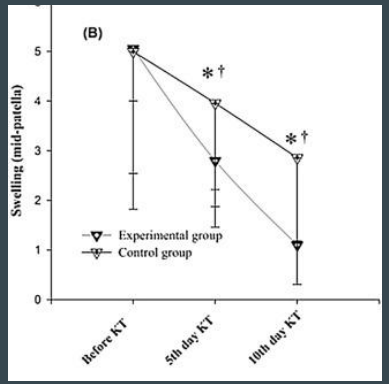
- Kinesiology tape is a thin, stretchy, elastic cotton strip with an adhesive backing
- Treats a variety of orthopedic and neuromuscular condition
- Kinesiology taping is a technique used to provide support and stability to muscles and joints
- Re-educates the neuromuscular system, optimizes performance, and promotes good circulation

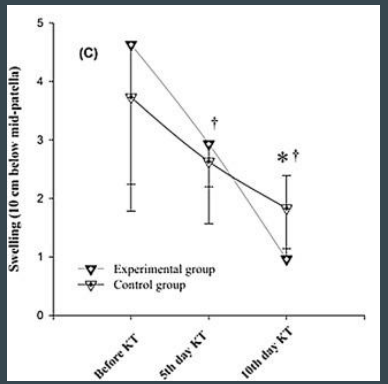
Previous Research on Kinesiology Tape

Most research conducted involving Kinesiology Tape evaluates:

- Pain prevention and swelling reduction
- Effect on a person's gait and its speed
- Effect on joint position sense and range of motion







Previous Research - Subject Pool

Very few subjects chosen to be involved in Kinesiology Tape research are healthy individuals without previous injury to their knee.

Most research covers the tape's effect on those afflicted with:

- Knee osteoarthritis
- Degenerative knee arthritis
- Patellofemoral pain syndrome

Previous Research - Shortcomings and Next Steps

Shortcomings:

- Failure to examine all uses
- Previously tested subject pools could not be used for testing the tape's preventive ability
- Not all variables of movement were measured

Next Steps:

- Examine the tape's advertised injury prevention ability
- Evaluate the effect the tape has on minimizing high-risk movement that could result in injury, specifically ACL injury

Hypothesis

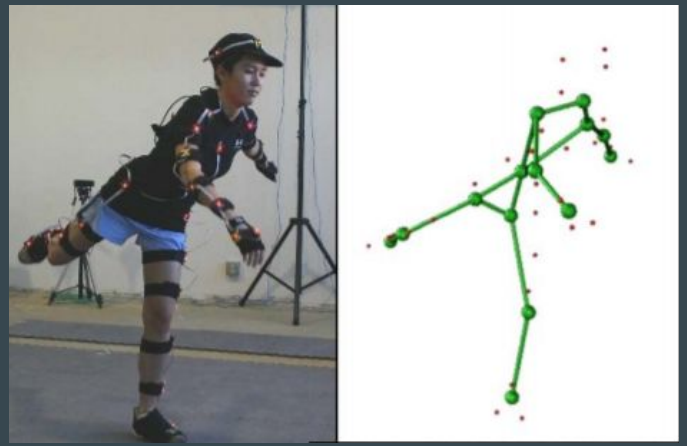
The application of kinesiology tape to the knee will decrease the moments about the knee during high-risk movements, such as cutting and landing, that could lead to ACL injury.

- Biological Problem: ACL injury
- Movement Targeted: cutting and landing
- Variables of Interest:
  - Internal and external moments
  - Moments of abduction and adduction

Proposal

- Non-contact ACL injury prevention by using kinesiology taping
- Criteria:
  - 30 participants ages 20-60
  - Showing no signs of previous knee injury
- Randomly divided into a test group and placebo group
- Series of physical tests that simulate high-risk movements
- Measure moments in knee associated with increased risk of ACL injury

Proposed Study



Equipment:

- Force Plates
- Motion Capture System

Tests:

- Cutting Movement - measure moments about the knee with and without tape as subject performs a cutting motion by running then suddenly slowing down and changing direction
- Landing Movement - measure moments about the knee with and without tape as subject performs a landing motion by jumping off a box

Movements Targeted

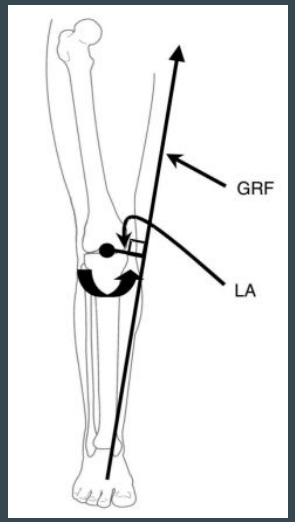
Cutting-

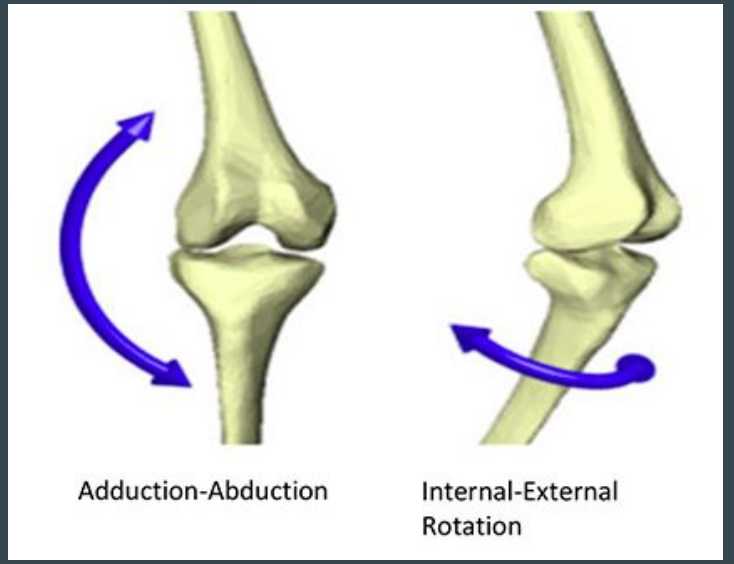
Landing-

Recorded Data and Calculations

- Spatial position and orientation of each marker placed on the segments of the body being analyzed will be recorded using a motion capture system.
- Forces acting on the knee will be measured using a force plate.
- Moments about the knee can then be calculated
  - Internal and External Moments
  - Abduction and Adduction Moments

Moment = Force x Moment Arm

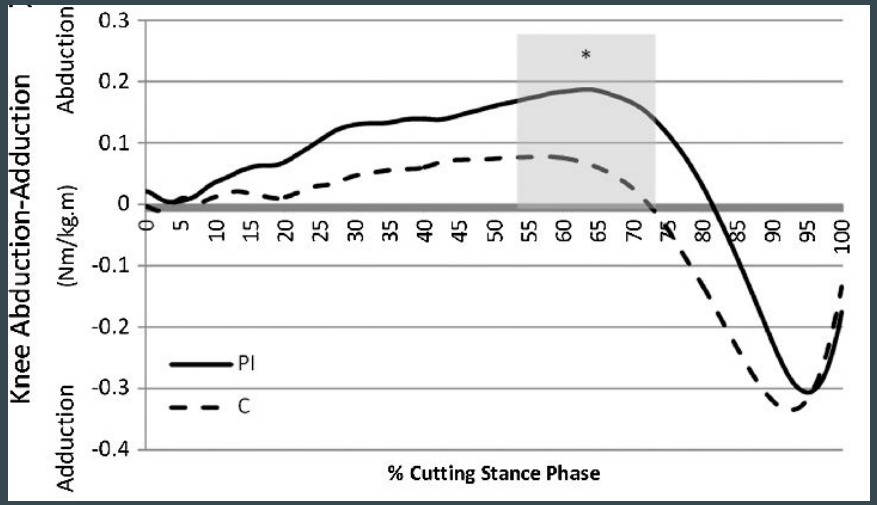


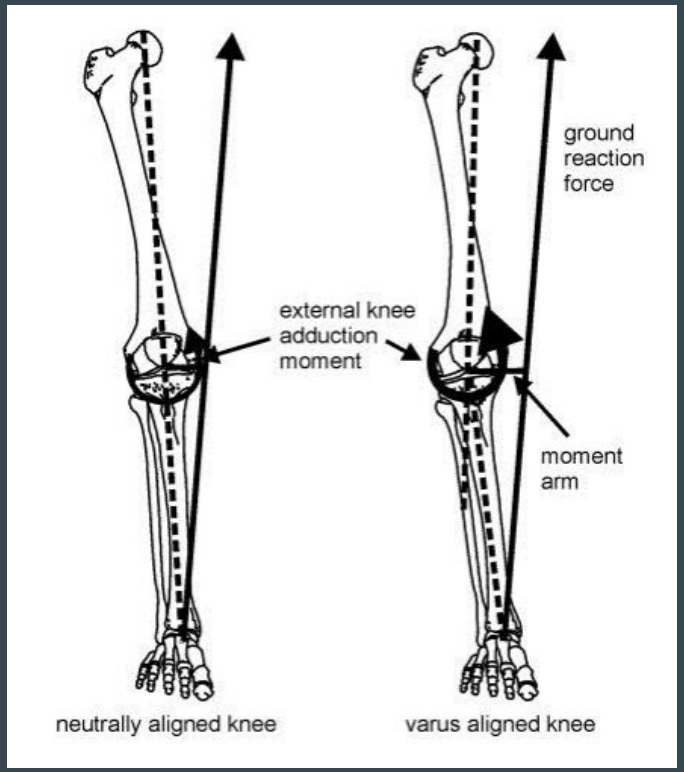


Analysis of Resulting Calculations

Reducing the movement of the joint would result in:

- Smaller moment arm
- Reduction of moment at the knee
- Reducing risk of injury to the ACL





Questions?