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Keeping Athletes on the Field: Preventing primary and secondary ACL injuries (PhD Academy Awards)

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What did I do?

I aimed to 1) examine the changes in biomechanics and injury incidence with utilization of the 11+ prevention program over two soccer seasons in collegiate women, 2) establish the incidence of lower extremity injuries and career duration after anterior cruciate ligament reconstruction (ACLR) and return Major League Soccer (MLS), 3) quantify the effects of a secondary injury prevention program on function, return-to-sport, and second ACL injury incidence in athletes after ACLR.

Why did I do it?

Due to the high incidence of ACL injuries in cutting, pivoting, and jumping sports, it would change athlete's lives if it were possible to prevent a first or a second ACL injury.[1]
Primary and secondary ACL injury prevention programs have been developed, but require outcomes testing to determine their efficacy and further improve their impact.

How did I do it?

Aim 1:

Two collegiate women's soccer teams performed the 11+ prevention program[2] for two seasons, while a control team performed their normal warm-up. Injuries were recorded and biomechanical changes were assessed via motion analysis of a drop jump during preseason and postseason.

Aim 2:

I compared the career length and lower extremity injury incidence of athletes who had an ACLR and returned to play in MLS to those of age-matched control athletes.

Aim 3:

I performed a secondary analysis of a randomized control trial investigating the ACL-Specialized Post-Operative Return-to-Sport (ACL-SPORTS) program[3]. I compared changes in functional and patient-reported outcomes over the course of the program between

men and women, and in the men explored the return-to-sport and second ACL injury outcomes over the first two years after ACLR. (I only reported on the men as not all of the women had completed the two year follow-up.)

What did I find?

Aim 1:

The 11+ led to fewer lower extremity injuries during the first season but did not change biomechanical risk factors[4] associated with ACL injuries in either the first or second seasons. Further, in the second season of 11+ use there was an increased knee injury risk, including three ACL injuries.

Aim 2:

After ACLR and return to MLS athletes had half as long careers compared to controls, and while playing, ACL group athletes started fewer and were unused in more regular/post-season games. Athletes after ACLR did not have a higher risk for lower extremity injuries, but did seem to have a lower risk for thigh and hamstring injuries.

Aim 3:

Both men and women improved in functional and patient-reported outcomes with the ACL-SPORTS program, with one exception. Men and women started the program with similar quadriceps strength limb symmetry; but over the course of the program men had improvements in limb symmetry and women did not. Two years after ACLR all of men had returned to sport, 95% at their preinjury level, and there was only one second ACL injury.

What is the most important clinical impact / practical application

Aim 1:

The 11+ is effective and should be implemented to reduce lower extremity injuries in collegiate women soccer players.

Aim 2:

These results support the view of return-to-sport as a continuum, not a single time point.[5] After ACLR, MLS athletes return to participation, and to play, but sports medicine teams may need to focus more on helping these athletes truly return to performance.

Aim 3:

Finally, the ACL-SPORTS program may be a beneficial secondary prevention program for men who wish to return-to-sport after ACLR. The program seems to be valuable for men and women, but during the return-to-sport phase of rehabilitation when many clinicians shift their focus to sport-related activities, women may need a continued focus on strengthening, especially given the implications of quadriceps asymmetry on reinjury risk.[6]

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Figure 1.
Single-legged hopping over hurdles, part of the ACL-Specialized Return-to-Sport return to sport and secondary ACL injury prevention programme.