

DIFFERENCE IN KNEE JOINT LOADING METRICS FOLLOWING ACL REPAIR VERSUS ACL RECONSTRUCTION

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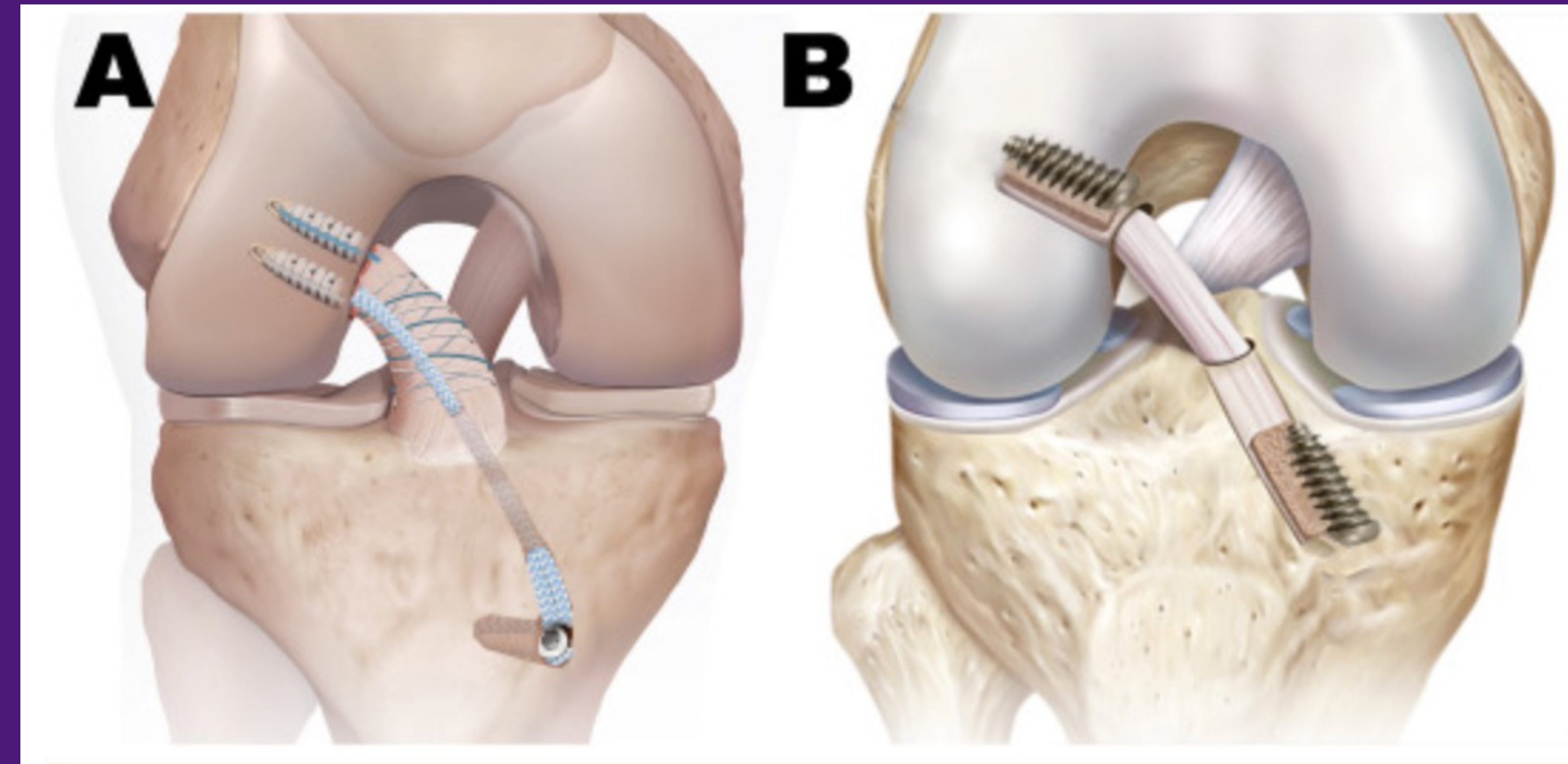
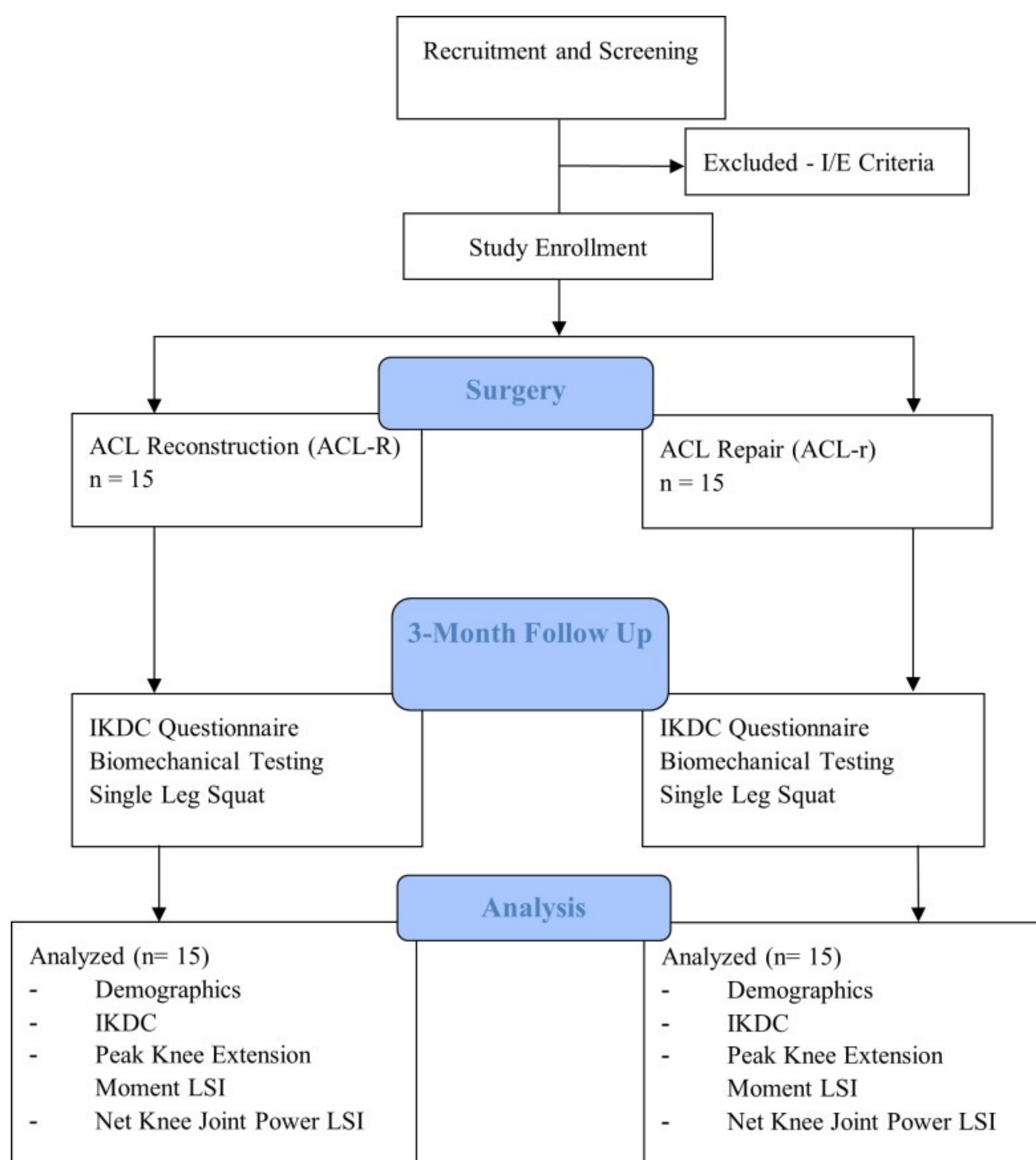
RESEARCH QUESTION

Do individuals who undergo Anterior cruciate ligament (ACL) reconstruction have greater severity of knee cartilage changes than individuals who undergo ACL repair at 3 months and at time of return to sports/ activities following surgery? Further, is there a relationship between knee joint loading, strength of lower limb, and knee cartilage changes seen in patients who have received ACL reconstruction or ACL repair at each measured timepoint?

BACKGROUND

ACL injuries are one of the most common knee injuries in athletes and the general population. At this time, ACL injuries are most often treated with ACL reconstruction and even with the great advances made in technology and physician expertise, the outcomes of ACL reconstruction on joint health is bleak. Those that undergo ACL-R may result in or expedite the arthritic process and lead to articular cartilage lesions. This is hypothesized to take place due to a variety of factors, including prolonged underloading of the knee joint following surgery. Recent studies have shown that ACL-r may provide some type of protection to the cartilage and possibly slow the effects of joint degeneration. This is said to be due to decreased surgical trauma associated with preservation of the native ACL ligament. ACL-r has been shown to benefit lower extremity and knee biomechanics and proprioception. This data is based off of older ACL-r methods and there is limited data on newer ACL-r techniques and the effect on knee joint loading. Therefore, this study is being conducted to assess the difference in knee joint loading metrics between individuals who have undergone primary ACL-r and those following standard ACL-R with a patella bone-tendon-bone autograft.

METHODS



A) ACL repair; B) ACL reconstruction²

Results: The ACL-r had a significantly greater peak knee extension moment (ACL-r: 78.46±5.79%; ACL-R: 56.86±5.79%; p=0.019, $\eta^2=.186$), as well as total knee joint power (ACL-r: 72.47±7.39%; ACL-R: 39.70±7.39%, p=0.006, $\eta^2=.245$) than the ACL-R group. The ACL-r group also had a significantly greater quadriceps LSI than the ACL-R group (ACL-r: 66.318±4.61%, ACL-R: 48.03±4.61%, p=0.013, $\eta^2=.206$).

Conclusion: Individuals who underwent ACL-r demonstrated increased knee joint loading symmetry during a single leg squat test, as well as greater quadriceps strength symmetry at 12 weeks post-operation as compared to those who underwent ACL-R.

RESULTS

Table 1. Participants Demographics (N=30)

	ACL-r (15)	ACL-R (15)	P-Value
Age (years)	38.87±13.9	25.60±11.78	0.009*
Height (cm)	173.4±10.0	173.5±10.3	0.996
Mass (kg)	77.9±17.5	75.4±15.6	0.996
Sex (M/F)	5/10	8/7	0.269
IKDC	67.82	68.52	0.886
Injury to Surgery (Days)	55.33±47.6	57.43±53.7	0.912

*Indicates significance difference between groups; IKDC: International Knee Documentation Committee Short Form

Table 2. Limb Strength Index Results

	ACL-r	ACL-R	p	η_p^2	95% CI
Peak knee extension moment LSI (%)	78.46±5.79	56.86±5.79	0.019*	0.186	[3.79, 39.42]
Net Knee Joint power LSI (%)	72.47±7.39	39.70±7.39	0.006*	0.245	[10.04, 55.50]
Quadriceps LSI (%)	66.318±4.61	48.03±4.61	0.013*	0.206	[4.11, 32.47]

*Indicates significant differences at a .05 evaluation; η_p^2 = partial eta squared effect size

FUTURE DIRECTIONS

Future directions for this study would include increasing the sample size and following patients for a longer time period to see if these loading differences persist. It would also be useful to look at bioenhanced ACL-r techniques and compare nd ACL-R to see if there are potentially even better outcomes and decreased rates of OA.

KEY LITERATURE

- Singleton S, Scofield H, Davis B, Waller A, Garrison C, Goto S, and Hannon J. Altered Knee Loading Following Primary ACL Repair versus ACL Reconstruction. *Int J Sports Phys Ther.* 2023;V18(3):596-605. doi:10.26603/001c.77362
- Chahla J, Nelson T, Dallo I, et al. Anterior cruciate ligament repair versus reconstruction: A kinematic analysis. *Knee.* Mar 2020;27(2):334-340. doi:10.1016/j.knee.2019.10.020