

# ENERGY ABSORPTION CONTRIBUTION AND RETURN TO SPORT SCALE AFTER PRIMARY ACL RECONSTRUCTION IN YOUNG ATHLETES

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## RESEARCH QUESTION

- 1) Do young athletes returning to sport after primary ACL reconstruction differ in the biomechanical loading distribution of energy across their lower extremity joints at the time of release from PT compared to athletes who did not return to sport?
- 2) Can the ACL-RSI be used to predict return to pre-injury sport following primary ACL reconstruction in young athletes?

## BACKGROUND

- Anterior cruciate ligament (ACL) connects femur and tibia
- ACL tear is a common injury in level 1 sports
- Average rehabilitation time of 9 months – physical and psychological barriers to RTS
- Alterations in joint loading and movement patterns puts the athlete at risk for re-injury in the surgical limb and contralateral limb
- Energy absorption contribution (EAC) estimates lower extremity muscle activity during landing exercises
- Peak vertical ground reaction force
- ACL-RSI evaluates psychological readiness to RTS: emotional response, confidence, and risk appraisal

## METHODS

- 39 athletes ages 13-25. Level 1 sport. Primary ACL tear with intention to return to sport.
- Jump landing + ACL-RSI
- Called at least 1 year later and asked whether they returned to same level of sport



Participants who returned to preinjury sport demonstrated altered biomechanical energy absorption compared to those who did not return to sport.

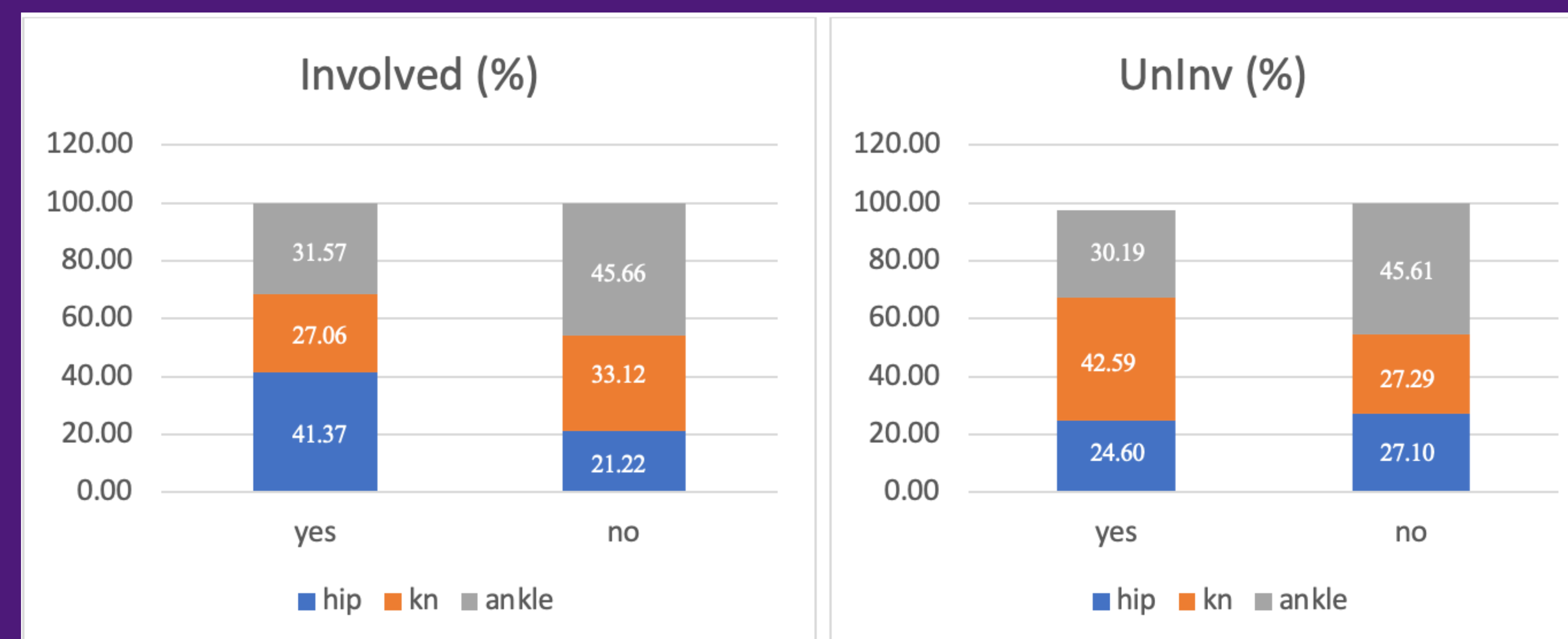


Fig 1. Involved and Uninvolved limb energy absorption contribution (EAC)

ACL-RSI at the time of release from PT may not be fully predictive of an athlete's ability to return to sport at 1-year post-assessment

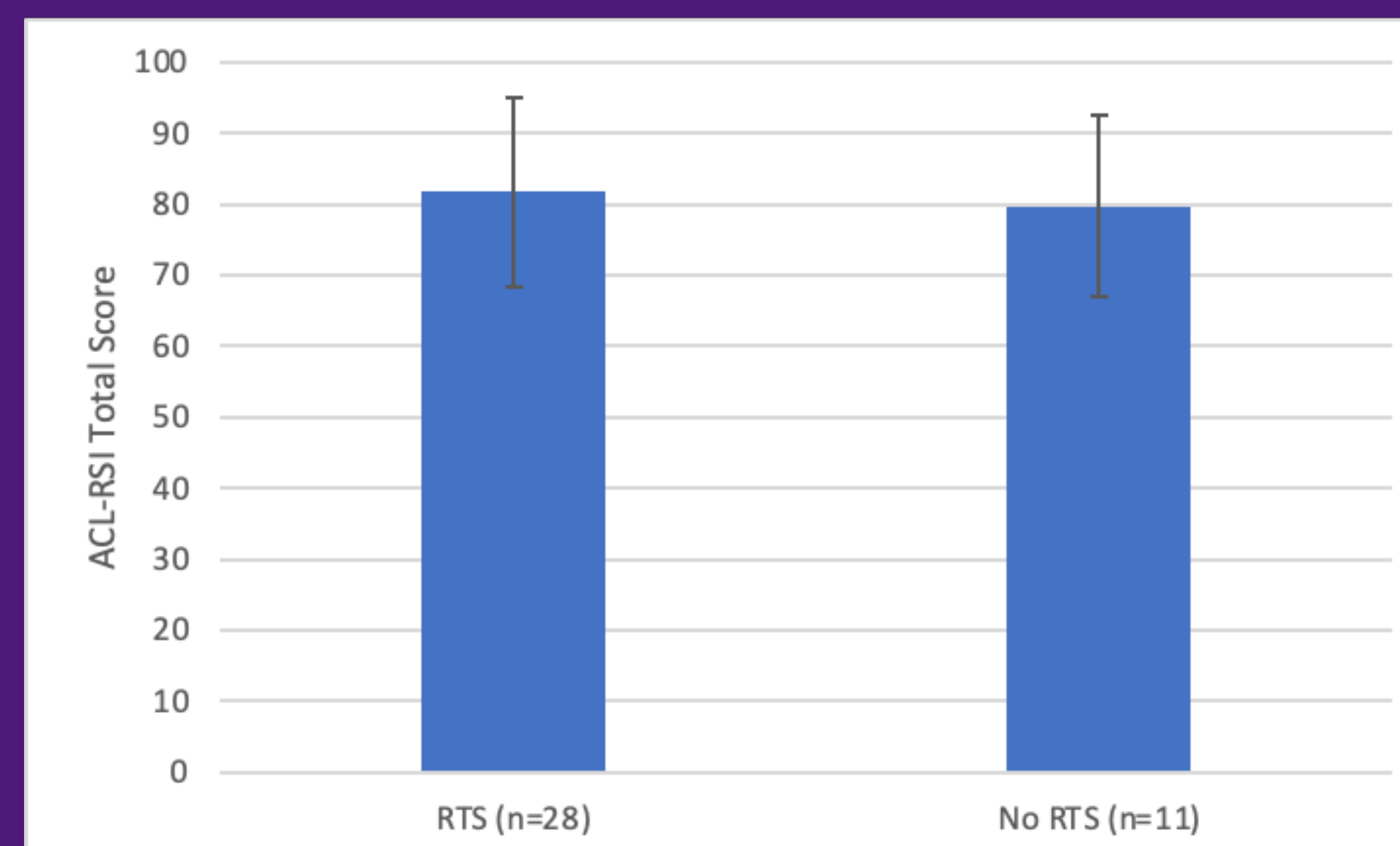


Fig 2. Total ACL-RSI scale in participants

## RESULTS

- 28 RTS, 11nRTS
- **Energy Absorption Contribution (EAC)**
- Participants who RTS had a significantly greater EAC in the hip of the involved limb (P=0.03)
- No significant differences in EAC of involved (P=0.54) or uninvolved (P=0.21) knee
- Participants who NRTS had a significantly higher EAC in both the involved (P=0.04) and uninvolved (P=0.03) limb ankles

### ACL-RSI

- No significant difference in RSI score between groups at time of RTS (P=0.41)

### Peak Ground Reaction Force

- Significant difference between groups in both involved and uninvolved limb

	RTS	NRTS	P-value
Involved limb	2.54 ± 0.75	1.86 ± 0.62	0.01
Uninvolved limb	3.14 ± 0.59	2.69 ± 0.53	0.04

## FUTURE DIRECTIONS

- Larger sample size
- Mechanism behind increased hip and ankle EAC
- Compare adult vs adolescent RSI scores
- Further investigate 3 domains of RSI

## REFERENCES

Garrison JC, Hannon J, Goto S, Giesler L, Bush C, Bothwell JM. Participants at three months post-operative anterior cruciate ligament reconstruction (ACL-R) demonstrate differences in lower extremity energy absorption contribution and quadriceps strength compared to healthy controls. *The Knee*. 2018;25(5):782-789.

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