ARE LIMB SYMMETRY INDICES A SENSITIVE TOOL FOR MEASURING FUNCTIONAL KNEE JOINT CAPACITY IN YOUTH WITH ACL INJURIES?

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The Issue

- ~50% of patients do not return to pre-injury physical activity levels following surgery and/or rehabilitation [1,2].
- Re-injury rates are high, with reports of 29.5% of graft ruptures within 2 years [3].

Knowledge Gap

- Current adult guidelines emphasize limb symmetries between the injured and contralateral limbs during a battery of hop tests [4,5], **these guidelines do not exist for children.**

Purpose

- To assess limb symmetry measures during clinically established hop tasks in paediatric patients with ACL injuries prior to reconstruction surgery.

Participants

- 48 ACL-Deficient (ACLD) patients with surgery scheduled and 45 Healthy Control (CONT) participants

Hop Tasks

- Hop tasks (Figure 1) were performed following instructions, demonstrations and 2 practice trials.
- 2 max effort trials were performed on the uninjured/dominant limb and then the injured/non-dominant limb.

Statistical Analysis

- Paired sample t-tests (p =.05) and Cohen's d evaluated between-limb differences.
- Independent t-tests (p =.05) evaluated CONT vs ACLD differences.
- Mean distances/times were calculated for each limb and expressed as a limb symmetry index (LSI), with a ratio of <.90 being deemed clinically significant [2].

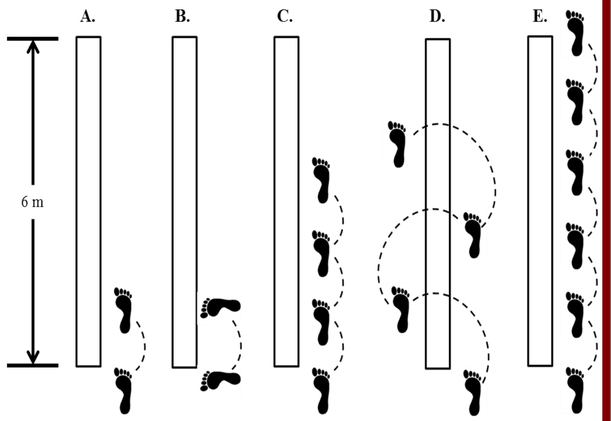


Figure 1. Single-limb hop tests (A-E) on the right foot.

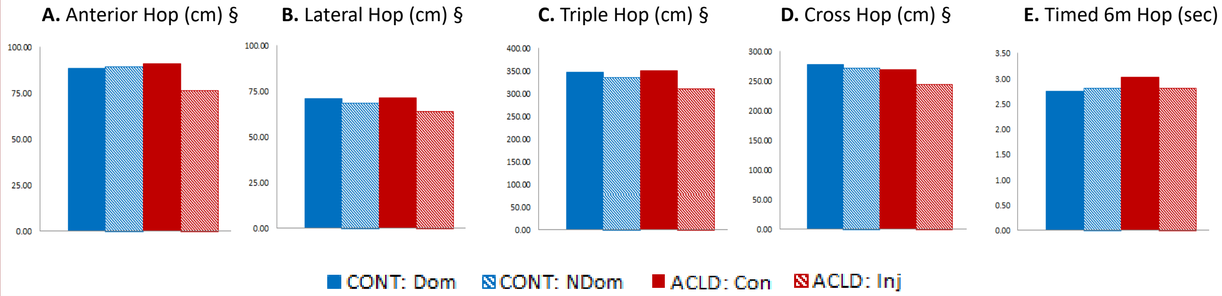
References

[1] Webster KE and Hewett TE (2019) *Sports Med* 49; 917-29. [2] Ardern CL et al. (2011) *Br J Sports Med* 45;596-606. [3] Paterno et al. (2014) *Am J Sports Med* 42;1567-73. [4] Adams D et al. (2012) *Orthop Sports Phys Ther* 42;601-14. [5] Noyes FR et al. (1991) *Am J Sport Med* 19;513-8.

Table 1. Group limb symmetry indices (LSI), Cohen's d, and the Pass Rate (PR: number of participants who had >.90 LSI) for each hop task; * signifies a LSI <.90; ǂ signifies a large effect size >.80.

	Anterior Hop			Lateral Hop			Triple Hop			Cross Hop			Timed 6m Hop		
	LSI	*d*	*PR*	*LSI*	*d*	*PR*	*LSI*	*d*	*PR*	*LSI*	*d*	*PR*	*LSI*	*d*	*PR*
ACLD	.842*	.903ǂ	17/48	.901	.599	17/48	.887*	1.28ǂ	16/48	.888*	1.05ǂ	16/48	.937	.196	27/48
CONT	1.01	.096	37/45	.981	.303	32/45	.944	.299	39/45	.969	.137	29/45	.981	.288	38/45

Figure 2. Means of hop measures for ACLD and CONT participants for each hop task (A-E) on both limbs; § signifies a significant difference between-limbs for ACLD group.



- Less than half (18/43; 42%) of the healthy participants satisfied the LSI > .90 criteria, while only 6 of 48 (~13%) ACLD met the threshold.
- Considering our findings in both injured and healthy populations, **it is clear that LSI alone cannot be used as the only evaluation of a paediatric patient's functional knee joint status.** Our study also reinforces the severe gap regarding functional capacity of the paediatric population and the need to develop effective measures of the knee joint for this population.
- Future work should include additional functional measures (i.e. isometric and dynamic strength, range of motion, muscular endurance, etc.) and combine these with psychometric evaluations of perceived function in healthy and boys and girls with ACL injuries.

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