

A Comparison of Injury Risk Determined by Laboratory and Field Tests

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Introduction

- College athletic programs commonly use laboratory and field tests to assess athletes' injury risk.
- Larger peak eccentric vertical ground reactions force (GRFv) predicts non-contact anterior cruciate ligament (ACL) injury in female athletes.^{1,2}
- Functional Movement Screen (FMS) has been shown to predict injury in female athletes.³
- Landing Error Scoring System (LESS) is a reliable method of identifying high risk movements¹ but does not predict ACL injuries in high school or college athletes.⁴
- No research has examined the relationship between these measures of injury risk.

Purpose

- The purpose of this study was to determine the relationship between variables measured by three injury risk assessments: LESS, peak eccentric GRFv, and FMS.

Methods

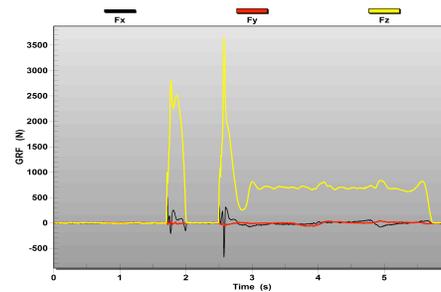
- Seventy-six Division III female athletes (basketball $n = 8$, soccer $n = 25$, cross-country $n = 23$, and volleyball $n = 20$).
- The athletes performed a 10-minute general dynamic warm-up prior to testing.
- Each athlete performed three box drop vertical jump (BDVJ) trials from a 30cm box onto an AccuPower force platform and all BDVJ trials were videotaped. Force plate data were sampled at 400Hz and normalized to body weight.
- The BDVJ that produced the greatest vertical jump height, based on flight time, was used for GRFv and LESS analysis.
- The 17 item LESS was used to qualitatively assess landing and jumping mechanics for each athlete and a composite LESS score was calculated for each leg (maximum possible score = 19), from which a LESS Relative Risk classification was assigned [0 = excellent (LESS ≤ 4), 1 = good (4 < LESS ≤ 5), 2 = moderate (5 < LESS ≤ 6), or 3 = poor (LESS > 6)].¹
- Athletes then performed 7 separate movement tests associated with the FMS. Each test was analyzed and scored using a 3-point scale.⁵ A Composite FMS score was calculated and a FMS injury risk classification was assigned [1 = high risk of injury (FMS score < 14) or 0 = low risk of injury (FMS score > 14)].⁵

Results

Table 1. Bivariate correlations examined the relationships between test variables.

		Peak Ecc GRFv	LESS Risk Left	LESS Risk Right	FMS
Peak Ecc GRFv	Pearson	1			
	N	76			
LESS Risk Left	Pearson	.318*	1		
	N	76	76		
LESS Risk Right	Pearson	.284**	.880**	1	
	N	76	76	76	
FMS Risk	Pearson	-.229*	.122	.018	1
	N	76	76	76	76

* Indicates significant results ($p < 0.05$), ** indicates significant results ($p < 0.01$)



Graph 1. GRFv Example.

Discussion

- The significant positive correlation with LESS and peak eccentric GRFv suggest the two tests measured similar or related risk factors.
- Since, peak eccentric GRFv has been shown to predict non-contact ACL injury risk¹, the significant correlation with the LESS may provide evidence of a modest criterion-related validity for the LESS in predicting ACL injury risk.
- The lack of significant correlation between FMS and LESS suggests that these tests can complement one another for a more comprehensive injury risk assessment than either test alone.

Future Research

- Future research should compare the ability of the FMS, LESS and peak eccentric GRFv to predict injuries, particularly ACL injuries, in isolation or in combination.
- Future research should continue to establish criterion-related validity of the peak eccentric GRFv in regard to the LESS.

Conclusion

- LESS and peak eccentric GRFv may assess similar or related injury risk factors.
- LESS and FMS appear to have little or no overlap in injury risk factor assessment.
- FMS and peak eccentric GRFv appear to assess distinctly different injury risk factors.

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