

**INTRODUCTION**

- A recent trend in sports medicine research is to determine risk of injury during sport based on preseason functional performance test (FPT) measures.
- Equivocal findings associated with prior studies may leave PTs with uncertainty as to which FPT, or combination of FPTs, can best identify athletes who have a greater risk for injury.
- Previous studies have utilized "low-tech" FPT measures: standing long jump (SLJ), single-leg hop (SLH), lower extremity functional test (LEFT), and the Y-balance test (YBT) (1,3,4).
- These "low-tech" options may not be able to identify potential deficits that could be collected with "high-tech" measures (e.g., DVJ measures collected in a motion capture lab) (2).
- The purpose of this study was to determine if "high-tech" and/or "low-tech" preseason functional performance test measures were associated with non-contact time loss lower quadrant (LQ = low back and/or lower extremity) injuries.



**METHODS**

Study design: Prospective cohort study  
 Aug 2015 - Nov 2016  
 Participants: Total of 206 male (n = 101) and female (n = 105) Division III collegiate athletes from George Fox University

**Procedures:**

1. Recruited athletes from GFU sports
2. Exclusion criteria; under the age of 18 or restricted from full sport participation by the team's physician
3. Athletes completed a preseason demographic questionnaire; height measured with cloth tape
4. Participants performed a 5-min dynamic warm-up
5. A lower quadrant biomechanical marker set was applied to each subject
6. Athletes performed the following:
  - a. Females: DVJ from 31 cm, SLJ, SLH (all in motion capture), YBT, and LEFT
  - b. Males: SLJ, SLH (all in motion capture), YBT, and LEFT
7. Non-contact LQ time loss injuries collected by the GFU ATCs

Table 1. Demographic Characteristics (Means ± SD) for Division III Collegiate Athletes

Characteristic	All Athletes (n = 206)	Female Athletes (n = 105)	Male Athletes (n = 101)	p value
Age (y)	19.3 (1.2)	19.2 (1.2)	19.5 (1.2)	0.1
Years in School	2.1 (1.1)	2.2 (1.1)	2.0 (1.0)	0.2
Age Starting Sport	10.7 (3.6)	11.1 (3.0)	10.2 (4.0)	0.09
Height (m)	1.74 (.10)	1.69 (.08)	1.80 (.08)	<b>0.0001</b>

**RESULTS**

Table 2. Odds Ratios (95% CI) for Selected Functional Performance Test Variables

Test	OR (95% CI)	p value
<b>Lower Extremity Functional Test</b>		
Males 105 sec or less	1.0 (Referent)	
Males 106 sec or more	0.3 (0.0, 2.0)	0.2
Females 117 sec or less	1.0 (Referent)	
Females 118 sec or more	0.6 (0.2, 2.2)	0.5
<b>Y Balance Test – Lower Quadrant</b>		
Anterior Reach Difference		
All Athletes (< 4cm)	1.0 (Referent)	
All Athletes (> 4cm)	0.6 (0.3, 1.2)	0.1
Men (< 4cm)	1.0 (Referent)	
Men (> 4cm)	<b>0.3 (0.1, 0.96)</b>	<b>0.04</b>
Women (< 4 cm)	1.0 (Referent)	
Women (> 4 cm)	1.0 (0.4, 2.8)	0.99
<b>Female Athletes Standing Long Jump</b>		
80% or more	1.0 (Referent)	
79% or less	0.6 (0.2, 2.1)	0.4
<b>(R) Single-Leg Hop (% ht)</b>		
70% or more	1.0 (Referent)	
69% or less	1.1 (0.3, 3.7)	0.9
<b>(L) Single-Leg Hop (% ht)</b>		
70% or more	1.0 (Referent)	
69% or less	1.0 (0.3, 3.3)	0.9
<b>Limb Symmetry Index</b>		
10% or less	1.0 (Referent)	
More than 10%	2.8 (0.4, 22.4)	0.3
<b>Jump/Hop Risk Factors</b>		
3 or more below cut scores	0.6 (0.2, 2.2)	0.5
2 or less below cut scores	1.0 (Referent)	
<b>Jump/Hop/LEFT Scores</b>		
All 4 below cut scores	0.7 (0.2, 2.5)	0.6
All others	1.0 (Referent)	
<b>(R) Single-Leg Hop</b>		
Knee valgus at landing	0.7 (0.2, 2.5)	0.6
No valgus at landing	1.0 (Referent)	
<b>(L) Single-Leg Hop</b>		
Knee valgus at landing	0.4 (0.1, 2.3)	0.3
No valgus at landing	1.0 (Referent)	

**RESULTS**

- In general: no association between YBT, LEFT, or jump/hop measures and future injury.
- Males with greater than 4 cm asymmetry in anterior reach for YBT demonstrated a protective effect (\*opposite finding from other studies)
- Potential reasons for the differences between our study and others:
  - Populations studied (1-4)
  - OD injury: time loss vs. non-time loss (1,3,4)
  - Not as many injuries occurred as expected

**CONCLUSION**

- There was no association between "low-tech" FPT measures and time loss injury in this population. This is counter to prior studies.
- Relationships between injury and preseason kinetic and kinematic data was explored; however, unable to draw conclusions at this time (power; n = 50).
- Analysis of kinetic and kinematic data for approximately 150 athletes to be completed soon.
- Findings from this data analysis will guide direction for future prospective studies.

**REFERENCES**

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