Movement Characteristics and Prior Injury in Agility and Non-Agility Sports

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Introduction

- Normal neuromuscular control is an important criterion in determining when a athlete returns to full sport participation after injury.[1]
- Function Movement Screens (FMS), Landing Error Scoring System (LESS) and peak eccentric ground reaction force (GRF_v) assess athletes' neuromuscular control and injury risk.
- If decisions regarding return to full sport participation after injury are based, at least in part, on normal neuromuscular control, the FMS scores, LESS scores, and peak eccentric GRF_v of previously injured athletes should be similar to those of non-injured athletes.

Purpose

- To compare the injury risk of female athletes who have sustained serious musculoskeletal injury in the past four years, but who have been medically cleared to participate fully in intercollegiate athletics, to female athletes who have not sustained serious musculoskeletal injury in the past four years.

Methods

- Seventy-six Division III female athletes clustered into two groups, agility sport athletes (volleyball n = 20, soccer n = 24, basketball n = 8) and non-agility sport athletes (cross country n = 24), performed three box drop vertical jump (BDVJ) test trials onto an AccuPower portable force platform from a 30cm box; sampled at 400Hz.
- All BDVJ trials were videotaped and the trial with the greatest vertical displacement was analyzed.
- LESS scores were calculated for each leg and the LESS injury risk classifications were determined [0 = excellent (LESS ≤ 4), 1 = good (4 < LESS ≤ 5), 2 = moderate (5 < LESS ≤ 6), or 3 = poor (LESS > 6)].[2]
- The FMS consisted of seven scored movement tests used to determine a FMS injury risk classification [1= high risk of injury (FMS score < 14) or 0 = low risk of injury (FMS score > 14)].[3]
- Participants completed a health history survey regarding serious musculoskeletal injuries occurring in the past four years.

Results

Table 1. Independent t-tests comparing mean peak eccentric GRF_v, FMS injury risk classification, and left and right lower extremity LESS injury risk classifications revealed non-significant differences between previously injured and non-injured groups of agility athletes.

Agility Athletes		
Variable	**Previous Injury Mean ± SD**	**No Previous Injury Mean ± SD**
FMSTotal	15.04 (±2.03)	15.1 (±2.19)
FMSRisk	0.43 (±.51)	0.38 (±.50)
PeakEcc	1748.34 (±895.79)	1955.35 (±826.43)
LESSTotalL	5.91 (±1.35)	5.41 (±1.74)
LESSRiskL	1.78 (±.95)	1.28 (±1.13)
LESSTotalR	5.91 (±1.38)	5.52 (±1.75)
LESSRiskR	1.74 (±.96)	1.41 (±1.18)

Table 2. Independent t-tests comparing mean peak eccentric GRF_v, FMS injury risk classification, and left and right lower extremity LESS injury risk classifications revealed a significant difference in left extremity LESS risk classification of previously injured athletes and non-injured athletes in the non-agility group [$t(22)$ = 2.25, $p < .05$]. All other results were non-significant.

Non-Agility Athletes		
Variable	**Previous Injury Mean ± SD**	**No Previous Injury Mean ± SD**
FMSTotal	15.23 (±1.42)	15.45 (±1.37)
FMSRisk	.31 (±.48)	.18 (±.41)
PeakEcc	1751.12 (±660.93)	1651.28 (±693.78)
LESSTotalL	4.85 (±1.46)	5.73 (±1.95)
LESSRiskL	1.00 (±1.00)*	2.00 (±1.18)*
LESSTotalR	5.15 (±1.28)	5.91 (±2.12)
LESSRiskR	1.31 (±.95)	1.91 (±1.22)

Figure 1: Correct knee alignment

Figure 2: Incorrect knee alignment

Discussion

- In both agility and non-agility sport groups, previously injured and non-injured athletes were found to have similar injury risk; although previously injured cross country athletes were at a significantly greater risk for left knee injury, based on LESS risk classification, compared to their non-injured teammates.
- While not statistically significant, previously injured agility sport athletes tended to be at increased risk for injury, based on FMS and LESS scores, compared to their non-injured teammates. However, previously injured non-agility sport athletes tended to be at decreased risk for injury, based on FMS and LESS scores, compared to their non-injured teammates.
- A limitation of this study could have been the size of the study. A larger study could have possibly found significant differences between cutting and non-cutting sports.

Conclusion

- Medically cleared athletes with a history of serious musculoskeletal injury are at no greater risk for injury than athletes that have not sustained an injury.

References

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