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Validity and reliability of the pro-agility test for assessing ACL injury risk

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Introduction

- Landing Error Scoring System (LESS) assesses athletes' neuromuscular control and injury risk.[1]
- Instances of the common behaviors of an anterior cruciate ligament (ACL) injury, are prevalent in agility sports during cutting maneuvers and sidestepping.[2]
- The validity and reliability of an agility assessment that incorporates a cutting movement to predict ACL injury risk is unknown.
- If neuromuscular control and biomechanics of the pro-agility test are consistent and similar to the LESS, the averaged risk classifications of the pro-agility test should be highly correlated with the LESS.

Purpose

- To test the reliability and validity of the pro-agility test in assessing compensatory movement patterns associated with risk of knee injury.

Methods

- Thirty Division III female agility athletes (volleyball *n* = 7, basketball *n* = 9, soccer *n* = 14) performed three box drop vertical jump test trials (BDVJ) from a 30cm box and two trials of the pro-agility test.
- All BDVJ and pro-agility trials were videotaped. The BDVJ trial with the greatest vertical displacement was analyzed.
- LESS scores were calculated for the right 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 pro-agility test consisted of nine scored kinematic assessments on knee flexion, knee valgus, tibia rotation, hip flexion, ground contact, center of gravity, inclination of the leg, and lateral trunk flexion. Error conditions were scored with a point and raised the athlete's injury classification.
- Pro-agility scores were calculated for the right leg and injury risk classifications were determined [0 = excellent, 1 = good, 2 = moderate, or 3 = poor (≥ 3)].
- Participants completed a health history survey regarding serious musculoskeletal injuries occurring in the past four years.

Results

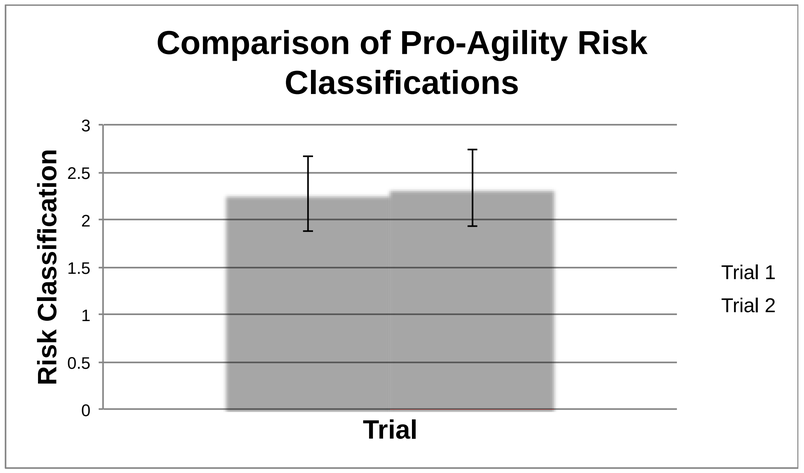

Figure 1.Comparison of the mean and standard deviation of pro-agility risk classification scores. No significant difference was found between the two pro-agility trials (*p* = .645).

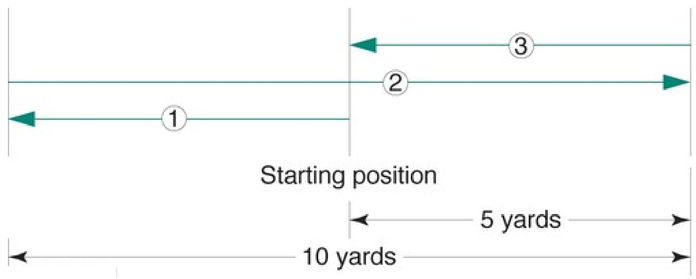

Figure 2. Layout for the pro-agility test.[3]

Table 1. Correlation between LESS and mean pro-agility risk classifications. Mean risk classifications for the pro-agility test were used in the Pearson Correlation analysis due to no differences between trials.

		LESS	PRO-AGILITY
LESS	Pearson Correlation	1	.189
	Sig. (2-tailed)	-	.318
	N	30	30
PRO-AGILITY	Pearson Correlation		1
	Sig. (2-tailed)		-
	N		30

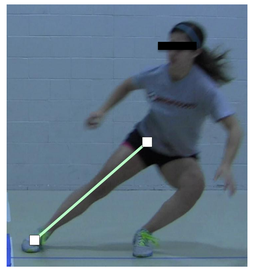

Figure 2: Correct pro-agility knee alignment

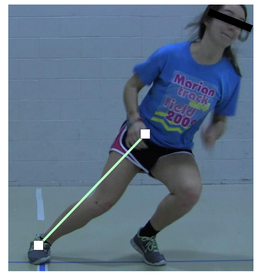

Figure 3: Incorrect pro-agility knee alignment

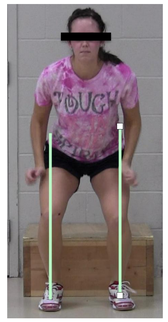

Figure 4: Correct LESS knee alignment

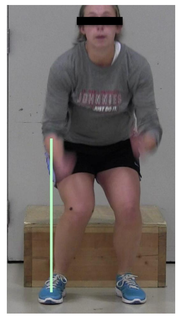

Figure 4: Incorrect LESS knee alignment

Discussion

- The pro-agility criteria for poor biomechanics and risk classifications were determined by the researcher. Criteria was based on research related to poor movement patterns that increased risk of injury and interpreted by the researcher. Scales and criteria may not have incorporated enough measures relevant to poor neuromuscular control.
- Most injuries occur during single-legged tasks.[4] Cutting movements involve high speeds that require large forces to decelerate and change directions generally on a single leg compared to the control of both legs to generate and absorb force in vertical jumps.[2] Lack of correlation between the pro-agility and LESS could be due to different movement patterns associated with differences between cutting and jumping tasks.
- Future research could compare biomechanics of agility tests to other predictors of ACL injury, such as ground reaction forces.
- Limitations of this study could have been the surface of the floor, type of shoe, camera quality and cutting techniques.

Conclusion

- The pro-agility test has high test-retest reliability in assessing compensatory movements. Compared to the LESS assessment, the pro-agility scoring criterion used in the current study is not a valid test of knee injury risk assessment.

References

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