Evaluation of a Survey Instrument for Assessment of Injury Risk among Athletes

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BACKGROUND AND PURPOSE

- Scores derived from surveys have been shown to provide valid and reliable indicators of treatment outcome[1-4]
  - Such surveys appear to be valuable for injury risk classification, but are not widely used for that purpose[5]
    - International Knee Documentation Committee (IKDC) subjective form for knee function (18 items)
    - Oswestry Disability Index (ODI) for low back dysfunction (10 items)
    - Foot and Ankle Ability Measure – Sport subscale (FAAM-S) for foot and ankle function (8 items)
    - Kerlan-Jobe Orthopedic Clinic (KJOC) survey for shoulder and elbow function (10 items)
- The 10-item Assessment of Functional Status (AFS) survey was derived from IKDC, ODI, FAAM-S, and KJOC items
- The purpose of our study was to assess the internal consistency and predictive validity of the AFS score for classification of injury risk among male and female college athletes who participated in various sports

PARTICIPANTS AND PROCEDURES

- Participants were 150 NCAA Division I athletes in basketball, football, soccer, volleyball and softball
  - 84 Males (all football players): age 20.8 ±1.3 years; height 1.85 ±0.06 m; mass 103.5 ±18.7 kg
  - 66 Females: age 19.6 ±1.2 years; height 1.71 ±0.09 m; mass 66.8 ±8.7 kg
  - AFS (Figure 1) administered at pre-participation physical exam (PPE)
    - Survey responses were coded to create 0-100 overall function score (100 = optimal function)
  - Occurrences of sprains and strains documented for 7-month period following PPE
    - Time-loss injury (TLI) defined as a sprain or strain resulting in a loss of full participation in sport activities
- Exclusion criteria: Unavailable on date of team PPE or discontinued sport participation for reason other than injury
- Internal consistency of AFS responses and TLI prediction accuracy were evaluated
  - Receiver operating characteristic (ROC) analysis used to assess dichotomized AFS association with TLI
  - Data analyzed by 2X2 cross tabulation
- Associations between AFS item #10 response, negative LESCA score, and TLI were evaluated
  - Negative LESCA scores were available for 27 female athletes
  - Cut-points for AFS item #10 and negative LESCA score derived from ROC analyses

Table 1

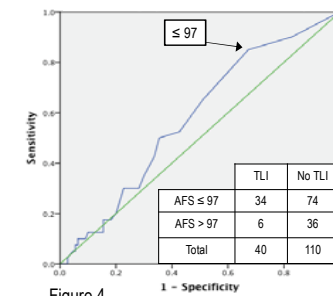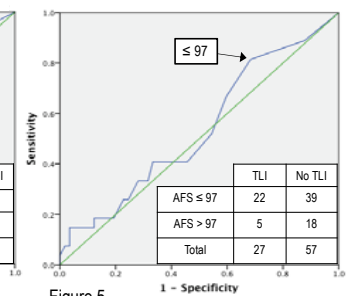|	Time-Loss Sprains and Strains				
	Shoulder	Core	Hip/Thigh	Knee/Leg	Ankle/Foot
Male	0	1	7	8	11
Female	2	1	3	2	5

Figure 1

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RESULTS

- Internal consistency of 10-item AFS: Cronbach's alpha = 0.89
- 40 time-loss sprains and strains occurred during the 7-month surveillance period (Table 1)
- Without regard to gender, an athlete with AFS ≤ 97 had 2.8 X greater odds for TLI than with AFS > 97 (Figure 2)
  - Male athletes with AFS ≤ 97 had 2.0 X greater odds for TLI than with AFS > 97 (Figure 3)
  - Female athletes with AFS ≤ 93 had 13.4 X greater odds for TLI than with AFS > 93 (Figure 4)
- Internal consistency of 9-item AFS ("life events" item #10 removed): Cronbach's alpha = 0.91
  - Although item #10 removal improved internal consistency, TLI predictive value justifies its retention
    - Among athletes who scored < 5 on AFS item #10, 100% sustained TLI (OR = 24.8*);
    Sensitivity = 38% and Specificity = 100%
      * Estimated odds ratio: 0.5 added to each cell of 2X2 table to avoid division by zero
    - Dichotomized item #10 response associated with dichotomized negative LESCA score (Figure 5);
    < 5 for item #10 associated with negative LESCA score ≥ 9 (OR = 4.9)

Figure 2

	TLI	No TLI
AFS ≤ 97	34	74
AFS > 97	6	36
Total	40	110

Figure 3

	TLI	No TLI
AFS ≤ 97	22	39
AFS > 97	5	18
Total	27	57

Figure 4

	TLI	No TLI
AFS ≤ 93	12	25
AFS > 93	1	28
Total	13	53

Figure 5

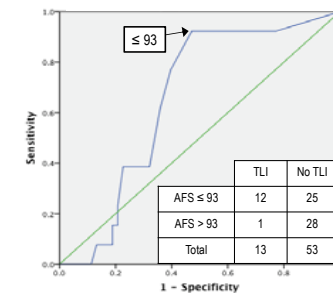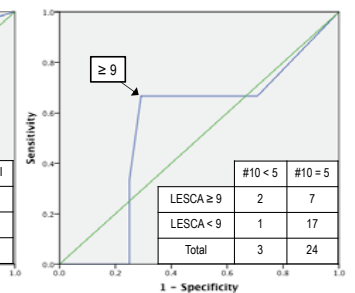|	#10 < 5	#10 = 5
LESCA ≥ 9	2	7
LESCA < 9	1	17
Total	3	24

CLINICAL RELEVANCE

- Limited research evidence is available to support any survey for prediction of musculoskeletal injury among athletes
- 10-item AFS demonstrated excellent internal consistency[6] and appears to provide a valid assessment of injury risk
  - Predictive power appears to be greater for female athletes than for male athletes
  - The predictive value of "life events" item #10 suggests that it represents the influence of psychosocial stress
- Administration of the AFS survey as part of a PPE may identify athletes who possess elevated injury risk, thereby providing a potentially valuable guide for development of individualized injury prevention program components

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