Differences Between Varsity Athletes and Non-Athletes in Acute Post-Concussion Presentation

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Background and Purpose

Concussions occur across multiple settings in addition to athletics. Athletes may derive benefits from earlier and consistent access to medical professionals as well as the understanding that there are inherent risks associated with sports participation. The purpose of this study was to examine differences between collegiate student-athletes and collegiate non-athletes on standard post-concussion measures in the acute stages after injury.

Methods and Study Design

Data for 23 University of Florida varsity athletes from the UF Concussion Databank (age 20.4±1.3 years) and 23 non-athletes from the general student body UF Student Health Care Center Concussion Databank (age 20.4±2.4 years) were analyzed.

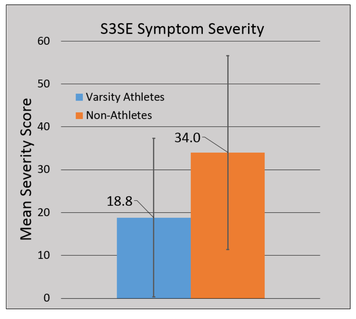
1) Data from the non-athletes' first evaluation were compared to varsity athlete data. Non-athletes were matched as closely as possible to a varsity athlete evaluation based on the number of days between the non-athlete's concussion and their initial assessment (in many cases, varsity athlete data were not from an initial assessment).
2) Multivariate analysis of variance (MANOVA) assessed non-athlete and varsity athlete group differences on standard post-concussion measures
    1) SCAT3 Symptom Evaluation (S3SE)
    2) Standardized Assessment of Concussion (SAC)
    3) Balance Error Scoring System (BESS)
3) Secondary analyses were performed investigating symptom domain differences within the S3SE as well as a subset of the sample (n=15 per group) using the Brief Symptom Inventory – 18 (BSI-18) using independent samples t-tests.

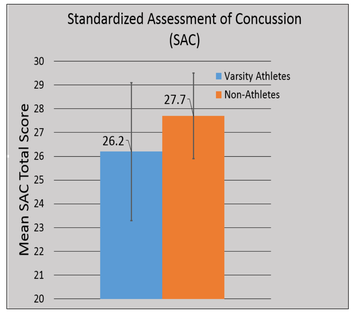
Analyses

Table 1. Sample Demographics

Group	Gender		Age	LD/ADHD	Psych Dx	Concussion History		
	Males N (%)	Females N (%)	Years (SD)	N (%)	N (%)	0 N (%)	1 N (%)	2+ N (%)
Varsity Athletes	15 (65.2)	8 (34.8)	20.4 (1.3)	3 (13.0)	0 (0.0)	10 (43.5)	10 (43.5)	2 (8.7)
Non-Athletes	12 (52.2)	11 (47.8)	20.4 (2.4)	0 (0.0)	1 (4.3)	9 (39.1)	8 (34.5)	2 (8.7)
Missing	0 (0.0)		0 (0.0)	2 (4.3)	2 (4.3)	5 (10.9)		
Sig.	p=.550		p=.870	p=.233	p=1.00	p=.706		

Table 2 and Figures 1-2. Descriptive statistic comparison of Varsity Athletes and Non-Athletes on standard post-concussion measures. Subjects were matched on the number of days between the Non-Athlete's injury and their first assessment.





Test Measure	Varsity Athletes	Non-Athletes	Sig.
	Mean (SD)	Mean (SD)	(p)
SAC	26.2 (2.9)	27.7 (1.8)	.037
BESS	18.6 (10.5)	16.0 (18.0)	.346
S3SE	18.8 (18.6)	34.0 (22.6)	.017
Physical	10.0 (8.1)	14.5 (9.5)	.070
Insomnia	1.7 (2.0	3.3 (3.1)	.034*
Cognitive	2.1 (3.1)	6.3 (4.4)	<.001
Emotional	2.0 (4.4)	2.4 (4.9)	.649
BSI-18	3.0 (6.3)	7.5 (8.5)	.015
Somatic	1.3 (1.8)	3.3 (2.8)	.025*
Depression	0.7 (1.6)	1.5 (2.4)	.322
Anxiety	1.0 (3.4)	2.7 (4.4)	.027*

*no longer significant after Bonferroni adjustment

Results

1) We observed a significant omnibus group effect on performance across the three post-concussion assessment measures ($F[3, 42]=4.114$, $p=.012$).
2) Follow-up univariate analyses indicated non-athletes reported significantly higher S3SE symptom severity than varsity athletes ($F[1,44]=6.166$, $p=.017$) but performed significantly better on the SAC ($F[1,44]=4.607$, $p=.037$). No group differences were observed on the BESS ($p=.346$).
3) Symptom domain-specific analyses on the S3SE indicate non-athletes report significantly higher Insomnia ($t[44]=2.194$, $p=.034$) and Cognitive symptom severities ($t[44]=4.021$, $p<.001$), though only Cognitive symptom differences survived Bonferroni correction.
4) Non-athletes reported significantly higher BSI-18 symptom severity ($t[28]=2.585$, $p=.015$). Domain-specific analyses revealed non-athletes reported significantly higher Somatic ($t[28]=2.373$, $p=.025$) and Anxiety symptom severities (($t[28]=.027$), but significance did not survive Bonferroni correction.

Conclusions

1) Non-athletes report more severe post-concussion symptoms than varsity athletes, but score significantly higher on a cognitive screening measure (SAC). Possible explanations include population differences in pain tolerance, willingness to report symptoms, pre-injury fitness or intelligence levels, personality traits, or access to immediate and consistent treatment.
2) Results also indicate population differences in emotional symptom reporting based on the BSI-18, but not the S3SE. This may support the necessity of using a more in-depth measure of psychological symptoms (i.e. the BSI-18) as opposed to relying on the S3SE to screen for emotional distress.
3) Further research should investigate individual-specific factors contributing to acute differences between non-athletes and varsity athletes after a concussion.

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