

CONCLUSIONS: Metrics derived from the VMRT and WBRA tests provided clear evidence of neuromechanical responsiveness deficiencies among Olympic athletes who reported a history of at least one concussion.

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Preliminary Normative Baseline Data for the Sport Concussion Assessment Tool 5 (SCAT 5) in Adolescent Athletes Morgan N. Anderson, Tracey Covassin, Abigail C. Bretzin, Kyle M. Petit, Jennifer L. Savage. *Michigan State University, East Lansing, MI. (No relevant relationships reported)*

Approximately 1.6 - 3.8 million sports related concussions (SRCs) occur annually in the United States. Current consensus statements recommend using a multifaceted assessment for sideline evaluation after SRC. Following systematic review of current research and expert panel review, the Sport Concussion Assessment Tool 5 (SCAT5) was developed from the Sport Concussion Assessment Tool 3 (SCAT3). The SCAT5 includes additional assessments and addresses limitations of the SCAT3. Given the updated edition, there is a need to examine baseline normative data for the SCAT5.

PURPOSE: To examine preliminary normative baseline data for the SCAT5 in adolescent soccer players.

METHODS: In this cross sectional study, adolescent soccer players were administered the SCAT5 prior to practice. The SCAT5 is a sport concussion sideline evaluation that contains observable signs, Maddocks questions, Glasgow Coma Scale, cervical spine assessment, background information, symptom evaluation, cognitive evaluation (Standardized Assessment of Concussion [SAC]), neurological screening and the modified balance error scoring system (mBESS). Means and standard deviations were evaluated for total number of symptoms (out of 22), symptom severity (out of 132), orientation (out of 5), immediate memory (out of 30), concentration (out of 5), delayed recall (out of 10), total SAC score (out of 50) and mBESS (out of 30).

RESULTS: The final sample consisted of 91 adolescent soccer players (23 males, 68 females; 13.78 ± 1.2 years old). The average total number of symptoms reported was 1.79 ± 2.9 and the average symptom severity score was 2.93 ± 6.4. The average scores of the individual components of the SAC included an: orientation score of 4.96 ± 0.2, immediate memory score of 19.97 ± 3.4, concentration score of 3.00 ± 1.2 and delayed recall score of 6.88 ± 1.7, equaling an average total SAC score of 34.80 ± 5.2. Finally, the average mBESS score was 3.21 ± 3.0 errors.

CONCLUSIONS: Establishing normative baseline data for the SCAT5 may help sports medicine professionals better screen and evaluate athletes for SRC on the sideline. Future researchers should continue to collect baseline data to establish normative SCAT5 values. In addition, researchers should focus on age and sex baseline and post-injury data in high school and collegiate athletes for the SCAT5.

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A Portrait of the Concussed Student-Athlete: Grade and Sex Affect Presentation of Symptoms Joseph W. Mayhan¹, Cali A. VanValkenburg¹, Vincent C. Nittoli², Adam W. Shunk², Courtney D. Jensen¹. ¹University of the Pacific, Stockton, CA. ²St. Vincent Sports Performance, Indianapolis, IN.
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It is important to appreciate the enormous diversity in the presentation and prognosis of sport-related concussions (SRC) in athletes. Duration of recovery is highly variable and partly attributable to injury severity, but a comprehensive evaluation must also include age and sex. Research on the interaction of these variables among youth athletes is limited.

PURPOSE: To evaluate the effect of age and sex on the presentation of SRC symptoms in student-athletes undergoing prolonged recovery.

METHODS: A sample of athletes from middle school to college (n=76) were evaluated for persistent symptoms of SRC. Cognitive function was measured using the ImPACT test; behavior and attitudes were collected via the Behavior Assessment System for Children (BASC) questionnaire. Independent-samples t tests, chi-squared tests, and multivariate analyses with a Bonferroni correction measured differences between sexes and scholastic grades on cognitive, behavioral, and functional assessments.

RESULTS: Subjects were 16.2 ± 2.3 years of age; 56.6% of patients were male. Men and women expressed no differences in age (p=0.780), number of previous concussions (p=0.231), or duration of current symptoms (p=0.445). Men tested higher in verbal memory (p=0.036), visual motor speed (p=0.003), and cognitive efficiency (reaction time and accuracy; p=0.007). Women reported better attitudes toward school (p=0.005) and teachers (p=0.043). College athletes sustained more previous concussions (2.6) than middle school (1.0) and high school (1.0) athletes (p=0.016), but high school athletes expressed a trend for more co-occurring diagnoses (1.4) than middle school (0.9) and college (0.6) athletes (p=0.057). The difference between high school and college was significant (p=0.029). Regarding performance, there was a difference between grade levels in the cognitive efficiency index with middle school athletes scoring significantly lower than high school and college athletes (p=0.022).

CONCLUSIONS: When youth athletes experience SRC, the sex and age of the athlete is associated with important differences in attitudes, memory, and functional capacities. Proper evaluation of a concussed athlete must consider the role that age and sex play on the diagnosis of injury severity and the expectations of recovery.

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Single and Dual-Task Tandem Gait Performance Throughout Concussion Recovery Jessie R. Oldham¹, Melissa S. DiFabio¹, Kelsey Bryk¹, Ryan M. DeWolf², Thomas W. Kaminski, FACSM¹, Thomas A. Buckley¹. ¹University of Delaware, Newark, DE. ²MGH Institute of Health Professions, Boston, MA.
(No relevant relationships reported)

Impaired postural control is common following concussion and is traditionally assessed with the Balance Error Scoring System (BESS); however, the BESS has been criticized for numerous limitations. Alternatively, tandem gait (TG) is a clinically feasible dynamic postural control assessment recommended by The Sport Concussion Assessment Tool- 3rd Edition (SCAT3). Single-task (ST) and dual-task (DT) standard gait assessments have successfully identified postural control impairments following concussion; however, there is minimal literature on the translation to ST and DT TG.

PURPOSE: To evaluate ST and DT TG performance throughout concussion recovery.

METHODS: Eighteen NCAA Division I student-athletes (Age: 20.3 ± 1.3 years; Height: 173.6 ± 8.9 cm; Weight: 70.1 ± 11.3 kg) participated in this study. All student-athletes were diagnosed with a concussion by an athletic trainer, and the diagnosis was confirmed by a team physician. Participants were instructed to walk heel-to-toe down a 3-meter line and back as quickly as possible. In accordance with the SCAT3, each participant completed four TG trials with the best time recorded. All participants were baseline tested prior to the season (BL), within 48 hours post-concussion (Acute), on the first symptom-free day (Asymp), and on the day he or she returned to full sports participation (RTP). A one-way ANOVA with repeated measures was utilized to examine both ST and DT TG at the four different post-concussion time points. The alpha level was set at p=0.05.

RESULTS: Both ST (p=0.001, F= 5.402) and DT (p=0.001, F= 8.995) TG were significant across the four time points following concussion. There were more pronounced changes in time to complete DT TG (BL: 12.9 ± 3.0 seconds; Acute: 15.4 ± 4.7 seconds; Asymp: 12.5 ± 2.8 seconds; RTP: 11.3 ± 2.0 seconds) compared to ST TG (BL: 10.3 ± 1.4 seconds; Acute: 10.9 ± 2.1 seconds; Asymp: 9.8 ± 1.9 seconds; RTP: 9.2 ± 1.4 seconds) across the four time points.

CONCLUSION: There were significant changes in time to complete ST and DT TG from BL to RTP following concussion, with more dramatic changes seen during the DT condition. These results suggest that TG, particularly during DT, is a useful measure of post-concussion recovery.

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The Relationship Between Patient-Reported Visual Symptoms and Visual Deficits After Concussion Eileen P. Storey, Matthew F. Grady, Christina L. Master. *The Children's Hospital of Philadelphia, Philadelphia, PA. (No relevant relationships reported)*

Previous reports in the literature have identified that visual deficits are common yet often undetected after pediatric concussion. Few studies have evaluated tools available to detect visual dysfunction after concussion.

PURPOSE: To investigate the association between patient-reported and physician-detected visual deficits after concussion.