Relative Value of Dual-Task Screening Tests for College Football Injury Risk Assessment

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BACKGROUND AND PURPOSE

- College football presents high risk for recurrent musculoskeletal injuries, progressive dysfunction, and disability.
- Unrecognized persisting effects of previous injuries may increase susceptibility to re-injury and chronic symptoms.
- Emerging evidence suggests neurocognitive factors play a key role in maintenance of dynamic segmental stability.
- Dual-task screening tests may be necessary for identification of subtle deficiencies that elevate injury risk.

RESULTS

- Univariable analysis results for binary categorizations of performance values and player attributes presented in Table 1.
- Variables that failed to demonstrate discriminative cut-points marked with asterisks.
- Single-leg balance center of pressure (COP) values slightly improved or unchanged with concurrent flanker test.
- Missing COP Average Velocity (single task) values imputed for 7 cases to permit inclusion in multivariable analysis.
- Visuomotor performance values demonstrated good discriminatory power both with and without concurrent flanker test.
- Proactive mode Outer Efficiency Index calculated as Ring 4-5 Average RT / Ring 3 Average RT.
- Proactive+Flanker Outer Efficiency Index (OEI) calculated as Ring 4-5 Average RT / Responsiveness Accuracy.

PARTICIPANTS AND PROCEDURES

- 66 NCAA Division I-FCS football players available during summer conditioning assessed prior to first pre-season practice.
- Postural sway quantified by HUMAC Balance System (CSMI Solutions, Inc., St. Joseph, MI) for both extremities.
- 4 possible flanker 5-arrow displays presented for 750 ms (of each possible set): <<<<<, >>>>>>, <<>>>>, <<<>, <<>>>.
- Center of pressure (COP) values for right and left extremities averaged for data analysis.
- Visuomotor performance assessed with and without verbal responses to flanker displays on a laptop screen (Figure 1).
- Responses quantified by Dynavision 32” system (Dynavision International, West Chester, OH) 90-s tests (Figure 2).
- Proactive mode – target buttons illuminated until hit (Average RT represented in ms).
- Proactive mode + Flanker – simultaneous verbal responses to 5-Arrow flanker displays on LCD screen.
- Reactive mode – target buttons must be hit within 1 s, while simultaneously reading scrolling text on LCD screen.

CLINICAL RELEVANCE

- High exposure to game conditions (Starter Status) demonstrated strongest association with Core/LE injury.
- With adjustment for Starter Status, dual-task OEI demonstrated strongest predictive power among measures.

REFERENCES


Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cut-Point</th>
<th>Odds Ratio</th>
<th>Confidence Interval</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
</table>
| Starter Status versus Non-Starter Status | | Startler 6.74 2.10 80 63
| Conussion History | | Yes 3.18 1.15 47 78
| Dynamics Proactive – Outer/Inner RT | | ≥ 1013 2.80 0.88 80 41
| Dynamics Proactive+Flanker – Outer/Inner RT | | ≥ 1013 2.80 0.88 80 41
| Dynamics Proactive+Flanker – Response Accuracy | | ≥ 1013 2.80 0.88 80 41
| Center of Pressure Max Deviation ** ** * | | ≥ 40.87 1.77 0.87 53 81
| Center of Pressure Path Length +Flanker | | ≥ 40.87 1.77 0.87 53 81