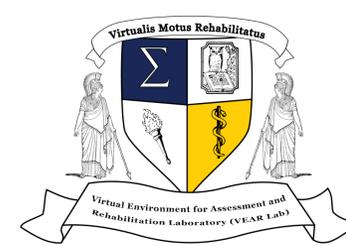


Neurocognitive Performance in Female American Football Players Differs From Their Male Counterparts

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Introduction

- Evidence is beginning to suggest that the female experience relative to concussions is different than males with respect to concussion rate, severity, duration, and return-to-play criteria¹⁻⁴.
- It has been suggested that females are more susceptible to concussions due to weaker and smaller neck muscles and as a result, females may experience a more severe concussion when acceleration and impacts are considered².
- Further, research indicates that females are more likely to report concussion symptoms and may take longer to recover than their male counterparts⁵.
- Concussions can have a significant impact on a female athlete's immediate and long-term sport participation at all levels⁵.
- Since females appear to have a different concussion experience, it is important to determine whether these sex differences exist at baseline or only after the onset of a concussion.
- Neurocognitive performance is a commonly used indicator of dysfunction due to a concussion, as well as a metric used for return-to-play decisions.
- Thus, there is a need to determine whether neurocognitive performance in female athletes differs from male athletes during preseason testing.

Purpose

- Examine neurocognitive performance data collected with the Trail Making Test (TMT) during preseason testing in order to compare these data to previously published male norms to determine whether sex difference exist.
- Hypothesis: Female football players would have different baseline values than male football players.

Methods

- Participants:** N = 31, age = 29.0 ± 7.0 yrs, tackle football experience = 2.7 ± 1.7 yrs from two Independent Women's American Football League teams.
- Task:** Neurocognitive testing in the preseason via the TMT, which is administered as two separate tests.
- Test A (TMT_A) demonstrates how quickly the participant can connect each circle on the test by following the sequential pattern with accuracy and precision (Figure 1).

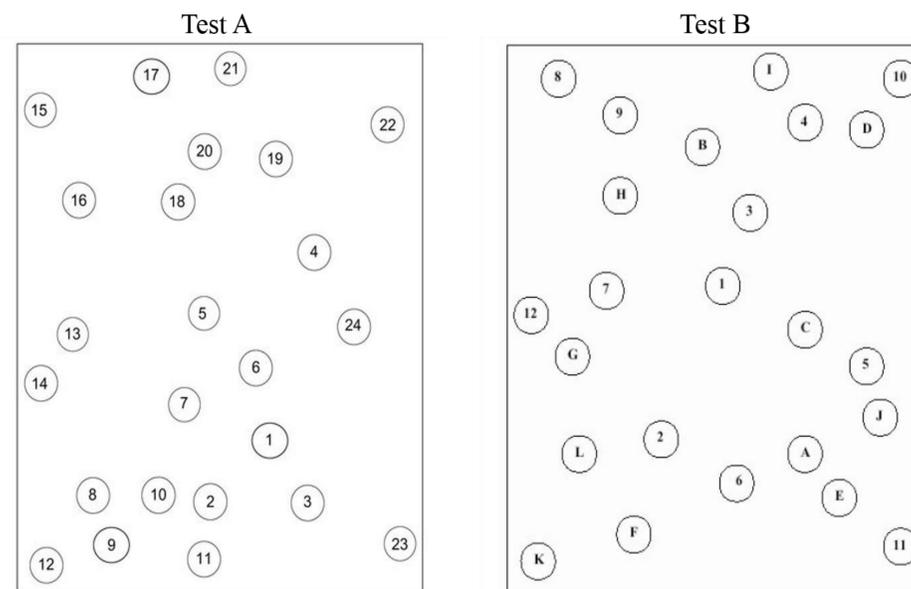


Figure 1. Trail Making Test (TMT). The dependent variable is the time it takes to complete in seconds

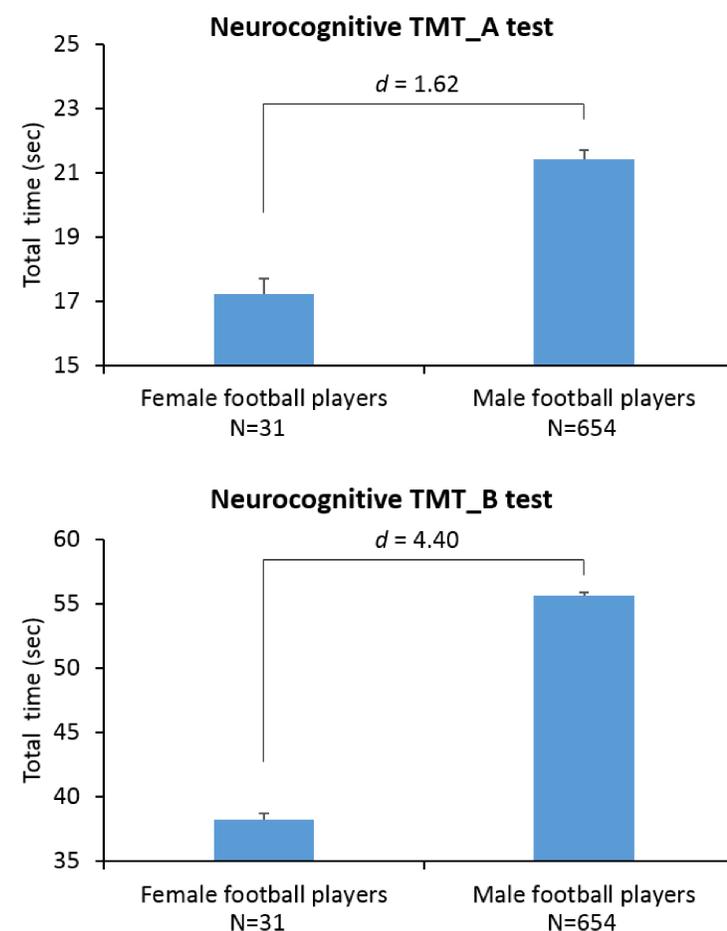


Figure 2. TMT_A and TMT_B for our female football player sample compared to published male football players.

Methods (continued)

- Test B (TMT_B) not only includes the accuracy and precision of TMT_A, but also includes switching between ordered sets from 1 to A, 2 to B, 3 to C and so on (Figure 1).
- Dependent variable:** Total time (sec) to complete each test.
- Comparative data:** TMT data from NFL players (N=654) in the Pellman et al. (2004) study were used as a male comparative sample.
- Statistics:** Cohen's effect size (*d*) was calculated between our female football sample and the male NFL sample to determine the magnitude of differences between the datasets.

Results

- A large effect size (*d* = 1.62) was observed between our female football sample (M = 17.20, SD = 6.00) and the NFL male sample (M = 21.40, SD = 7.40) for TMT_A (Figure 2).
- Similarly, a large effect size (*d*=4.40) was observed between our female football sample (M = 38.20, SD = 14.20) and the NFL male sample (M = 55.60, SD = 17.10) for TMT_B (Figure 2).

Discussion

- Our female football sample showed better neurocognitive performance on the TMT relative to the NFL male sample.
- This may be due to less exposure to head trauma in the past due to less tackle football experience.
- Regardless of the etiology, our data suggests that sex-specific normative data in the neurocognitive domain may be needed to develop more appropriate return-to-play criteria in female football players.
- Future work will examine other neurocognitive tests with a female athlete population, along with increasing our sample size.

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