

Neuromotor Performance in Female American Football Players is Different Than Males in a Preseason Balance Test

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Introduction

- There has been a rise in female participation in sports that are defined as collision sports, where athletes intentionally hit each other (e.g., American football), leading to a relatively high rate of concussion incidence (Figure 1).
- Covassin et al. (2006) showed that female athletes have different neuropsychological performance relative to males in preseason concussion testing¹.
- The significance of this finding is that it could directly influence return-to-play criteria.
- For example, preseason testing is not always practical due to time constraints or valid due to an athlete “sandbagging” their baseline testing².
- Thus, using norm-reference values (data derived from a large population) instead of baseline-references values (data derived from the participant prior to the season) has been suggested to be a more valid way to derive return characteristics³.
- If the norm-reference method were adopted and only male values were used, that approach is only valid if female and male baseline values are the same.
- Given the emergence of recent research on sex-differences relative to concussion testing⁴⁻⁶, it is likely that females and males have different baseline values, which would necessitate the need for sex-specific norm-reference data sets.

Purpose

- Examine neuromotor performance data collected with a balance test 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:** Balance test prior to their season that consisted of three 20-sec static stances with eyes closed on a force plate using the BTrackS™ Balance Plate (Figure 2).
- **Dependent variables:** Average total distance traveled (cm) by the center of pressure (CoP) during the three trials.

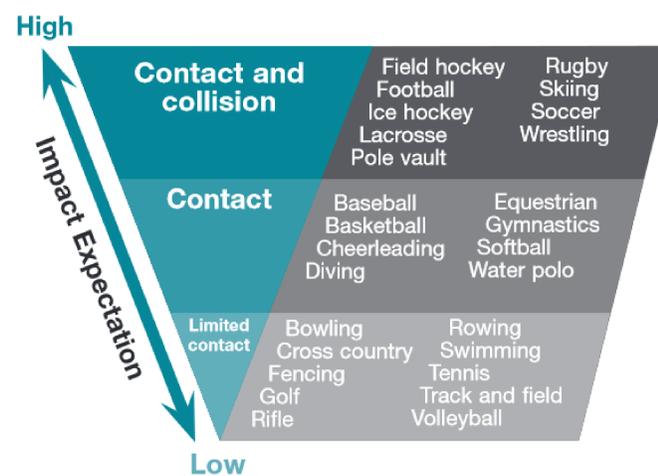


Figure 1. Impact level relative to various sports.



Figure 2. Neuromotor test of balance

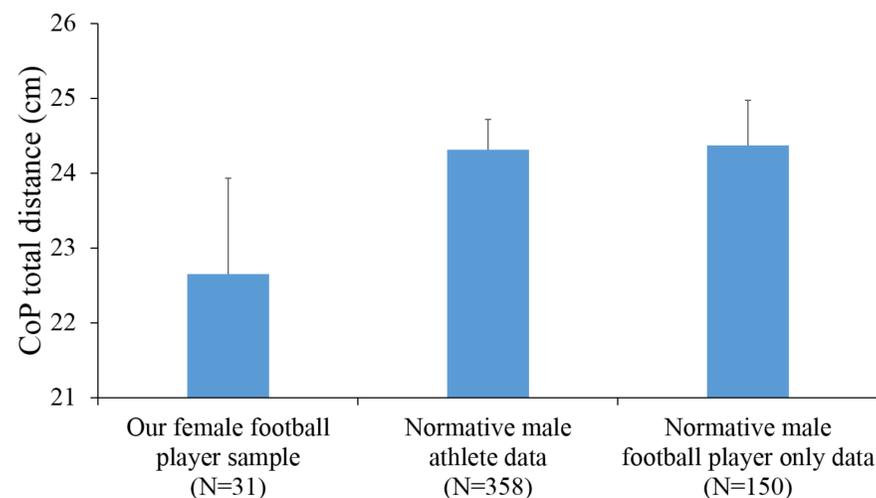


Figure 3. Average total distance (cm) of the center of pressure (CoP) during three 20 second static balance tests.

Methods (continued)

- **Comparative data:** Normative data of male athletes who fell within one standard deviation of the age of our female sample (range = 22-36 yrs) were provided by the manufacturer.
- **Statistics:** Cohen’s effect size (*d*) was calculated between our female football players and (1) all male athletes (N = 358) and (2) male athletes who played football (N = 150) to determine the magnitude of difference between the datasets.

Results

- Moderate effect sizes (*d*=0.61 and 0.63) were observed between our female football players (M=22.65, SD=7.26) and all male athletes (M=24.31, SD=7.68), and between our female football players and male football players (M=24.37, SD=7.45).

Discussion

- The female football players in our sample had less CoP movement, indicating better balance, relative to males.
- Concussions are known to increase CoP movement, indicating worse balance.
- However, given the lower baseline CoP measures in women, our data suggest that post-concussion measures of balance in women may still be considered normative if compared to return-to-play criteria derived for men.
- Thus, our data suggest that sex-specific guidelines for return-to-play criteria may be justified.

References

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