

Adolescent Athletes With Positive Risk Factors Report a Greater Concussion History at Baseline

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BACKGROUND & PURPOSE

- Concussion position statements have identified modifiers and risk factors for sustaining a concussion and duration of recovery.^{1,2}
- Such risk factors include sex, age, previous concussion history, migraines, attention-deficit hyperactivity disorder, learning disabilities, and mental health disorders.^{1,2}
- Recent data from the CARE Consortium has identified female sex, age, attention-deficit hyperactivity disorder, medical history of headaches in the past 3 months, and symptoms as risk factors for increased concussion risk in college-aged cadets.³
- With little known about these risk factors in an adolescent population, the purpose of this study was to examine the relationship between a history of concussion and baseline risk factors in adolescent athletes
 - Risk Factors:** 1) Sex, 2) attention-deficit hyperactivity disorder, 3) history of headaches, 4) diagnosed migraines, 5) learning disability, and 6) speech therapy

DESIGN & METHODS

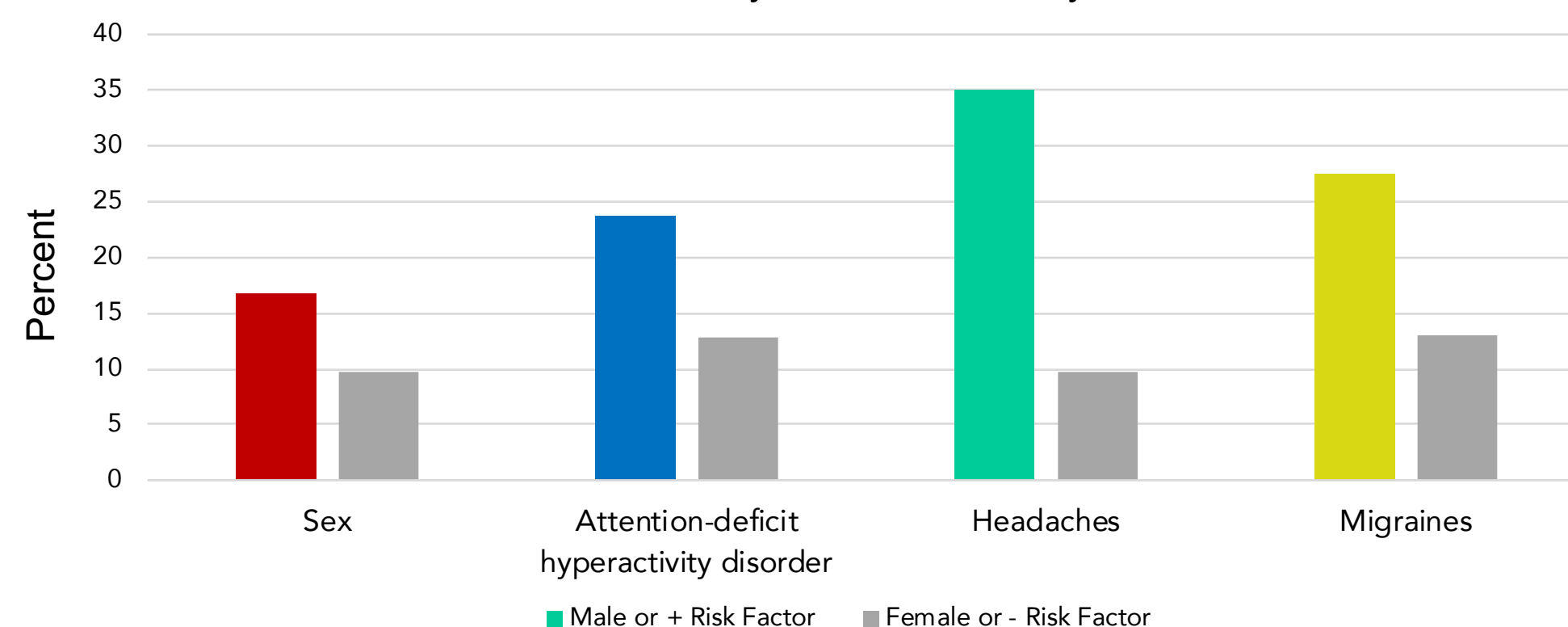
- Data were retrospectively analyzed from a sample of 1,239 high school athletes, between the ages of 13-18 (M±SD= 15.3±2.0) years.
- All participants underwent routine baseline testing, consisting of computerized neurocognitive testing, using the Immediate Post-Concussion Assessment and Cognitive Test (ImPACT), during the 2014-2015 to 2018-2019 academic years.
- Student-athletes self-reported medical history on ImPACT and were divided into two dichotomous groups based of sex or positive risk factor. Any athlete who reported multiple positive risk factors were excluded from the analyses.
- A series of Chi-Square (χ^2) tests and odd ratios (OR) with confidence intervals were conducted to determine the relationship between a self-reported history of concussion and baseline risk factors.

RESULTS

- Male sex** ($\chi^2= 12.55$, $p<.001$; OR 1.85, 95% CI=1.31-2.61), **attention-deficit hyperactivity disorder** ($\chi^2= 8.68$, $p=.005$; OR 2.08, 95% CI=1.26-3.43), **headaches** ($\chi^2= 31.20$, $p<.001$; OR 3.81, 95% CI=2.31-6.29), and **migraines** ($\chi^2= 9.71$, $p=.005$; OR 2.52, 95% CI=1.38-4.59) were associated with a self-reported history of concussion.
- No significant relationship existed between a history of concussion and learning disability ($\chi^2= 1.96$, $p=.15$) and speech therapy ($\chi^2= 1.29$, $p=.26$).

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|------------------------------------|--------------------------------|
| Male sex: 16.8% (117/693) | Female sex: 9.8% (54/546) |
| Diagnosed ADHD: 23.7% (23/97) | No ADHD: 12.9% (148/1142) |
| Diagnosed headaches: 35.0% (27/77) | No headaches: 9.8% (144/1162) |
| Diagnosed migraines: 27.5% (16/58) | No migraines: 13.1% (155/1181) |

Prevalence of History of Concussion by Risk Factor



DISCUSSION & CONCLUSIONS

- Male sex, attention-deficit hyperactivity disorder, history of headaches and diagnosed migraines were associated with a greater prevalence of prior concussion in high school/adolescent athletes.
- The frequency of a history of concussion in adolescent athletes was roughly 2x higher for males compared to females, and for positive risk factors of sex, attention-hyperactivity disorder, and migraine, compared to those without. Frequency of headaches was roughly 3x higher.
- These results further support and warrant special consideration in adolescent athletes who report a history of positive risk factors of concussion.
- Future research is needed to understand if the risk factors and prevalence exist prior to a sustained concussion or are exacerbated following a concussion.