Estimated age of first exposure to American football and outcome from concussion

Jaclyn B. Caccese, PhD, Zac Houck, MS, Thomas W. Kaminski, PhD, ATC, et al.

Cite as: Neurology® 2020;95:e2935-e2944. doi:10.1212/WNL.0000000000010672

Study question

Is there an association between the estimated age of first exposure (eAFE) to American football and cognitive, psychiatric, and recovery time outcomes following concussion?

What is known and what this paper adds

Studies regarding the association between eAFE to American football and neurocognitive, neurologic, and neuroradiologic outcomes have been conflicting. This study did not find an association between earlier eAFE to American football and longer symptom recovery, worse balance, worse cognitive performance, or greater psychological distress following concussion.

Methods

For these longitudinal analyses, the investigators recruited 294 men within 24–48 hours following sport-related concussions and 327 men at the time the athletes began their return to play progression. Participants experienced sport-related concussions while playing American football for 30 colleges and universities affiliated with the National Collegiate Athletic Association (NCAA) and who had valid baseline data. At baseline preseason and post-concussion timepoints, these participants underwent assessments with the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) tool, the Balance Error Scoring System (BESS), and the Brief Symptom Inventory–18 (BSI-18) instrument. The investigators computed eAFE as the age at baseline minus self-reported years of play at baseline. The primary outcomes were associations between eAFE and ImPACT scores, BESS scores, BSI-18 scores, and days from concussion to asymptomaticity.

Results and study limitations

In both unadjusted and adjusted models, younger eAFE showed associations only with worse 24–48-hour post-concussion ImPACT Visual Motor Speed scores ($R^2 = 0.031, p = 0.012$) and better BSI-18 Somatization subscores ($R^2 = 0.014, p = 0.038$) when athletes were asymptomatic, but the effect sizes were small. eAFE did not show an association with any other assessment results, including other ImPACT composite scores, BESS scores, BSI-18 scores, or days from concussion to asymptomaticity. The present study’s limitations include using self-reported data to calculate eAFE values, an assumption of continuous post-eAFE play, and a lack of adjustments for team positions and participation in other sports. These findings may not generalize well to athletes who play other contact and collision sports.

Study funding and competing interests

This study was funded by the Grand Alliance CARE Consortium, which receives funding from the NCAA and the US Department of Defense. Some authors report additional competing interests. Go to Neurology.org/N for full disclosures.

Table Associations between younger eAFE values and outcomes in adjusted models

<table>
<thead>
<tr>
<th>Outcome</th>
<th>24-48 h</th>
<th>Asymptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Added $R^2$</td>
<td>$p$ Value</td>
</tr>
<tr>
<td>BESS</td>
<td>0.000</td>
<td>0.896</td>
</tr>
<tr>
<td>BSI-18 Somatization</td>
<td>0.002</td>
<td>0.518</td>
</tr>
<tr>
<td>BSI-18 Anxiety</td>
<td>0.000</td>
<td>0.951</td>
</tr>
<tr>
<td>BSI-18 Depression</td>
<td>0.003</td>
<td>0.318</td>
</tr>
<tr>
<td>BSI-18 GSI</td>
<td>0.001</td>
<td>0.751</td>
</tr>
<tr>
<td>ImPACT Verbal Memory</td>
<td>0.015</td>
<td>0.081</td>
</tr>
<tr>
<td>ImPACT Visual Memory</td>
<td>0.001</td>
<td>0.596</td>
</tr>
<tr>
<td>ImPACT Visual Motor Speed</td>
<td>0.023</td>
<td>0.023</td>
</tr>
<tr>
<td>ImPACT RT</td>
<td>0.000</td>
<td>0.999</td>
</tr>
<tr>
<td>ImPACT Symptom Severity</td>
<td>0.000</td>
<td>0.807</td>
</tr>
<tr>
<td>Days Until Asymptomatic</td>
<td>0.000</td>
<td>0.985</td>
</tr>
</tbody>
</table>

A draft of the short-form article was written by M. Dalefield, a writer with Editage, a division of Cactus Communications. The corresponding author(s) of the full-length article and the journal editors edited and approved the final version.
Estimated age of first exposure to American football and outcome from concussion
Jaclyn B. Caccese, Zac Houck, Thomas W. Kaminski, et al.
Neurology 2020;95:e2935-e2944 Published Online before print September 9, 2020
DOI 10.1212/WNL.0000000000010672

This information is current as of September 9, 2020

Updated Information & Services
including high resolution figures, can be found at:
http://n.neurology.org/content/95/21/e2935.full

References
This article cites 30 articles, 2 of which you can access for free at:
http://n.neurology.org/content/95/21/e2935.full#ref-list-1

Citations
This article has been cited by 1 HighWire-hosted articles:
http://n.neurology.org/content/95/21/e2935.full##otherarticles

Subspecialty Collections
This article, along with others on similar topics, appears in the following collection(s):
All CBMRT/Null Hypothesis
http://n.neurology.org/cgi/collection/all_cbmrt_null_hypothesis
Brain trauma
http://n.neurology.org/cgi/collection/brain_trauma
Outcome research
http://n.neurology.org/cgi/collection/outcome_research

Permissions & Licensing
Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
http://www.neurology.org/about/about_the_journal#permissions

Reprints
Information about ordering reprints can be found online:
http://n.neurology.org/subscribers/advertise

Neurology ® is the official journal of the American Academy of Neurology. Published continuously since 1951, it is now a weekly with 48 issues per year. Copyright © 2020 American Academy of Neurology. All rights reserved. Print ISSN: 0028-3878. Online ISSN: 1526-632X.