

ATTENUATED GENERAL STARTLE REACTIVITY IN ADOLESCENT ATHLETES WITH A CONCUSSION HISTORY

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BACKGROUND

Concussions are a significant public health problem. Most concussion symptoms resolve quickly but lingering difficult-to-detect sensorimotor impairments lead to increased risk of musculoskeletal injury (e.g., ACL tear)¹.

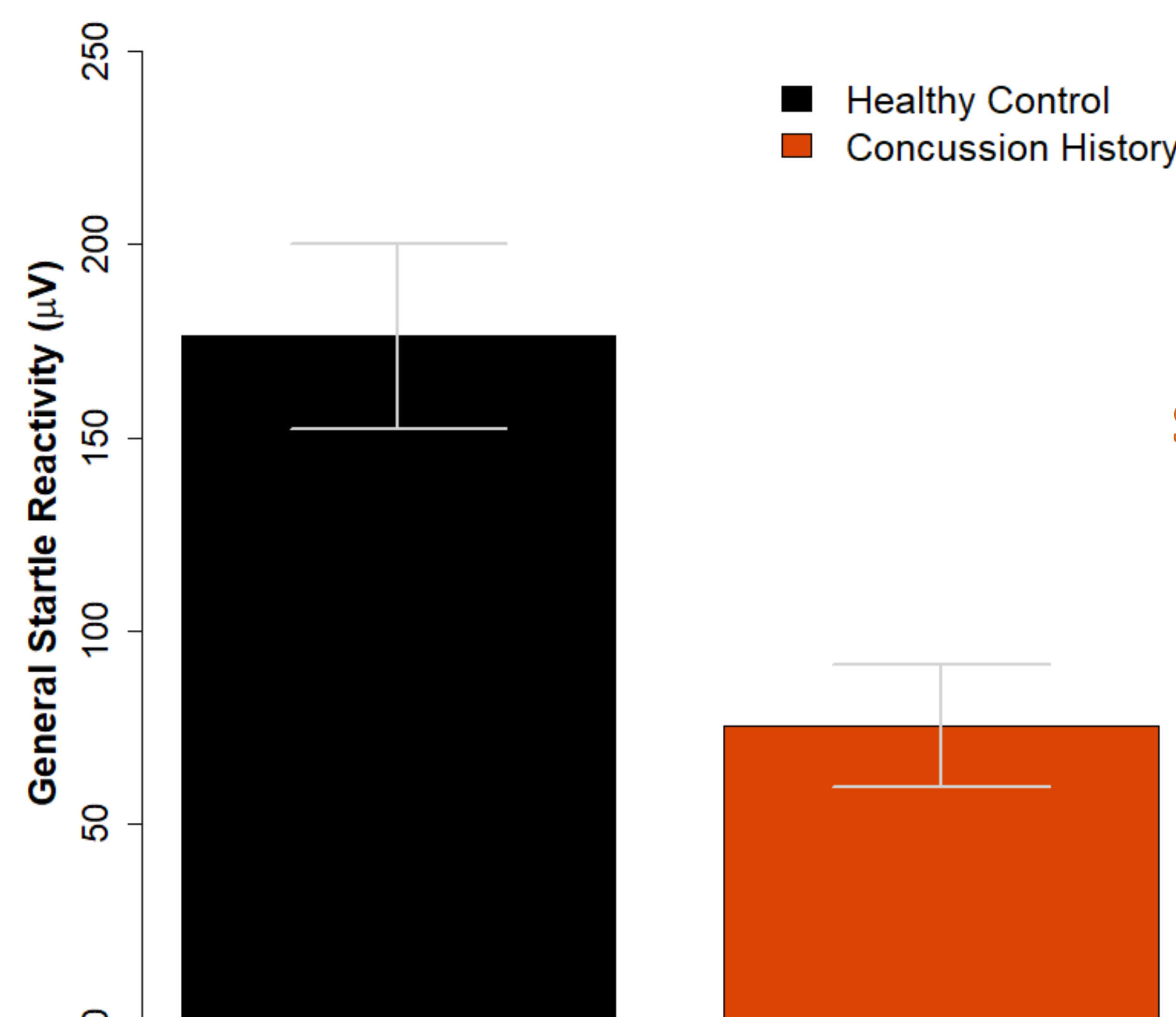
Standard clinical assessments used to clear athletes to return to sport currently lack the sensitivity and reliability to detect subtle—yet critical and persistent—post-concussion sensorimotor deficits².

Due to its narrow structure and sensitivity to rotational forces, the brainstem is particularly vulnerable to injury from head impacts^{3,4}. The startle response is directly brainstem mediated making it liable to be impacted by concussion.

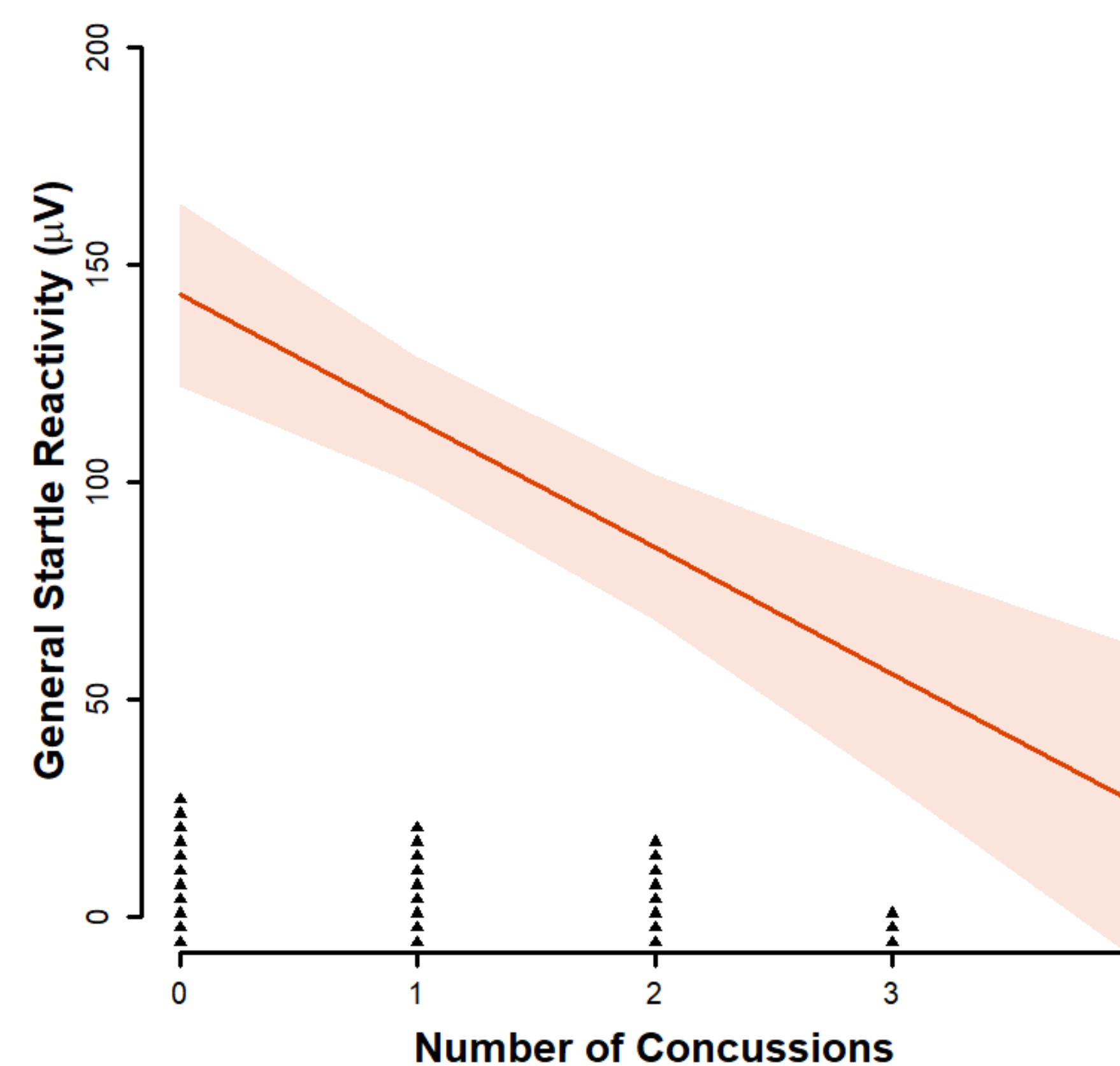
Rodent models of concussion show suppressed startle reactivity for weeks following injury⁵.

We examined general startle reflex in adolescent athletes with a concussion history compared to healthy controls to begin to evaluate its utility as a marker of post-concussion sensorimotor deficiency.

RESULTS



General Startle Reactivity was significantly lower in adolescents with a concussion history, $b = -100.8$, $t = 3.51$, $p = 0.001$.



For every additional concussion, general startle reactivity was 29 microvolts lower, $b = -29$, $t = -2.41$, $p = .022$

METHODS

33 adolescent athletes

With a concussion history
 $N = 23$
Age: 14.7 ± 1.8 years
60% female

Without a concussion history
 $N = 10$
Age: 13.3 ± 2.8 years
57% female

We measured mean general startle reactivity to auditory probes using standard procedures following SPR guidelines.



We analyzed general reactivity in a General Linear Model (GLM) with a between-subjects regressor for group (concussion history vs. healthy control) and an exploratory GLM with a between subject regressor for number of concussions.

CONCLUSIONS

These preliminary results suggest **novel evidence for attenuation of acoustic startle magnitude in adolescents with a concussion history for years after concussion.**

There may be a **dose-response relationship** with concussion history.

General startle reactivity may aid the **assessment of lingering sensorimotor dysfunction** beyond that detectable from standard clinical assessment.

As general startle reactivity continues to be used within NIMH RDoC's Sensorimotor Domain, its ability to **aid clinical identification of concussion recovery and readiness to return to sport** should be further explored.

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