



Traumatic Brain Injury Across the Pediatric Lifespan: What we know

Juliet Haarbauer-Krupa*

PhD, Department of Pediatrics, Emory University School of Medicine and Fellow of the American Congress of Rehabilitation Medicine (FACRM), USA

*Correspondence to: Juliet Haarbauer-Krupa, PhD, FACRM, USA; Email: jhkrupa@me.com

Received: March 17, 2026; Manuscript No: JNCN-26-5472; Editor Assigned: March 26, 2026; PreQc No: JNCN-26-5472 (PQ); Reviewed: April 08, 2026; Revised: April 21, 2026; Manuscript No: JNCN-26-5472 (R); Published: April 30, 2026

Citation: Haarbauer Krupa J (2026). Traumatic Brain Injury Across the Pediatric Lifespan: What we know. J. Neurosci. Clin. Neurol. Vol.1 Iss.1, April (2026), pp:1-2.

Copyright: © 2026 Juliet Haarbauer-Krupa. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

DESCRIPTION

Traumatic brain injury (TBI) among children is a significant health problem as indicated by the high rate of emergency department (ED) visits, hospitalizations, and deaths in the United States, as well as increased risk for long-term negative effects, such as changes in cognition and behavior, that can notably impact a child's learning, school, and recreational participation [1-4]. Current methods of surveillance that rely on administrative healthcare datasets may underestimate the true prevalence of TBI among children because these data sources identify those seen for care in hospital settings, but do not capture those who seek care elsewhere or do not seek care at all. National parent surveys show that among the 6–17-year-old age group, 5.4 % of parents reported their child has a suspected TBI within his /her lifetime. In this group, 88.6% sought care from a physician or other healthcare provider [5].

When describing young children's brains, many people have said "Their brains are "plastic", and they will be "fine" after a traumatic brain injury (TBI). However, research is now reporting effects of a brain injury in infants, toddlers, and preschool children that shows that young children can have long term effects. The most we know about adult outcomes for children is that there is a high rate of a childhood history of TBI in those in the prison system, an outcome we do not want to see for children. Recent reports based on national TBI screening in the justice system estimate that the TBI prevalence among criminal justice-involved populations is between 44.6% and 60.0%, much higher than that of the general population [6,7]. Similarly, an examination of youth recently admitted to the justice system showed a high incidence of TBI (50% of males; 49% of females), which may have contributed to criminal justice system involvement [6,7]. While the association between TBI and involvement in the justice system is well-documented, less is known about why this relationship exists.

Currently much of the focus on children is about adolescents who experience a sports related concussion, partly because of Return to Play (RTP) policies enacted in all 50 US states. However, injury mechanisms vary across the age groups and include other mechanisms such as falls, struck by an object, and motor vehicle crashes [8]. The majority of concussions reported were sustained by children 6 years of age and older primarily via SRR activities, as previously reported; thus, concussion prevention in athletic settings is important to ensure safety for all children in sports and recreational activities. Importantly, these findings also show that approximately 30% of youth 0-17 years of age sustain concussions from activities other than sports [8].

Children younger than 5 years old have the highest incidence of emergency department visits for TBI at a time that is just beginning the development of cognitive, motor and sensory skills. The signs and symptoms in young children during the clinical assessment are different than those observed among older children since their symptoms are typically observed and reported by parents. Recent reports describe concussion symptoms in young children can include sleep issues, increased irritability and crying, vomiting, toilet training regression, decreased appetite, and headache [9]. The effects of early childhood TBI can include higher prevalence of chronic health conditions, education and therapy needs, and functional difficulties such as activity limitations and poor coordination [9].

Research has also indicated that a brain injury is a chronic health condition which is also reported in children with effects that can extend beyond initial medical care [10]. Most of what we learned was due to unmet needs [10,11]. Current services are insufficient because there is often a discrepancy between the need for pediatric rehabilitation and school services, receipt of those services, communication between models of care, and an inadequate understanding among parents about the need for therapy and educational support following discharge from acute medical care [3,4,12].

A challenge in the field is how to determine when children have fully recovered from their injury from a clinical, functional, and neurophysiologic perspective. Although long term studies of children are limited, emerging research demonstrates that TBI effects can persist throughout childhood and span into adulthood [4,7,13].

Compared with adults, children have the greatest risk for long-term consequences from a TBI. Their vulnerability for changes in brain development and neuropsychological impairment that impacts academic and social outcomes supports a critical need for follow-up care beyond the acute injury. There is an essential need to optimize coordination between healthcare and educational systems of care [3].

Providing education and supporting healthcare providers, caregivers, and teachers of children is critical not only to address the child's medical and educational needs but also recognizing the unique challenges families face. Education is also needed for Emergency Department and Pediatric Physicians about diagnosis, education for parents and caregivers, and follow-up. We need to recognize that brain injuries occur in children, monitor them over time and ensure that care is provided when needed.

CONFLICT OF INTEREST

The author has previously received funding for pediatric TBI projects from NIDILRR and Children's Healthcare of Atlanta. This commentary was written without funding.

REFERENCES

- Peterson AB, Xu L, Daugherty J, Breiding MJ. Surveillance report of traumatic brain injury-related emergency department visits, hospitalizations, and deaths, United States, 2014.
- Babikian T, Merkley T, Savage RC, Giza CC, Levin H. Chronic aspects of pediatric traumatic brain injury: review of the literature. *Journal of neurotrauma*. 2015;32(23):1849-60.
- Haarbauer-Krupa JK, Glang A, Kurowski B, Breiding MJ. Report to Congress: the management of traumatic brain injury in children.
- Haarbauer-Krupa J, Pugh MJ, Prager EM, Harmon N, Wolfe J, et al. Epidemiology of chronic effects of traumatic brain injury. *Journal of neurotrauma*. 2021;38(23):3235-47.
- Haarbauer-Krupa J, Wray AP, Lebrun-Harris LA, Cree RA, Womack LS. Prevalence and correlates of suspected and diagnosed traumatic brain injuries among US school-aged children. *The Journal of Pediatrics: Clinical Practice*. 2024;14:200117.
- Hunter S. Prevalence of traumatic brain injury among criminal justice-involved populations: A meta-analysis. The University of Alabama; 2022.
- Nagele D, Vaccaro M, Schmidt MJ, Keating D. Brain injury in an offender population: implications for reentry and community transition. *Journal of Offender Rehabilitation*. 2018;57(8):562-85.
- Haarbauer-Krupa J, Arbogast KB, Metzger KB, Greenspan AI, Kessler R, et al. Variations in mechanisms of injury for children with concussion. *The Journal of pediatrics*. 2018;197:241-8.
- Beauchamp MH, Anderson V, Ewing-Cobbs L, Haarbauer-Krupa J, McKinlay A, et al. Early childhood concussion. *Pediatrics*. 2024 Nov 1;154(5):e2023065484.
- Kurowski BG, Haarbauer-Krupa J, Giza CC. When traumatic brain injuries in children become chronic health conditions. *The Journal of head trauma rehabilitation*. 2023;38(4):348-50.
- Fuentes MM, Wang J, Haarbauer-Krupa J, Yeates KO, Durbin D, et al. Unmet rehabilitation needs after hospitalization for traumatic brain injury. *Pediatrics*. 2018;141(5):e20172859.
- Haarbauer-Krupa J, Ciccio A, Dodd J, Ettl D, Kurowski B, et al. Service delivery in the healthcare and educational systems for children following traumatic brain injury: Gaps in care. *The Journal of head trauma rehabilitation*. 2017;32(6):367-77.
- Masel BE, DeWitt DS. Traumatic brain injury: a disease process, not an event. *Journal of neurotrauma*. 2010;27(8):1529-40.