



# Return to School following Traumatic Brain Injury



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# Session Overview

- What is a Traumatic Brain Injury (TBI)?
- Epidemiology of TBI
- What we currently know about TBI in Children
- Effects of TBI in Children
- Return to School Following a TBI

# What is a Traumatic Brain Injury (TBI) ?

A traumatic brain injury, or TBI, is an injury that affects how the brain works.

It may be caused by a:

- Bump, blow, or jolt to the head
- Penetrating injury (such as from a gunshot) to the head

There are three main types of TBI:

- Mild TBI or concussion
- Moderate TBI
- Severe TBI



# Epidemiology of TBI

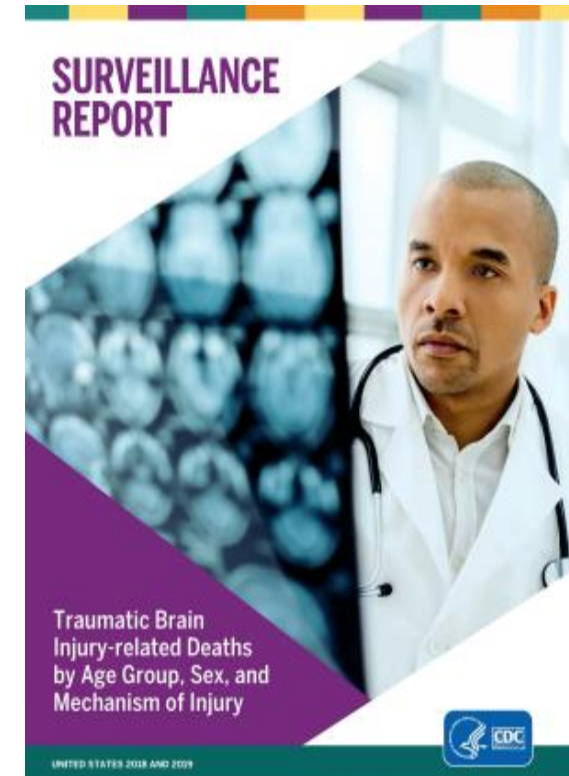


# Epidemiology of TBI

## TBI Surveillance

CDC collects and reports TBI data to understand:

- How many people are affected by this injury
- Who is most at risk
- The leading ways a person may get a TBI
- Whether programs to prevent TBI are working



Source: <https://www.cdc.gov/traumaticbraininjury/data/index.html>



# Epidemiology of TBI

## National Estimate of Parent Reported History of TBI

Parents report 2.5% of children have a history of TBI in the United States.

Source: Haarbauer-Krupa, J, Heggs Lee, A, Bitsko, RH, Zhang, X, Kresnow-Sedacca, M, Prevalence of parent reported traumatic brain injury in children and associated health conditions. JAMA Pediatr, 2018, doi:10.1001/jamapediatrics.2018.2740.

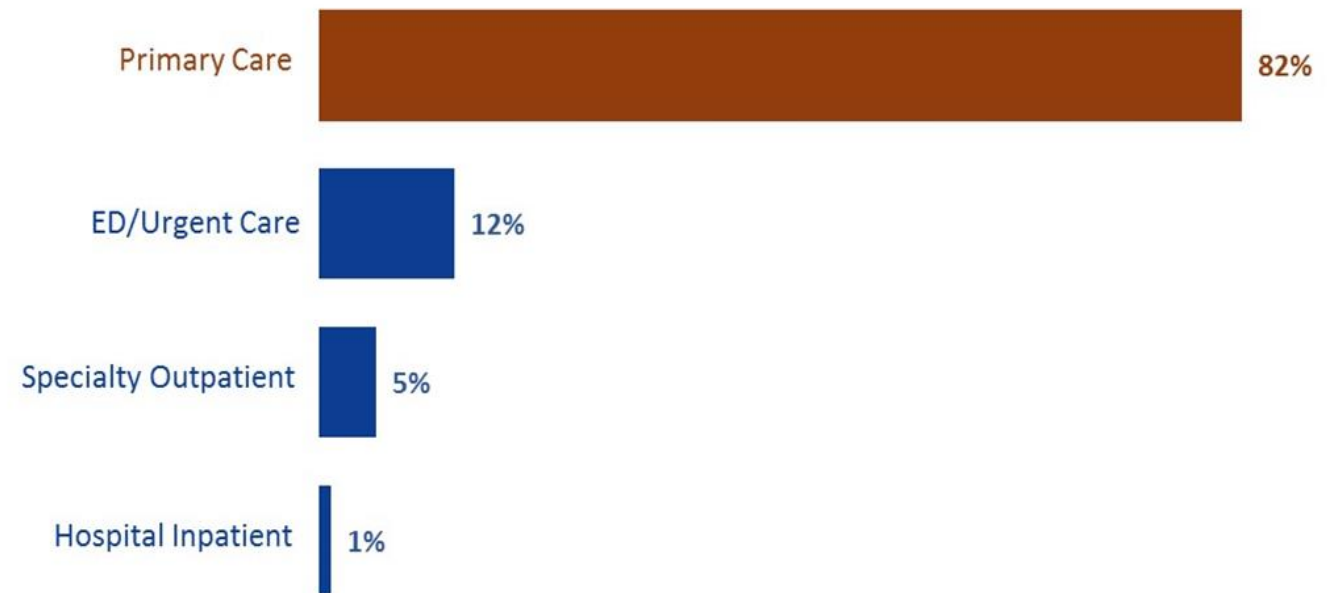


# Epidemiology of TBI

Not all visits for concussion are in the Emergency Department

## Where Are Most Youth Concussions First Diagnosed?

Point of Entry Data from The Children's Hospital of Philadelphia show the vast majority of youth concussions are diagnosed in a primary care setting



Arbogast KB, Curry AE, Pfeiffer MR, Zonfrillo MR, Haarbauer-Krupa J, Breiding MJ, Coronado VG, Master CL. Point of healthcare entry for youth concussion within a large pediatric care network. *JAMA Pediatrics* 2016 May; 170(4): epub ahead of print.



Healthcare

School



# Models of Care for Children

Children and their families experience two models of care for Concussion and TBI



# Identification of TBI

## Healthcare

- Healthcare provider makes the diagnosis based on CDC definition/ICD-CM codes
- Current data is from Emergency Department visits
- Some children are seen by a pediatrician or family practitioner, especially for mild injuries.
- In some settings the athletic trainer makes the initial diagnosis

## School

- PARENT OR STUDENT REPORT
- Discharge letter or information from healthcare visit conveyed to school
- Teacher report of a change in student behavior
- Observation of a TBI event at school

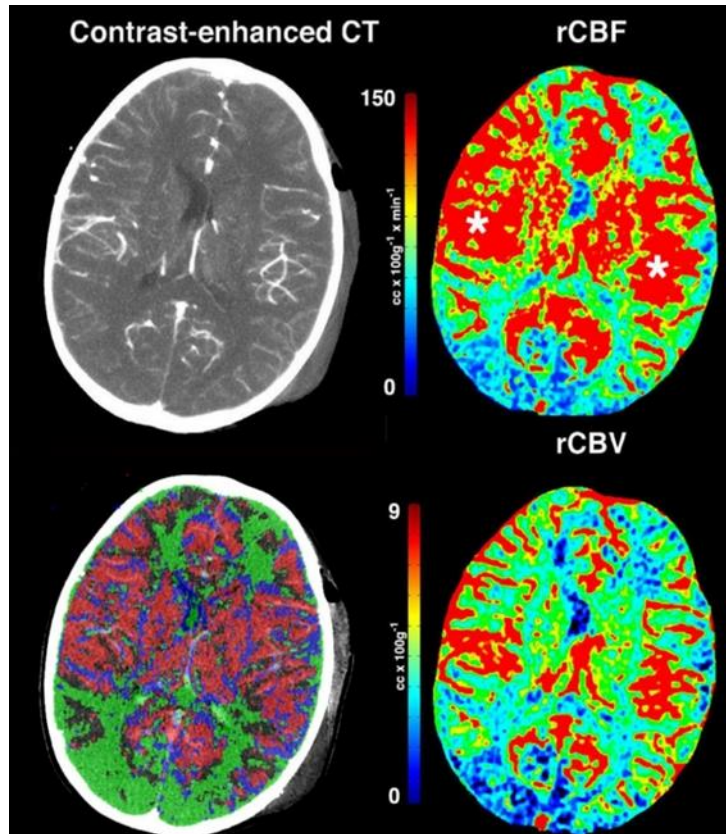
EVENT OCCURRED BUT DID NOT SEEK MEDICAL CARE

# Understanding How TBI Affects Children



# What we know about TBI across the Pediatric Lifespan

Imaging has advanced

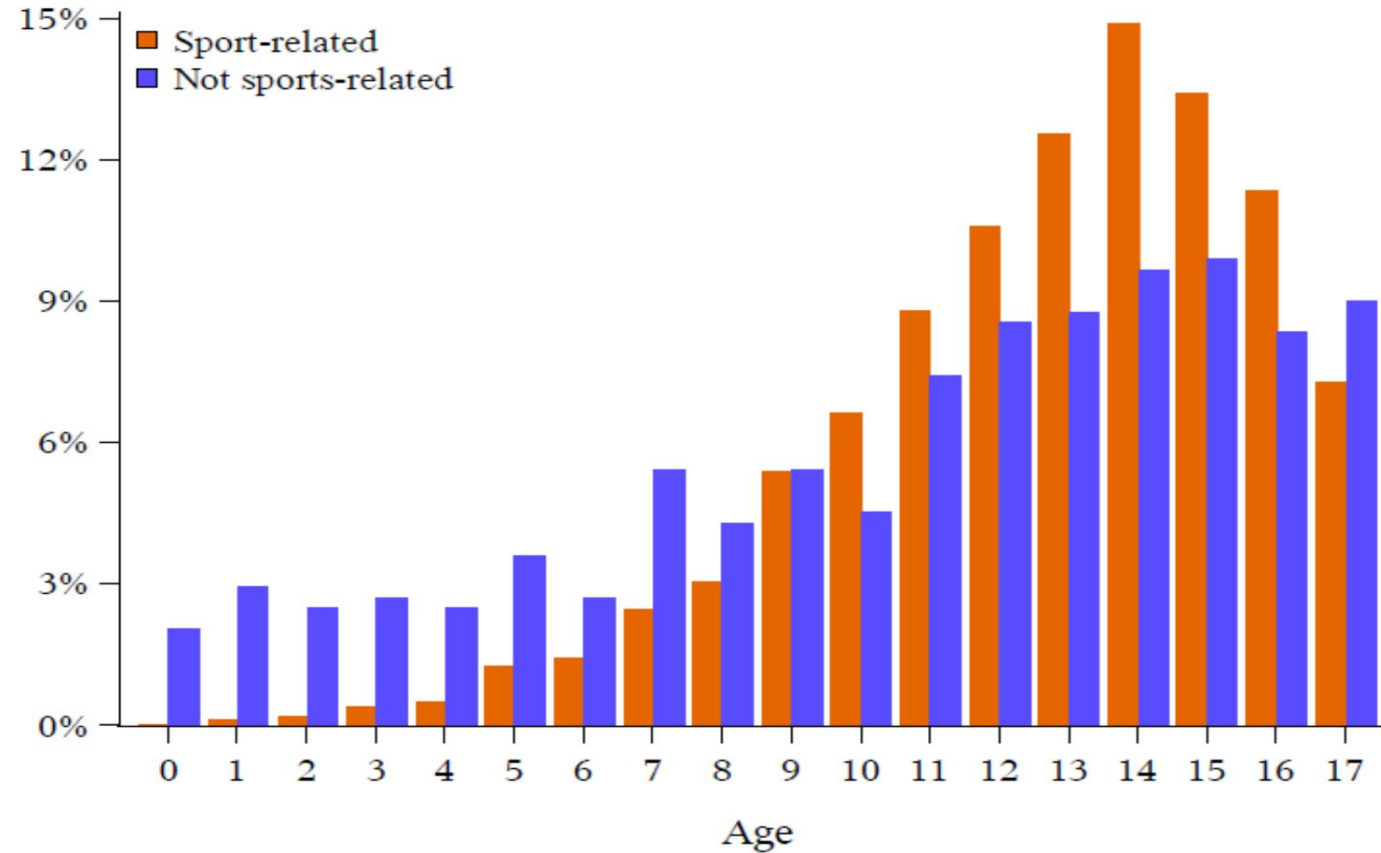


Multiple TBIs Mean Something



# What we know about TBI across the Pediatric Lifespan

## TBI Mechanism of Injury Varies by Age



Source: Haarbauer-Krupa, J, Arbogast, KB, , Metzger, KB, Greenspan, Al Kessler, R, Curry, AE, Bell, JM DePadilla, L, Pfeiffer, MR, Zonfrillo, MR, & Master, CL. (2018). Variations in mechanisms of injury for children with concussion. *Journal of Pediatrics*.



# What we know about TBI Across the Pediatric Lifespan



**Age at the time of injury means something.**

**Younger children are at risk for long term effects.**



# What we know about TBI Across the Pediatric Lifespan

## Past and Current Health History Means Something

Children with a lifetime history of TBI are more likely to have co-occurring health conditions

	Lifetime History of TBI	No Lifetime History of TBI
Learning Disorder	21%	9%
ADHD	20%	8%
Speech/Language Problems	19%	8%
Developmental Delay	15%	5%
Bone, joint or muscle problems	14%	3%
Anxiety	13%	4%
Depression	11%	3%
Behavior Problems	8%	2%
Hearing Problems	7%	3%

Source: Haarbauer-Krupa, J, Heggs Lee, A, Bitsko, RH, Zhang, X, Kresnow-Sedacca, M, Prevalence of parent reported traumatic brain injury in children and associated health conditions. *JAMA Pediatr*, 2018, doi:10.1001/jamapediatrics.2018.2740.

# What we know about TBI Across the Pediatric Lifespan

**Heterogeneity** in Injury Effects and Outcomes – related to multiple factors

- injury characteristics
- individual child characteristics
- the child's environment



# What we know about TBI Outcomes Across the Pediatric Lifespan





# What we know about TBI Across the Pediatric Lifespan

## TRANSITION



Childhood

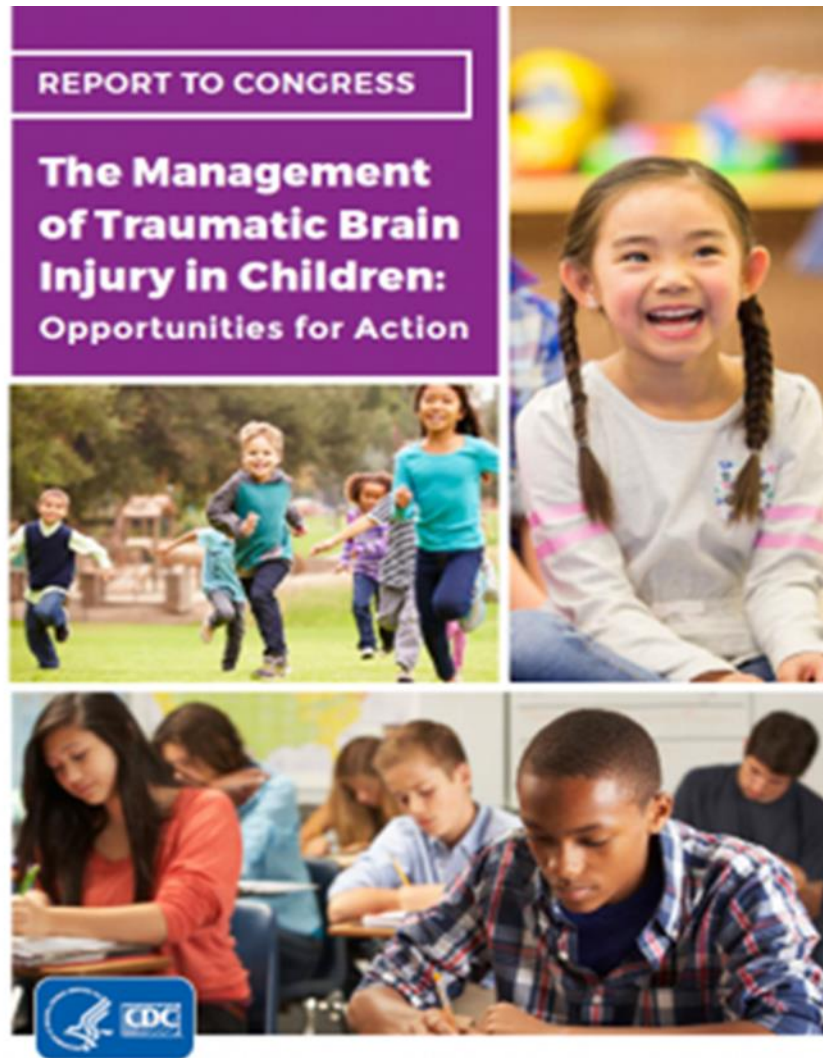


adulthood



Becoming an adult

# Report to Congress on the Management of TBI in Children



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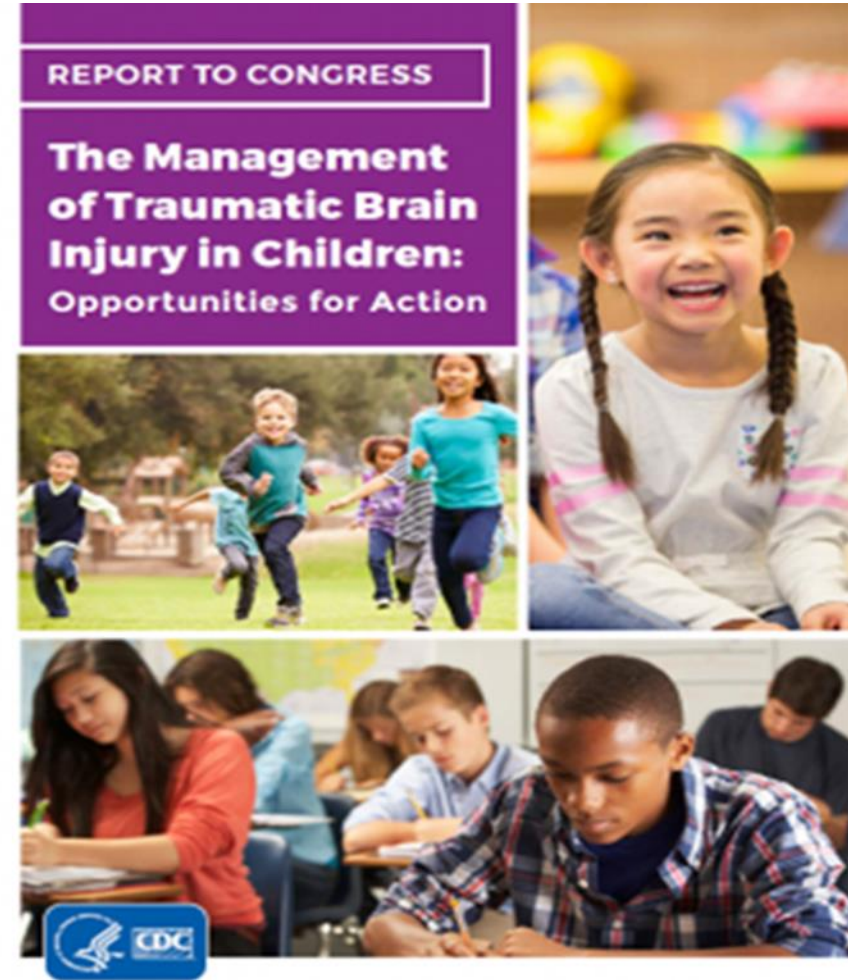
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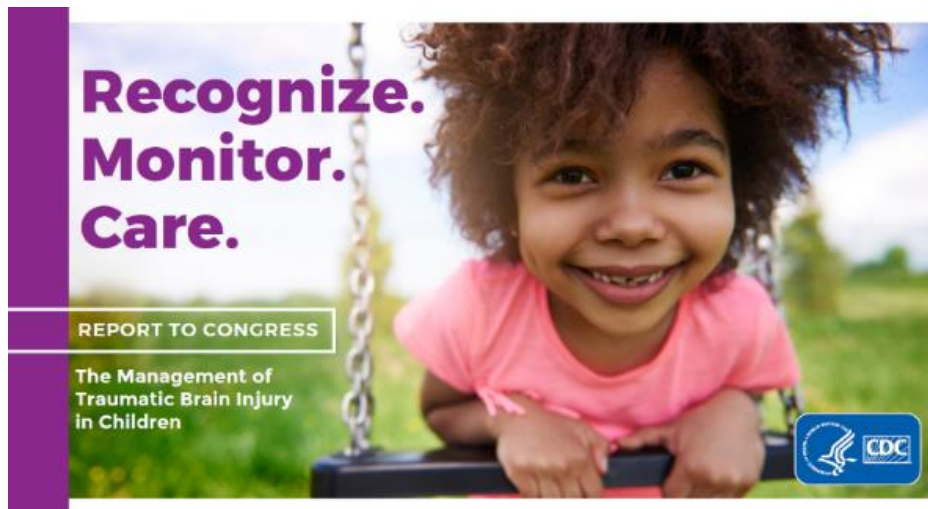
# Report to Congress on the Management of TBI in Children

- + **TBI Act of 2014**
- + The United States Congress directed CDC, in consultation with the National Institutes of Health to: **“conduct a review of scientific evidence related to brain injury in children and submit a Report to Congress that describes the results and makes recommendations”**
- + Released in March 2018



# Report to Congress on the Management of TBI in Children

- Identifies gaps in health care, school, and community services
- Highlights policy strategies to address the short and long-term consequences of a TBI



- Offers **specific and actionable recommendations** to improve TBI care in children, and advance our understanding of TBI care in the future

# Report to Congress Recommendations

- Ensure that all children who return to school following a TBI are monitored
- Coordination of care across settings (medical, educational)
- Train educational professionals
- Understand Transitions
  - From elementary to middle to high school
  - From pediatric to adult healthcare
- Conduct Research
  - Need for longitudinal studies
  - More comprehensive surveillance estimates



## TBI as a Chronic Health Condition

The World Health Organization (WHO) defines a chronic disease as having one or more of the following characteristics:

- 1) has a long duration
- 2) caused by non-reversible pathologic alterations
- 3) requires specialized training of the patient for rehabilitation
- 4) may require a long period of observation, supervision or care

Source: Pruitt S, Annandale S, World Health Organization. Noncommunicable Disease and Mental Health Cluster. Innovative care for chronic conditions : building blocks for action : global report. Noncommunicable Diseases and Mental Health, World Health Organization; 2002:iv, 112.

# TBI as a Chronic Health Condition

- TBI as a chronic health condition in children
- Research is emerging on the long-term effects in children- indicating the effects of TBI can remain over the child's lifespan into adulthood.

Most studies report on Moderate to Severe TBI

Source: Corrigan JD, Hammond FM. Traumatic brain injury as a chronic health condition. Arch Phys Med Rehabil. Jun 2013;94(6):1199-201. doi:10.1016/j.apmr.2013.01.023; Sariaslan A, Sharp DJ, D'Onofrio BM, Larsson H, Fazel S. Long-Term Outcomes Associated with Traumatic Brain Injury in Childhood and Adolescence: A Nationwide Swedish Cohort Study of a Wide Range of Medical and Social Outcomes. PLoS Med. 08 2016;13(8):e1002103. doi:10.1371/journal.pmed.1002103;



# TBI as a Chronic Health Condition

## TBI as a chronic health condition in children

- Adults who report a childhood injury report post TBI health and behavioral changes that result in financial and emotional challenges

Kurowski, Brad G. MD, MS; Haarbauer-Krupa, Juliet PhD, FACRM; Giza, Christopher C. MD, FAAN. When Traumatic Brain Injuries in Children Become Chronic Health Conditions. *Journal of Head Trauma Rehabilitation* ():10.1097/HTR.0000000000000842, December 14, 2022. | DOI: 10.1097/HTR.0000000000000842 .

# Return to School after TBI



# Promising Practices Overall

- Facilitate parent Involvement
- Share materials and ideas about Return to School Program Communication and Collaboration
- Partner with academic institutions and other TBI stakeholders
- Use evidence to form policies and practices



# Policy and Legislative Impact

## Return to Play and Return to Learn Laws



### School Health Plan

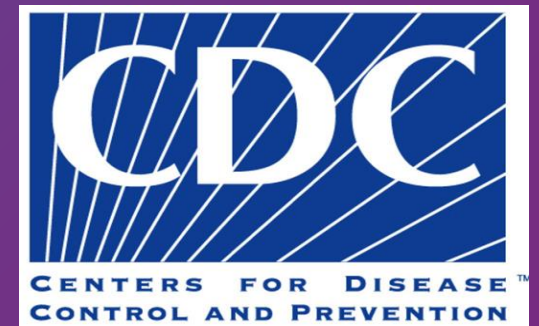


### Special Services Laws

- 504 plans
- Special Education Laws



# CDC HEADS UP Resources for Schools





# CDC handout describing symptom- based recovery tips

## How Can I Help My Child Recover After a Concussion?



This sheet includes common concussion symptoms your child may experience, and tips you can use to help with recovery.



Most children with a concussion, a type of traumatic brain injury, feel better within a couple of weeks. However, for some, symptoms will last for a month or longer. Concussion symptoms may appear during the normal healing process, or as your child gets back to their regular activities. **If there are any symptoms that concern you or are getting worse, be sure to seek medical care as soon as possible.**



### RECOVERY TIPS FOR YOUR CHILD'S CONCUSSION SYMPTOMS

Making short-term changes to your child's daily activities can help him or her get back to a regular routine more quickly. As your child begins to feel better, you can slowly remove these changes. Use your child's symptoms to guide his or her return to normal activities. If your child's symptoms do not worsen during an activity, then this activity is OK for them. If symptoms worsen, your child should cut back on that activity.

It is important to remember that each concussion and each child is unique, so your child's recovery should be customized based on his or her symptoms. Factors that may delay recovery include your child having: a history of a previous concussion or other brain injury, neurological or mental health disorders, learning difficulties, or family and social stressors.

#### QUICK TIPS



Ensure your child avoids activities that can put him or her at risk for another injury to the head and brain.



Help your child keep a positive attitude. Most children with a concussion feel better within a couple of weeks.



Ensure your child gets enough rest.



Research shows giving a letter to schools increases school-based accommodations for a student with a concussion.

## SCHOOL LETTER Returning to School After a Concussion



### DEAR SCHOOL STAFF:

This letter offers input from a healthcare provider with experience in treating concussion, a type of traumatic brain injury. This letter was created to help school professionals and parents support students returning to school after a concussion. You can use these recommendations to make decisions about support for your student based on his or her specific needs. This letter is not intended to create a 504 Plan or an IEP unless school professionals determine that one is needed. Most students will only need short-term support as they recover from a concussion. A strong relationship between the healthcare provider, the school, and the parents will help your student recover and return to school.

\_\_\_\_\_, was seen for a concussion on \_\_\_\_\_ Date  
Student Name  
In \_\_\_\_\_ office or clinic.  
Healthcare Provider's Name

### The student is currently reporting the following symptoms:



#### PHYSICAL

- ☐ Bothered by light or noise
- ☐ Dizziness or balance problems
- ☐ Feeling tired, no energy
- ☐ Headaches
- ☐ Nausea or vomiting
- ☐ Vision problems



#### THINKING OR REMEMBERING

- ☐ Attention or concentration problems
- ☐ Feeling slowed down
- ☐ Foggy or groggy
- ☐ Problems with short- or long-term memory
- ☐ Trouble thinking clearly



#### SOCIAL OR EMOTIONAL

- ☐ Anxiety or nervousness
- ☐ Irritability or easily angered
- ☐ Feeling more emotional
- ☐ Sadness

### The student also reported these symptoms:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## RETURNING TO SCHOOL

### Based on the student's current symptoms, I recommend that the student:

- ☐ Be permitted to return to school and activities while school professionals closely monitor the student. School professionals should observe and check in with the student for the first two weeks, and note if symptoms worsen. If symptoms do not worsen during an activity, then this activity is OK for the student. If symptoms worsen, the student should cut back on time spent engaging in that activity, and may need some short-term support at school. Tell the student to update his or her teachers and school counselor if symptoms worsen.

- ☐ Is excused from school for \_\_\_\_\_ days.

- ☐ Return to school with the following changes until his or her symptoms improve.

**(NOTE:** Making short-term changes to a student's daily school activities can help him or her return to a regular routine more quickly. As the student begins to feel better, you can slowly remove these changes.)

### Based on the student's symptoms, please make the short-term changes checked below:

- |   |  |
|---|--|
| <input type="checkbox"/> No physical activity during recess                                       | <input type="checkbox"/> Allow for a quiet place to take rest breaks throughout the day                              |
| <input type="checkbox"/> No physical education (PE) class   | <input type="checkbox"/> Lessen the amount of screen time for the student, such as on computers, tablets, etc.       |
| <input type="checkbox"/> No after school sports   | <input type="checkbox"/> Give ibuprofen or acetaminophen to help with headaches (as needed)                          |
| <input type="checkbox"/> Shorten school day   | <input type="checkbox"/> Allow the student to wear sunglasses, earplugs, or headphones if bothered by light or noise |
| <input type="checkbox"/> Later school start time  | <input type="checkbox"/> Other: _____  |
| <input type="checkbox"/> Reduce the amount of homework  |  |
| <input type="checkbox"/> Postpone classroom tests or standardized testing                         |  |
| <input type="checkbox"/> Provide extended time to complete school work, homework, or take tests   |  |
| <input type="checkbox"/> Provide written notes for school lessons and assignments (when possible) |  |

Most children with a concussion feel better within a couple of weeks. However, for some, symptoms can last for a month or longer. **If there are any symptoms that concern you, or are getting worse, notify the student's parents that the student should be seen by a healthcare provider as soon as possible.**


► For information on helping students return to school safely after a concussion, visit [www.cdc.gov/HEADSUP](http://www.cdc.gov/HEADSUP).

\_\_\_\_\_  
Healthcare Provider's Name (printed) Healthcare Provider's Signature Date


For additional questions, you may reach me at: \_\_\_\_\_



CDC has a training for educators on concussion among children.



**CDC HEADS UP**



**Online Concussion Training  
for School Professionals**

**Take the Training**

CDC has a training for healthcare providers on concussion among children.





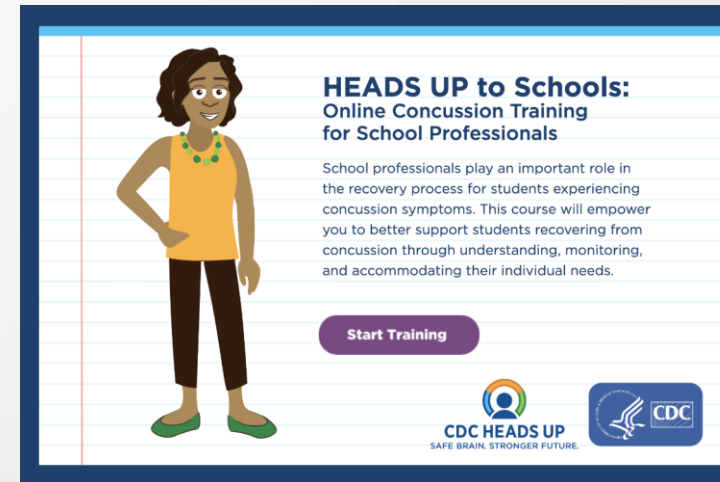


## *Athletic Trainers*

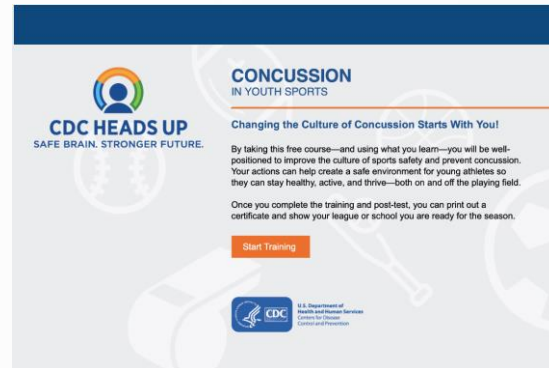


## *Healthcare Providers*

# Online Trainings



## *School Professionals*



## *Youth Sports Coaches*

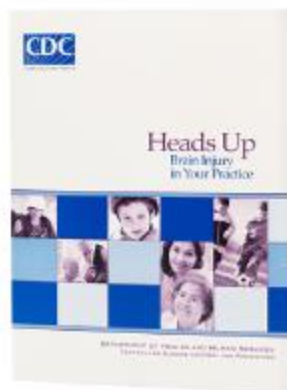


## *High School Sports Coaches*

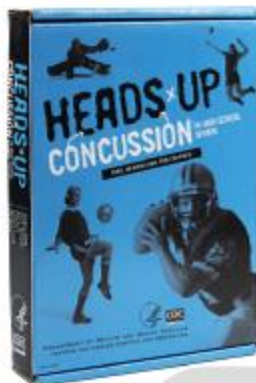
# Online Trainings



## *Sports Officials*



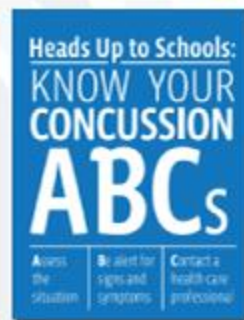
2003



2005



2007



2010



2018



2023



# Summary

- Children experience TBI and Concussion across the age span of childhood.
- Children and their families navigate two models of care –Healthcare and School Systems
- Children can experience long term effects over their school career and into adulthood.





# Traumatic Brain Injury



TBI is not just an event.

Recognize.  
Monitor.  
Care.

Report to Congress

The Management of Traumatic  
Brain Injury in Children

[Go.usa.gov/xnvbq](https://www.go.usa.gov/xnvbq)



# Thank you!

The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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