Concussion Identification (Assessment, Diagnosis) and Management in the School Setting

Gerard A. Gioia, PhD
Director, Safe Concussion Outcome, Recovery & Education (SCORE) Program
Division Chief (Emeritus), Pediatric Neuropsychology
Children's National Hospital
Professor, Depts. of Pediatrics and Psychiatry/Behavioral Sciences
George Washington University School of Medicine & Health Sciences



October 12, 2026

Disclosure

Psychological Assessment Resources, Inc. - Test Author (royalties)

- Behavior Rating Inventory of Executive Function-2 (BRIEF2)
- Post-Concussion Executive Inventory (PCEI)
- Post-Concussion Symptom Inventory-2 (PCSI-2)

Many other tests & measures (no royalties)

- Acute Concussion Evaluation (ACE) – office, ED
- ACE Care Plan; Home/School Instructions
- Post-Concussion Symptom Inventory (PCSI) 5-7, 8-12, 13-18; Parent
- Children's Exertional Effects Rating Scale (ChEERS)
- Concussion Learning Assessment & School Survey-3 (CLASS-3) – Parent, Self-Report
- Progressive Activities of Controlled Exertion (PACE)-Self Efficacy (Child, Parent)
- Multimodal Assessment of Cognition & Symptoms (MACS)
- SCORE4BrainHealth app – Parent, Coach, School + app
- [Concussion Recognition & Response (CRR) –Parent/Coach app (retired)]
- [Concussion Assessment & Response (CARE)- Medical app (retired)]

Learning Objectives

1. Describe the key considerations in the diagnosis of a concussion.
2. Discuss 3 important active rehabilitation actions that should be taken to assist recovery.
3. Describe 2 STAMP supports that can be provided in the classroom to support a concussed student.
4. Apply the latest recommendations on Return to School/ Risk recommendations following injury

Children's National.

Concussion/ mTBI Definition

An acute brain injury resulting from:

- Mechanical energy to the head from external physical forces including:

  (1) 1 or more of the following: confusion or disorientation, loss of consciousness for 30 minutes or less, post-traumatic amnesia for less than 24 hours, and/or other transient neurological abnormalities such as focal signs, symptoms, or seizure;

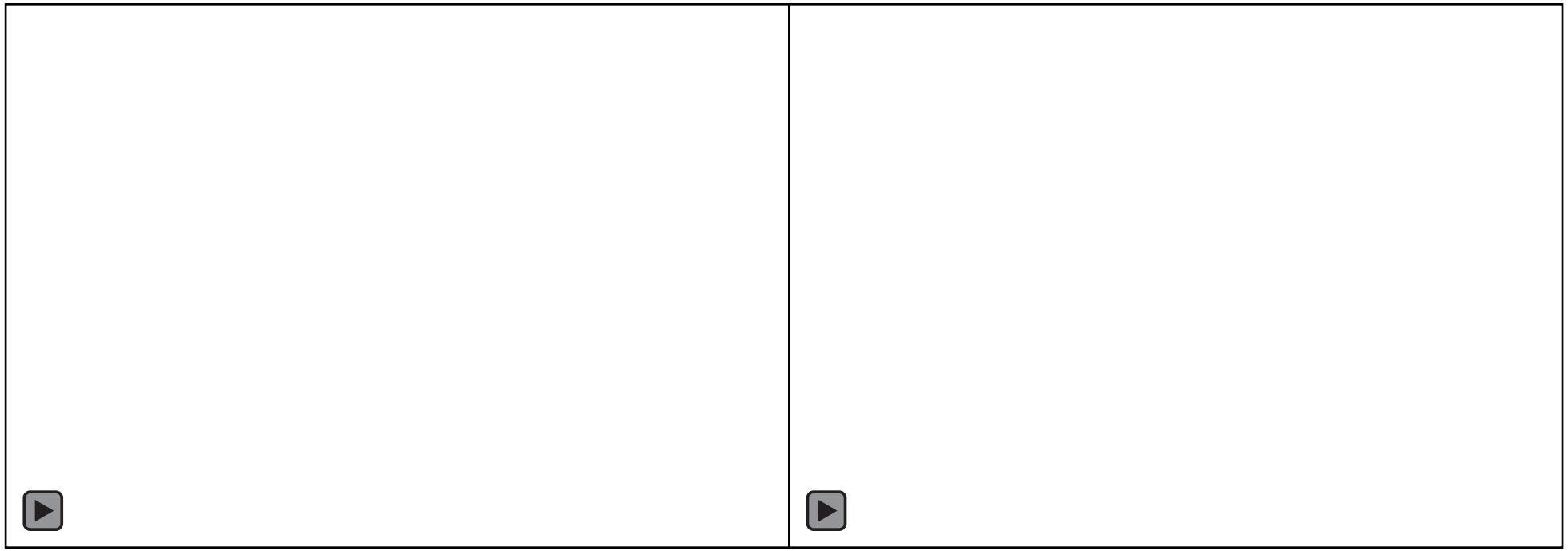
  (2) Glasgow Coma Scale score of 13-15 after 30 minutes post-injury or later upon presentation for healthcare."

Concussion/ mTBI Definition

- Disturbance of brain function is related to: neurometabolic dysfunction, rather than structural injury typically associated with normal structural neuroimaging findings (i.e., CT scan, MRI).
- Concussion may or may not involve a loss of consciousness (LOC). (<10%)

Concussions are largely a “software” injury of the brain not a “hardware” injury

Brain Motion...



Wake Forest School of Medicine

Joel Stitzel,
jstitzel@wakehealth.edu

Children's National

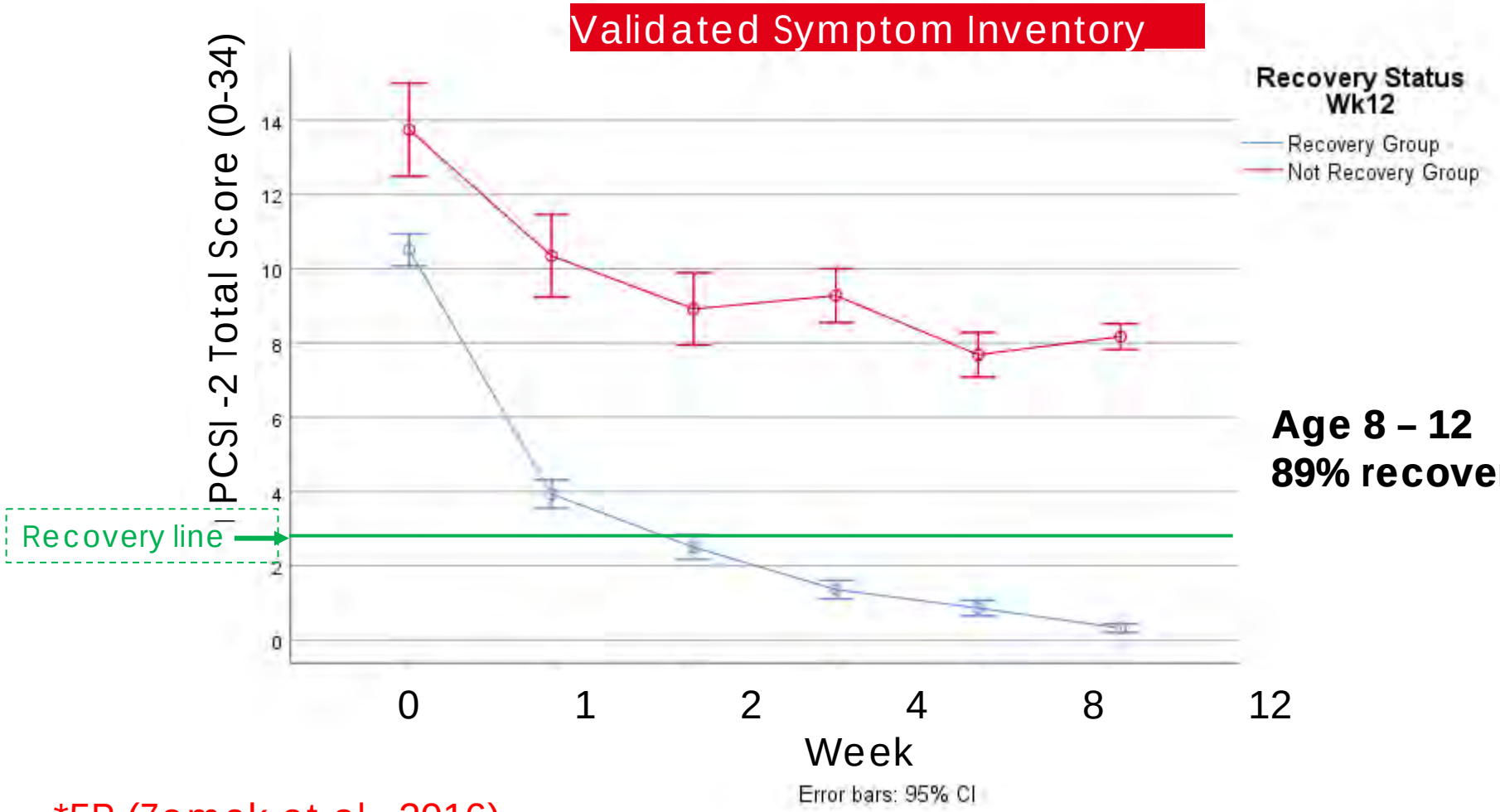
Concussion/ mTBI Definition

Concussion results in a constellation of symptoms:

- physical, cognitive, emotional and fatigue/ sleep-related.

Duration of symptoms are variable, may last for as short as several minutes and last as long as several days, weeks, months or even longer in some cases.

Recovery Curves by age group (8-12 years)*



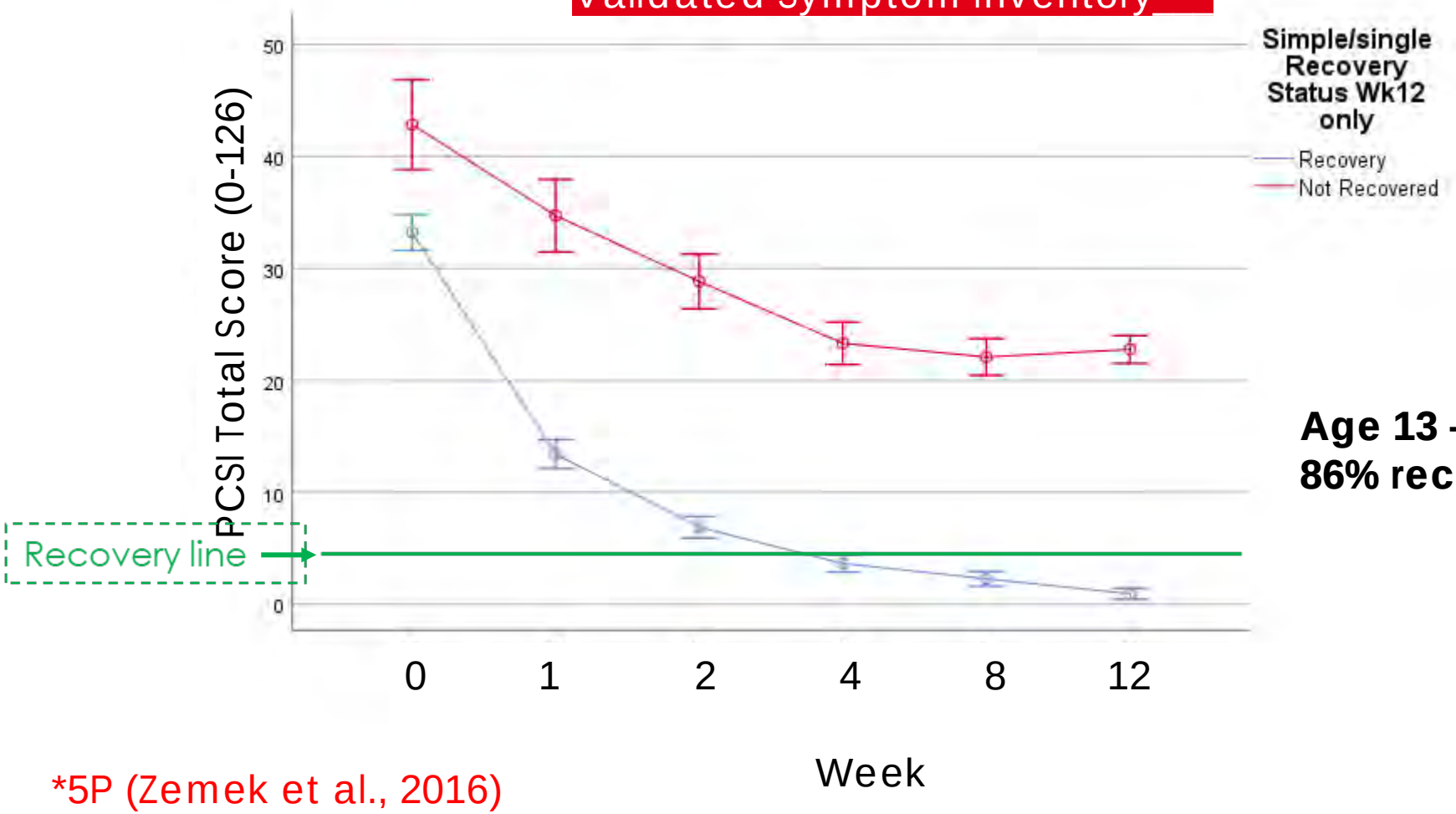
Age 8 – 12 N=815
89% recovered (12 weeks)

*5P (Zemek et al., 2016)

Children's National.

Recovery Curves by age group (13-18 years)*

Validated Symptom Inventory

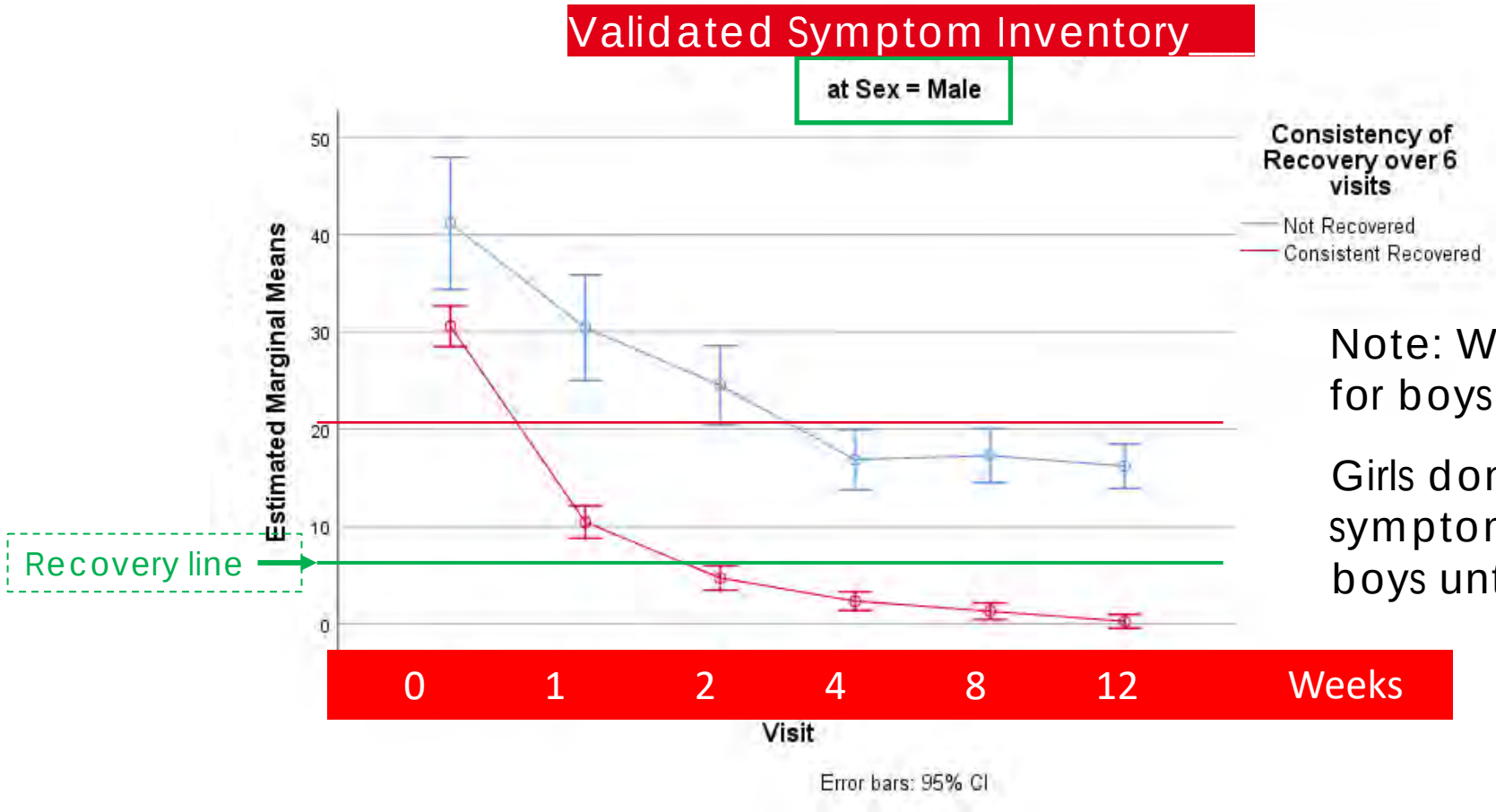


Age 13 – 18 N=736
86% recovered (12 weeks)

*5P (Zemek et al., 2016)

Children's National.

5P sample symptom trajectories by sex



Note: Wk2 & Wk4 symptoms for boys vs girls:

Girls don't attain the symptom recovery level of boys until Wk4

Beyond Definition & Diagnosis

The Importance of ACTIVE Concussion Management

Facilitating & Supporting Recovery

Children's National

Active Rehabilitation

- Concussion care has been evolving over the past 20 years
- More evidence-based tools are available to evaluate/ diagnose and treat
- **Active rehabilitation** is now the predominant treatment approach, including returning kids to school, social and physical activity as early as they can safely tolerate it.
- A variety of healthcare providers play a role in identifying, diagnosing, treating concussions
- All need training and tools to learn and implement the latest guidelines

Children's National.

Recovery Enhancing Activities:
Concussion Prescription for All

- Good nighttime sleep (9+ hours), min. naps
- 3 meals/day, hydration (1 oz per lb up to 100 lbs)
- Managing daytime activity (PACE- Progressive Activities of Controlled Exertion)
  - use symptoms as the guide
  - Be active but not too little, not too much
  - When symptomatic, take the day in doses (activity-recharge-activity…)
- Manage stress
  - focus on the positive
  - know and do what you can control
- Daily gradual physical activity/ exercise

Children's National.

Benefits of Physical Activity for Recovery

JAMA Pediatrics | Original Investigation

Early Subthreshold Aerobic Exercise for Sport-Related Concussion
A Randomized Clinical Trial

John J. Leddy, MD; Mohammad N. Haider, MD; Michael J. Ellis, MD; Rebekah Mannix, MD; Scott R. Darling, MD; Michael S. Freitas, MD; Heidi N. Suffoletto, MD; Jeff Leiter, PhD; Dean M. Cordingley, MSc; Barry Willer, PhD

Key Points

Question What is the effectiveness of subsymptom threshold aerobic exercise vs a placebo-like stretching program prescribed to adolescents in the short term after sport-related concussion?

Findings In this randomized clinical trial of 103 adolescents, those assigned to aerobic exercise recovered faster (13 days) than those assigned to placebo-like stretching (17 days), a significant difference.

Meaning Early subthreshold aerobic exercise appears to be an effective treatment for adolescents after sport-related concussion.

IMPORTANCE Sport-related concussion (SRC) is a significant public health problem without an effective treatment.

OBJECTIVE To assess the effectiveness of subsymptom threshold aerobic exercise vs a placebo-like stretching program prescribed to adolescents in the acute phase of recovery from SRC.

Children's National







How does a concussion manifest in school?

How do we support recovery?





Children's National.

chapter twelve

Return to school

When and how should return to school be organized after a concussion?

Gerard A. Gioia

For a podcast-type discussion of this chapter:

https://notebooklm.google.com/notebook/264b4cf5-10ed-4036-9a3a-99060d50eb1b/audio

Contents

Introduction 241
Partnering in the neighborhood of mild traumatic brain injury care 242
Mild TBI and school learning and performance 243
Improving the systems of mild traumatic brain injury care 246
Components of the school mild traumatic brain injury management pathway 247
Implementing the school mild traumatic brain injury management pathway 249
- Step 1. School notification of mild traumatic brain injury 250
- Step 2. Health-care provider communication/return to school letter 250
- Step 3. Academic management plan created by academic monitor 251
- Step 4. First day of return to school 252
- Step 5. Implementation of the academic management plan 252
- Step 6. Progress monitoring 252
- Step 7. Recovery/Return to full academic participation 253

Summary 254
Appendices 255
- Appendix A: ACE return to school letter 255
- Appendix B: ACE gradual return to school guide 256
- Appendix C: Symptom-targeted academic management plan (STAMP) 257
- Appendix D: Symptom monitoring log 258
- Appendix E: Academic monitoring tool 259

References 259

School Management Pathway

mTBI School Management Pathway Worksheet

Step	Event	Action	Completion Date
	Prior to School Return		
1	School notification of mTBI Injury Date:_____	MTBI Management Team alerted	
2	Healthcare Provider Communication/ Return to School Letter Date of Return:_____	a. Symptom Monitor: Reviews symptom status & contacts family b. Academic Monitor: Coordinates with Symptom Monitor to construct academic management plan (e.g., STAMP)	a._____ b._____
3	Academic Management Plan Created	Academic Monitor: Reviews Academic Management Plan with teachers to prepare for student's return	
	Return to School		
4	First Day of Return to School	a. Symptom Monitor: Meets with student to re-assess symptom status, notes any changes b. Academic Monitor: Makes final academic management plan changes; counsels student on plan	a._____ b._____
5	Academic Management Plan implemented	a. Symptom Monitor: Arrange symptom monitoring schedule b. Academic Monitor: Update teaching team if needed	a._____ b._____
6a	Progress Monitoring	a. Symptom Monitor: Periodic symptom updates with student, from family/ healthcare providers b. Academic Monitor: Collects weekly updates from teachers	a._____ b._____
6b	Academic Management Plan Adjusted	Symptom Monitor & Academic Monitor discuss changes to academic management plan Academic Monitor informs student/ teacher of changes	Adj 1_____ Adj 2_____ Adj 3_____
7a	Recovery/ Return to Full Academic Participation	Supports no longer required	a._____
7b	Complicated Recovery/ Additional Supports Assessed	Referral to HCP for further assessment of complicating factors, additional programming supports	b._____

Figure 12.1 mTBI school management pathway.

These seven steps are a systematic plan for educating and supporting the student with a concussion. It will require the school to have some identified roles and personnel to carry out the tasks.

No different than a 504 team. And the need will be for a much shorter period of time, if proper supports are provided.

Children's National

School Resources from “Return to School” chapter

Appendix A: ACE return to school letter

ACE POST-CONCUSSION
RETURN TO SCHOOL LETTER

Dear School Staff:

_____ sustained a concussion on _____. Every concussion is different and recovery typically can take between several days to several weeks. While it is important for the student to return to school as soon as they can tolerate, the key to assisting recovery is to manage their physical and cognitive activity. Too much cognitive or physical activity can make symptoms worse and possibly prolong recovery, while too little activity can unnecessarily create anxiety and cause him/her to fall behind in their school work. As symptoms resolve and the student's learning/cognitive functioning returns to normal, they can gradually progress to their normal school day.

The student is currently reporting the following symptoms. They should be viewed as the targets for classroom accommodations and adjustments.

PHYSICAL		COGNITIVE	SOCIAL/EMOTIONAL
Headaches	Visual problems	Feeling foggy	Irritability / Easily Angered
Sensitivity to Light	Sensitivity to Noise	Memory loss	Nervousness
Vomiting	Nausea	Feeling slowed down	Sadness
Fatigue	Dizziness	Difficulty concentrating	Feeling more emotional
Balance Problems	Tingling		

Based on the current symptoms, he/she is ___ permitted to return to school. OR ___ is excused for ___ days. As general guidance, the student can return to school when:

(1) They can concentrate on school work for 30 minutes before symptoms worsen significantly, AND
(2) Symptoms reduce or disappear with cognitive rest breaks, allowing return to activity.

The student requires the following physical restrictions until cleared by a health professional:

- No physical activity during recess
- No PE class
- No Sports

Other _____

Health Care Provider Signature _____ Date _____

Contact information: _____

SCHOOL SUPPORTS

Students with post-concussion symptoms and/or neuropsychological dysfunction often need support to perform school related activities. The following accommodations and adjustments to the student's school program may be helpful to support the specific targeted symptoms.

- Shortened day
- Shortened classes
- Rest breaks during the day as needed
- Reduced/modified homework
- Support for prioritizing, organization and planning coursework
- No significant classroom or standardized testing
- Extended time to complete coursework, assignments, tests
- Alternative/modified grading or reduced make up work

Appendix B: ACE gradual return to school guide

ACE Post-Concussion
Gradual Return to School (GrRTS) Guide

Use of the Gradual Return to School Guide: Every student's recovery from concussion is different. The five progressive stages were designed to give the medical provider and school team general guidance to assist the student's gradual return to school. The stages should not be viewed as absolute for every student if their symptoms do not warrant it. What is important is to strike a balance between providing the student with the necessary supports for symptom relief while progressing to their normal school schedule. Students with faster recoveries may skip a stage or two. Use of the ***Symptom Targeted Academic Management Plan*** should accompany this guide.

Stage	Description	Level of Activity	Move to stage 2 when:
1	Return to School, Partial Day (1–3 hours)	• Attend 1–3 classes. Intersperse rest breaks. • Scheduled rest breaks: ____ Rest breaks/ day in quiet area. ___ AM ___ PM ____ When symptoms worsen ("flash pass") ____ min. • Expectations for productivity: Minimal • No classroom/ standardized tests. No homework. • Attendance is primary goal • Excused from Physical Education (PE) class. No recess.	▪ Symptom status improving ▪ Tolerates 4–5 hours of activity-rest cycles ▪ 2–3 cognitive rest breaks built into school day

Stage	Description	Level of Activity	Move to stage 3 when:
2	Full Day, Maximal Supports (required throughout day)	• Attend most classes with 2–3 rest breaks (20–30 min). • Scheduled rest breaks: ____ Rest breaks/ day in quiet area. ___ AM ___ PM ____ When symptoms worsen ("flash pass") ____ min. • Expectations for productivity: Minimal—moderate. • No classroom/ standardized tests. • Homework < 60 minutes. • Excused from Physical Education (PE) class. No recess.	▪ Symptom number & severity improving ▪ Needs 1–2 cognitive rest breaks built into school day.

Stage	Description	Level of Activity	Move to stage 4 when:
3	Return to Full Day, Moderate Supports (provide in response to symptoms)	• Attend all classes with 1–2 rest breaks (20–30 min). • Scheduled rest breaks: ____ Rest breaks/ day in quiet area. ___ AM ___ PM ____ When symptoms worsen ("flash pass") ____ min. • Expectations for productivity: Moderate. • No classroom/ standardized tests. Begin quizzes. • Moderate homework 60–90 minutes. • Design schedule for make-up work. Consider reducing or waiving missing/ outstanding work. Assign essential learning tasks. • Excused from Physical Education (PE) class. No recess.	▪ Continued symptom improvement ▪ Needs no more than 1 cognitive rest break per day

Stage	Description	Level of Activity	Move to stage 5 when:
4	Return to Full Day, Minimal Supports (Monitor final recovery)	• Attend all classes with 0–1 rest breaks (20–30 min) OR when symptoms worsen ("flash pass") • Expectations for productivity: Moderate—maximum. • Begin modified classroom tests (allow breaks, extra time, alternate formats). Number of classroom tests per day ____. • Homework 90+ minutes. • Begin to address make-up work. • Excused from Physical Education (PE) class. No recess.	▪ No active symptoms ▪ No exertional effects across the full school day.

Stage	Description	Level of Activity	Date of full return:
5	Full Return, No Supports Needed	• Full class schedule, no rest breaks. • Maximum expectations for productivity. • Address make-up work.	

Any use or revision of this material should cite the Safe Concussion Outcome Recovery & Education (SCORE) program and receive permission from the authors (G. Giora).

Appendix C: Symptom-targeted academic management plan (STAMP)

To be completed by the Academic Monitor

Children's National

Student Name: _____ **Date:** _____

Symptom Targeted Academic Management Plan (STAMP)

Below, please see the symptoms they are currently experiencing. To promote recovery, the student will be provided with the following classroom accommodations that support their academic learning and performance:

Symptom (check)	Functional school problem	Accommodation/ management strategy (select)
Cognitive Symptoms		
Attention & concentration difficulties	Short focus on lecture, classwork, homework	___ Shorter assignments (odd/even problems, requiring outline or bullet points instead of full written responses) ___ Break down tasks and tests into chunks/segments ___ Lighter work load: Max. nightly homework (including studying): ___ min
Working memory (short-term memory)	Trouble holding instructions, lecture, reading material, thoughts in mind during tasks	___ Repetition ___ Written instructions ___ Provide student with teacher generated class notes
Memory consolidation/ retrieval	Retaining new information Accessing learned information	___ Smaller chunks/segments to learn, repetition ___ Recognition cues
Processing speed	Unable to keep pace with work load Slower reading/writing/calculation Difficulty processing verbal information effectively	___ Allowances for extended time to complete coursework, assignments, tests ___ Reduce/slowdown verbal information and check for comprehension
Cognitive Fatigue/ Fogginess	Decreased arousal, mental energy; trouble thinking clearly, formulating thoughts	___ Rest breaks during classes ___ Homework, and examinations in quiet location
Physical Symptoms		
Headaches	Interferes with concentration Increased irritability	___ Intersperse rest breaks, shortened day if symptom does not subside ___ Allow for short naps in quiet location (e.g., nurse's office)
Light/ noise sensitivity	Symptoms worsen in bright or loud environments	___ Wear sunglasses/hat, seating away from bright sunlight ___ Limit exposure to SMART board, computers, provide class notes ___ Avoid noisy/crowded environments such as lunchroom, assemblies, chorus/music class, and hallways. Leave class early. ___ Allow student to wear earplugs as needed
Dizziness/ balance/ nausea	Unsteadiness when walking Nausea or vomiting	___ Elevator pass ___ Class transition before bell
Sleep disturbance	Decreased arousal, shifted sleep schedule, trouble falling asleep	___ Later start time ___ Shortened day or rest breaks
Fatigue	Lack of energy	___ Periodic rest breaks, short naps in quiet location ___ Passive participation
Emotional Symptoms		
Irritability	Poor tolerance for stress	___ Reduce stimulation and stressors (e.g., overwhelmed with missing work)
Anxiety/ nervousness	Worried about falling behind, pushing through symptoms	___ Reassurance from teachers and team about accommodations, workload reduction, alternate forms of testing ___ Time built in for socialization
Depression/ withdrawal	Withdrawal from school or friends because of stigma or activity restrictions	___ Allow student to be engaged with peers during selected low stress/ extracurricular activities as tolerated ___ Lunch in a quiet room with friends
Specific Academic Recommendations		
Subject specific difficulties	Writing	Provide alternatives to written output (word bank, oral response, etc.)
	Mathematics calculation	Use of calculator, reduced number of problems
	Reading comprehension	___ Shorter reading passages ___ Provide tools to assist with visual tracking or comprehension of information (e.g., use of audio books)
Make-up/Missing work	Trouble managing current load of make-up work	___ Waive previously missed work ___ Reduce amount of outstanding work (assign essential learning tasks)
Tests/quizzes	Unprepared for tests/quizzes	___ No/ Modified classroom testing (e.g., breaks, extra time, quiet location) ___ Limit number of classroom tests per day: _____ per day.
Other:		

Any use or revision of this material should cite the Safe Concussion Outcome Recovery & Education (SCORE) program and receive permission from the authors (G. Giora).

Returning to School

Original Article

Medical-School Partnership in Guiding Return to School Following Mild Traumatic Brain Injury in Youth

Journal of Child Neurology
1-16
© The Author(s) 2014
Reprints and permission:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/0883073814555604
jcn.sagepub.com
SAGE

Gerard A. Gioia, PhD[1]

Abstract

Mild traumatic brain injury is recognized as a prevalent and significant risk concern for youth. Appropriate school return is particularly challenging. The medical and school systems must be prepared partners to support the school return of the student with mild traumatic brain injury. Medical providers must be trained in assessment and management skills with a focused understanding of school demands. Schools must develop policies and procedures to prepare staff to support a gradual return process with the necessary academic accommodations. Ongoing communication between the family, student, school, and medical provider is essential to supporting recovery. A systematic gradual return to school process is proposed including levels of recommended activity and criteria for advancement. Targets for intervention are described with associated strategies for supporting recovery. A 10-element Progressive Activities of Controlled Exertion (PACE) model for activity-exertion management is introduced to manage symptom exacerbation. A strong medical-school partnership will maximize outcomes for students with mild traumatic brain injury.

sion of symptom-

s – certain classes or
– and require closer

ports, recess)

Children's National

Providing Academic Supports Based on Recovery "Best Guess"

- If 70 +/-% children and adolescents recover within 4 weeks (Zemek et al, 2016), then
- For most students, recovery supports (school, physical, social) should plan for several days to several weeks
- For smaller percentage of students, plan for supports for several months

Is the Student following the Recovery Enhancing Guidelines?

Children's National.

Academic Effects of Concussion in Children and Adolescents

Danielle M. Ransom, PsyD[a,b], Christopher G. Vaughan, PsyD[a,b], Lincoln Pratson, ATC[c], Maegan D. Sady, PhD[a,b], Catherine A. McGill, PsyD[a,b], Gerard A. Gioia, PhD[a,b]

OBJECTIVE: The aim of this work is to study the nature and extent of the adverse academic effects faced by students recovering from concussion.

METHOD: A sample of 349 students ages 5 to 18 who sustained a concussion and their parents reported academic concerns and problems (eg, symptoms interfering, diminished academic skills) on a structured school questionnaire within 4 weeks of injury. Postconcussion symptoms were measured as a marker of injury severity. Results were examined based on recovery status (recovered or actively symptomatic) and level of schooling (elementary, middle, and high school).

RESULTS: Actively symptomatic students and their parents reported higher levels of concern for the impact of concussion on school performance ($P < .05$) and more school-related problems ($P < .001$) than recovered peers and their parents. High school students who had not yet recovered reported significantly more adverse academic effects than their younger counterparts ($P < .05$). Greater severity of postconcussion symptoms was associated with more school-related problems and worse academic effects, regardless of time since injury ($P < .001$).

CONCLUSIONS: This study provides initial evidence for a concussion's impact on academic learning and performance, with more adverse effects reported by students who had not yet recovered from the injury. School-based management with targeted recommendations informed by postinjury symptoms may mitigate adverse academic effects, reduce parent and student concerns for the impact of the injury on learning and scholastic performance, and lower the risk of prolonged recovery for students with active postconcussion symptoms.

Children's National.

What kinds of school problems are you having SINCE YOUR INJURY?

Type of Problem	Elementary (n=42)	Middle (n=78)	High School (n=120)
Headaches interfering	53%	73%	71%
Can't pay attention	47%	58%	66%
Feeling too tired	53%	61%	52%
Homework taking much longer	35%	48%	63%*
Difficulty understanding material	29%	46%	54%
Difficulty studying for tests	18%	36%	53%*
Difficulty taking Notes	18%	17%	35%*
Average # reported*)	**2.53 (2.1)**	**3.37 (1.7)**	**3.92 (2.1)**

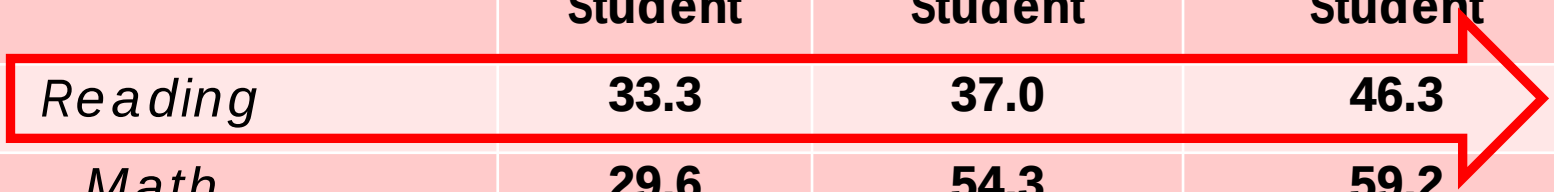
* Significant (p<.05) difference

Ransom et al. (2015)

Children's National.

Which classes/ subjects are you having trouble with SINCE YOUR INJURY?

Class/ Subject	Elementary (n=27/ 82)	Middle (n=92/ 122)	High School (n=147/ 186)
	Student	Student	Student
Reading	33.3	37.0	46.3
Math	29.6	54.3	59.2
Science	14.8	29.7	46.3
Social Studies	14.8	23.1	36.1
Foreign Language	7.4	33.7	32.0
Art	0.0	5.5	3.4
None	14.8	16.3	12.9



Children's National.

When should the injured student return to school following a concussion?

C. 2-3 days after their injury, even if still symptomatic, with supports (with some exceptions)

Children's National.

Return to School

Original Investigation | Pediatrics

Association Between Early Return to School Following Acute Concussion and Symptom Burden at 2 Weeks Postinjury

Christopher G. Vaughan, PsyD; Andrée-Anne Ledoux, PhD; Maegan D. Sady, PhD; Ken Tang, PhD; Keith Owen Yeates, PhD; Gurinder Sangha, MD; Martin H. Osmond, MD; Stephen B. Freedman, MD; Jocelyn Gravel, MD; Isabelle Gagnon, MD; William Craig, MD; Emma Burns, MD; Kathy Boutis, MD; Darcy Beer, MD; Gerard Gioia, PhD; Roger Zemek, MD; for the PERC 5P Concussion Team

EXPOSURE The independent variable was the number of days of school missed. Missing fewer than 3 days after concussion was defined as an early return to school.

MAIN OUTCOMES AND MEASURES The primary outcome was symptom burden at 14 days, measured with the Post-Concussion Symptom Inventory (PCSI). Symptom burden was defined as symptoms status at 14 days minus preinjury symptoms. Propensity score analyses applying inverse probability of treatment weighting were performed to estimate the relationship between the timing of return to school and symptom burden.

CONCLUSIONS AND RELEVANCE In this cohort study of youth aged 5 to 18 years, these results supported the growing belief that prolonged absences from school and other life activities after a concussion may be detrimental to recovery. An early return to school may be associated with a lower symptom burden and, ultimately, faster recovery.

JAMA Network Open. 2023;6(1):e2251839. doi:10.1001/jamanetworkopen.2022.51839

Key Points

Question Is the timing of return to school after concussion associated with symptom burden at 14 days postinjury?

Findings In this cohort study, analysis of data collected from a multicenter sample of youth aged 5 to 18 years with concussion showed that older youth missed more days of school, on average, than younger youth. An early return to school was associated with a lower symptom burden at 14 days postinjury in the 8- to 12-year age group and 13- to 18-year age group.

Meaning These findings suggest that prolonged absence from school after a concussion is associated with a greater symptom burden and may be detrimental to recovery.

Children's National

Contents lists available at ScienceDirect

Seminars in Pediatric Neurology

journal homepage: www.elsevier.com/locate/spen

Return-to-school protocols in pediatric concussion care

Talin Babikian [a,*], Madison Harris [b], Elvina Chow [a], Gerard A. Gioia [c], Christopher G. Vaughan [d]

[a] University of California, 760 Westwood Blvd., Rm C8-849, Los Angeles, CA 90095, USA
[b] University of California, 924 Westwood Blvd., Suite 400, Los Angeles, CA 90095, USA
[c] Children's National Hospital, George Washington University, 15245 Shady Grove Road, Suite 350, Rockville, MD 20850, USA
[d] Children's National Hospital, 15245 Shady Grove Road, Suite 350, Rockville, MD 20850, USA

Children's National.

Implementation Checklist for returning student to school

1. **Initiate Early, Supported School Return** - Most youth can return to school within 1–2 days of injury as tolerated.[1,25] Early return reduces risk of prolonged symptoms and improves emotional and academic outcomes.[2,27] Full removal from school or assignment of complete cognitive rest ("cocooning") is not supported by evidence and may worsen anxiety and functional impairment.[36,40] Instead, clinicians should recommend partial attendance or modified days initially, matched to symptom tolerance, with progressive increases in cognitive load as symptoms improve.[21,27]
2. **Link Accommodations to Symptom Clusters** - Symptoms predict school difficulty and should direct targeted strategies.[8,30]

Children's National.

3. Adjust Workload to Prevent Cumulative Stress - Fear of falling behind is a major barrier to recovery and can worsen anxiety, avoidance, and symptom exacerbation.[42,43] Evidence indicates that reduced workload, rather than complete excusal, is associated with better academic continuity and emotional outcomes.[27,29] Clinicians should recommend:

- Prioritizing essential assignments only, focus on demonstrating mastery rather than completing all assignments, can be creative about how mastery is demonstrated by way of special projects, reports, or examinations.
- Limiting homework minutes per night
- Delaying high-stakes tests
- Allowing rest breaks before symptom escalation

4. Integrate Physical Activity Strategically - Symptom-limited, light-intensity physical activity early in recovery is safe and improves outcomes.[36,45] Excessive inactivity or strict rest may delay recovery.[40] Students should be encouraged to take light walking breaks, lightly engage in symptom-provoking exertion, and reintroduce PE gradually. For those with autonomic dysfunction or exercise intolerance, graded sub-symptom exercise is beneficial and should be guided by rehabilitation professionals.[46]

5. Use a Multidisciplinary Model - Multidisciplinary assessment identifies functional impairments missed by single-discipline approaches.[37,41]

6. Account for Developmental and Contextual Factors - Academic demands and symptom expression differ across school levels. High school students often report greater math and computer-based task difficulty, while college students face higher reading burdens and self-management challenges.[32,43] Younger students may require more environmental regulation (noise, light) and more structured breaks.[12] Social determinants, including SES and racial context, shape access to accommodations and care pathways.[50,51]

Children's National.

7. Ensure Clear, Actionable Communication - Consistent with McAvoy et al [21], the return to school/academic planning should involve the student, family, clinician, school nurse, teachers, and counselors. Communication reduces confusion, supports self-advocacy, and ensures modifications are implemented with fidelity.[28,29] Clinicians should provide clear, actionable academic adjustment letters tailored to symptom clusters. These letters should translate broad restrictions (e.g., 'limit cognitive exertion') into specific, observable school strategies that directly match the functional deficits.

Table 1
Symptom-linked, age-banded return to school participation accommodations after pediatric concussion.

Symptom Cluster	Common Difficulties at School	Early Elementary (K–2)	Upper Elementary (3–5)	Middle & High School	College / Young Adult*
Headache, fatigue, slowed processing	Sustaining attention; mental endurance; completing assignments; worsening symptoms over the school day	Shortened school day; 10–15 min work blocks with rest breaks; reduced writing demands	Structured pacing (20 min work/10 min rest); reduced homework; extra time for tests; quiet rest space	Prioritized workload; flexible deadlines; no more than one major test/day; permitted breaks	Reduced course load; extended time; flexible deadlines; asynchronous participation options
Visual or vestibular symptoms	Reading; copying from board; screen use; navigating hallways	Read-aloud instructions; minimal screen exposure; seating close to teacher; reduced visual complexity	Larger print; printed notes; limited copying; shortened reading periods	Copies of slides/notes; reduced screen load; gradual reintroduction of reading; preferential seating	Adjustable font sizes; note-sharing; limited online testing; reduced screen-heavy coursework
Light or noise sensitivity	Bright classrooms; assemblies; cafeteria; band or music rooms	Dimmed lighting; quiet space for transitions	Flexible seating; access to headphones; avoidance of loud events early in recovery	Sunglasses/hat for transitions; quiet lunch option; modified rehearsal participation	Quiet study environments; flexible seating in large lecture halls; avoid large gatherings early on
Sleep disturbance, morning fatigue	Early classes; morning tests; difficulty sustaining attention	Later arrival; quiet rest space	Avoid early tests; reduced homework load	Temporary late start; structured homework pacing; reduced extracurricular load in beginning	Adjusted class schedule; avoidance of early morning courses; extended deadlines

Table 1 cont.

Mood symptoms (irritability, anxiety, depression)	Test stress; peer interactions; fear of falling behind; reduced self-efficacy	Predictable routines; reassurance; simplified expectations	Counselor check-ins; clarified essential vs. excused work	Mental health support; modified testing load; transparent make-up policies	Mental health services; coordination with disability services
Executive dysfunction, organization problems	Tracking assignments; managing multiple classes; planning and prioritizing work	Visual schedules; assisted transitions	Homework folder; assignment checklists	Digital planner; task prioritization support; reduced multi-project load	Syllabus review; planning tools; academic coaching
Social overload or anxiety	Busy hallways; cafeteria; recess; group work	Shorter exposure periods; structured small-group play	Quiet lunch option; supervised re-entry to recess	Staged exposure to large environments; alternatives to assemblies	Flexible attendance; gradual reintegration into clubs
Physical activity intolerance (PE/ sports)	Running; drills; exertion; competitive play	Walking instead of running; modified PE; increased supervision during recess or modified/no sports during recess	Reduced intensity tasks; supervised pacing; increased supervision during recess or modified/no sports during recess	Symptom-limited participation; non-contact drills	Temporary exemption; graded RTP coordination

* While not considered a formal academic accommodation, discussion with college students about substances/alcohol related behaviors and the interaction this may have with concussion symptoms may be an important component of the return to school/academic process.

Children's National

How Do I Know What Difficulties the Student might be having?

*Concussion Learning Assessment & School Survey, 3rd Ed.

Dimensional rating scale that quantifies:

- **Overall concern** that the injury will affect learning & performance (General Academic Concern)
- **Possible academic problems** in the school/ homework settings (Academic Problems scale)
- **School-related stresses** experienced by student (School Stresses)
- **Academic subjects** impacted (Academic Subjects)

*Stemming from Ransom et al 2015/2026 - CLASS-3

Children's National.

School-focused Concussion Symptom Assessment

Check for updates

Identifying School Challenges Following Concussion: Psychometric Evidence for the Concussion Learning Assessment & School Survey, 3rd Ed. (CLASS-3)

Gerard A. Gioia[1] · Talin Babikian[2] · Bradley J. Barney[3] · Sara P. D. Chrisman[4] · Lawrence J. Cook[3] · Nyaz Didehbani[5] · Rachel Richards[6] · Maegan D. Sady[1] · Erin Stolz[7] · Christopher Vaughan[1] · Frederick Rivara[8] · Christopher Giza[9]

Received: 31 August 2020 / Revised: 9 September 2020 / Accepted: 16 September 2020
© American Academy of Pediatric Neuropsychology 2020

Abstract

Challenges with school learning following a concussion have become recognized more so over the past decade. Evidence-based assessment tools to identify these clinical problems and needs can facilitate critical supports for the recovering student. The Concussion Learning Assessment & School Survey, 3rd Edition (CLASS-3), developed to address this need, was administered to student participants ($n = 390$, ages 10–18 years) and their parents ($n = 132$, ages 5–18 years). We present sources of psychometric evidence regarding the reliability/precision and validity/accuracy in support of the interpretation of th[illegible]ur CLASS-3 scale

PROOF

Children's National

Concussion Learning Assessment & School Survey (CLASS) Self-report

2. Think about the past few days and tell us whether the following school problems are worse **because of your concussion**.

	0-42 scale	Not Worse/ Not a problem	A little Worse	Somewhat Worse	A lot Worse
a	Difficulty taking notes	☐	☐	☐	☐
b	Difficulty understanding new material	☐	☐	☐	☐
c	In class, work taking longer	☐	☐	☐	☐
d	Homework taking longer	☐	☐	☐	☐
e	Difficulty studying for tests or quizzes	☐	☐	☐	☐
f	Trouble remembering what was studied	☐	☐	☐	☐
g	Trouble reading	☐	☐	☐	☐
h	Easily distracted during classwork	☐	☐	☐	☐
i	Easily distracted during homework	☐	☐	☐	☐
j	Headaches interfering with classwork	☐	☐	☐	☐
k	Headaches interfering with homework	☐	☐	☐	☐
l	Tiring easily during the school day	☐	☐	☐	☐
m	Tiring easily during homework	☐	☐	☐	☐
n	Easily bothered by lights/ screens or noise	☐	☐	☐	☐

5. Please check one column for each of the following supports to indicate which supports you need and/ or are receiving ***because of your concussion***.

Support	**Do you need it?**				**Do you have it?**			
	No	Yes	I Don't Know		No	Yes, but not enough	Yes	I Don't Know
Shortened day								
Shorter classes								
Rest breaks								
Extra time to complete work								
No tests								
Modified tests (shorter length, more time, no screens, etc.)								
Current work reduced or waived								
Makeup work reduced or waived								
Coordinated plan for makeup work								
Other:								

Academic Progress Monitoring

- Students with concussions do improve over time
- Need for academic supports will decrease in proportion to their recovering symptoms
- Critical necessity to regularly monitor (a) symptoms using a standardized symptom scale, (b) academic manifestations via measure like the CLASS-3.
- Adjust the number and intensity of supports accordingly. For example,
  - Number of rest breaks for headache, fatigue
  - Extra time for attentional problems, slow performance
  - Need for sunglasses, ear plugs, early class dismissal for overstimulation
  - Emotional supports for frustration, anxiety

Supporting Recovery

Physical

- Headache
- Fatigue
- Visual problems (blurry/"double")
- Nausea/vomiting
- Balan
-
- ss/tingling

Sleep

- Sleeping more/less
- Trouble falling asleep
- Drowsiness

Cognitive

- Mental fogginess
- Difficulty concentrating
- bering
- own

Emotional

- More emotional
- Irritable
- Sad
- Nervous

Targets for Supports

Children's National

Symptom Targeted Academic Management Plan (STAMP)

Below, please see the symptoms they are currently experiencing. To promote recovery, the student will be provided with the following classroom accommodations that support their academic learning and performance:

Symptom (check)	**Functional school problem**	**Accommodation/ management strategy** (select)
Cognitive Symptoms		
Attention & concentration difficulties	Short focus on lecture, classwork, homework	___ Shorter assignments (odd/even problems, requiring outline or bullet points instead of full written responses) ___ Break down tasks and tests into chunks/segments ___ ~~Lighter work load: Max. nightly homework (including studying): ___ min~~
Working memory (short-term memory)	Trouble holding instructions, lecture, reading material, thoughts in mind during tasks	___ Repetition ___ Written instructions ___ Provide student with teacher generated class notes
Memory consolidation/ retrieval	Retaining new information Accessing learned information	___ Smaller chunks/segments to learn, repetition ___ Recognition cues
Processing speed	Slower reading/writing/calculation Difficulty processing verbal information effectively	___ Allowances for extended time to complete coursework, assignments, tests ___ Reduce/slowdown verbal information and check for comprehension
Cognitive Fatigue/ Fogginess	Decreased arousal, mental energy; trouble thinking clearly, formulating thoughts	___ Rest breaks during classes ___ Homework, and examinations in quiet location
Physical Symptoms		
Headaches	Interferes with concentration Increased irritability	___ Intersperse rest breaks, shortened day if symptom does not subside ___ Allow for short naps in quiet location (e.g., nurse's office)
Light/ noise sensitivity		
Dizziness/ balance/ nausea		
Sleep disturbance	Decreased arousal, shifted sleep schedule, trouble falling asleep	___ ~~Later start time~~ ___ Shortened day or rest breaks
Fatigue	Lack of energy	___ Periodic rest breaks, short naps in quiet location ___ Passive participation
Emotional Symptoms		

Targets for Student Support and Treatment

Increasing Confidence in Controlling Active Recovery - (Self-Efficacy) Key Messages

You will get better.

You will improve and recover.

You have control of your activity.

Your efforts to control your activity and time will pay off.

Find your “sweet spot” of activity.

You will learn self-control.

Children's National.

Stay Active and…

“Use your symptoms as your guide

“Not Too Little, Not Too Much”

“Take your day in doses”

Questions (and answers) to ask medical providers and parents to support student learning and recovery

Medical:

1. What is the injured student's initial symptom status upon return to school?

2. Can the school have "regular" communication (questions, feedback) with the medical staff about student progress/ symptom response? (via app email?)

Parents:

1. How is the student feeling after a full day of school? (How ya doin'? Fatigue level, stress and/or emotional concerns, headaches, troubles concentrating on HW?

Key things teachers/ school staff need to know

1. Empathize/ support: “If you stuck your head out into the street and a car going 20-30 miles per hour hit your head, how would you feel going back to work?” That’s what the student is dealing with.
2. Take it slow initially up return, check in with the student
3. Know/ offer the range of symptom-specific supports/ accommodations
4. Build confidence and control in the student

Summary

- Concussion assessment, diagnosis and management has advanced substantially over the past two decades with evidence-based guidelines
- Although a “clinical diagnosis,” specific criteria assist the clinician
- Evidence-based tools are available to assess: symptoms, executive dysfunction, academic challenges, self-confidence in recovery
- Early education of the patient, and guidance on an active rehabilitation model (safe, gradual return to life activities) has evidence and should be the norm
- Return to school can be particularly challenging for the returning student, with evidence indicating benefits for:
  - Return after only several days
  - Structured, monitored approach supporting gradual return to academics

So you think you might have a concussion?

- How do you know?
- What do you do?
- What should you look for?

Children's National.



SCORE for Brain Health

SCORE 4 Brain Health

Children's National Medical Center

“SCORE4BrainHealth” app

About SCORE 4 Brain Health

The SCORE 4 Brain Health app is a tool that offers three important elements of concussion recognition and response:

1. **Incidents:** Initial recognition of a suspected concussion with guidance regarding the next important steps to take to receive appropriate care,

2. **Track:** If a concussion has been suspected (or diagnosed by a healthcare provider), tracking the symptoms over time to assist in the recovery management of the injury, and

3. **Learn:** Access to a library of information to educate the user about concussion and ways to assist the recovery process.

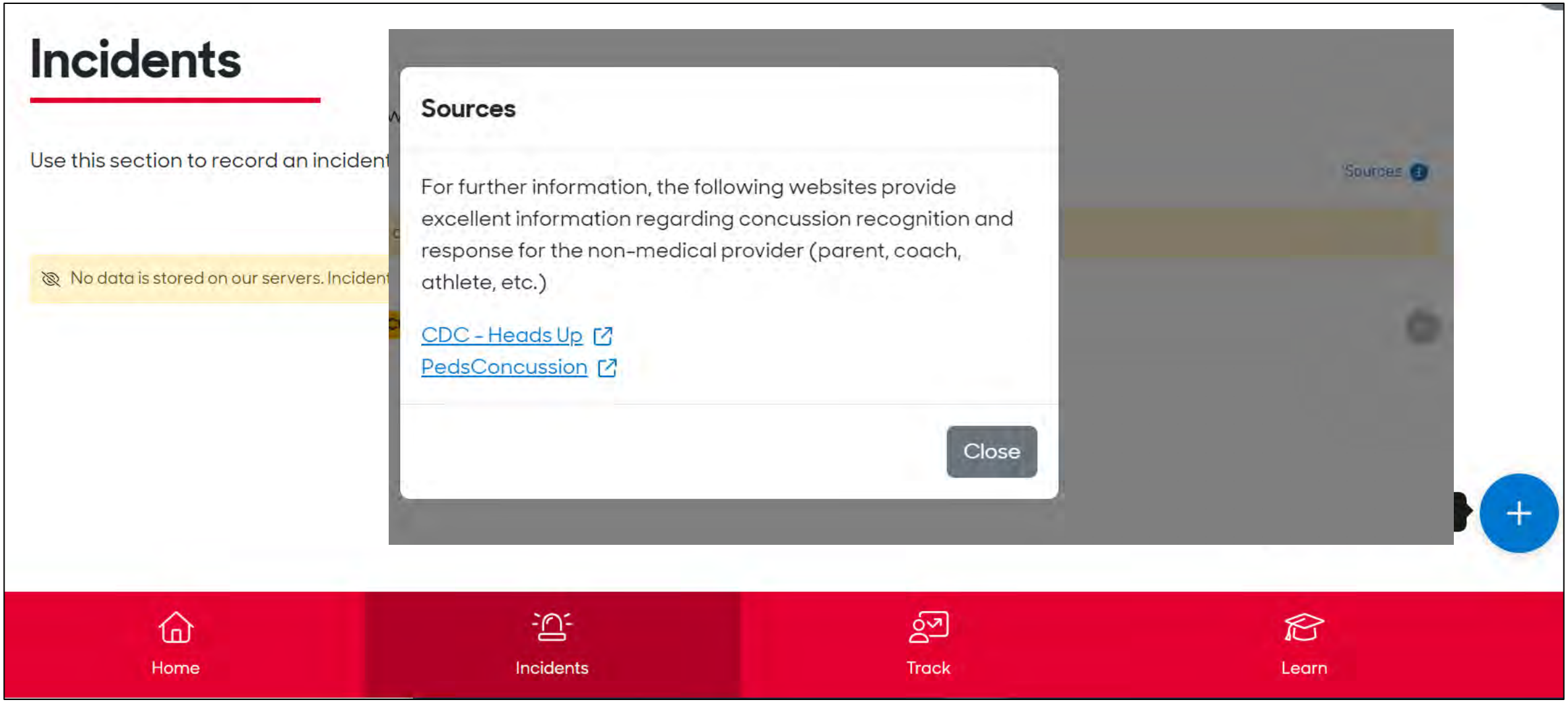
The app can be used for persons of any age from infant/preschoool to adult.

No data is stored on our servers. Data is only stored on your device, unless you choose to share with someone else.



Children's National

Recognition of possible injury



Children's National



Instructions: Rate your observations of these symptoms any more than usual since the injury.

0 = No more than usual 1 = A little more 2 = A lot more

1	Appears to have headaches/ head hurts	0	1	2
2	Appears sick to their stomach or nauseous	0	1	2
3	Has less of an appetite	0	1	2
4	Appears dizzy, unsteady	0	1	2
5	Appears to have balance problems, or falling more	0	1	2
6	Having more trouble paying attention in play	0	1	2
7	Bright lights bothering more than usual	0	1	2
8	Loud noises bothering more than usual	0	1	2
9	Appears sad	0	1	2
10	Is grumpy or irritable	0	1	2
11	Is less playful, socially engaging or interactive	0	1	2
12	Moving more slowly	0	1	2
13	Appears more tired during the day, lower energy than usual	0	1	2
14	Appears more drowsy or sleepy than usual	0	1	2
15	Napping or sleeping more than usual	0	1	2
	Total Symptom Score			

Children's National.

Incident - Johnnie

Step 16 of 17

About the injured person

First Name *	Johnnie
Last Name	Cash
Age	12
Sex	Male

Children's National.

Incident

Step 3 of 17

To help recognize a concussion, you should watch for and ask others to report the following **TWO THINGS**

1. A forceful bump, hit, or jolt to the head or body that results in rapid movement of the head.
2. A change in the person's behavior, thinking, or physical functioning.

The next screens will help you recognize and respond to a suspected concussion.

Incident

Step 5 of 17

You have indicated a likely hit to the head. Next, assess the person for possible **SIGNS** (what you see) or **SYMPTOMS** (what they tell you).

Children's National.

Recording observed “signs” and reported “symptoms”

SYMPTOMS

Respond to all the symptoms with a Y or N

Talk with the person. Ask if they are experiencing any of these symptoms **any more than usual**.

Headache/pressure in head	Y	N
Nausea or vomiting	Y	N
Balance problems	Y	N
iness	Y	
Fatigue or feeling more tired than usual	Y	N

Children's National.

Algorithm for suspected concussion: “Blow” plus sign(s)/symptom(s)

Concussion Suspected

Sources

You indicated that there was a likely **hit to the head** and **23 SIGNS or SYMPTOMS** were reported.

Remove the person from any risk activity (e.g., game or situation where re-injury could occur) and restrict participation until they receive written medical clearance to return.

1. Inform parent/caregiver, family member or healthcare provider of suspected concussion.
2. Recommend further medical evaluation.
3. At the end of this report, you will be able to share recommended early guidance with parent/caregiver, family member, and/or healthcare provider.
4. The person should be observed over next 24 hours. Do not leave him or her alone. It is OK for the person to fall asleep but check that they are responsive.

In the first 24 hours, instruct the caretaker to review and record symptoms every few hours while the person is awake, and observe for danger signs.

Children's National

Tracking/ Monitoring symptoms over time

Track - Johnnie

02:47pm 05/31/2024

Step 3 of 5

Cognitive Symptoms

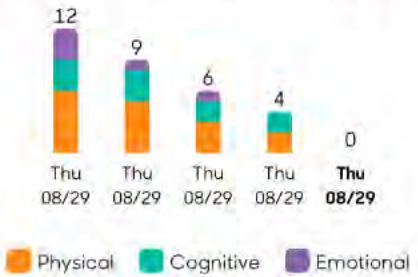
Mark whether each symptom is present Yes (Y) more than usual or No (N), not more than usual.

Difficulty concentrating	**Y**	N
Difficulty remembering	Y	**N**
ng foggy or groggy	**Y**	
Feeling slowed down	Y	**N**

Children's National

SCORE for Brain Health

Symptom tracking: Johnny Sample



06:31 PM Thursday, 08/29/2024

- Headache/pressure in head
- Balance problems
- Dizziness
- Blurry or double vision
- Fatigue
- Sensitivity to light or noise
- Difficulty concentrating
- Feeling foggy or groggy
- Feeling slowed down
- Irritable
- More emotional
- Does not "feel right"

Recorded by Father

06:33 PM Thursday, 08/29/2024

- Headache/pressure in head
- Fatigue
- Feeling foggy or groggy
- Feeling slowed down

Recorded by Father

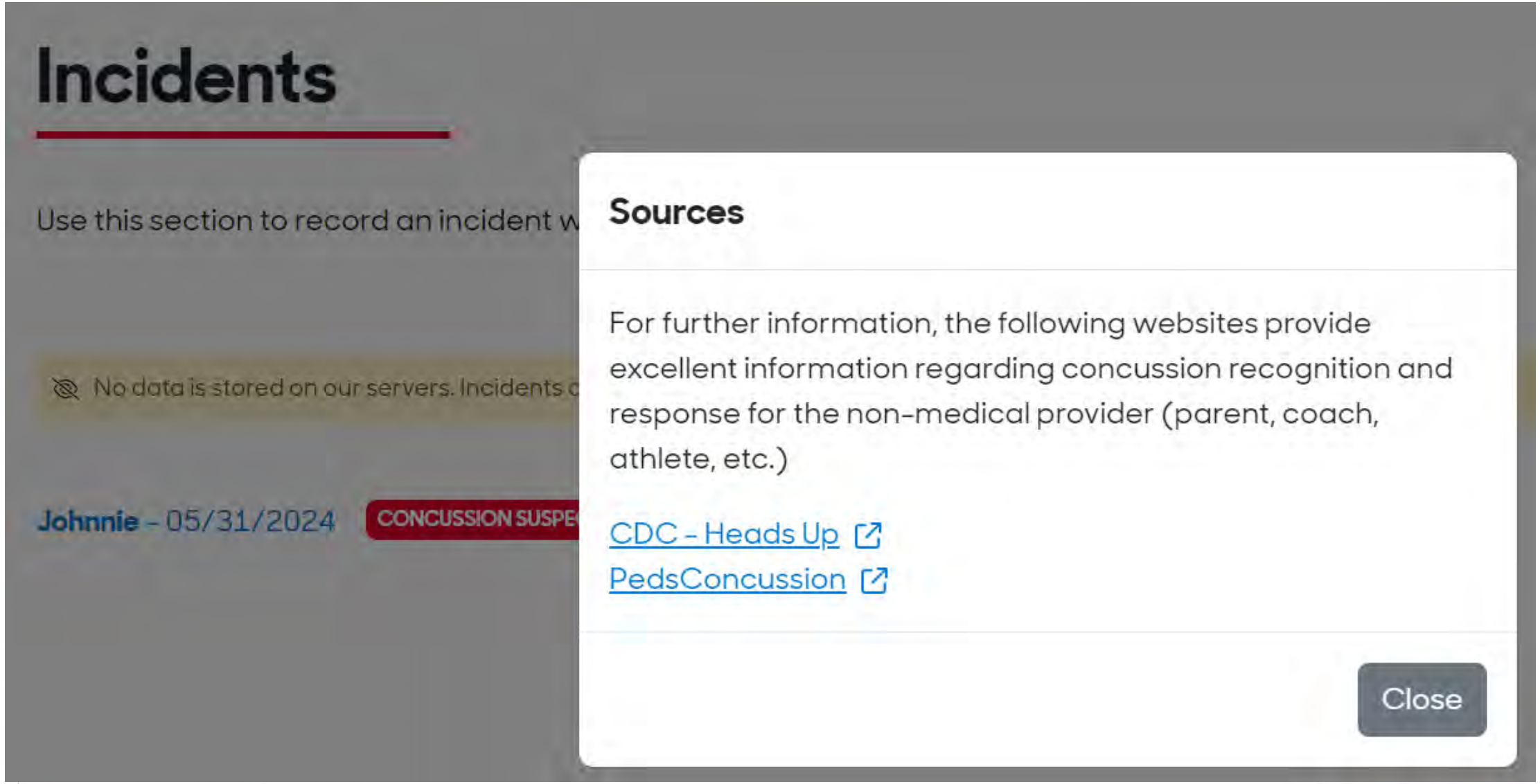
06:34 PM Thursday, 08/29/2024

No symptoms recorded

Recorded by Father

Children's National

Educational Resources



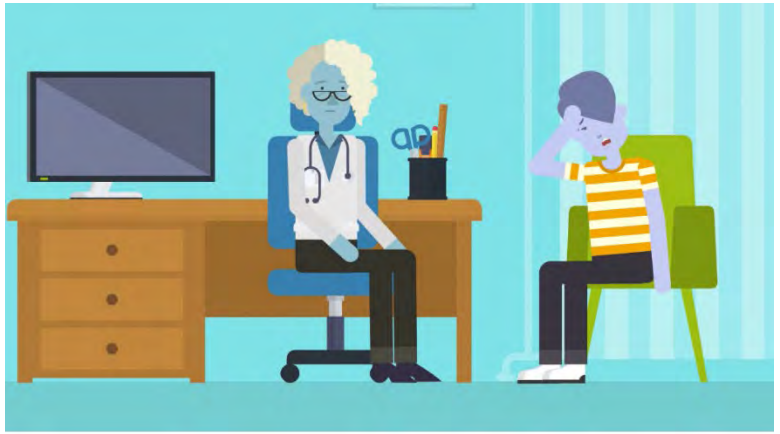
Children's National

Educational Resources

Video Education

- Teaching children and parents about their injury and an active approach to recovery provides basis to take control
- Seven animated videos detailing concussion and its management provides guidance for patients, families, and school personnel over the course of recovery





Children's National

Educational Resources

onTRACK

Online Treatment Recovery Assistance for Concussion in Kids



TIP SHEETS

MODULE 1

WHAT IS A CONCUSSION?

When - Day 1 after the injury

Learn about concussion, how it occurs, the types of symptoms kids experience and general guidelines about managing recovery.

2 minutes 17 seconds

MODULE 2

MANAGE YOUR RECOVERY: BALANCE YOUR ACTIVITY & ENERGY WITH THE 3 P's

When - Day 2-3

Over the first few days after a concussion, gradually reintroduce activity, using the 3 Ps – Plan, Prioritize and Pace. It's important to balance your activity level: not too much and not too little.

2 minutes 24 seconds

MODULE 3

MANAGE YOUR RECOVERY: GET MOVING & GET BETTER!

When - Day 2-3

Learn more about how to use the 3 Ps to guide your recovery. Using your symptoms as guide, you can start everyday activities (exercise, schoolwork, seeing friends).

2 minutes 19 second

MODULE 7

WHAT TO DO WHEN RECOVERY GOES SLOWLY

When - if symptoms persist for over 3 weeks

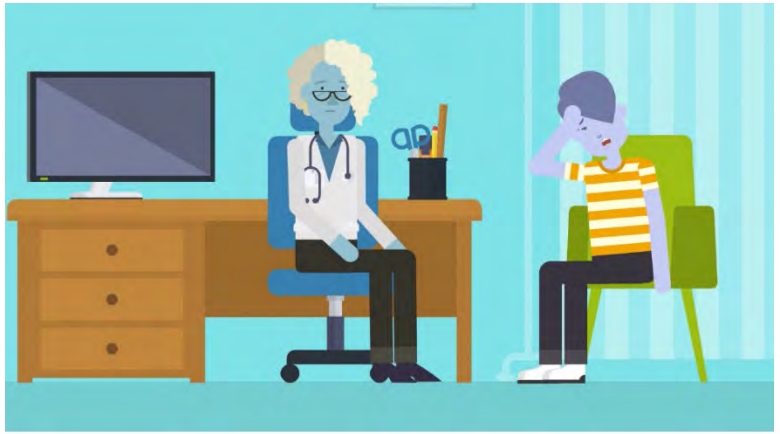
If symptoms persist for more than 3 weeks, you may want to see a specialist.

3 minutes 1 second

Video Education

- Teaching children and parents about their injury and an active approach to recovery provides basis to take control
- Seven animated videos detailing concussion and its management provides guidance for patients, families, and school personnel over the course of recovery





Children's National

onTRACK

onTRACK

Online Treatment Recovery Assistance for Concussion in Kids



TIP SHEETS

MODULE 1

WHAT IS A CONCUSSION?

When - Day 1 after the injury

Learn about concussion, how it occurs, the types of symptoms kids experience and general guidelines about managing recovery.

2 minutes 17 seconds

MODULE 2

MANAGE YOUR RECOVERY:
BALANCE YOUR ACTIVITY & ENERGY WITH THE 3 P's

When - Day 2-3

Over the first few days after a concussion, gradually reintroduce activity, using the 3 Ps – Plan, Prioritize and Pace. It's important to balance your activity level: not too much and not too little.

2 minutes 24 seconds

MODULE 3

MANAGE YOUR RECOVERY:
GET MOVING & GET BETTER!

When - Day 2-3

Learn more about how to use the 3 Ps to guide your recovery. Using your symptoms as guide, you can start everyday activities (exercise, schoolwork, seeing friends).

2 minutes 19 second

MODULE 7

WHAT TO DO WHEN RECOVERY GOES SLOWLY

When - if symptoms persist for over 3 weeks

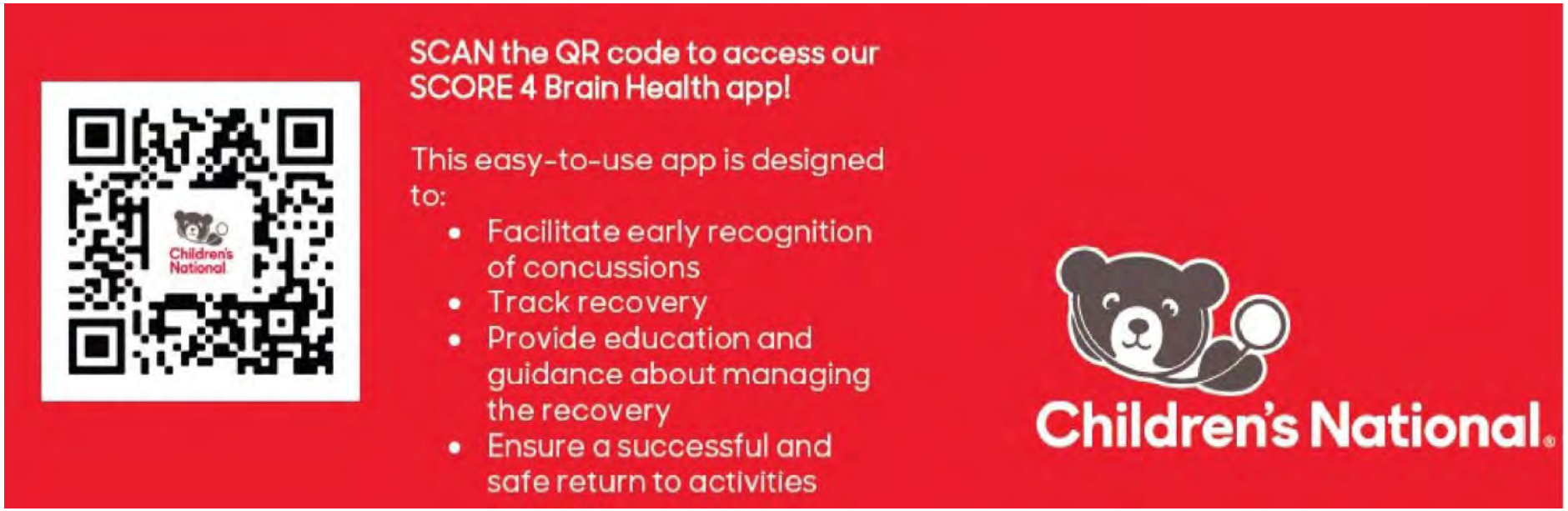
If symptoms persist for more than 3 weeks, you may want to see a specialist.

3 minutes 1 second

Accessing the videos and tip sheets

https://ontrack.cbirt.org/

Feel free to access and use!



Children's National

Thank You!

ggioia@childrensnational.org



References

Davis, GA, Anderson, V, Babl,FE, Gioia,GA, Giza, C, Meehan,W, Moser,RS, Purcell,L, Schatz,P, Schneider, KJ, Takagi,M, Yeates,KO, Zemek,R (2017) What is the difference in concussion management in children as compared with adults? A systematic review. Br J Sports Med. Published Online First. 4/28/2017. doi:10.1136/bjsports-2016-097415.

Gioia, G.A. (2018) Return to school: When and how should return to school be organized after a concussion? I. Gagnon & A. Ptito (Eds.) Sports Concussions : A Complete Guide to Recovery and Management. New York : CRC Press.

Gioia, GA. Medical-School Partnership in Guiding Return to School Following Mild Traumatic Brain Injury in Youth. (2015) *Journal of Child Neurology*. DOI: 10.1177/0883073814555604.

Gioia**,** GA, Glang, AE, Hooper, SR, & Eagan-Brown, B. (2015). Building statewide infrastructure for the academic support of students with mild traumatic brain injury. *Journal of Head Trauma Rehabilitation. DOI: 10.1097/HTR.0000000000000205.*

References

Gioia, GA (2012) Pediatric Assessment and Management of Concussions. *Pediatric Annals*, 41(5), 198-203.

Iverson G, Gagnon I, Greisbach GS. Active rehabilitation for slow to recover children. In: Kirkwood M, Yeates KO, editors. *Mild traumatic brain injury in children and adolescents*. New York: Guilford Press; 2012. p 281–302.

Leddy JJ, Willer B. Use of graded exercise testing in concussion and return-to-activity management. *Current*

Lumba-Brown, A, Yeates, KO, Sarmiento, K, Breiding, MJ, Haegerich, TM, Gioia, GA, et al. (2018) Centers for Disease Control and Prevention Guideline on the Diagnosis and Management of Mild Traumatic Brain Injury Among Children. (2018) *JAMA Pediatrics. doi:10.1001/jamapediatrics.2018.2853.*

Purcell, L., Davis, G. & Gioia, G (2018) What factors must be considered in 'return to school' following concussion and what strategies or accommodations should be followed? A systematic review. *British Journal of Sports Medicine. Epub ahead of print. 3/5/2018, doi:10.1136/bjsports-2017-097853*

Ransom, DM, Vaughan, CG, Pratson, L, Sady, MD, McGill, CA, Gioia, GA. Academic Effects of Concussion in Children and Adolescents (2015) *Pediatrics. 135(6):1043-50. doi: 10.1542/peds.2014-3434. Epub 2015 May 11. PMID: 25963014*

References

Ransom DM, Burns A, Youngstrom EA, Sady MD, Vaughan CG, & Gioia GA. (2016). Applying an Evidence-Based Assessment Model to Identify Students at Risk for Perceived Academic Problems following Concussion. Journal of the International Neuropsychological Society, 22(10): 1038-1049.

Silverberg ND, Iverson GL, Caplan B, Bogner J. Is rest after concussion 'The Best Medicine?' Recommendations for activity resumption following concussion in athletes, civilians, and military service members. *Journal of Head Trauma Rehabilitation* 2013;28: 250–259.

Sady, M, Vaughan, C & Gioia, G (2018) Measuring Dynamic Symptom Response in Concussion: Children's Exertional Effects Rating Scale. *Journal of Head Trauma Rehabilitation, DOI: 10.1097/HTR.0000000000000424.*