

# PedsConcussion

— LIVING GUIDELINE FOR —  
PEDIATRIC CONCUSSION CARE



[www.pedsconcussion.com](http://www.pedsconcussion.com)

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# DISCLAIMER:

The recommendations and resources found within the Living Guideline for Pediatric Concussion Care are intended to inform and instruct care providers and other stakeholders who deliver services to children and youth who have sustained or are suspected of having sustained a concussion. This guideline is not intended for use with patients or clients over the age of 18 years. It is not for self-diagnosis or treatment. Patient, parents, and/or caregivers may wish to bring their healthcare and other providers' attention to this guideline.

The best available evidence has informed the recommendations in this document, and relevant evidence published after this guideline could influence the recommendations made within. Healthcare professionals should also consider their own judgment, the preferences of their patients, and factors such as the availability of resources in their decisions.

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# GUIDELINE OVERVIEW

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# RECOMMENDATIONS

## Section A: Concussion

### Recognition, Initial Medical Assessment, and Management

#### Introduction:

Concussion is a condition that exists along a clinical-pathological spectrum of traumatic brain injury (TBI) and can result in non-specific physical, cognitive, sleep, and emotional symptoms. To provide a comprehensive medical assessment in a patient with acute head and neck trauma, a more severe form of TBI, cervical spine injury, medical conditions, mental health conditions, and neurological conditions that can present with non-specific neurological symptoms including red flags must be ruled out. This requires a comprehensive clinical history, a comprehensive physical examination, ordering and interpreting necessary diagnostic tests, and initiating referrals to medical specialists and healthcare professionals as needed. Patients diagnosed with a concussion must be provided with education and guidance on how to manage their symptoms and how to make a safe and graduate return-to-school/activity/sport and work.

The majority of children and adolescents with an acute concussion will experience symptom resolution and a return to daily activities within 1-4 weeks'. Those with prolonged symptoms (symptoms that last more than 4 weeks following the acute injury) can benefit from a referral to interdisciplinary teams and experienced healthcare professionals who are optimally trained to evaluate and treat the heterogeneous causes of these symptoms. For those at risk of a prolonged recovery, specialized interdisciplinary concussion care is ideally initiated within the first two weeks post-injury. When providing medical clearance to return to activities with a risk of future concussion, patients should be managed on an individualized basis. Interdisciplinary concussion teams may be recommended to manage recovery in situations in which patients have prolonged symptoms, complex medical histories, repeated concussions, or pre-injury conditions or diagnoses.

Medical and healthcare professionals should work together with patients, their families, and those involved in their lives (teachers, coaches, employers, friends, etc.) using a team and family-centred approach to best manage the needs of the patient after a concussion and promote positive health outcomes. Proper concussion recognition in children and adolescents requires all involved in a child/adolescent's life to be educated on the signs and symptoms of this condition and to collaborate to ensure that youth with suspected concussion are immediately removed from play or activity and directed to the most appropriate care. The following sections provide recommendations specific to concussion recognition, initial medical assessment, and management.



# Domain 1: Concussion Recognition and Directing to Care

## Introduction:

All school and sport stakeholders including students, athletes, parents, teachers, coaches, officials, and healthcare professionals play an important role in recognizing suspected concussions and supporting the child when returning to school, sport, work, and other activities.

Tool 1.1: [Pediatric Concussion – The Role of School Boards Community Sports Organizations and Centres](#)

Tool 1.2: [Concussion Recognition Tool 5](#)

Tool 1.3: [Manage Acute and Prolonged Symptoms Algorithm](#)

## Recommendations:

**1.1a School boards, sports organizations, and community centres should provide pre-season concussion education and conduct a review of all concussion policies in effect within the school or sport setting.**

**Level of Evidence: C**

**1.1b School boards, sports organizations, and community centres should ensure updated policies are in place to recognize and accommodate a child/adolescent who has sustained a concussion.**

Tool 1.1: [Pediatric Concussion – The Role of School Boards Community Sports Organizations and Centres](#)

**Level of Evidence: C**

**1.2 Remove the child/adolescent from the activity immediately if a concussion is suspected for immediate assessment and to avoid another injury.**

Do not leave the child alone and contact the parent/caregiver immediately. Do not let the child/adolescent return-to-sport (practice or game play) or other activities that day. “If in doubt, sit them out.”

A concussion should be suspected:

- In any child/adolescent who sustains a significant impact to the head, face, neck, or body and demonstrates/exhibits *any* of the visual signs of a suspected concussion or reports *any* symptoms of a suspected concussion as detailed in the [Concussion Recognition Tool 5](#) (Tool 1.2).

Premature return to activities and sport can lead to another injury. Another blow to the head may complicate the injury further and have a longer recovery time due to the higher risk of prolonged

symptoms. Severe brain swelling or cerebral edema after a concussion is very rare but potentially fatal.

Suggested concussion tools to share with teachers, coaches, parents, peers, and others

- Link: [Parachute Return to School Strategy](#) (handout) (Parachute)
- Link: [Concussion Ed – Parachute Concussion Education](#) (app from Parachute)
- Link: [PAR Concussion Recognition & Response: Concussion symptom recognition tool for coaches and parents](#) (app)
- Link: [CATT: Concussion Resources for School Professionals](#) (handout)

**Level of Evidence: B**

**1.3 Recommend an emergency medical assessment for a child/adolescent with any of the “red flag” symptoms.**

If a child/adolescent demonstrates any of the ‘Red Flags’ indicated by the [Concussion Recognition Tool 5](#), a more severe head or spine injury should be suspected and an emergency medical assessment is required. **These red flag symptoms may appear immediately or within a few hours or days after injury.** Delayed red flag symptoms also require urgent medical assessment as they may indicate a more severe injury. Consider arranging an ambulance service as necessary to facilitate urgent medical assessment at the nearest hospital and execution of the Emergency Action Plan for your organization. When calling an ambulance, describe the specific red flags symptoms over the phone.

**Red flag symptoms include:**

- Severe or increasing headache
- Neck pain or tenderness
- Double vision
- Weakness or numbness in arms/legs
- Seizure or convulsions
- Loss of consciousness
- Deteriorating conscious state
- Repeated vomiting
- Increasingly restless, agitated or combative state
- Slurred speech

Suggested tools to help identify “Red Flag” symptoms

- Tool 1.2 [Concussion Recognition Tool 5](#) (handout)
- Link: [Concussion Ed – Parachute Concussion Education](#) (app)
- Link : [PAR Concussion Recognition & Response](#) (app)

**Level of Evidence: B**

**1.4 Concussion should be suspected and diagnosed as soon as possible to maintain health and improve outcomes. Concussion can be suspected in the community by healthcare professionals, parents, teachers, coaches, and peers. Those with a suspected concussion should be assessed by a physician or nurse practitioner to perform a thorough medical assessment to exclude more severe injuries, consider a full differential diagnosis, and confirm the diagnosis of concussion.**

**It is important to note that some patients may experience a delayed onset of concussion symptoms. Delayed concussion symptoms also require medical assessment to exclude more severe injuries.**

Tool 1.3: [Manage Acute and Prolonged Symptoms Algorithm](#)

Symptoms may appear immediately or within several hours after injury

- A concussion is an evolving injury; symptoms may change over time

- See Recommendation 1.3: [Recommend emergency assessment for a child/adolescent with any of the “red flag” symptoms](#)

Suggested tools for the general community to suspect a concussion

- [Concussion Recognition Tool 5: To help identify concussion in children, adolescents and adults](#)

Suggested tools for experienced healthcare professionals to suspect a concussion:

- Link: Sport Concussion Recognition Tool 5 (SCAT5) for Children aged 5-12  
[English](#) / [French](#)
- Link: SCAT5 for Athletes aged 13+ [English](#) / [French](#)

**Level of Evidence: B**



## Domain 2: Initial Medical Assessment and Management

### Introduction:

A thorough medical assessment by a physician or nurse practitioner should be performed on all children and adolescents with a suspected concussion. This assessment includes a full differential diagnosis (ruling out: a more severe TBI, cervical spine injury, medical conditions, mental health conditions, and neurological conditions that can present with non-specific neurological symptoms including red flags) and a confirmation of the diagnosis of concussion. If a more severe injury or other conditions identified at initial assessment are suspected, emergent referrals should be made to appropriate healthcare professionals. Acute signs and symptoms should be considered in context with the child/adolescent's normal pre-injury performance, especially for those with learning and communication deficits, ADHD, and/or physical disabilities.

At the initial assessment, verbal and written information should be shared regarding the course of recovery and about when the child/adolescent can return-to-school/activity/sport and work. Patients and their parents and/or caregivers need to know that most patients recover fully from concussion even though the recovery rate is variable and unpredictable. Providing information reduces anxiety, helps set realistic expectations, promotes recovery, and prevents re-injury.

Some children/adolescents will continue to have symptoms at one month and beyond. In these situations, the healthcare professional should refer the patient to an interdisciplinary concussion team for individualized care that targets specific prolonged symptoms. Findings from the patient's clinical history and initial assessment can identify patients who may have an elevated risk of experiencing prolonged symptoms following concussion. Identifying patients at risk for delayed recovery in the acute stage allows for early supportive care, close monitoring for prolonged symptoms, and an opportunity to consider early referral (before 4-weeks post-acute injury) to an interdisciplinary concussion team. For those at risk of a prolonged recovery, specialized interdisciplinary concussion care is ideally initiated within the first two weeks post-injury.

Prolonged rest beyond the first 24-48 hours after a concussion is not recommended and may cause more harm than good. Return to physical and cognitive activity should be gradual and individualized based on activity tolerance and symptom presentation (e.g., the patient is able to engage in an activity without worsening of post-concussion symptoms). Complete absence from the school environment for more than one week is generally not recommended. The child/adolescent should gradually return to their school environment (with academic accommodations) as soon as they are able to tolerate engaging in cognitive activities without exacerbating their symptoms, even if they are still experiencing symptoms. Full-contact sport or high-risk activities where there is a risk for repeat concussion should be avoided until 1) post-concussion symptoms have subsided, 2) the child/adolescent has returned to full school activities without accommodations related to post-concussion symptoms, and 3) child/adolescent has medical clearance to return to full-contact sport and high-risk activities following the completion of a return-to-sport protocol.

Upon discharge from the initial assessment from the Emergency Department or Primary Care Provider (physician or nurse practitioner), families should be provided with written instructions which include

red flags to return for urgent re-assessment. Families should be informed that most patients recover fully from concussion even though the recovery rate is variable; this will help set realistic expectations, promote recovery and prevent re-injury.

- Tool 1.3: [Manage Acute and Prolonged Symptoms Algorithm](#)
- Tool 2.6: [Post-Concussion Information Sheet](#)

## Recommendations:

**2.1 Physicians or nurse practitioners should perform a comprehensive medical assessment on all children/adolescents with a suspected concussion or with acute head or spine trauma.**

Tool 1.3: [Manage Acute and Prolonged Symptoms Algorithm](#)

Include a clinical history, physical examination, and the evidence-based use of diagnostic tests or imaging as needed.

### **2.1a Take a comprehensive clinical history.**

Details that should be collected in the clinical history include:

- Patient demographics (e.g., age, sex, gender)
- Assess injury mechanism and symptoms at the time of injury
- Assess symptom burden at the time of initial presentation
  - Number of symptoms
  - Severity of symptoms
  - Type of symptoms
- Presence of loss of consciousness, post-traumatic amnesia, and red flags (seizures, neck pain, focal neurological deficits)
- Current post-concussion symptoms (using age-appropriate standardized symptom inventory)
- Review mental health (Domain 8: [Mental Health](#))
- Past medical history (e.g., previous concussions, migraine or non-specific headaches, mental health disorders, coagulopathy). Note the duration until recovery from previous concussions (i.e., within 7-10 days or prolonged).
- Allergies/immunizations
- Ask whether the child/adolescent is taking any substances or medications: Prescribed or over-the-counter medications or supplements, alcohol, or recreational drugs including cannabis. These substances may mask or modify concussion symptoms.
- Ask about school, activities, work, and sports participation

**Level of Evidence: B**

### **2.1b Note common modifiers that may delay recovery and use a clinical risk score to predict risk of prolonged symptoms.**

Link: [Predicting Persistent Post-Concussive Problems in Pediatrics \(5P\): Score Calculator](#)

Modifiers that may delay recovery:

- Age (increased risk with increased age).
- Sex (female).
- Duration of recovery from a previous concussion.
- High pre-injury symptom burden.
- High symptom burden at initial presentation.
- Clinical evidence of vestibular or oculomotor dysfunction.
- Vestibular-Ocular Reflex (VOR) and tandem gait parameters.
- Orthostatic intolerance.

- Personal and family history of migraines.
- History of learning or behavioural difficulties.
- Personal and family history of mental health.
- Family socioeconomic status/education.

**Level of Evidence: A**

### **2.1c Perform a comprehensive physical examination.**

Vital signs (resting heart rate and blood pressure)

- Level of consciousness (GCS)
- Mental status
- A complete neurological examination (cranial nerve, motor, sensory, reflex, cerebellar, gait and balance testing) (Tool 2.1: [Physical Examination](#))
- A cervical spine examination (palpation, range of motion, provocative cervical spine tests) (Tool 2.1: [Physical Examination](#))
- An examination of the visual and vestibular systems

Tools to consider:

- Link: SCAT5 for Children aged 5-12 [English](#) / [French](#)
- Link: SCAT5 for Athletes aged 13+ [English](#) / [French](#)
- Link: [Post-Concussion Symptom Inventory \(PCSI\) Self Assessment](#) (age 5-7, 8-12, age 13-18)
- Link: [CDC Pediatric mTBI Guideline Checklist](#)
- Link: [Heads Up to Health Care Professionals \(CDC\)](#)
- Link: [Acute Concussion Evaluation \(ACE\)](#).

**Level of Evidence: B**

### **2.1d Consider CT of the brain or cervical spine only in patients whom, after a medical assessment, a structural intracranial or cervical spine injury is suspected; do not conduct routine neuroimaging for the purpose of diagnosing concussion.**

Most children/adolescents who sustain an acute head injury or suspected concussion do not need diagnostic imaging.

Use the following tools, as appropriate, to determine the need for CT imaging in patients with acute head trauma:

- Tool 2.2: [PECARN Management Algorithm for Children after Head Trauma](#)
- Tool 2.3: [CATCH 2 Rule for children after head trauma](#)
- Tool 2.4: [Algorithm for the Management of the Pediatric Patient  \$\geq\$  2 Years With Minor Head Trauma](#)

Although validated clinical decision-making rules are highly sensitive, these tools are meant to assist but not replace clinical judgment. CT scans should be used judiciously as the exposure of children/adolescents to the effects of ionizing radiation carries a small increased lifetime risk of cancer. If a structural brain injury is suspected in a patient with acute head trauma undergoing initial medical assessment in the office setting, urgent referral to an Emergency Department should be arranged.

Diagnostic imaging of the spine should be considered when symptoms are suggestive of structural cervical spine injury. Imaging should be considered in patients with severe neck pain, tenderness or clinical evidence of radiculopathy or myelopathy. The choice of imaging modality (plain radiographs, CT or MRI of the cervical spine) should be guided by the suspected pathology.

Patients with positive traumatic findings observed on diagnostic imaging of the brain or spine should be urgently referred to a neurosurgeon for consultation.

**Level of Evidence: A- CT. B- MRI**

## **2.2 Provide verbal information and written (electronic) handouts regarding the course of recovery and when the child/adolescent can return to school/activity/sport/work.**

Consider the following anticipatory guidance (verbal reassurance) in order to reduce anxiety, set realistic expectations, promote recovery, and prevent re-injury:

- Most patients recover fully from concussion even though the recovery rate is variable and unpredictable.
- Current symptoms are expected and common.
- The burden and distress parents/caregivers of children/adolescents who have sustained a concussion may experience is common.
- Children typically recover in 1-4 weeks but some children/adolescents will have symptoms at one month and beyond and need to be monitored/seek additional care. Females aged 13-18 years have an increased risk of prolonged recovery.
- Recommendation 2.3 [Recommend graduated return to physical and cognitive activity](#)
- Domain 12: [Return-to-School and Work](#)

Summary of online tools to consider related to lifestyle strategies and expectations:

- Link: [Return to Activity Strategy](#) (CATT)
- Link: [Return to Sport Strategy](#) (CATT)
- Link: [After a Concussion: Return to Sport Strategy](#) (Parachute)
- Link: [Return-to-School Strategy](#) (CATT)
- Link: [HEADS UP Resources for Returning to School](#) (CDC)
- Link: [Return to School Strategy \(Parachute\)](#)
- Link: Advice for gradually resuming intellectual, physical and sports activities [English/ French](#) (INESSS)

**Level of Evidence: B**

## **2.3 Recommend graduated return to cognitive and physical activity to promote recovery.**

While most children/adolescents fully recover, the recovery rate can be variable. Return to physical and cognitive activity should be individualized based on activity tolerance and symptom presentation.

### **2.3a Recommend an initial 24-48 hour period of rest with limited physical and cognitive activity.**

**Level of Evidence: B- Gradual return to physical activity. C- Gradual return to cognitive activity.**

**2.3b Recommend that low to moderate level physical and cognitive activity be gradually started 24-48 hours after a concussion at a level that does not result in recurrence or exacerbation of symptoms. Activities that pose no/low risk of sustaining a concussion should be resumed even if**

**mild residual symptoms are present or whenever acute symptoms improve sufficiently to permit activity.**

Low to moderate level physical and cognitive activity:

- Avoid activities associated with a risk of contact, fall, or collisions ([Recommendation 2.3c](#)).
- Symptoms should be monitored carefully and activities that make symptoms worse should be avoided
- Child/adolescent should gradually increase exercise/activity that matches an improvement in symptoms
- Emphasize that spreading activities throughout the day helps patients achieve more and that they should avoid doing too much at once. Tool 2.5: [“Four P’s” – Prioritize, Plan, Pace, and Position](#)
- Domain 12: [Return-to-School and Work](#)
- Tool 2.6: [Post-Concussion Information Sheet](#) (includes a list of examples of low-risk activities)
- Link: [CATT Return to Sport Strategy](#) (CATT online; includes examples of low risk activities)

**Level of Evidence: B- Gradual return to physical activity. C- Gradual return to cognitive activity.**

**2.3c Recommend that patients avoid activities associated with a risk of contact, fall, or collisions such as high speed and/or contact activities and full-contact sport that may increase the risk of sustaining another concussion during the recovery period.**

Advise/emphasize that returning to full-contact sport or high-risk activities before the child/adolescent has recovered increases the risk of delayed recovery and for sustaining another more severe concussion or more serious injury.

**Level of Evidence: B**

**2.3d Refer select patients (e.g., highly-active or competitive athletes, those who are not tolerating a graduated return to physical activity, or those who are slow to recover) following acute injury to a medically supervised interdisciplinary team with the ability to individually assess sub-symptom threshold aerobic exercise tolerance and to prescribe aerobic exercise treatment. This exercise tolerance assessment can be as early as 48 hours following acute injury.**

**Level of Evidence: A**

**Patients who are active may benefit from referral to a medically supervised interdisciplinary team with the ability to individually assess sub-symptom threshold aerobic exercise tolerance and to prescribe aerobic exercise treatment. This exercise tolerance assessment can be as early as 48 hours following acute injury.**

**Level of Evidence: C**

**Links to exertion test resources:**

1. [Buffalo Concussion Treadmill Test \(BCTT\) – Instruction Manual](#)
2. [Buffalo Concussion Bike Test \(BCBT\) – Instruction Manual](#)
3. [Borg Rating of Perceived Exertion](#)
4. [Visual Analog Scale \(VAS\)](#)

**2.4 Provide education and guidance regarding strategies to promote recovery.**

**2.4a Advise on the importance of sleep and discuss sleep hygiene.**

Advise that consistent sleep schedules and duration of sleep may contribute to general recovery from a concussion and alleviate symptoms such as mood, anxiety, pain, fatigue, and cognitive difficulties if these are present.

Summary of tools to consider:

- Tool 2.7: [Strategies to Promote Good Sleep and Alertness](#)
- Link: [Sleep for Youth. CHEO Sleep Hygiene handout](#)
- Link: [Concussion Handbook](#) (Holland Bloorview Kids Rehabilitation Hospital)

**Level of Evidence: C**

**2.4b Advise on maintaining social networks and interactions as tolerated beyond a brief initial period of cognitive and physical rest (24-48 hours after injury).**

Beyond a brief initial period of cognitive and physical rest, 24-48 hours after injury, children/adolescents should participate in rewarding social activities, modified as needed, while staying below their symptom-exacerbation thresholds and avoiding risk for re-injury. There is evidence that reducing the risk of social isolation and mental health issues may promote recovery.

- Identify these activities and suggest modifications as appropriate.
- Educate on the principle that participation in rewarding social activities in the presence of residual or prolonged symptoms may have to be limited so that they do not result in a recurrence or exacerbation of symptoms.

**Level of Evidence: B**

**2.4c Advise on the use of computers, phones, and other devices with screens. Beyond an initial period of cognitive and physical rest (24-48 hours after injury), use of devices with screens may be gradually resumed at a level that does not result in recurrence or exacerbation of symptoms.**

Advise that computers, phone, and other devices with screens may exacerbate symptoms, especially in the first days after injury. The use of these devices can be increased according to symptom tolerance as the child/adolescent recovers. For sleep hygiene purposes, these devices should not be used in the hour prior to bedtime.

**Level of Evidence: C**

**2.4d Advise on avoiding alcohol and other recreational drugs after a concussion.**

Alcohol and recreational drugs may have a negative effect on concussion recovery. Avoiding alcohol or drugs prevents a child/adolescent from self-medicating and resorting to drugs to relieve symptoms. Impaired judgment after a concussion could lead to risky behaviour that causes further harm or may delay the identification of complications.

**Level of Evidence: C**

**2.4e Advise to avoid driving during the first 24-48 hours after a concussion. Advise patients to begin driving when they are feeling improved, can concentrate sufficiently to feel safe behind the wheel, and when the act of driving does not provoke significant concussion symptoms.**

Provide verbal information related to when an adolescent should return to driving during recovery from a concussion. Driving is a complex coordinated process that requires vision, balance, reaction time, judgment, cognition, and attention. Concussion may have affected some or all of these skills. Driving impairments have been shown to exist even in asymptomatic patients 48 hours after a concussion. Avoiding driving for at least 24-48 hours after a concussion may potentially prevent motor vehicle accidents and, therefore, injury to the adolescent or to others.

**Level of Evidence: C**

**2.5 Over-the-counter medications such as acetaminophen and ibuprofen may be recommended to treat acute headache. Advise on limiting their use to less than 15 days a month and avoiding “around-the-clock” dosing to prevent overuse or rebound headaches (i.e., advise that children/adolescents avoid using over the counter medications at regular scheduled times throughout the day).**

**Level of Evidence: B**

**2.6 At present, there is limited evidence to support the administration of intravenous medication to treat acute headaches in pediatric concussion patients in the Emergency Department setting.**

**Level of Evidence: B**

**2.7 After assessment, nearly all children/adolescents with concussion may be safely discharged from clinics and Emergency Departments for observation at home.**

The decision to observe in the hospital will depend on clinical judgment. Indicators for longer in-hospital observation (or to return to emergency for re-assessment) may include:

- Worsening symptoms (headache, confusion, irritability)
- Decreased level of consciousness
- Prolonged clinical symptoms (persistent/prolonged vomiting, severe headache, etc.)
- Bleeding disorders
- Multi-system injuries
- Co-morbid symptoms

Other discharge considerations:

- Observe the child/adolescent for a period of time to verify that they do not develop “red flag” symptoms prior to discharge. Use clinical judgment.
- Verify that the child/adolescent has a normal mental status (alertness/behaviour/cognition) and their symptoms are improving prior to discharge.
- Verify that an assessment of clinical risk factors indicating the need for a CT scan was performed or a normal result was obtained if a CT scan was performed prior to discharge. See [Recommendation 2.1d](#) for more information on when to consider diagnostic brain or cervical spine imaging.

**Level of Evidence: B**

**2.8 Recommend a medical follow-up visit in 1-2 weeks to re-assess and monitor clinical status. Recommend an immediate medical follow-up in the presence of any deterioration.**

Those with a confirmed diagnosis of concussion may be managed by a healthcare professional who within their formally designated scope of practice has the capacity to manage ongoing concussion-related symptoms.

Level of Evidence: C

**2.9 Consider referral to an interdisciplinary concussion team in the presence of modifiers that may delay recovery.**

See Recommendation 2.1b: [Note any modifiers that may delay recovery and use a clinical risk score to predict risk of prolonged symptoms.](#)

Level of Evidence: A

**2.9a Specialized interdisciplinary concussion care is ideally initiated for patients at elevated risk for a delayed recovery within the first two weeks post-injury.**

Level of Evidence: B

**2.10 Provide post-concussion information and a written medical assessment to the child/adolescent and the parent/caregiver prior to sending the child/adolescent home.**

Write the discharge note/written medical assessment with the following information:

- The outcome of the initial medical assessment.
- Indicate to the child/adolescent and their parents, teachers, and coaches if they have been medically cleared to participate in full-contact sports or high-risk activities.
- Link: [Canadian Guideline on Concussion in Sport Medical Assessment Letter](#) (Parachute Canada)
- Link: [Montreal Children's Hospital Discharge Instructions](#)

Verbal and written (or electronic) guidance should include:

- Tool 2.6: [Post-Concussion Information Sheet](#)
- An overview of common concussion symptoms.
- Warning signs that should prompt emergency medical assessment.
- Suggestions regarding activity modifications and non-pharmacological strategies to manage symptoms.
- Information on how and when to make a gradual return-to-school and low-risk physical activities. (Domain 12: [Return-to-School and Work](#))
- Recommendation 2.3: [Recommend a graduated return to physical and cognitive activity](#)).
- Information on when a medical follow-up appointment is needed ([Recommendation 2.7](#)).

Examples of patient information handouts to consider:

- Link : Institut national d'excellence en sante et en services sociaux (INESSS- Québec). Advice for gradually resuming intellectual, physical and sports activities. [English](#) / [French](#)
- Link: [CDC: Heads UP Discharge Instructions](#)
- Link: [Concussion & You Handbook: Holland Bloorview Kids Rehabilitation Hospital](#)
- Link: [Understanding and Managing Concussion in Youth: 3rd Edition Concussion Kit: Montreal Children's Hospital](#)

Level of Evidence: B



## Domain 3: Medical Follow-up and Management of Prolonged Symptoms

### Introduction:

A medical follow-up is recommended if a child/adolescent is experiencing post-concussion symptoms, has not completed the return-to-school or return-to-activity/sport stages, or experiences any deterioration. Post-concussion symptoms and return-to-school/ activity/sport/work status should be reassessed. A medical assessment including clinical history, comprehensive physical examination, and consideration for diagnostic tests or imaging should be considered in patients with red flag symptoms or worrisome clinical findings. Those with a confirmed diagnosis of concussion may be managed by a healthcare professional that, within their formally designated scope of practice, has the capacity to manage ongoing concussion-related symptoms.

Patients who are experiencing clinical improvement in their post-concussion symptoms should continue to be provided with education, reassurance, and guidance on advancing through their return-to-school/activity/sport strategies. At follow-up visits, patients should be provided with an updated medical clearance letter indicating if they are medically cleared to participate in full-contact sport or high-risk activities.

If post-concussion symptoms have not resolved by one-month, or if the child/adolescent's condition/symptoms worsen, consider referral to specialized care with an interdisciplinary concussion team and ensure that the child/adolescent is well supported at school and at home. Additionally, early identification of patients with modifiers that may delay recovery allows for early targeted supportive care, close monitoring for prolonged symptoms, and consideration for early referral (before 4-weeks following acute injury) to an interdisciplinary concussion team.

For those at risk of a prolonged recovery, specialized interdisciplinary concussion care is ideally initiated within the first two weeks post-injury. Patients who are active, competitive athletes, and those who are not tolerating a gradual return to physical activity may benefit from early assessment of their sub-symptom threshold aerobic exercise tolerance and prescribed aerobic exercise as early as 48 hours following acute injury.

### [Tool 1.3: Manage Acute and Prolonged Symptoms Algorithm](#)

### Recommendations:

#### **3.1 Perform a repeat medical assessment on all patients presenting with post-concussion symptoms 1-2 weeks following acute injury.**

Include a focused clinical history, focused physical examination, and consideration for the need for diagnostic tests including imaging. See [Tool 1.3: Manage Acute and Prolonged Symptoms Algorithm](#).

#### **3.1a Take a focused clinical history based on symptoms described.**

- Domain 6: [Headache](#)
- Domain 7: [Sleep](#)
- Domain 8: [Mental Health](#)
- Domain 9: [Cognition](#)
- Domain 10: [Vision, Vestibular, and Oculomotor Function](#)
- Domain 11: [Fatigue](#)
- Domain 12: [Return-to-School and Work](#)

Consider signs and symptoms in context with the child/adolescent's normal performance, especially for those with pre-existing conditions (e.g., learning and communication deficits, ADHD, and/or physical disabilities) to identify the underlying causes of the prolonged symptoms or concerns and develop a management strategy.

**Level of Evidence: B**

### 3.1b Examine the child/adolescent and perform a focused physical examination.

- Tool 2.1: [Physical Examination](#)
- Vital signs (Resting heart rate and blood pressure).
- A complete neurological examination (cranial nerve, motor, sensory, reflex, cerebellar, gait, balance testing) (Tool 2.1: [Physical Examination](#)).
- A cervical spine examination (palpation, range of motion, provocative cervical spine tests) (Tool 2.1: [Physical Examination](#)).
- Review mental health. Perform a post-concussive assessment and a cognitive screen, reassessing for existing and new mental health symptoms such as anxiety and mood.
- Screen the child/adolescent for medication/substances that may mask or modify the symptoms.
- Consider a broad differential diagnosis for children/adolescents with prolonged symptoms.
- Monitor the return-to-activity/sport and return-to-school status.
- Further examination of the child/adolescent should be based on symptoms:
  - Link: [Post-Concussion Symptom Inventory \(PCSI\) Self-Assessment](#) (age 5-7, 8-12, age 13-18)
    - Domain 6: [Headache](#)
    - Domain 7: [Sleep](#)
    - Domain 8: [Mental Health](#)
    - Domain 9: [Cognition](#)
    - Domain 10: [Vision, Vestibular, and Oculomotor Function](#)
    - Domain 11: [Fatigue](#)
    - Domain 12: [Return-to-School and Work](#)

**Level of Evidence: B**

### 3.1c Consider diagnostic brain or cervical spine MRI imaging for those with focal or worrisome symptoms.

See [Recommendation 2.1d](#): When to consider diagnostic brain or cervical spine imaging.

Urgent conventional MRI should be considered in concussion patients who present with focal or worrisome symptoms (e.g., deteriorating vision, focal weakness or numbness, altered awareness, prominent behavioural changes, or worsening headaches that are not responding to treatment) and in whom a structural brain injury or abnormality is suspected.

Level of Evidence: B-MRI

**3.2 Provide patients with general education and guidance that outlines mental health considerations, non-pharmacological strategies to minimize symptoms including sleep hygiene, activity modifications, limiting triggers, information on screen time, the importance of social interaction, and how to work with the school team to facilitate school success.**

Level of Evidence: C

- Tool 2.6: [Post-Concussion Information Sheet](#)
- Tool 2.7: [Strategies to Promote Good Sleep and Alertness](#)
- Link: [Sleep for Youth. CHEO Sleep Hygiene handout](#)
- Recommendation 2.3 [Recommend graduated return to cognitive and physical activity](#)
- Domain 12: [Return-to-School and Work](#)
- Recommendation 2.4c: [Advise on the use of computers, phones, and other screen devices](#)

**3.3 Encourage patients with post-concussion symptoms to engage in cognitive activity and low-risk physical activity as soon as tolerated while staying below their symptom-exacerbation thresholds. Activities that pose no/low risk of sustaining a concussion (no risk of contact, collision, or falling) should be resumed even if mild residual symptoms are present or whenever acute symptoms improve sufficiently to permit activity.**

Level of Evidence: B Gradual Return to physical activity aerobic exercise treatment. C Gradual return to cognitive activity.

See [Recommendation 2.3](#).

- Refer select patients (e.g., highly-active or competitive athletes, those who are not tolerating a graduated return to physical activity, or those who are slow to recover) following acute injury to a medically supervised interdisciplinary team with the ability to individually assess sub-symptom threshold aerobic exercise tolerance and to prescribe aerobic exercise treatment. This exercise tolerance assessment can be as early as 48 hours following acute injury. Level of Evidence: A
- Patients who are active may benefit from referral to a medically supervised interdisciplinary team with the ability to individually assess sub-symptom threshold aerobic exercise tolerance and to prescribe aerobic exercise treatment. This exercise tolerance assessment can be as early as 48 hours following acute injury. Level of Evidence: C

See [Recommendation 2.3](#).

See Tool 2.6: [Post-Concussion Information Sheet](#) for examples of low-risk activities.

**3.4 Refer to specialized care with an interdisciplinary concussion team if post-concussion symptoms do not gradually resolve by 4 weeks.**

See Tool 1.3: [Manage Acute and Prolonged Symptoms Algorithm](#).

Assessment by an interdisciplinary concussion team can assist in identifying the type of management that is required, along with the medical and health professions on the interdisciplinary concussion team or external to this team who can provide the required management. Not all children/adolescents will require care from all members of the interdisciplinary concussion team and care should be targeted based on identified symptoms and patient needs.

**Level of Evidence: B**

**3.5 Consider early referral (prior to 4-week post-injury) to an interdisciplinary concussion team in the presence of modifiers that may delay recovery.**

**Level of Evidence: A**

**Specialized interdisciplinary concussion care is ideally initiated for patients at elevated risk for a delayed recovery within the first two weeks post-injury.**

**Level of Evidence: B**

See Recommendation 2.1b: [Note any modifiers that may delay recovery and use a clinical risk score to predict risk of prolonged symptoms.](#)

**3.6 Initiate treatment for specific symptoms or concerns while waiting for a referral to an interdisciplinary concussion team or sub-specialist.**

- Domain 6: [Headache](#)
- Domain 7: [Sleep](#)
- Domain 8: [Mental Health](#)
- Domain 9: [Cognition](#)
- Domain 10: [Vision, Vestibular, and Oculomotor Function](#)
- Domain 11: [Fatigue](#)
- Domain 12: [Return-to-School and Work](#)

**Level of Evidence: B**

**3.7 Recommend regular medical follow-up if a child/adolescent is still experiencing post-concussion symptoms or has not completed the return-to-school or return-to-sport/activity stages. Recommend an immediate medical follow-up in the presence of any deterioration.**

**Level of Evidence: C**



## Domain 4: Medical Clearance for Full-Contact Sports or High-Risk Activity

### Introduction:

Medical clearance to return to full-contact sports or high-risk activities should be made on an individual basis using clinical judgment based on the findings of the medical follow-up. Presently there is no objective test to confirm physiological recovery following concussion. The child/adolescent should have returned to all school activities, including writing exams without accommodations related to their concussion/post-concussion symptoms, before medical clearance is given for returning to full-contact sports or high-risk activities.

### Recommendations:

#### **4.1 Consider patients for medical clearance to return to full-contact activities and sport/game play if clinical criteria have been met.**

The following clinical criteria should be considered or met before recommending that a child/adolescent returns to full-contact activities and sport/game play:

- Child/adolescent has successfully returned to all school activities including writing exams without symptoms above their previous pre-injury level or requiring accommodations related to their concussion/post-concussion symptoms, (e.g., child/adolescent may have pre-existing accommodations or new accommodations related to something other than their concussion).
- Normal neurological and cervical spine examination.
- Asymptomatic at rest (or back to the pre-injury state in patients with pre-existing conditions such as baseline headaches or mental health conditions).
- Tolerating physical activities and non-contact activities without any symptoms.
- No longer taking any drugs or substances atypical to their pre-injury functioning that could mask symptom presentation.

For children/adolescents with complex medical histories (e.g., repeated concussion, baseline concussion-like symptoms), see [Recommendation 5.1](#) for information regarding returning to full-contact sports or high-risk activities, or retirement from full-contact sports or high-risk activities.

**Level of Evidence: B**

#### **4.2 Provide patients with a letter indicating medical clearance to return to all activities when medically cleared.**

Link: [Canadian Guideline on Concussion in Sport Medical Assessment Letter](#)

Link: Quebec Association of Sport and Exercise Medicine physicians: Medical clearance letter. [English](#) / [French](#)

**Level of Evidence: C**

#### **4.3 Advise medically cleared patients to seek immediate medical attention if he or she develops new concussion-like symptoms or sustains a new suspected concussion.**

Tool 1.2: [Concussion Recognition Tool 5: To help identify concussion in children, adolescents, and adults](#)

Level of Evidence: B



## Domain 5: Sport Concussion Considerations

### Introduction:

Return to full-contact sport or high-risk activity decisions may be complicated for children/adolescents who have experienced multiple concussions or who have baseline conditions that are associated with concussion-like symptoms. Numerous factors including concussion history, co-morbidities, contraindications, symptom presentation, injury threshold, and sequelae should be considered when making return to sport decisions for children/adolescents who have complex medical histories. The current evidence does not support an added benefit of baseline testing. Mandatory pre-season baseline testing is not recommended.

Link: [Parachute Statement on Baseline Testing](#) (Parachute Canada).

### Recommendations:

**Refer a child/adolescent with multiple concussions or baseline conditions associated with concussion-like symptoms to an interdisciplinary concussion team to help with return to full-contact sports or high-risk activities or retirement decisions from full-contact sports or high-risk activities.**

Level of Evidence: C

Return to full-contact sport or high-risk activity decisions can be complicated for children/adolescents with more complex medical histories. The following factors should be taken into consideration in the discussion and decisions made about return-to-sport or retirement:

- Concussion history.
- Co-morbidities (e.g., learning and communication deficits, ADHD, physical disabilities, psychiatric disorders).
- Absolute contraindications for return-to-sport and high-risk activities.
- Early recurrence or greater frequency of symptoms.
- Lower injury threshold.
- Increasing recovery time.
- Potential short- and long-term sequelae.

Some patients may benefit from neuropsychological assessment to determine resolution of cognitive problems. If a post-injury cognitive or neuropsychological assessment is deemed clinically necessary, it is recommended that this assessment be interpreted by a pediatric neuropsychologist.

**5.2 Baseline testing on children/adolescents using concussion assessment tools or tests (or any combination of tests/tools) is not recommended or required for concussion diagnosis or management following an injury.**

Level of Evidence: B

See the [Parachute Statement on Baseline Testing](#) for more information (Parachute Canada).

“Baseline testing refers to the practice of having an athlete complete certain concussion assessment tools/tests prior to sports participation to provide baseline measurements that can be compared to post-injury values in the event of a suspected concussion. Current evidence does not support a significant added benefit of baseline testing athletes. This includes the Child SCAT5 and the SCAT5

tools, as well as neuropsychological and neurocognitive tests, both computerized or not.” ([Parachute Statement on Baseline Testing](#))

See [Recommendation 5.3](#): Special considerations regarding baseline testing.

### 5.3 Special considerations regarding baseline testing.

Level of Evidence: B

Please consult the [Parachute Statement on Baseline Testing](#) for more information (Parachute Canada).

“There may be unique athlete populations and sports environments where baseline testing may be considered. These situations should be considered the exception and not the rule.”

- “Clinical neuropsychologists may consider baseline cognitive or neuropsychological testing in select youth athletes (greater than 12 years old) who have pre-existing conditions, such as a history of previous concussion, ADHD, or learning disorders, that may impact the interpretation of post-injury test results.”
- “Certain teams and sporting federations have well-established physician-supervised concussion protocols with dedicated experienced healthcare professionals working directly and continuously with youth athletes (i.e., that are present at training and competition events). In these sport environments, baseline testing may be considered as an optional assessment within the comprehensive concussion protocol as long as the medical teams caring for these athletes include experienced healthcare professionals who have competency-based training and clinical experience to allow them to administer and interpret these tests.”

(Reproduced with permission from Parachute Canada: [Parachute Statement on Baseline Testing](#)).

**5.4 [Recommendation 2.3d](#): Refer select patients (e.g., competitive athletes, those who are not tolerating a graduated *return* to physical activity, or those who are slow to recover) to a medically supervised interdisciplinary team with the ability to individually assess sub-symptom threshold aerobic exercise tolerance and to prescribe aerobic exercise treatment.**

Level of Evidence: B





# Domain 15:

## Telemedicine and Virtual Concussion Care

### Introduction:

Preliminary research has demonstrated that telemedicine can be used to provide timely access to safe and cost-effective medical care of carefully selected concussion patients living in underserved regions. Research from the teleneurology, telepsychiatry and teleneuropsychology literature suggests that patients with prolonged concussion symptoms including those with headaches, mental health disorders, and cognitive impairment may also benefit from accessing care via telemedicine. While the COVID-19 pandemic has propelled greater use of virtual care, healthcare professionals using virtual platforms to deliver concussion care should be aware of the limitations of these approaches in order to ensure they are practicing in accordance with regional guidelines and policies outlined by their respective professional regulatory bodies. The future use of telemedicine and virtual care to assist in delivering primary and interdisciplinary concussion care will continue to be refined by future research and experience.

Definitions:

*Telemedicine:* Telemedicine has been defined as “the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment, and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities.” (WHO, 2010). Telemedicine can be delivered synchronously (e.g., in-person videoconferencing) or asynchronously (e.g., store and forward or EConsultation).

*Virtual care:* Virtual care has been defined as “any interaction between patients and/or members of their circle of care, occurring remotely, using any forms of communication or information technologies, with the aim of facilitating or maximizing the quality and effectiveness of patient care” (Shaw et al, 2018).

The following clinical recommendations and preliminary algorithm have been developed to share evidence and expert opinion on how to guide the medical and interdisciplinary care of pediatric concussion patients using telemedicine and include suggestions to optimize a virtual medical assessment.

Tool 15.1: [Considerations for telemedicine and virtual care algorithm](#)

Tool 15.2: [Considerations for a virtual physical examination for medical assessment and follow-up of concussion patients](#)

Tool 15.3: [Virtual Care Exam Training Resource](#). A training manual to assist front-line healthcare professionals who are caring for patients that cannot be seen in person or have already had an in-person assessment and require follow-up.

## Recommendations:

### 15.1 Considerations for a Virtual Medical Assessment.

**See Recommendation 2.1** *“Physicians or nurse practitioners should perform a comprehensive medical assessment on all children/adolescents with a suspected concussion or with acute head or spine trauma.*

- *Include a clinical history, physical examination, and the evidence-based use of diagnostic tests or imaging as needed.”*

In-person medical assessments are ideal for all children/adolescents with suspected or diagnosed concussion, however, telemedicine may be considered to assist in the medical assessment for patients who meet the following criteria:

- A previous medical assessment by a physician or nurse practitioner has been performed.
- Access or travel for an in-person medical assessment is limited or difficult
- There is no history of abnormal diagnostic imaging (e.g., intracranial hemorrhage, spine or facial fracture)

**Note:** All providers should be aware of current public health recommendations when providing care to their patients.

Tool 15.1: [Considerations for telemedicine and virtual care algorithm](#)

Level of Evidence: 

#### 15.1a

**Obtain informed consent from the patient and/or their parent/caregiver to conduct a remote medical assessment via telemedicine.**

This process should outline the benefits and limitations of performing clinical care via telemedicine as well as taking measures to ensure privacy and confidentiality. Discuss the important limitation of not being able to perform some aspects of the physical examination virtually (e.g., testing of motor or sensory functioning, fundoscopy, etc.) and outline what arrangements will be made to facilitate an urgent in-person assessment as needed to optimize clinical care.

For other general considerations on how clinicians and patients can be prepared for a virtual visit see the following links:

- Canadian Medical Association. Scaling up virtual care in Canada: CMA a key player in new national task force. February 2020. <https://www.cma.ca/scaling-virtual-care-canada-cma-key-player-new-national-task-force>
- American Medical Association. [TeleHealth Quick Guide](#) September 2020.
- Canadian Medical Association. [Virtual Care Guide for Patients](#). June 2020.

Level of Evidence: 

#### 15.1b

**Take a comprehensive virtual clinical history.**

Complete a comprehensive virtual clinical history that addresses the same key components of an in-person medical assessment including patient demographics, injury mechanism, symptoms at the time of injury, symptom burden at the time of presentation, loss of consciousness, post-traumatic amnesia, self-reported red flags, mental health, past medical history, assessment of concussion modifiers, current medications and allergies, school, work, and sports participation.

- See [Recommendation 2.1a](#) for details that should be collected in the clinical history. This recommendation includes a validated age-appropriate symptom inventory that can be considered as a tool to assess current symptoms and severity.

Level of Evidence: 

15.1c

See [Recommendation 2.b](#) “Note common modifiers that may delay recovery and use a clinical risk score to predict risk of prolonged symptoms.”

15.1d


#### **Considerations for a virtual physical assessment**

A virtual physical examination should aim to assess similar aspects of neurological functioning evaluated during an in-person medical assessment with modifications based on the presence of a remote telepresenter or examiner.

- The unassisted virtual physical examination should include assessment of mental status, speech, cranial nerves, coordination, balance, gait, cognitive functioning, oculomotor functioning, and the cervical spine.
- Certain aspects of the physical examination including assessment of motor, sensory and vestibular functioning; palpation and provocative testing of the cervical spine; testing of visual acuity and deep tendon reflexes; as well as fundoscopic and otoscopic examinations cannot be performed virtually.

Tool 15.2: [Considerations for a virtual physical examination for medical assessment and follow-up of concussion patients](#)


Tool 15.3: [Virtual Care Exam Training Resource](#). A training manual to assist front-line healthcare professionals who are caring for patients that cannot be seen in person or have already had an in-person assessment and require follow-up.

Level of Evidence: 

15.1e

#### **Considerations for a virtual physical examination for medical assessment and follow-up of concussion patients**

Link: [Recommendation 2.1c](#) -recommendations on an in-person medical assessment.

Level of Evidence: 

15.1f

**[Recommendation 2.1d](#): “Consider CT of the brain or cervical spine only in patients whom, after a medical assessment, a structural intracranial or cervical spine injury is suspected; do not conduct routine neuroimaging for the purpose of diagnosing concussion.”**

15.2

**Provide verbal information and written (electronic) handouts regarding the course of recovery and when the child/adolescent can return to school/activity/sport/driving/work and strategies to promote recovery.**

This should include the following:


- Guidance on the appropriate use of rest and guidance on making a gradual return to symptom-limiting cognitive, school, social, and low-risk physical activities.
  - Recommendation 2.3 Recommend graduated return to cognitive and physical activity to promote recovery.
  - Domain 12: Return to school
- Guidance on sleep (Recommendation 2.4 a)
- Recommendation on social networks and interactions (Recommendation 2.4b)
- Recommendation on driving (Recommendation 2.4e)

- Guidance on the appropriate use of over-the-counter medications for symptom management (Recommendation 2.5)
- Recommendation on screen time and electronic device use (Recommendation 2.4c)
- Recommendation to avoid alcohol and recreational drugs (Recommendation 2.4d)

Where available, provide post-injury education that is appropriate for the patient's culture and/or preferred language.

Summary of online tools to consider related to lifestyle strategies and expectations:

- Link: Tool 2.6: [Post-Concussion Information Sheet](#)
- Link: [Advice for gradually resuming intellectual, physical and sports activities English/ French](#)(INESSS)
- Link: [After a Concussion: Return to Sport Strategy](#)(Parachute Canada)
- Link: [HEADS UP Resources for Returning to School](#)(CDC)
- Link: [Return to Activity Strategy](#)(CATT)
- Link: [Return-to-School Strategy](#)(CATT)
- Link: [Return to Sport Strategy](#)(CATT)
- Link: [Return to School Strategy](#)(Parachute)
- Link: [Post Concussion Information Sheet for First Nations Youth](#) (Parachute)
- Link: [Post Concussion Information Sheet for Nunavut Youth – French](#) (Parachute)
- Link: [Post Concussion Information Sheet for Nunavut Youth – English](#) (Parachute)
- Link: [Post Concussion Information Sheet for Nunavut Youth – Inuktitut](#) (Parachute)
- Link: [Post Concussion Information Sheet for Nunavut Youth – Inuinnaqtun](#) (Parachute)


Level of Evidence: 

15.3

**Provide a written (electronic) medical assessment or clearance letter to the child/adolescent and the parent/caregiver.**

Link: [Canadian Guideline on Concussion in Sport Medical Assessment Letter](#)

Link: [Canadian Guideline on Concussion in Sport Medical Clearance Letter](#)

Level of Evidence: 

15.4


**Provide a medical follow-up assessment on children/adolescents with concussion in 1-2 weeks to re-assess and monitor clinical status. A regular medical follow-up is also recommended if a child/adolescent is still experiencing post-concussion symptoms or has not completed the return-to-school or return-to-sport/activity stages. Recommend immediate in-person medical attention in the presence of any deterioration.**

While in-person medical follow-up is ideal, telemedicine (e.g., real-time in-person videoconferencing) may be considered for follow-up appointments for the following patients with concussion:

1. Those for whom access or travel for follow-up is limited or unavailable such as those who live in rural and remote communities.
2. Those who have undergone a previous in-person medical assessment by the treating physician or nurse practitioner
3. Those whose symptoms are stable, improving, or resolved
4. Those who do not report any subjective red flags (e.g., blurred or double vision, weakness or numbness, vertigo) and who have a satisfactory virtual physical examination with no objective red flags (e.g., diplopia on extraocular movement testing, positive pronator drift, pain on testing of cervical spine range of motion)

5. Those who do not require supplemental testing (diagnostic imaging, neuropsychological testing, graded aerobic exercise testing), and/or inter-disciplinary referrals to optimize patient care

Tool 15.1: [Considerations for telemedicine and virtual care algorithm](#)

Level of Evidence: 

**Please refer to [Domain 3: Medical follow-up and Management of Prolonged Symptoms](#) for a full list of clinical guideline recommendations to consider when performing a medical follow-up assessment and managing prolonged concussion symptoms.**

15.5

**Please refer to [Domain 4: Medical Clearance for full-contact sports and high-risk activities](#) for a full list of clinical recommendations to consider when determining if a child/adolescent is ready to return to full-contact sports or high-risk activities. Medical clearance is not required to return to school.**

15.6

**Recommendations for inter-disciplinary healthcare professionals involved in the care of concussion patients:**


#### **Neuropsychologists**

Virtual care may be considered to assist in the assessment and longitudinal care of concussion patients who develop persistent cognitive and mood-related symptoms or who are having persistent problems in school. Neuropsychologists should be aware of the limitations of performing certain neuropsychological tests via in-person videoconferencing. Specific symptom assessments can be administered virtually or completed before the virtual appointment and sent to the neuropsychologist ahead of time.

Level of Evidence: 

#### **Physiotherapists**


Virtual care may be considered by physiotherapists to advance vestibular, cervical spine and medically supervised individually tailored sub-symptom threshold aerobic exercise treatment plans in patients who have undergone previous in-person assessment by the treating physiotherapist. Physiotherapists should recognize that a comprehensive assessment of the cervical spine and vestibular system as well as graded aerobic exercise testing, which are required to provide initial recommendations regarding targeted rehabilitation, cannot be performed virtually. If a physiotherapist is providing virtual care, they must be able to arrange an urgent in-person assessment as needed.

Level of Evidence: 

- See link for general information on telerehabilitation: TR-Telerehab Toolkit: <https://kite-uhn.com/tools/tr-telerehab-toolkit>
- Alberta Physiotherapy: Telerehabilitation Resource Guide [https://www.physiotherapyalberta.ca/files/guide\\_telerehabilitation.pdf](https://www.physiotherapyalberta.ca/files/guide_telerehabilitation.pdf)

#### **Psychiatrists**

Telemedicine may be considered to assist in the assessment and longitudinal care of concussion patients who develop persistent psychiatric and sleep-related symptoms and disorders.

Level of Evidence: 

#### **Headache neurologists**

Telemedicine may be considered to assist in the assessment and longitudinal care of concussion patients who develop persistent headaches.

Level of Evidence: **B**

#### **Occupational therapists**

Virtual care may be considered to assist in the assessment and longitudinal care of concussion patients who develop prolonged cognitive and mood-related symptoms and to assist with a successful return to school and other activities of daily living.

Level of Evidence: **C**

# Section B: Managing Concussion Symptoms 1-4 Weeks Following Acute Injury



## Domain 6: Headache

### Introduction:

Headache is one of the most common symptoms reported by children/adolescents who sustain a concussion. In most cases, headache associated with an acute concussion will resolve spontaneously within 1-4 weeks of injury along with other concussion symptoms. In some cases, headaches can persist beyond this time frame.

For patients with post-concussion headaches 1-2 weeks following acute injury, a repeat medical assessment must be conducted including a clinical history, physical examination, and the evidence-informed use of diagnostic imaging. The assessment should also include proper classification or characterization of the patient's headache. This assessment will help identify co-morbid medical disorders (e.g., a history of migraine or non-specific headaches or psychiatric disorders) and other factors (e.g., overuse of analgesics) that can contribute to prolonged headaches. Some prolonged post-concussion headaches can be classified according to the [International Classification of Headache Disorders \(ICHD-III\)](#), while others cannot. Proper characterization of prolonged post-concussion headaches can help provide information to execute appropriate interdisciplinary referrals and guide evidence-based management.

Tool 6.1: [Post-Concussion Headache Algorithm](#).

### Recommendations:

#### **6.1 Perform a repeat medical assessment on all patients presenting with post-concussion headaches 1-2 weeks following acute injury.**

Include a focused history, physical examination, and consideration of diagnostic brain or cervical spine MRI imaging for those with focal or worrisome symptoms.

Tool 6.1: [Post-Concussion headache algorithm](#).

##### **6.1a Take a focused clinical history.**

Level of Evidence: B

- Collect details that help to classify or characterize the headache subtype(s) that are present.
- Headache onset, location, quality or character, severity, and frequency.
- Factors that elicit or worsen headaches (e.g., bright lights, reading, exercise, foods, etc.).

- Factors that alleviate headaches.
- Associated symptoms (e.g., aura, photosensitivity, dizziness, eye strain, neck pain).
- The presence of red flags which may indicate a more severe brain injury or other intracranial pathology (e.g., worsening headaches, repeated vomiting, weakness or numbness of the extremities, visual changes).
- The level of disability associated with the headache (e.g., missed days from school).
- Use of medications or other substances.
- Psychological or social factors or conditions that can be associated with stress and headaches (e.g., mood or anxiety disorders) (Domain 8: [Mental Health](#)).
- Assess how much headaches affect day-to-day activities.
- Link: [pedMIDAS Headache Severity Tool for Children aged 4-18](#).
- Disturbed sleep.
- Personal and family history of headaches and headache disorders (e.g., migraine).
- Future participation in full-contact sport or high-risk activities
- 

#### 6.1b Perform a focused physical examination.

Level of Evidence: B

- Vital signs (resting heart rate and blood pressure).
- A complete neurological examination (cranial nerve, motor, sensory, reflex, cerebellar, gait and balance testing) Tool 2.1: [Physical Examination](#).
- A cervical spine examination (palpation, range of motion, provocative cervical spine tests). Tool 2.1: [Physical Examination](#).
- With appropriate experience, consider performing an examination of vision, oculomotor and vestibular functioning (Domain 10: [Vision, Vestibular, and Oculomotor Function](#)).

#### 6.1c Consider diagnostic brain or cervical spine MRI imaging for those with focal or worrisome symptoms.

See [Recommendation 2.1d](#) for more information on when to consider diagnostic brain or cervical spine imaging.

Level of Evidence: A (CT), B (MRI)

#### 6.1d Classify and characterize the headache subtype based on the clinical history and physical examination findings.

Consult the [International Classification of Headache Disorders \(ICHD-III\)\\*](#) and Tool 6.1: [Post-Concussion Headache Algorithm](#) for more information.

Common prolonged post-concussion headache subtypes include:

- Migraine, tension, or cluster headaches
- Cervicogenic headaches
- Physiological or exercise-induced headaches
- Headaches associated with prolonged visual stimulation
- Occipital neuralgia

\* "Reproduced with permission of International Headache Society"

**Level of Evidence: B**

## **6.2 Provide general post-concussion education and guidance on headache management.**

**6.2a Advise on non-pharmacological strategies to minimize headaches including sleep hygiene, activity modifications, limiting triggers, and information on screen time.**

Tool 2.7: [Strategies to Promote Good Sleep and Alertness.](#)

Link: [Sleep for Youth. CHEO Sleep Hygiene handout](#)

Recommendation 2.4c: [Advise on the use of computers, phones, and other screen devices.](#)

**Level of Evidence: C**

**6.2b Encourage patients with headaches to engage in cognitive activity and low-risk physical activity as soon as tolerated while staying below their symptom-exacerbation threshold. Activities that pose no/low risk of sustaining a concussion (no risk of contact, collision, or falling) should be resumed even if mild residual symptoms are present or whenever acute symptoms improve sufficiently to permit activity.**

See [Recommendation 2.3](#)

See Tool 2.6: [Post-Concussion Information Sheet](#) for examples of low-risk activities.

**Level of Evidence: B- Gradual return to physical activity. C- Gradual return to cognitive activity.**

**6.2c Consider suggesting the use of a headache and medication diary in order to monitor symptoms and medications taken. Use clinical judgment and an individualized approach on use or duration of this strategy.**

Link: [Headache and Medication Diary \(Boston Children's Hospital\)](#)

**Level of Evidence: C**

**6.2d Over-the-counter medications such as acetaminophen and ibuprofen may be recommended to treat acute headache. Advise on limiting the use of these medications to less than 15 days a month and avoiding "around-the-clock" dosing to prevent overuse or rebound headaches. I.e., advise that children/adolescents avoid using over the counter medications at regular scheduled times throughout the day.**

**Level of Evidence: C**

**6.3 Refer patients who have prolonged post-concussion headaches for more than 4 weeks to an interdisciplinary concussion team or to a sub-specialist for further evaluation and management. Consider early referral (prior to 4-weeks after the acute injury) to an interdisciplinary concussion team in the presence of modifiers that may delay recovery. Specialized interdisciplinary concussion care is ideally initiated for patients at elevated risk for a delayed recovery within the first two weeks post-injury. Level of Evidence: B**

Prolonged headaches in pediatric concussion patients can be difficult to classify and manage and can co-occur with other prolonged post-concussion symptoms (dizziness, neck pain, sleep disturbance, cognitive or mood challenges).

If an interdisciplinary concussion team member is not available:

- Consider appropriate referral to interdisciplinary professionals who have competency-based training and clinical experience to independently manage the identified headaches and headache disorders.

If a child/adolescent with prolonged post-concussion headache has not had a recent vision assessment, refer to an optometrist for an assessment.

**Level of Evidence: C**

#### **6.4 Initiate pharmacological therapy to treat and manage prolonged headaches while waiting for the interdisciplinary concussion team or sub-specialist referral.**

For patients with post-traumatic headaches that are migrainous in nature, the use of migraine-specific abortants such as triptan class medications may be used if effective. Due to the risk of developing medication-induced headaches, limit use of abortants to fewer than 6-10 days per month.

Tool 6.2: [General Considerations Regarding Pharmacotherapy](#)

Tool 6.3: [Approved Medications for Pediatric Indications](#)

Prophylactic therapy should be considered:

- If headaches are occurring frequently
- If headaches are disabling
- If acute headache medications are contraindicated, poorly tolerated, or are being used too frequently.

**Level of Evidence: B**

#### **6.5 Recommend a medical follow-up to reassess clinical status if headaches persist. Recommend an immediate medical follow-up in the presence of any deterioration. Consider early referral (prior to 4-weeks after the acute injury) to an interdisciplinary concussion team in the presence of modifiers that may delay recovery.**

Level of Evidence: C- Medical follow-up. A- Early referral in the presence of modifiers that may delay recovery

**Specialized interdisciplinary concussion care is ideally initiated for patients at elevated risk for a delayed recovery within the first two weeks post-injury. Level of Evidence: B**

See Recommendation 2.1b: [Note any modifiers that may delay recovery and use a clinical risk score to predict risk of prolonged symptoms.](#)



## Domain 7: Sleep

### Introduction:

Sleep disturbances may occur following a concussion. Symptoms vary between different children/adolescents and within an individual child/adolescent. Examples include having difficulties falling asleep/staying asleep or excessive daytime sleeping. Medication use, headaches and mental health conditions (e.g. anxiety, depression) may also affect sleep. Poor sleep may be related to cognitive complaints and worse post-concussion symptoms. A repeat medical exam to rule out a more severe injury is required for children/adolescents who are experiencing sleep disturbances that last more than 1-2 weeks following a concussion. The presence of sleep disturbances following concussion is a risk factor for a prolonged recovery from concussion. Early identification allows for early targeted supportive care, close monitoring for prolonged symptoms, and consideration for early referral.

Information related to sleep hygiene and non-pharmacological strategies to improve sleep should be shared with families. Children/adolescents with prolonged sleep disturbances should be encouraged to engage in low-risk physical activity and resume sub-symptom cognitive activities. Children/adolescents who are experiencing sleep disturbances more than 4 weeks following a concussion should be referred to a cognitive behavioural therapist or an interdisciplinary concussion team. If sleep disturbances are present for more than 6 weeks following a concussion the child/adolescent may require more specialized care from a sleep specialist.

Tool 7.1: [Managing post-concussion sleep disturbances algorithm](#).

Tool 7.2: [Factors that may influence the child/adolescent's sleep/wake cycle](#).

### Recommendations:

#### 7.1

**Perform a repeat medical assessment on all patients presenting with post-concussion sleep disturbances 1-2 weeks following acute injury.**

Level of Evidence: C

Include a focused history, physical examination, and consider diagnostic brain or cervical spine MRI imaging for those with focal or worrisome symptoms.

- Tool 7.1: [Managing post-concussion sleep disturbances algorithm](#).

Screen for factors that may influence the child/adolescent's sleep/wake cycle and for sleep-wake disturbances such as insomnia or excessive daytime sleepiness.

- Tool 7.2: [Factors that may influence the child/adolescent's sleep/wake cycle](#).

**7.2 Provide general education and guidance on sleep hygiene that outlines non-pharmacological strategies to improve sleep.**

- Tool 2.7: [Strategies to Promote Good Sleep and Alertness](#)
- Link: [Sleep for Youth. CHEO Sleep Hygiene handout](#)
- Link: [Holland Bloorview Kids Rehabilitation Hospital: Concussion Handbook](#)

Level of Evidence: C

**7.2a Continue to encourage patients with sleep disturbances to engage in sub-symptom threshold cognitive activities and physical activities that pose no/low risk of sustaining a concussion (no risk of contact, collision, or falling) as soon as tolerated.**

See [Recommendation 2.3](#).

See Tool 2.6: [Post-Concussion Information Sheet](#) for examples of low-risk activities.

Level of Evidence: B- Gradual return to physical activity. C- Gradual return to cognitive activity.

**7.3 Manage patients who experience sleep-wake disturbances for more than 4 weeks with cognitive behavioural therapy, treat with daily supplements, and/or refer to an interdisciplinary concussion team.**

**7.3a Refer the child/adolescent to a cognitive behavioural specialist. The treatment of choice for primary insomnia and insomnia co-morbid to a medical or psychiatric condition is cognitive behavioural therapy (CBT).**

- Level of Evidence: C
- **If CBT is unavailable to the patient or the patient is waiting for CBT treatment:**
  - Optimize and implement sleep hygiene (Tool 2.7: [Strategies to Promote Good Sleep and Alertness](#))
  - Monitor the patient weekly for the first few weeks.
  - Re-emphasize that patients with sleep disturbances should continue to engage in sub-symptom threshold cognitive and physical activities that pose no/low risk of sustaining a concussion (no risk of contact, collision, or falling) as tolerated ([Recommendation 2.3](#)).
  - Consider referring to an interdisciplinary concussion team.

**7.3b Consider suggesting non-pharmacological supplements such as magnesium, melatonin\*, and zinc to improve sleep and recovery without the use of medication that may have side effects.**

- Level of Evidence: C
- Tool 6.3: [Approved Medications for Pediatric Indications](#).
- *\*Melatonin was not found to be effective when used for youth with concussion symptoms 4-6 weeks after injury in a single-center double-blinded randomized controlled trial” (Barlow et al 2020. Efficacy of Melatonin in Children With Postconcussive Symptoms: A Randomized Clinical Trial. Pediatrics*

**7.4 Refer patients with prolonged post-concussion sleep disturbances (more than 6 weeks) to a sleep specialist or an interdisciplinary concussion team if the interventions introduced at 4 weeks have been unsuccessful and sleep issues persist.**

Level of Evidence: C

- If sleep issues persist for more than 6 weeks post-acute injury, sleep hygiene can't be optimized, and if poor sleep quality is impacting the ability to return-to-school or ability to recondition:
  - Refer to a sleep specialist who has experience with concussion and polysomnography or to an interdisciplinary concussion team that has the expertise to understand sleep disturbances in the context of concussion-related symptoms.
- Consider ordering sleep tests to rule out possible sleep-related breathing disorders, nocturnal seizures, periodic limb movements, or narcolepsy.
- Examples of sleep tests include Sleep Study, Multiple Sleep Latency Test, and the Maintenance of Wakefulness Test.

**7.5 Consider prescribing medication on a short-term basis if sleep has not improved after 6 weeks following the acute injury.**

Level of Evidence: C

Ensure that medications do not result in dependency and that the patient has minimal adverse effects.

The aim is to establish a more routine sleep pattern.

- Potential medication options include trazodone 12.5 mg or amitriptyline 5.0 – 10.0 mg.
- Tool 6.2: [General Considerations Regarding Pharmacotherapy](#).
- Tool 6.3: [Approved Medications for Pediatric Indications](#).

If sleep disturbances persist after pharmacological treatment refer to a pediatric sleep specialist ideally with experience with concussion and polysomnography.

**7.6 Recommend a medical follow-up to reassess clinical status if sleep disturbances persist.**

**Recommend an immediate medical follow-up in the presence of any deterioration. Consider early referral (before 4 weeks) to an interdisciplinary concussion team in the presence of modifiers that may delay recovery.**

Level of Evidence: C- Medical follow-up. A- Early referral in the presence of modifiers that may delay recovery.

**Specialized interdisciplinary concussion care is ideally initiated for patients at elevated risk for a delayed recovery within the first two weeks post-injury.**

Level of Evidence: B

See Recommendation 2.1b: [Note any modifiers that may delay recovery and use a clinical risk score to predict risk of prolonged symptoms](#).



## Domain 8: Mental Health

### Introduction:

There is evidence that early identification of common mental health disorders and risk factors for mental health disorders may prevent/mitigate additional problems such as learning and behavior problems, school avoidance and exacerbation of pre-existing problems. Having a mental health disorder prior to concussion is a critical risk factor for a post-concussion mental health disorder. Early identification of family problems or parental mental health disorders permits healthcare professionals to watch for environmental factors that are known to influence recovery from a concussion and identify any associated negative outcomes.

It is important to:

- Assess if there is an association between concussion symptoms and restrictions to activity that may be related to the child/adolescent's mental health.
- Treat and manage the mental health disorder itself and prevent it from becoming a long-term problem.
- Encourage the child/adolescent to remain connected and engage with their peers, friends, and teammates.

Tool 8.1: [Post-Concussion Mental Health Considerations Algorithm](#).

Tool 8.2: [Management of Prolonged Mental Health Disorders Algorithm](#).

### Recommendations:

#### 8.1 Assess existing and new mental health symptoms and disorders.

Experienced and trained healthcare professionals should use appropriate screening tools to assess the child/adolescent. These assessments should be considered for children/adolescents with a history of mental health problems or with prolonged post-concussive symptoms.

Use Tool 8.1: [Post-Concussion Mental Health Considerations Algorithm](#) and refer to a mental health specialist using clinical judgment.

Assessment screening tools to consider (direct website links):

- Link: [PHQ-SADS \(somatic\)](#)
- Link: [Severity Measure for Depression- Child Age 11–17 \(adapted from PHQ-9 modified for Adolescents \[PHQ-A\]\)](#)
- Link: [Severity Measure for Generalized Anxiety Disorder-Child Age 11–17 \(adapted from GAD-7\)](#)
- Link: [HEADS-ED Tool](#)—Screening for Pediatric Mental Health (online interactive tool)
- PROMIS Anxiety (pediatric and parent versions are available via [HealthMeasures.net](#))
- PROMIS Depression (pediatric and parent versions are available via [HealthMeasures.net](#))
- PROMIS Profile (25 questions, 37 questions, 49 questions versions are available via [HealthMeasures.net](#))
- Link: [Children's Somatization Inventory \(CSI\)](#)

**Level of Evidence: A**

**8.2 Assess the child/adolescent's broader environment, including family and caregiver function, mental health, and social connections.**

- Ask about socioeconomic status (caregiver education, family income, occupation)
- Ask about social impacts and life stressors (school setting, friends, teammates)
- Ask the child/adolescent and parents and/or caregivers to complete the following, as appropriate:
  - Link: PROMIS Family Function
  - Link: [Patient Health Questionnaire \(PHQ-9\)](#) (self-administered screen for depression in adults)
  - Link: [Generalized Anxiety Disorder scale \(GAD-7\)](#)

**Level of Evidence: B**

**8.3 Treat mental health symptoms or refer to a specialist in pediatric mental health.**

Base the mental health treatment on individual factors, patient preferences, the severity of symptoms, and co-morbidities.

Tools to assist healthcare professionals to make treatment decisions:

- Tool 8.1: [Post-Concussion Mental Health Considerations Algorithm](#)
- Tool 8.2: [Management of Prolonged Mental Health Disorders Algorithm](#)
- Tool 6.2: [General Considerations Regarding Pharmacotherapy](#)
- Tool 6.3: [Approved Medications for Pediatric Indications](#)

Refer to a local healthcare professional, specialized pediatric concussion program or to a specialist with experience in pediatric mental health if child/adolescent has prolonged or urgent mental health symptoms. Provide the name of a specialist with experience in pediatric mental health.

For deciding when to refer a child/adolescent to a specialist, use Tool 8.1: [Post-Concussion Mental Health Considerations Algorithm](#).

**Level of Evidence: B**



## Domain 9: Cognition

### Introduction:

Prolonged cognitive problems post-concussion that are affecting a child/adolescent's daily functioning (e.g., problems with speech, learning, attention, memory, information processing, etc.) need to be identified and managed appropriately. Identifying the nature and interaction between pre-existing and concussion-related cognitive problems will help to clarify the most appropriate supports based on the child/adolescent's characteristics, including return-to-school and return-to-activity/sport. Experienced school-based educational professionals, where available, can support the healthcare professionals in this area. Examples of school-based educational professionals vary and may include: vice-principals, learning support teachers (LST), guidance counsellors, student success teachers, and school board services such as psychology, social work, speech language pathology (SLP), etc.

### Recommendations:

#### **9.1 Evaluate a child/adolescent for cognitive symptoms that interfere with daily functioning following the acute injury.**

Level of Evidence: B

For symptoms that interfere with daily functioning for more than 4 weeks following acute injury, further evaluation by experienced professionals to assess cognitive problems may be required.

Depending on the nature of the cognitive symptoms, examples of professionals may include:

- Experienced educational professionals.
- Pediatric neuropsychologists.
- Occupational therapists.
- Speech language pathologists.

Other assessments may be required to determine the underlying cause(s) and any pre-existing contributing factors that can be managed:

- Use a risk score to assess any modifiers that may delay recovery ([Recommendation 2.1b](#)).
- A mental health assessment and a closer look at the family may be recommended (Domain 8: [Mental Health](#)).
- Vision, vestibular, and hearing assessments may be recommended (Domain 10: [Vision, Vestibular, and Oculomotor Function](#)).
- Physical examination (Tool 2.1: [Physical Examination](#)).
- As per usual pediatric clinical practice, broad clinical history taking is recommended to understand the youth's developmental, medical, social, academic, and family histories. Particular consideration should be given to the interplay between these pre-existing factors and current cognitive profile/presentation/symptoms.

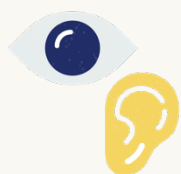
9.2

**Manage cognitive symptoms that interfere with daily functioning for more than 4 weeks following acute injury.**

Level of Evidence: B

See Domain 3: [Medical Follow-up and Management of Prolonged Symptoms](#).

See Domain 12: [Return-to-School and Work](#) for suggestions to guide an initial discussion about the best pathways for the student in school, employment, sports, social, and home environments. Tools and tests should be used in conjunction with an examination of previous school records such as marks and teacher observations.



## Domain 10: Vision, Vestibular, and Oculomotor Function

### Introduction:

Patients with acute head and neck trauma can present with symptoms such as dizziness, blurred or double vision, vertigo, postural imbalance, difficulty focusing, motion sensitivity, and/or headaches during reading. These symptoms may be suggestive of dysfunction within the neurological systems responsible for visual, vestibular, and oculomotor functioning, including balance, and gait. Identification of these deficits can aid in the provision of academic and activity-related accommodations during the acute stage after injury. Most acute concussion patients with these clinical features will experience symptom resolution and return to daily activities within 4 weeks following the acute injury and these patients will only need supportive care and anticipatory guidance. By conducting early screening for impairments in visual, vestibular, and oculomotor functioning as well as balance and gait, appropriate referrals to an interdisciplinary concussion team and sub-specialists can be initiated to provide evidence-based targeted interventions.

A repeat medical assessment on concussion patients with prolonged dizziness, blurred or double vision, vertigo, difficulty reading, postural imbalance, or headaches elicited by prolonged visual or vestibular stimulation is required 1-2 weeks following the acute injury. Although the cause of these prolonged symptoms can be multi-factorial, the assessment often reveals impairments in vestibular functioning, balance, or vision. The repeat medical assessment should include a focused clinical history, focused physical examination, and a consideration for the use of additional diagnostic tests as indicated (i.e., screening vestibular oculomotor assessment, visual field testing, and neuroimaging). The medical assessment must consider conditions such as intraparenchymal hemorrhage, stroke, traumatic cranial neuropathy, or temporal bone fractures.

Tool 10.1: [Post-Concussion Vestibular \(balance/dizziness\) and Vision Disturbances Algorithm](#).

### Oculomotor or Vision Deficits

Visual and oculomotor deficits can be due to cranial neuropathies, structural brain injuries, or functional impairments in convergence, accommodation, smooth pursuits, saccades, and vestibulo-ocular reflex functioning. Visual deficits are common symptoms following a concussion. In some patients, these deficits will spontaneously recover and will only need monitoring, supportive care, and anticipatory guidance. However, there is evidence that these deficits may also be associated with increased risk for prolonged symptoms. Identifying these deficits early will allow for early targeted supportive care, management, close monitoring for prolonged, and early referral for further treatment.

### Benign Paroxysmal Positional Vertigo

Benign paroxysmal positional vertigo (BPPV) can be caused by the traumatic displacement of the crystals (otoconia) of the inner ear into one of the semi-circular canals. This displacement results in intermittent brief episodes of vertigo and a characteristic pattern of nystagmus (involuntary eye movement) with head movements that stimulate fluid flow in the affected canal (e.g., laying down, sitting up, rolling in bed, looking up, bending over, rapid horizontal head movements). If the patient reports vertigo or dizziness that occurs for seconds following position changes, a screen for BPPV and consideration for targeted particle re-positioning manoeuvres should be conducted. In patients who continue to experience prolonged vertigo or dizziness after completing 3 particle repositioning manoeuvres, consideration should be given to a referral to an interdisciplinary concussion team or sub-specialist (i.e., otolaryngology) for further assessment and management.

### Vestibulo-Ocular Deficits

The vestibulo-ocular reflex (VOR) enables clear vision with head motion. In many cases, difficulties with clear vision during head motion are reported following a concussion and there is emerging evidence that alterations in VOR function may predict a longer recovery following concussion. Dizziness and/or blurred vision with head motion may be reported and should be further investigated by a healthcare professional with experience in this area. Vestibular rehabilitation has been reported to facilitate recovery when a child/adolescent is experiencing altered gain of the VOR.

## Recommendations:

### 10.1

**Perform a repeat medical assessment on all patients presenting with dizziness, blurred or double vision, vertigo, difficulty reading, postural imbalance, or headaches elicited by prolonged visual or vestibular stimulation 1-2 weeks following acute injury.**

Level of Evidence: B

Depending on the nature of the symptoms, the medical assessment should include a focused history, focused physical examination, and consideration for the need for diagnostic brain or cervical spine MRI imaging for those with focal or worrisome symptoms.

Tool 10.1: [Post-Concussion Vision, Vestibular, and Oculomotor Disturbances Algorithm](#).

Tool 2.1: [Physical examination](#).

[Recommendation 2.1d](#): When to consider diagnostic brain or cervical spine imaging.

### 10.2 Screen for oculomotor or vision deficits

Perform an assessment of visual acuity, pupillary function, visual fields, fundoscopy, and extra-ocular movements.

- With appropriate experience, consider an objective assessment of convergence, accommodation, saccades and smooth pursuits.
- Consider additional tests such as automated visual field testing, formal vestibular testing or diagnostic imaging.

Assessment video to consider:

Link: [Visio-vestibular examination](#) (The Children's Hospital of Philadelphia).

Consider referral to an interdisciplinary concussion team or neuro-ophthalmologist, neuro-optometrist, developmental optometrist, occupational therapist, or physiotherapist with competency-based training in vestibular rehabilitation to assess for impairments in convergence, accommodation, saccades and other visual oculomotor disorders.

Level of Evidence: C

**10.3 Screen for benign paroxysmal positional vertigo (BPPV) if the patient reports vertigo or dizziness that occurs for seconds following position changes and consider targeted particle repositioning manoeuvres.**

After completing a neurological screen and clearing the cervical spine to move into the test position, perform the Dix-Hallpike Test. If positive for BPPV (i.e., reproduction of vertigo, typically for seconds, in addition to a characteristic pattern of nystagmus for the canal that is being assessed), a Particle Repositioning Manoeuvre may be appropriate.

Consider the Epley Manoeuvre which can be used to treat the anterior and posterior canals in the case of a canalithiasis. There are many subtypes of BPPV that may require further assessment or alternate canalith repositioning manoeuvres and referral to a healthcare professional (often a physiotherapist with competency-based training in vestibular rehabilitation) for treatment. If symptoms are provoked by pressure (i.e., val salva) or accompanied by a change in hearing, referral to an otolaryngologist or neuro-otologist is warranted.

In patients who continue to experience prolonged vertigo or dizziness despite 3 particle repositioning manoeuvres, consider referral to an interdisciplinary concussion team or neuro-otologist or physiotherapist with competency-based training in vestibular rehabilitation. These experienced healthcare professionals should rule out alternative peripheral and central vestibular disorders (e.g., superior semi-circular canal dehiscence (SSCD), vestibular hypofunction) and initiate active management with rehabilitation or referral as appropriate.

Online videos to consider:

- Link: [Dix-Hallpike Test](#) (University of Calgary)
- Link: [Epley Manoeuvre](#) (University of Calgary)

**Level of Evidence: C**

#### 10.4 Screen for vestibulo-ocular deficits.

With appropriate experience, perform an assessment of the vestibulo-ocular reflex (VOR) such as the head thrust test and dynamic visual acuity.

Consider referral to a physiotherapist with competency-based training in vestibular rehabilitation.

Online videos to consider:

- Link: [Head Thrust Test and Dynamic Visual Acuity \(University of Calgary\)](#)
- Link: [Visio-Vestibular Examination \(The Children's Hospital of Philadelphia\)](#)
- Link: [Dynamic Visual Acuity \(University of Calgary\)](#)

**Level of Evidence: B**

#### 10.5 Screen for balance deficits.

Assess for prolonged balance deficits and determine which systems (visual reflexes, inner ear, musculoskeletal, nervous system or brain) might be contributing to dizziness, headaches, and balance problems. Vestibular rehabilitation may improve balance and dizziness. If prolonged impairment is identified, refer to a specialist immediately.

Perform assessment of postural stability and balance.

- Standing balance test (eyes open/closed, tandem stance, single leg stance), Balance Error Scoring System.
- Dynamic balance: Consider the Functional Gait Assessment, BOT.

Consider referral to an interdisciplinary concussion team or physiotherapist with competency-based training in vestibular rehabilitation.

Online videos to consider:

- Link: [Visio-Vestibular Examination](#) (The Children's Hospital of Philadelphia)
- Link: [Balance Error Scoring System](#)
- Link: [Functional Gait Assessment](#) (University of Calgary)

Level of Evidence: C

**10.6 Screen for and consider underlying psychosocial contributors of visual, vestibular, and oculomotor dysfunction.**

See Domain 8: [Mental Health](#).

Level of Evidence: C

**10.7 Provide general post-concussion education that outlines symptoms of concussion, provides suggestions regarding activity modification and includes academic accommodations to manage visual, vestibular and oculomotor symptoms.**

Guidance about how to make a gradual return-to-school, cognitive activities, and physical activities:

- Recommendation 2.3: [Recommend graduated return to cognitive and physical activity](#)
- Recommendation 2.4c: [Advise on the use of computers, phones, and other screen devices](#)
- Domain 12: [Return-to-School and Work](#)

Level of Evidence: C

**10.8 Encourage patients with post-concussion vestibular, vision or oculomotor symptoms to engage in cognitive activity and low-risk physical activity as soon as tolerated while staying below their symptom-exacerbation thresholds. Activities that pose no/low risk of sustaining a concussion (no risk of contact, collision, or falling) should be resumed even if mild residual symptoms are present or whenever acute symptoms improve sufficiently to permit activity.**

Level of Evidence: B- Gradual return to physical activity. C- Gradual return to cognitive activity.

See [Recommendation 2.3](#).

- Refer select patients (e.g., highly-active or competitive athletes, those who are not tolerating a graduated return to physical activity, or those who are slow to recover) following acute injury to a medically supervised interdisciplinary team with the ability to individually assess sub-symptom threshold aerobic exercise tolerance and to prescribe aerobic exercise treatment. This exercise tolerance assessment can be as early as 48 hours following acute injury. Level of Evidence: A
- Patients who are active may benefit from referral to a medically supervised interdisciplinary team with the ability to individually assess sub-symptom threshold aerobic exercise tolerance and to prescribe aerobic exercise treatment. This exercise tolerance assessment can be as early as 48 hours following acute injury. Level of Evidence: C

See Tool 2.6: [Post-Concussion Information Sheet](#) for examples of low-risk activities.

**10.9 Refer patients with prolonged post-concussion vestibular functioning, balance or visual dysfunction (more than 4 weeks following the acute injury) to an interdisciplinary concussion team with appropriate experience. Consider early referral (before 4 weeks) to an interdisciplinary concussion team in the presence of modifiers that may delay recovery.**

Level of Evidence: A

**Specialized interdisciplinary concussion care is ideally initiated for patients at elevated risk for a delayed recovery within the first two weeks post-injury. Level of Evidence: B**

Tool 10.1: [Post-Concussion Vision, Vestibular, and Oculomotor Disturbances Algorithm](#).

Assessment by an interdisciplinary concussion team can assist in identifying the type of management that is required, along with the medical and health professions on the interdisciplinary concussion team or external to this team who can provide the required management. Not all children/adolescents will require care from all members of the interdisciplinary concussion team and care should be targeted based on identified symptoms and patient needs.

See Recommendation 2.1b: [Note any modifiers that may delay recovery and use a clinical risk score to predict risk of prolonged symptoms](#).

**10.10 Recommend a medical follow-up to reassess clinical status if vestibular functioning, balance or visual dysfunction symptoms persist. Recommend an immediate medical follow-up in the presence of any deterioration.**

**Level of Evidence: C**



## Domain 11: Fatigue

### Introduction:

Physical, mental, or cognitive fatigue is common following a concussion. Fatigue can be defined as weariness or tiredness following physical and/or cognitive/mental exertion. A repeat medical exam is necessary for children/adolescents experiencing fatigue 1-2 weeks following a concussion to rule out a serious medical condition or injury. Children/adolescents experiencing prolonged post-concussion fatigue should be encouraged to participate in low-risk physical and cognitive activities below their symptom exacerbation threshold (at a level that does not bring on symptoms or make symptoms worse). Pacing and energy management techniques should be shared with the child/adolescent (Tool 2.5 [“Four P’s” – Prioritize, Plan, Pace and Position](#)). If a child/adolescent experiences fatigue for more than 4 weeks following the acute injury consider referring to an interdisciplinary concussion team.

### Recommendations:

#### **11.1 Perform a repeat medical assessment on all patients presenting with post-concussion fatigue 1-2 weeks following acute injury.**

The medical assessment should include a clinical history of symptoms, physical examination, and screen for other causes of fatigue (e.g., mononucleosis, anemia, thyroid dysfunction, mood disorders, pregnancy, etc.).

**Level of Evidence: C**

#### **11.2 Provide patients with post-concussion fatigue with general education and guidance that outlines non-pharmacological strategies to help cope with fatigue symptoms and set expectations.**

Strategies and post-concussion education guidance related to fatigue:

- Emphasize that spreading activities throughout the day helps patients achieve more and that they should avoid doing too much at once. Tool 2.5 [“Four P’s” – Prioritize, Plan, Pace and Position](#)
- Encourage good diet and hydration
- Encourage good sleep hygiene. Tool 2.7: [Strategies to Promote Good Sleep and Alertness](#)
- Link: [Sleep for Youth. CHEO Sleep Hygiene handout](#)
- Avoid daytime napping
- Identify the triggers of fatigue
- Encourage the child/adolescent to plan meaningful goals, record activity achievement, and identify patterns of fatigue by using a notebook or diary.
- Inform that fatigue can be worsened by low mood or stress.
- Inform that deconditioning can compound fatigue.
- Encourage a gradual return-to-school with accommodation (Domain 12: [Return-to-School and Work](#))

**Level of Evidence: C**

**11.3 Encourage patients with post-concussion fatigue to engage in cognitive activity and low-risk physical activity as soon as tolerated while staying below their symptom-exacerbation thresholds. Activities that pose no/low risk of sustaining a concussion (no risk of contact, collision, or falling) should be resumed even if mild residual symptoms are present or whenever acute symptoms improve sufficiently to permit activity.**

**Level of Evidence:** B- Gradual return to physical activity. C- Gradual return to cognitive activity.

See [Recommendation 2.3](#).

- Refer select patients (e.g., highly-active or competitive athletes, those who are not tolerating a graduated return to physical activity, or those who are slow to recover) following acute injury to a medically supervised interdisciplinary team with the ability to individually assess sub-symptom threshold aerobic exercise tolerance and to prescribe aerobic exercise treatment. This exercise tolerance assessment can be as early as 48 hours following acute injury. Level of Evidence: A
- Patients who are active may benefit from referral to a medically supervised interdisciplinary team with the ability to individually assess sub-symptom threshold aerobic exercise tolerance and to prescribe aerobic exercise treatment. This exercise tolerance assessment can be as early as 48 hours following acute injury. Level of Evidence: C

See Tool 2.6: [Post-Concussion Information Sheet](#) for examples of low-risk activities.

**11.4 Consider referral to an interdisciplinary concussion team for patients with prolonged post-concussion fatigue (more than 4 weeks following the acute injury) to learn pacing techniques.**

**Level of Evidence:** C

**11.5 Recommend a medical follow-up to re-assess clinical status if fatigue symptoms persist. Recommend an immediate medical follow-up in the presence of any deterioration. Consider early referral (before 4 weeks) to an interdisciplinary concussion team in the presence of modifiers that may delay recovery.**

**Level of Evidence:** C- Medical follow-up. A- Early referral in the presence of modifiers that may delay recovery

**Specialized interdisciplinary concussion care is ideally initiated for patients at elevated risk for a delayed recovery within the first two weeks post-injury. Level of Evidence:** B

See Recommendation 2.1b: [Note any modifiers that may delay recovery and use a clinical risk score to predict risk of prolonged symptoms.](#)



## Domain 12: Return-to-School and Work

### Introduction:

Parents and/or caregivers need to be made aware that most youth will experience symptom resolution and full return to daily activities following a concussion; however this is highly variable and individual. Complete absence from the school environment for more than one week is generally not recommended, however, it is reasonable for a child/adolescent to miss some school after a concussion, regardless of symptoms. The child/adolescent should gradually return to their school environment as soon as they are able to tolerate engaging in cognitive activities without exacerbating their symptoms, even if they are still experiencing symptoms. It is important not to allow or encourage the child/adolescent to “settle into the habit” of missing school. The school setting provides beneficial contact with peers and social support.

#### Overview:

- The return-to-school process should be coordinated by the school’s concussion management team and/or a point person in the school (e.g., guidance counsellor, principal/vice principal, teacher, etc.).
- A key to the initial management of concussion is a gradual return to the school environment and activities after the initial period of rest (24-48 hours) and as soon as cognitive activities can be tolerated without making symptoms worse.
- Children/adolescents should be provided fast-acting temporary accommodations to their workload and schedule. Accommodations can be modified as symptoms resolve and/or when children/adolescents are caught up on missed workload and learning.
- Manage the gradual return to school/activity/sport on a case-by-case basis.

#### Identifying and managing new or pre-existing school difficulties will:

- Clarify the most appropriate treatment and management options and accommodations based on the child/adolescent’s characteristics
- Promotes cognitive recovery and successful reintegration at school or work
- Support/assist return-to-school, engagement in daily activities, return to social engagement, management and treatment of symptoms

#### Tools to consider:

- Tool 12.1: [Concussion Implications and Interventions for the Classroom](#)
- Tool 12.2: [Template: Letter of Accommodation from the concussion care team to the school](#)
- Tool 12.3: [Template Letter of Accommodation from Physician to School](#)
- Tool 12.4: [Sample Letter/Email from School to Parents](#)
- Link: [CATT Return to School Strategy](#)
- Link: [CATT Student Return to Learn Plan](#)
- Link: [Heads Up Schools: Helping Students Recover from a Concussion: Classroom Tips for Teachers](#)
- Link: [Parachute’s Protocol for Return to Learn After a Concussion](#) (Parachute Canada)
- Link: [Post-Concussion Academic Accommodation Protocol](#) (University of Oregon)
- Link: [SCHOOLFirst: Enabling successful return to school for Canadian youth following a concussion](#) (Holland Bloorview Kids Rehabilitation Hospital)

## Recommendations:

**12.1 The child/adolescent should return to their school environment as soon as they are able to tolerate engaging in cognitive activities without exacerbating their symptoms, even if they are still experiencing symptoms. Recommend a stepwise return-to-school plan. Include temporary accommodations based on symptoms and recommendations from the healthcare professional. Monitor and modify the return-to-school plan based on ongoing assessment of symptoms.**

Level of Evidence: B

This involves collaboration and communication among healthcare professionals, school-based professionals, the child/adolescent, and/or parents/caregivers.

Summary of tools to consider: These tools are suggestions for initiating a discussion to determine the best pathways for the student in learning environments.

- Tool 12.1: [Concussion Implications and Interventions for the Classroom](#)
- Tool 12.2: [Template: Letter of Accommodation from the concussion care team to the school](#)
- Tool 12.3: [Template Letter of Accommodation from Physician to School](#)
- Tool 12.4: [Sample Letter/Email from School to Parents](#)
- Link: [CATT Return to School Strategy](#)
- Link: [CATT Student Return to Learn Plan](#)
- Link: [Heads Up Schools: Helping Students Recover from a Concussion: Classroom Tips for Teachers](#)
- Link: [Parachute's Protocol for Return to Learn After a Concussion](#) (Parachute Canada)
- Link: [Post-Concussion Academic Accommodation Protocol](#) (University of Oregon)
- Link: [SCHOOLFirst: Enabling successful return to school for Canadian youth following a concussion](#) (Holland Bloorview Kids Rehabilitation Hospital)

**12.1a. Complete absence from the school environment for more than one week is not generally recommended. Children/adolescents should receive temporary academic accommodations (e.g., modifications to schedule, classroom environment and workload) to support a return to the school environment in some capacity as soon as possible.**

Level of Evidence: C

- Tool 12.1: [Concussion Implications and Interventions for the Classroom](#)
- Tool 12.2: [Template: Letter of Accommodation from the concussion care team to the school](#)
- Tool 12.3: [Template Letter of Accommodation from Physician to School](#)

**12.1b [Recommendation 2.3c](#): Recommend that patients avoid school activities associated with a risk of contact, fall, or collisions such as high speed and/or contact activities and full-contact sport that may increase the risk of sustaining another concussion during the recovery period. Advise/emphasize that returning to full-contact sport or high-risk activities before the child/adolescent has recovered increases the risk of delayed recovery and for sustaining another more severe concussion or more serious injury.**

**12.2 Assess for school difficulties using clinical judgment.**

Level of Evidence: B

- Determine how much school the child/adolescent has missed post-concussion and how much missed workload the child/adolescent is expected to catch up on from missed school days.
- Obtain school records to determine what issues may have been present prior to the concussion
- School or cognitive difficulties may overlap with vision, vestibular, hearing, mental health, and social/family issues. Please assess.

- Domain 8: [Mental Health](#)
- Domain 9: [Cognition](#)
- Domain 10: [Vision, Vestibular, and Oculomotor Function](#)

### 12.3 Manage school difficulties.

On re-evaluation, experienced health professionals (and school-based educational professionals where available) should manage school cognitive difficulties, provide accommodations, and reduce stressors. This should be done in collaboration with the child/adolescent, parents/caregivers, schools and/or employers to support success in the home, school, and community.

Refer to an interdisciplinary concussion team and/or a school-based educational professional (if available) if symptoms interfere with daily functioning more than 4 weeks following a concussion (Domain 9: [Cognition](#)). Refer for a formal evaluation if school difficulties may have been pre-existing. Use tools to encourage reintegration within the school, employment, sports, social, and home environments.

Summary of tools to consider:

- Tool 12.1: [Concussion Implications and Interventions for the Classroom](#)
- Tool 12.2: [Template: Letter of Accommodation from the Concussion Care Team to the School](#)
- Tool 12.3: [Template Letter of Accommodation from Physician to School](#)
- Tool 12.4: [Sample Letter/Email from School to Parents](#)
- Link: [SCHOOLFirst Handbook: Enabling successful return to school for Canadian youth following a concussion](#), page 6 (Holland Bloorview Kids Rehabilitation Hospital)

**Level of Evidence: C**

**12.4 Encourage patients with school difficulties to engage in cognitive activity and low-risk physical activity as soon as tolerated while staying below their symptom-exacerbation thresholds. Activities that pose no/low risk of sustaining a concussion (no risk of contact, collision, or falling) should be resumed even if mild residual symptoms are present or whenever acute symptoms improve sufficiently to permit activity. See [Recommendation 2.3](#).**

**Level of Evidence: B- Gradual return to physical activity. C- Gradual return to cognitive activity.**

**12.5 Return-to-school and return-to-sport strategies can be performed simultaneously. Recommend that the child/adolescent return-to-school full-time at a full academic load, including writing exams without accommodations related to their concussion/post-concussion symptoms, before returning to full-contact sport or high-risk activities.**

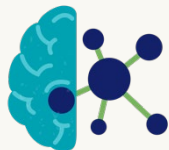
See Domain 4: [Medical clearance for full-contact sport or high-risk activity](#).

**Level of Evidence: B**

**12.6 Prioritize return-to-school before return to work.**

Level of Evidence: B- Need for rest. C- Ideal duration of rest. B- Starting return to activity earlier.

For teens who work, please consult the “[Guidelines for Concussion/ Mild Traumatic Brain Injury and Persistent Symptoms 3rd Edition For Adults \(18+ years of age\)](#)” for recommendations on how to work with the adolescent’s employer regarding non-academic accommodations so that the adolescent can gradually return-to-work while promoting recovery.



## Domain 13: Biomarkers – Neuroimaging

### Recommendations:

**13.1 At this stage, advanced neuroimaging biomarkers are not yet ready for clinical implementation/management.**

Biomarkers such as functional MRI (fMRI), diffusion tensor imaging (DTI), magnetic resonance spectroscopy (MRS), arterial spin labeling (ASL), cerebrovascular-reactivity mapping (CVR), quantitative susceptibility based susceptibility weighted imaging (qSWI), electroencephalography/event-related potential (EEG/ERP), transcranial magnetic stimulation (TMS), while potentially useful as research tools, are not ready for clinical implementation.

**Level of Evidence: C**

**13.2 When conventional MRI is performed in the clinical management of concussion patients, the inclusion of susceptibility-weighted images (SWI) sequences could be considered as it may be useful for detecting small hemorrhages. The clinical significance of small hemorrhages on SWI is not clear at present.**

See [Recommendation 2.1d](#) for more information on when to consider diagnostic brain or cervical spine imaging.

**Level of Evidence: C**



## Domain 14: Biomarkers – Serologic

### Recommendations:

**14.1 The use of serologic biomarkers is not clinically indicated. Presently there is no validated “concussion blood test” that can be used to accurately detect concussion in children/adolescents.**

At this stage, newer serologic and other clinical biomarkers, while potentially useful as research tools, are not ready for clinical implementation/management.

**Level of Evidence: C**

# TOOLS

Tool 1.1: [Pediatric Concussion: The role of school boards, community sports organizations, and centres](#)

Tool 1.2: [Concussion Recognition Tool 5. To help identify concussion in children, adolescents, and adults](#)

Tool 1.3: [Manage Acute and Prolonged Symptoms Algorithm](#)

Tool 2.1: [Physical Examination](#)

Tool 2.2: [PECARN Management Algorithm for Children after Head Trauma](#)

Tool 2.3: [CATCH2 Rule](#)

Tool 2.4: [Algorithm for the Management of the Pediatric Patient  \$\geq 2\$  years with Minor Head Trauma](#)

Tool 2.5: [“Four P’s” – Prioritize, Plan, Pace, and Position](#)

Tool 2.6: [Post-Concussion Information Sheet](#)

Tool 2.7: [Strategies to Promote Good Sleep and Alertness](#)

Tool 6.1: [Post-Concussion Headache Algorithm](#)

Tool 6.2: [General Considerations Regarding Pharmacotherapy](#)

Tool 6.3: [Approved Medications for Pediatric Indications](#)

Tool 7.1: [Managing Post-Concussion Sleep Disturbances Algorithm](#)

Tool 7.2: [Factors That May Influence the Child/Adolescent’s Sleep/Wake Cycle](#)

Tool 8.1: [Post-Concussion Mental Health Considerations Algorithm](#)

Tool 8.2: [Management of Prolonged Mental Health Disorders Algorithm](#)

Tool 10.1: [Post-Concussion Vestibular \(balance/dizziness\) and Vision Disturbances Algorithm](#)

Tool 12.1: [Concussion Implications and Interventions for the Classroom](#)

Tool 12.2: [Template: Letter of Accommodation from the Concussion Care Team to the School](#)

Tool 12.3: [Template Letter of Accommodation from Physician to School](#)

Tool 12.4: [Sample Letter/Email from School to Parents](#)

# REFERENCES

Updated: April 1, 2022

Aaron Stacey, Hamner Jason W, Ozturk Erin D, Hunt Danielle L, Iaccarino Mary Alexis, Meehan William P, Howell David R, and Tan Can Ozan. 2021. “Cerebrovascular Neuroprotection after Acute Concussion in Adolescents.” *Annals of Neurology* 90 (1): 43–51. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=33855730>.

Aggarwal Seema, Ott Summer D, Padhye Nikhil Meininger Janet C, and Armstrong Terri S. 2019. “Clinical and Demographic Predictors of Concussion Resolution in Adolescents: A Retrospective Study.” *Applied Neuropsychology: Child* 8 (1): 50–60. <https://doi.org/10.1080/21622965.2017.1381099>.

Aggarwal Seema, Ott Summer D, Padhye Nikhil Schulz Paul E, Seema S. Aggarwal, Summer D. Ott, Nikhil S. Padhye, and Paul E. Schulz. 2020. “Sex, Race, ADHD, and Prior Concussions as Predictors of Concussion Recovery in Adolescents.” *Brain Injury* 34 (6): 809–17. <https://doi.org/10.1080/02699052.2020.1740942>.

Anderson Stevi, Gatens Dustin, Glatts Colette, and Russo Stephen A. 2019. “Normative Data Set of SWAY Balance Mobile Assessment in Pediatric Athletes.” *Clinical Journal of Sport Medicine* 29 (5): 413–20. <https://doi.org/10.1097/JSM.0000000000000545>.

Babl Franz, Anderson Vicki, Rausa Vanessa C, Anderson Nicholas, Pugh Remy, Chau Tracey, Clarke Cathriona, et al. 2021. “Accuracy of Components of the SCAT5 and ChildSCAT5 to Identify Children with Concussion.” *International Journal of Sports Medicine*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34399426>.

Barlow Karen, Brooks Brian L, Esser Michael J, Kirton Ada Mikrogianakis Angelo, Zemek Roger L, MacMaster Frank P, et al. 2020. “Efficacy of Melatonin in Children with Postconcussive Symptoms: A Randomized Clinical Trial.” *Pediatrics* 145 (4). <https://doi.org/10.1542/peds.2019-2812>.

Barlow Karen, Girgulis Katherine A, Goldstein Genevieve, Crowe Erica G, Vo Mai K, Su Peter, Esser Michael J, Dewey Deborah, and Kirk Valerie G. 2020. “Sleep Parameters and Overnight Urinary Melatonin Production in Children With Persistent Post-Concussion Symptoms.” *Pediatric Neurology* 105: 27–34. <https://doi.org/10.1016/j.pediatrneurol.2019.11.006>.

Black Amanda, Miutz Lauren N, Kv Vineetha Warriyar, Schneider Kathryn J, Yeates Keith Owen, Emery Carolyn A, Amanda M. Black, et al. 2020. “Baseline Performance of High School Rugby Players on the Sport Concussion Assessment Tool 5.” *Journal of Athletic Training* 55 (2): 116–23. <https://doi.org/10.4085/1062-6050-123-19>.

Black Amanda, Yeates Keith Owen, Babul Shelina, Nettel-Aguirre Alberto, and Emery Carolyn A. 2020. “Association between Concussion Education and Concussion Knowledge, Beliefs and Behaviours among Youth Ice Hockey Parents and Coaches: A Cross-Sectional

Study.” *BMJ Open* 10 (8): e038166.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=32830117>.

Borland Meredith, Dalziel Stuart R, Phillips Natalie, Lyttle Mark D, Bressan Silvia, Oakley Ed, Hearps Stephen J.C, et al. 2019. “Delayed Presentations to Emergency Departments of Children With Head Injury: A PREDICT Study.” *Annals of Emergency Medicine* 74 (1): 1–10. <https://doi.org/10.1016/j.annemergmed.2018.11.035>.

Brooks Brian, Kumari Jeshna, and Virani Shane. 2021. “Family Burden in Adolescents With Refractory Postconcussion Symptoms.” *The Journal of Head Trauma Rehabilitation*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34320550>.

Brooks Brian, Mrazik Martin, Barlow Karen M, McKay Carly D, Meeuwisse Willem H, and Emery Carolyn A. 2014. “Absence of Differences Between Male and Female Adolescents With Prior Sport Concussion.” *Journal of Head Trauma Rehabilitation* 29 (3): 257–64. <https://doi.org/10.1097/HTR.000000000000016>.

Brooks Brian, Virani Shane, Khetani Aneesh, Carlson Helen, Jadavji Zeanna, Mauthner Micaela, Low Trevor A, et al. 2020. “Functional Magnetic Resonance Imaging Study of Working Memory Several Years after Pediatric Concussion.” *Brain Injury* 34 (7): 895–904. <https://doi.org/10.1080/02699052.2020.1753240>.

Champigny Claire, Rawana Jennine, Iverson Grant L, Maxwell Bruce, Berkner Paul D, and Wojtowicz Magdalena. 2020. “Influence of Anxiety on Baseline Cognitive Testing and Symptom Reporting in Adolescent Student Athletes.” *Journal of Neurotrauma* 37 (24): 2632–38. <https://doi.org/10.1089/neu.2020.7079>.

Charek Daniel, R J Elbin, Sufrinko Alicia, Schatz Philip, D’Amico Nathan R, Collins Michael W, and Kontos Anthony P. 2020. “Preliminary Evidence of a Dose-Response for Continuing to Play on Recovery Time After Concussion.” *The Journal of Head Trauma Rehabilitation* 35 (2): 85–91. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=31033740>.

Chizuk Haley, Willer Barry S, Horn Emily C, Haider Mohammad N, and Leddy John J. 2021. “Sex Differences in the Buffalo Concussion Treadmill Test in Adolescents with Acute Sport-Related Concussion.” *Journal of Science and Medicine in Sport*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33992537>.

Cohen Paul, Sufrinko Alicia, Elbin Robert J, Collins Michael W, Sinnott Aaron M, and Kontos Anthony P. 2020. “Do Initial Symptom Factor Scores Predict Subsequent Impairment Following Concussion?” *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine* 30 Suppl 1: S61–68. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32132479>.

Cook Nathan, Sapigao Rosemarie G, Silverberg Noah D, Maxwell Bruce A, Zafonte Ross, Berkner Paul D, and Iverson Grant L. 2020. “Attention-Deficit/Hyperactivity Disorder Mimics the Post-Concussion Syndrome in Adolescents.” *Frontiers in Pediatrics* 8 (February): 1–10. <https://doi.org/10.3389/fped.2020.00002>.

Corwin Daniel, Arbogast Kristy B, Haber Rebecca A, Pettijohn Kevin W, Zonfrillo Mark R, Grady Matthew F, and Master Christina L. 2020. “Characteristics and Outcomes for Delayed Diagnosis of Concussion in Pediatric Patients Presenting to the Emergency Department.” *The Journal of Emergency Medicine*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33036827>.

Corwin Daniel, Arbogast Kristy B, Swann Casey, Haber Rebecca, Grady Matthew F, and Master Christina L. 2020. “Reliability of the Visio-Vestibular Examination for Concussion among Providers in a Pediatric Emergency Department.” *American Journal of Emergency Medicine* 38 (9): 1847–53. <https://doi.org/10.1016/j.ajem.2020.06.020>.

Corwin Daniel, McDonald Catherine C, Arbogast Kristy B, Mohammed Fairuz N, Metzger Kristina B, Pfeiffer Melissa R, Patton Declan A, et al. 2020. “Clinical and Device-Based Metrics of Gait and Balance in Diagnosing Youth Concussion.” *Medicine and Science in Sports and Exercise* 52 (3): 542–48.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=31524833>.

Corwin Daniel, Propert Kathleen Zorc Joseph Zonfrillo Mark R, Wiebe Douglas Daniel J. Corwin, Kathleen J. Propert, Joseph J. Zorc, Mark R. Zonfrillo, and Douglas J. Wiebe. 2019. “Use of the Vestibular and Oculomotor Examination for Concussion in a Pediatric Emergency Department.” *American Journal of Emergency Medicine* 37 (7): 1219–23.

<https://doi.org/10.1016/j.ajem.2018.09.008>.

Corwin Daniel, Zonfrillo Mark R, Master Christina L, Arbogast Kristy B, Grady Matthew F, Robinson Roni L, Goodman Arlene M, and Wiebe Douglas J. 2014. “Characteristics of Prolonged Concussion Recovery in a Pediatric Subspecialty Referral Population.” *The Journal of Pediatrics* 165 (6): 1207–15. <https://doi.org/10.1016/j.jpeds.2014.08.034>.

Coslick Alexis, Chin Kaitlyn E, Kalb Luther G, Slomine Beth S, and Suskauer Stacy J. 2020. “Participation in Physical Activity at Time of Presentation to a Specialty Concussion Clinic Is Associated With Shorter Time to Recovery.” *PM and R* 12 (12): 1195–1204.

<https://doi.org/10.1002/pmrj.12443>.

Crasta Jewel, Raja Altamash Caffo Brian S, Hluchan Christine M, and Suskauer Stacy J. 2021. “The Effect of Age and Competition Level on Subtle Motor Performance in Adolescents Medically Cleared Postconcussion: Preliminary Findings.” *American Journal of Physical Medicine & Rehabilitation* 100 (6): 563–69.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32932362>.

Crowe Louise, Anderson Vicki, Barton Sarah, Babl Franz E, and Catroppa Cathy. 2014. “Verbal Ability and Language Outcome Following Traumatic Brain Injury in Early Childhood.” *Journal of Head Trauma Rehabilitation* 29 (3): 217–23.

<https://doi.org/10.1097/HTR.0b013e31829babfd>.

DeMatteo Carol, Randall Sarah, Lin Chia-Yu A Yu A, and Claridge Everett A. 2019. “What Comes First: Return to School or Return to Activity for Youth After Concussion? Maybe We Don’t Have to Choose.” *Frontiers in Neurology* 10 (JUL): 1–9.

<https://doi.org/10.3389/fneur.2019.00792>.

Dobney Danielle, Grilli Lisa, Beaulieu Christine, Straub Meghan, Galli Carlo, Saklas Mitchell, Friedman Debbie, Dubrovsky Alexander Sasha, and Gagnon Isabelle J. 2020. “Feasibility of Early Active Rehabilitation for Concussion Recovery in Youth: A Randomized Trial.” *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine* 30 (6): 519–25.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=33141524>.

Dobney Danielle, Grilli Lisa, Kocilowicz Helen, Beaulieu Christine, Straub Meghan, Friedman Debbie, and Gagnon Isabelle. 2017. “Evaluation of an Active Rehabilitation Program for Concussion Management in Children and Adolescents.” *Brain Injury* 31 (13–14): 1753–59.

<https://doi.org/10.1080/02699052.2017.1346294>.

Dodd Andrew, Lu Hanzhang, Wertz Christopher J, Ling Josef M, Shaff Nicholas A, Wasserott Benjamin C, Meier Timothy et al. 2020. “Persistent Alterations in Cerebrovascular Reactivity in Response to Hypercapnia Following Pediatric Mild Traumatic Brain Injury.” *Journal of Cerebral Blood Flow and Metabolism : Official Journal of the International Society of Cerebral Blood Flow and Metabolism* 40 (12): 2491–2504.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=31903838>.

Dodd Jonatha Murphy Samantha, and Bosworth Christopher. 2020. “Sensitivity of the Memory Validity Profile (MVP): Raising the Bar.” *Child Neuropsychology : A Journal on Normal and Abnormal Development in Childhood and Adolescence* 26 (1): 137–44.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem4&NEWS=N&AN=31145035>.

Eagle Shawn, Womble Melissa N, R J Elbin, Pan Raymond, Collins Michael W, and Kontos Anthony P. 2020. “Concussion Symptom Cutoffs for Identification and Prognosis of Sports-Related Concussion: Role of Time Since Injury.” *The American Journal of Sports Medicine* 48 (10): 2544–51.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32693612>.

Ellis Michael, Boles Susan, Derksen Vickie, Dawyduk Brenda, Amadu Adam, Stelmack Karen, Kowalchuk Matthew, et al. 2019. “Evaluation of a Pilot Paediatric Concussion Telemedicine Programme for Northern Communities in Manitoba.” *International Journal of Circumpolar Health* 78 (1): 1573163. <https://doi.org/10.1080/22423982.2019.1573163>.

Ellis Michael, McDonald Patrick Olson Ashley, Koenig James, and Russell Kelly. 2019. “Cervical Spine Dysfunction Following Pediatric Sports-Related Head Trauma.” *Journal of Head Trauma Rehabilitation* 34 (2): 103–10. <https://doi.org/10.1097/HTR.0000000000000411>.

Ellis Michael, Mendez Ivar, and Russell Kelly. 2020. “Preliminary Clinical Algorithm to Optimise Remote Delivery of Paediatric Concussion Care in Canada’s North.” *International Journal of Circumpolar Health* 79 (1): 1832390.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=33089768>.

Gabbe Belinda, Brooks Caroline, Demmler Joanne C, Macey Steven, Hyatt Melanie A, and Lyons Ronan A. 2014. “The Association between Hospitalisation for Childhood Head Injury and Academic Performance: Evidence from a Population e-Cohort Study.” *Journal of*

Epidemiology and Community Health 68 (5): 466–70. <https://doi.org/10.1136/jech-2013-203427>.

Gillie Brandon, Fazio-Sumrok Vanessa, Eagle Shawn R, Kegel Nathan, Trbovich Alicia M, Collins Michael W, and Kontos Anthony P. 2020. “Clinical Predictors of Post-Injury Anxiety in Adolescent Patients Following Concussion.” *Applied Neuropsychology: Child* 0 (0): 1–7. <https://doi.org/10.1080/21622965.2020.1799790>.

Green Stephanie, Keightley Michelle Lobaugh Nancy J, Dawson Deirdre R, and Mihailidis Alex. 2018. “Changes in Working Memory Performance in Youth Following Concussion.” *Brain Injury* 32 (2): 182–90. <https://doi.org/10.1080/02699052.2017.1358396>.

Grool Anne, Aglipay Mary, Momoli Franco, Meehan William P, Freedman Stephen B, Yeates Keith Owen, Gravel Jocelyn, et al. 2016. “Association Between Early Participation in Physical Activity Following Acute Concussion and Persistent Postconcussive Symptoms in Children and Adolescents.” *JAMA* 316 (23): 2504. <https://doi.org/10.1001/jama.2016.17396>.

Guerriero Réjean, Kuemmerle Karamah, Pepin Michael J, Taylor Alex Wolff Robert, Meehan William P, M Guerriero, et al. 2018. “The Association Between Premorbid Conditions in School-Aged Children With Prolonged Concussion Recovery.” *Journal of Child Neurology* 33 (2): 168–73. <https://doi.org/10.1177/0883073817749655>.

Haider Mohammad, Johnson Samantha L, Mannix Rebekah, Macfarlane Alexander J, Constantino Dyla Johnson Blair D, Willer Barry, et al. 2019. “The Buffalo Concussion Bike Test for Concussion Assessment in Adolescents.” *Sports Health* 11 (6): 492–97. <https://doi.org/10.1177/1941738119870189>.

Haider Mohammad, Leddy John J, Wilber Charles G, Viera Kaitlin B, Bezherano Itai, Wilkins Kimberly J, Miecznikowski Jeffrey C, and Willer Barry S. 2019. “The Predictive Capacity of the Buffalo Concussion Treadmill Test after Sport-Related Concussion in Adolescents.” *Frontiers in Neurology* 10 (APR): 1–7. <https://doi.org/10.3389/fneur.2019.00395>.

Heyworth Benton, Carroll Kaitlin M, Rizza Andrew J, McInnis Kelly C, and Gill Thomas J. 2014. “Treatment of Concussion in High School Athletes: A Proposed Protocol for Athletic and Academic Return to Activity.” *Orthopaedic Journal of Sports Medicine* 2 (7\_suppl2): 2325967114S0007-2325967114S0007. <https://doi.org/10.1177/2325967114S00079>.

Ho Rachelle, Hall Geoffrey B, Noseworthy Michael D, and DeMatteo Carol. 2020. “Post-Concussive Depression: Evaluating Depressive Symptoms Following Concussion in Adolescents and Its Effects on Executive Function.” *Brain Injury* 34 (4): 520–27. <https://doi.org/10.1080/02699052.2020.1725841>.

Hood Ethan, Klima Dennis W, Chui Kevin K, Avallone Nicholas J, Ethan A. Hood, Dennis W. Klima, Kevin K. Chui, and Nicholas J. Avallone. 2019. “Pre-Season Concussion Assessment Utilizing the King-Devick Test.” *Research in Sports Medicine* 27 (4): 467–72. <https://doi.org/10.1080/15438627.2018.1535434>.

Howell David, Bonnette Scott, Diekfuss Jed A, Grooms Dustin Myer Gregory D, and Meehan William P. 2020. “Youth With Concussion Have Less Adaptable Gait Patterns Than Their Uninjured Peers: Implications for Concussion Management.” *The Journal of Orthopaedic and Sports Physical Therapy* 50 (8): 438–46. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32441192>.

Howell David, Hunt Danielle L, Aaron Stacey E, Meehan William P, and Tan Can Ozan. 2021. “Influence of Aerobic Exercise Volume on Postconcussion Symptoms.” *The American Journal of Sports Medicine*, 3635465211005761.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33856860>.

Howell David, Kriz Pete Mannix Rebekah C, Kirchberg Tyle Master Christina L, and Meehan William P. 2019. “Concussion Symptom Profiles Among Child, Adolescent, and Young Adult Athletes.” *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine* 29 (5): 391–97. <https://doi.org/10.1097/JSM.0000000000000629>.

Howell David, Lugade Vipul, Potter Morgan N, Walker Gregory, and Wilson Julie C. 2019. “A Multifaceted and Clinically Viable Paradigm to Quantify Postural Control Impairments among Adolescents with Concussion.” *Physiological Measurement* 40 (8).

<https://doi.org/10.1088/1361-6579/ab3552>.

Howell David, Mannix Rebekah C, Quinn Bridget, Taylor J Andrew, Tan Can Ozan, and Meehan William P. 2016. “Physical Activity Level and Symptom Duration Are Not Associated After Concussion.” *The American Journal of Sports Medicine* 44 (4): 1040–46.

<https://doi.org/10.1177/0363546515625045>.

Howell David, Potter Morgan N, Kirkwood Michael W, Wilson Pamela E, Provance Aaron J, Wilson Julie C, David R. Howell, et al. 2019. “Clinical Predictors of Symptom Resolution for Children and Adolescents with Sport-Related Concussion.” *Journal of Neurosurgery: Pediatrics* 24 (1): 54–61. <https://doi.org/10.3171/2018.11.PEDS18626>.

Howell David, Zemek Roge Brilliant Anna N, Mannix Rebekah C, Master Christina L, and Meehan William P. 2018. “Identifying Persistent Postconcussion Symptom Risk in a Pediatric Sports Medicine Clinic.” *American Journal of Sports Medicine* 46 (13): 3254–61.

<https://doi.org/10.1177/0363546518796830>.

Iverson Grant, Jones Payton J, Karr Justin E, Maxwell Bruce, Zafonte Ross, Berkner Paul D, and McNally Richard J. 2020. “Architecture of Physical Cognitive, and Emotional Symptoms at Preseason Baseline in Adolescent Student Athletes With a History of Mental Health Problems.” *Frontiers in Neurology* 11 (March): 1–10.

<https://doi.org/10.3389/fneur.2020.00175>.

Iverson Grant, Karr Justin E, Maxwell Bruce, Zafonte Ross, Berkner Paul D, and Cook Nathan E. 2021. “Examining Criteria for Defining Persistent Post-Concussion Symptoms in Children and Adolescents.” *Frontiers in Neurology* 12: 614648.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=pmnm&NEWS=N&AN=33708170>.

Johnson Ashleigh, McCarty Carolyn A, Marcynyszyn Lyscha A, Zatzick Douglas F, Chrisman Sara Pd, and Rivara Frederick P. 2021. “Child- Compared with Parent-Report Ratings on Psychosocial Measures Following a Mild Traumatic Brain Injury among Youth with Persistent Post-Concussion Symptoms.” *Brain Injury* 35 (5): 574–86.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=33733955>.

Jones Kelly, Starkey Nicola, Barker-Collo Suzanne, Ameratunga Shanthi, Theadom Alice, Pocock Katy, Borotkanics Robert, and Feigin Valery L. 2021. “Parent and Teacher-Reported Child Outcomes Seven Years After Mild Traumatic Brain Injury: A Nested Case Control

Study.” *Frontiers in Neurology* 12: 683661.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=pmnm&NEWS=N&AN=34367050>.

Karr Justin, Garcia-Barrera Mauricio A, Marsh Jacqueline M, Maxwell Bruc Berkner Paul D, and Iverson Grant L. 2020. “Preseason Baseline Neurocognitive Performances and Symptom Reporting on ImPACT R: A Comparison of Adolescent Student-Athletes Tested in Spanish and English.” *Journal of Athletic Training*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33237992>.

Keenan Ryan, Lovanio Kathleen, Lapidus Garry, Chenard Danielle, and Smith Sharon. 2020. “Improved Concussion Discharge Instructions in a Pediatric Emergency Department.”

*Advanced Emergency Nursing Journal* 42 (1): 63–70.

<https://doi.org/10.1097/TME.0000000000000280>.

Kelmendi Fatos, Morina Arsim A, Mekaj Agon Y, Dragusha Shefki, Ahmeti Feti, Alimehmeti Ridvan, Morina Qamile, Berisha Murat, Krasniqi Bleri and Kerolli Berat. 2021. “Ability of S100B to Predict Post-Concussion Syndrome in Paediatric Patients Who Present to the Emergency Department with Mild Traumatic Brain Injury.” *British Journal of Neurosurgery*, 1–6.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33565911>.

Kissinger-Knox Alicia, Eagle Shawn R, Jennings Sabrina, Collins Michael W, and Kontos Anthony P. 2021. “Does Time since Concussion Alter the Factor Structure of a Multidomain Assessment in Adolescents?” *Child Neuropsychology : A Journal on Normal and Abnormal Development in Childhood and Adolescence*, 1–13.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34098854>.

Kontos Anthony, Eagle Shawn R, Mucha Anne, Kochick Victoria, Reichard Jessica, Moldovan Claire, Holland Cyndi L, Blaney Nicholas A, and Collins Michael W. 2021. “A Randomized Controlled Trial of Precision Vestibular Rehabilitation in Adolescents Following Concussion: Preliminary Findings.” *The Journal of Pediatrics*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34450120>.

Krainin Benjamin, Seehusen Corrine N, Smulligan Katherine L, Wingerson Mathew J, Wilson Julie C, and Howell David R. 2021. “Symptom and Clinical Recovery Outcomes for Pediatric Concussion Following Early Physical Activity.” *Journal of Neurosurgery.Pediatrics*, 1–8.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34560641>.

Leddy John, Haider Mohammad N, Ellis Michael Mannix Rebekah, Darling Scott R, Freitas Michael S, Suffoletto Heidi N, et al. 2019. “Early Subthreshold Aerobic Exercise for Sport-Related Concussion.” *JAMA Pediatrics* 173 (4): 319.

<https://doi.org/10.1001/jamapediatrics.2018.4397>.

Leddy John, Hinds Andrea L, Miecznikowski Jeffrey, Darling Scott, Matuszak Jason, Baker John G, Picano John, et al. 2018. “Safety and Prognostic Utility of Provocative Exercise

Testing in Acutely Concussed Adolescents: A Randomized Trial.” *Clinical Journal of Sport Medicine* 28 (1): 13–20. <https://doi.org/10.1097/JSM.0000000000000431>.

Leddy John, Master Christina L, Mannix Rebekah, Wiebe Douglas Grady Matthew F, Meehan William P, Storey Eileen P, et al. 2021. “Early Targeted Heart Rate Aerobic Exercise versus Placebo Stretching for Sport-Related Concussion in Adolescents: A Randomised Controlled Trial.” *The Lancet Child & Adolescent Health*. [https://doi.org/10.1016/S2352-4642\(21\)00267-4](https://doi.org/10.1016/S2352-4642(21)00267-4).

Lindholm Erika, D’Cruz Roshan, Fajardo Romulo, Meckmongkol Teerin, Ciullo Sean, Grewal Harsh, Prasad Rajeev, et al. 2019. “Admission of Pediatric Concussion Injury Patients: Is It Necessary?” *Journal of Surgical Research* 244 (December): 107–10. <https://doi.org/10.1016/j.jss.2018.09.040>.

Lindsey Hannah, Hodges Cooper B, Greer Kaitlyn Wilde Elisabeth A, and Merkley Tricia L. 2021. “Diffusion-Weighted Imaging in Mild Traumatic Brain Injury: A Systematic Review of the Literature.” *Neuropsychology Review*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33721207>.

Manaseer Thaer, Gross Douglas P, Dennett Liz, Schneider Kathryn, and Whittaker Jackie L. 2020. “Gait Deviations Associated With Concussion: A Systematic Review.” *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine* 30 Suppl 1: S11–28. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32132473>.

Mang Cameron, Whitten Tara A, Cosh Madeline Dukelow Sean P, and Benson Brian W. 2020. “Assessment of Postural Stability During an Upper Extremity Rapid, Bimanual Motor Task After Sport-Related Concussion.” *Journal of Athletic Training* 55 (11): 1160–73. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=33064821>.

Mantey Dale, Omega-Njemnobi Onyinye, Barroso Cristina and Kelder Steven H. 2020. “Self-Reported History of Concussions Is Associated with Risk Factors for Suicide Completion among High School Students.” *Journal of Affective Disorders* 263: 684–91. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=mesx&NEWS=N&AN=31740108>.

Marcynyszyn Lyscha, McCarty Carolyn A, Rivara Frederick P, Johnson Ashleigh M, Wang Jin, and Zatzick Douglas F. 2021. “Parent Traumatic Events and Adolescent Internalizing Symptoms: The Mediating Role of Parental Depression Among Youth with Persistent Postconcussive Symptoms.” *Journal of Pediatric Psychology*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33411915>.

Marin Jennife Rodean Jonathan, Hall Matt, Alpern Elizabeth Aronson Paul L, Chaudhari Pradip P, Cohen Eyal, et al. 2020. “Trends in Use of Advanced Imaging in Pediatric Emergency Departments, 2009-2018.” *JAMA Pediatrics* 174 (9): 2009–18. <https://doi.org/10.1001/jamapediatrics.2020.2209>.

Marshall Cameron, Chan Nicole, Tran Pauline, and DeMatteo Carol. 2019. “The Use of an Intensive Physical Exertion Test as a Final Return to Play Measure in Concussed Athletes: A

Prospective Cohort.” *Physician and Sportsmedicine* 47 (2): 158–66.

<https://doi.org/10.1080/00913847.2018.1542258>.

Master Christina, Curry Allison E, Pfeiffer Melissa R, Metzger Kristina B, Kessler Ronni S, Haarbauer-Krupa Juliet, DePadilla Lara, Greenspan Arlene, Breiding Matthew J, and Arbogast Kristy B. 2020. “Characteristics of Concussion in Elementary School-Aged Children: Implications for Clinical Management.” *Journal of Pediatrics* 223: 128–35.

<https://doi.org/10.1016/j.jpeds.2020.04.001>.

Mayer Andrew, Stephenson David D, Wertz Christopher J, Dodd Andrew B, Shaff Nicholas A, Ling Josef M, Park Grace, et al. 2019. “Proactive Inhibition Deficits with Normal Perfusion after Pediatric Mild Traumatic Brain Injury.” *Human Brain Mapping* 40 (18): 5370–81.

<https://doi.org/10.1002/hbm.24778>.

Mayer Andrew, Wertz Christopher J, Robertson-Benta Cidney Pabbathi Reddy Sharvani, Stephenson David D, Dodd Andrew B, Oglesbee Scott J, et al. 2020. “Neurosensory Screening and Symptom Provocation in Pediatric Mild Traumatic Brain Injury.” *The Journal of Head Trauma Rehabilitation* 35 (4): 270–78.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32108710>.

Miller Gabrielle, DePadilla Lara, Jones Sherry Everett, Bartholow Brad N, Sarmiento Kelly, and Breiding Matthew J. 2021. “The Association Between Sports- or Physical Activity-Related Concussions and Suicidality Among US High School Students, 2017.” *Sports Health* 13 (2): 187–97.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32845815>.

Miller Michael, Robinson Michael, Bartha Robert, Stewart Tanya Charyk, Fischer Lisa, Dekaban Gregory A, Menon Ravi S, Shoemaker J Kevin, and Fraser Douglas D. 2021. “Concussion Acutely Decreases Plasma Glycerophospholipids in Adolescent Male Athletes.” *Journal of Neurotrauma*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33176582>.

Morissette Marc, Cordingley Dean M, Ellis Michael J, and Leiter Jeff R.S. 2020. “Evaluation of Early Submaximal Exercise Tolerance in Adolescents with Symptomatic Sport-Related Concussion.” *Medicine and Science in Sports and Exercise* 52 (4): 820–26.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=31688644>.

Morrison Heidi, Miutz Lauren N, Emery Carolyn A, and Smirl Jonathan D. 2021. “A Standardized Buffalo Concussion Treadmill Test Following Sport-Related Concussion in Youth: Do ActiGraph Algorithms Matter?” *Journal of Athletic Training*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33481016>.

Murdaugh Donna, Ono Kim E, Morris Sarah O, Burns Thomas G, Donna L. Murdaugh, Kim E. Ono, Sarah O. Morris, and Thomas G. Burns. 2018. “Effects of Developmental Age on Symptom Reporting and Neurocognitive Performance in Youth After Sports-Related Concussion Compared to Control Athletes.” *Journal of Child Neurology* 33 (7): 474–81.

<https://doi.org/10.1177/0883073818766815>.

O'Brien Michael, Howell David R, Pepin Michael and Meehan William P. 2017. "Sport-Related Concussions: Symptom Recurrence After Return to Exercise." *Orthopaedic Journal of Sports Medicine* 5 (10): 232596711773251–232596711773251. <https://doi.org/10.1177/2325967117732516>.

Oldham Jessie, Meehan William P, and Howell David R. 2021. "Impaired Eye Tracking Is Associated with Symptom Severity but Not Dynamic Postural Control in Adolescents Following Concussion." *Journal of Sport and Health Science* 10 (2): 138–44. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=33130092>.

Orban Sarah, Epstein Jeffery N, Carr Devon, Logan Kelsey, Gubanich Paul J, Sidol Craig, and Myer Gregory D. 2020. "Attention-Deficit/Hyperactivity Disorder Status and Sex Moderate Mild Traumatic Brain Injury Symptom Severity in Children and Adolescents." *Clinical Journal of Sport Medicine Publish Ah* (00). <https://doi.org/10.1097/jsm.0000000000000821>.

Peiffer Adam, MacDonald James, Duerson Drew, Mitchell Gladys, Hartwick Andrew T.E, and McDaniel Catherine E. 2020. "The Influence of Binocular Vision Symptoms on Computerized Neurocognitive Testing of Adolescents With Concussion." *Clinical Pediatrics* 59 (11): 961–69. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32476458>.

Podolak Olivia, Chaudhary Sofia, Haarbauer-Krupa Juliet, Metzger Kristina B, Curry Allison Kessler Ronni S, Pfeiffer Melissa R, et al. 2020. "Characteristics of Diagnosed Concussions in Children Aged 0 to 4 Years Presenting to a Large Pediatric Healthcare Network." *Pediatric Emergency Care Publish Ah* (00): 1–6. <https://doi.org/10.1097/pec.0000000000002148>.

Puffenbarger Melissa, Ahmad Fahd A, Argent Michelle, Gu Hongjie, Samson Charle Quayle Kimberly and Saito Jacqueline M. 2019. "Reduction of Computed Tomography Use for Pediatric Closed Head Injury Evaluation at a Nonpediatric Community Emergency Department." *Academic Emergency Medicine* 26 (7): 784–95. <https://doi.org/10.1111/acem.13666>.

Raji Cyrus, Wang Maxwell B, Nguyen Nhu Nhu, Owen Julia P, Palacios Eva M, Yuh Esther L, and Mukherjee Pratik. 2020. "Connectome Mapping with Edge Density Imaging Differentiates Pediatric Mild Traumatic Brain Injury from Typically Developing Controls: Proof of Concept." *Pediatric Radiology* 50 (11): 1594–1601. <https://doi.org/10.1007/s00247-020-04743-9>.

Ramsey Kesley, Vaughan Christopher, Wagner Barry M, McGuire Joseph F, and Gioia Gerard A. 2021. "Impact of Self-Efficacy and Affective Functioning on Pediatric Concussion Symptom Severity." *Journal of the International Neuropsychological Society : JINS*, 1–8. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33441215>.

Ransom Danielle, Burns Alison R, Youngstrom Eric A, Vaughan Christopher G, Sady Maegan D, and Gioia Gerard A. 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): 1038–49. <https://doi.org/10.1017/S1355617716000916>.

Root Jeremy, McNamara Brittany, Ledda Matt, Madati Ponda J, Jeremy M. Root, Brittany McNamara, Matt Ledda, and Ponda J. Madati. 2019. "Pediatric Patient Compliance With

Recommendations for Acute Concussion Management.” *Clinical Pediatrics* 58 (7): 731–37.  
<https://doi.org/10.1177/0009922819839230>.

Root Jeremy, Sady Maegan D, Gai Jiaxiang, Vaughan Christopher G, Madati Ponda J, Jeremy M Root, Maegan D Sady, Jiaxiang Gai, Christopher G Vaughan, and Ponda J Madati. 2020. Effect of Cognitive and Physical Rest on Persistent Postconcussive Symptoms Following a Pediatric Head Injury. *Journal of Pediatrics*. Vol. 227. United States: Elsevier Inc.  
<https://doi.org/10.1016/j.jpeds.2020.07.049>.

Sinnott Aaron, R J Elbin, Collins Michael W, Reeves Valerie L, Holland Cyndi L, and Kontos Anthony P. 2019. “Persistent Vestibular-Ocular Impairment Following Concussion in Adolescents.” *Journal of Science and Medicine in Sport* 22 (12): 1292–97.  
<https://doi.org/10.1016/j.jsams.2019.08.004>.

Smulligan Katherine, Wingerson Mathew J, Seehusen Corrine N, Magliato Samantha N, Wilson Julie C, and Howell David R. 2021. “Patient Perception of Dizziness and Imbalance Does Not Correlate with Gait Measures in Adolescent Athletes Post-Concussion.” *Gait & Posture* 90: 289–94. <https://doi.org/https://doi.org/10.1016/j.gaitpost.2021.09.184>.

Sufrinko Alicia, Kontos Anthony P, Apps Jennifer N, McCrea Michael, Hickey Robert W, Collins Michael W, and Thomas Danny G. 2017. “The Effectiveness of Prescribed Rest Depends on Initial Presentation After Concussion.” *The Journal of Pediatrics* 185 (June): 167–72. <https://doi.org/10.1016/j.jpeds.2017.02.072>.

Taylor Mark, Knochel Miguel L, Proctor Spencer J, Brockmeyer Douglas L, Runyon Lisa Fenton Stephen J, and Russell Katie W. 2020. “Pediatric Trauma Telemedicine in a Rural State: Lessons Learned from a 1-Year Experience.” *Journal of Pediatric Surgery*.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33228973>.

Teel Elizabeth, Caron Jeffrey G, and Gagnon Isabelle J. 2021. “Higher Parental Stress Is Significantly Related to Longer Clinical Recovery Times in Concussed Children: A Mixed-Methods Study.” *Journal of Science and Medicine in Sport*.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34518082>.

Van Deventer Katie, Seehusen Corrine N, Walker Gregory Wilson Julie C, and Howell David R. 2020. “The Diagnostic and Prognostic Utility of the Dual-Task Tandem Gait Test for Pediatric Concussion.” *Journal of Sport and Health Science*.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=32795624>.

Walker Gregory, Wilson Julie C, Potter Morgan N, Provance Aaron J, Kirkwood Michael, and Howell David R. 2021. “Age Is Associated with Postural Control Performance Following Youth Concussion.” *Journal of Pediatric Rehabilitation Medicine*.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34219677>.

Ware Ashley, Shukla Ayushi, Goodrich-Hunsaker Naomi J, Lebel Catherine, Wilde Elisabeth A, Abildskov Tracy J, Bigler Erin D, et al. 2020. “Post-Acute White Matter Microstructure Predicts Post-Acute and Chronic Post-Concussive Symptom Severity Following Mild Traumatic Brain Injury in Children.” *NeuroImage: Clinical* 25 (December 2019): 102106.  
<https://doi.org/10.1016/j.nicl.2019.102106>.

Weber Michelle, Welch Bacon, E Cailee, and McLeod Tamara Valovich. 2019. “School Nurses’ Management and Collaborative Practices for Student-Athletes Following Sport-Related Concussion.” *The Journal of School Nursing : The Official Publication of the National Association of School Nurses* 35 (5): 378–87.

Williams Richelle, Johnson Rachel S, Snyder Valier, R Alison, Curtis Bay R, Valovich McLeod, and C Tamara. 2020. “Evaluating Multiple Domains of Health in High School Athletes With Sport-Related Concussion.” *Journal of Sport Rehabilitation*, 1–7.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33038870>.

Wingerson Mathew, Seehusen Corrine N, Walker Gregory, Wilson Julie C, and Howell David R. 2020. “Clinical Feasibility and Utility of a Dual-Task Tandem Gait Protocol for Pediatric Concussion Management.” *Journal of Athletic Training*.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33150416>.

Abbassi, Ensie, and Bess Sirmon-Taylor. 2017a. “Recovery Progression and Symptom Resolution in Sport-Related Mild Traumatic Brain Injury.” *Brain Injury* 31 (12): 1667–73.  
<https://doi.org/10.1080/02699052.2017.1357834>.

Abeare, Christopher A., Isabelle Messa, Brandon G. Zuccato, Bradley Merker, and Laszlo Erdodi. 2018. “Prevalence of Invalid Performance on Baseline Testing for Sport-Related Concussion by Age and Validity Indicator.” *JAMA Neurology* 1. Shi F, (6): 697–703.  
<https://doi.org/10.1001/jamaneurol.2018.0031>.

Acacia, Holmes, Chen Zhongxue, Yahng Lilian, Fletcher David, and Kawata Keisuke. 2020. “Return to Learn: Academic Effects of Concussion in High School and College Student-Athletes.” *Frontiers in Pediatrics* 8 (March): 4–9. <https://doi.org/10.3389/fped.2020.00057>.

Adrian, Rozbacher, Selci Erin, Leiter Jeff, Ellis Michael, and Russell Kelly. 2017. “The Effect of Concussion or Mild Traumatic Brain Injury on School Grades, National Examination Scores, and School Attendance: A Systematic Review.” *Journal of Neurotrauma* 34 (14): 2195–2203. <https://doi.org/10.1089/neu.2016.4765>.

Akram, Zamani, Ryan Nicholas P, Wright David K, Caeyenberghs Karen, and Semple Bridgette D. 2020. “The Impact of Traumatic Injury to the Immature Human Brain: A Scoping Review with Insights from Advanced Structural Neuroimaging.” *Journal of Neurotrauma* 37 (5): 724–38. <https://doi.org/10.1089/neu.2019.6895>.

ALBERTS, JAY L., ANIL THOTA, JOSHUA HIRSCH, SARAH OZINGA, TANUJIT DEY, DAVID D. SCHINDLER, MANDY M. KOOP, DANIEL BURKE, and SUSAN M. LINDER. 2015. “Quantification of the Balance Error Scoring System with Mobile Technology.” *Medicine & Science in Sports & Exercise* 47 (10): 2233–40.  
<https://doi.org/10.1249/MSS.0000000000000656>.

Alberts, Jay L., Michael T. Modic, Belinda Udeh, Tanujit Dey, Kay Cherian, Xiaoyang Lu, Richard Figler, Andrew Russman, and Susan M. Linder. 2019. “Development and Implementation of a Multi-Disciplinary Technology Enhanced Care Pathway for Youth and Adults with Concussion.” *Journal of Visualized Experiments* 2019 (143).  
<https://doi.org/10.3791/58962>.

Alicia, Wang, Zhou Guangwei, Kawai Kosuke, O'Brien Michael, Shearer A Eliot, and Brodsky Jacob R. 2021. "Benign Paroxysmal Positional Vertigo in Children and Adolescents With Concussion." *Sports Health*, 1941738120970515.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33528343>.

Alison, Crichton, Ignjatovic Vera, Babl Franz E, Oakley Ed, Greenham Mardee, Hearps Stephen, Delzoppo Carmel, et al. 2021. "Interleukin-8 Predicts Fatigue at 12 Months Post-Injury in Children with Traumatic Brain Injury." *Journal of Neurotrauma* 38 (8): 1151–63. <https://doi.org/10.1089/neu.2018.6083>.

Alkathiry Abdulaziz, Kontos Anthony P, Furman Joseph M, Whitney Susan L, Anson Eric R, and Sparto Patrick J. 2019. "Vestibulo-Ocular Reflex Function in Adolescents With Sport-Related Concussion: Preliminary Results." *Sports Health* 11 (6): 479–85. <https://doi.org/10.1177/1941738119865262>.

Alkathiry, Abdulaziz A., Anthony P. Kontos, Joseph M. Furman, Susan L. Whitney, Eric R. Anson, and Patrick J. Sparto. 2019. "Vestibulo-Ocular Reflex Function in Adolescents With Sport-Related Concussion: Preliminary Results." *Sports Health* 11 (6): 479–85. <https://doi.org/10.1177/1941738119865262>.

Alosco, Michael L., and Robert A. Stern. 2019. "Youth Exposure to Repetitive Head Impacts From Tackle Football and Long-Term Neurologic Outcomes: A Review of the Literature, Knowledge Gaps and Future Directions, and Societal and Clinical Implications." *Seminars in Pediatric Neurology* 30 (July): 107–16. <https://doi.org/10.1016/j.spen.2019.03.016>.

Alsalaheen, Bara A, Jamie Haines, Amy Yorke, Kayla Stockdale, and Steven P Broglio. 2015. "Reliability and Concurrent Validity of Instrumented Balance Error Scoring System Using a Portable Force Plate System." *Physician and Sportsmedicine* 43 (3): 221–26. <https://doi.org/10.1080/00913847.2015.1040717>.

Alsalaheen, Bara A., Susan L. Whitney, Gregory F. Marchetti, Joseph M. Furman, Anthony P. Kontos, Michael W. Collins, and Patrick J. Sparto. 2016. "Relationship between Cognitive Assessment and Balance Measures in Adolescents Referred for Vestibular Physical Therapy after Concussion." *Clinical Journal of Sport Medicine* 26 (1): 46–52. <https://doi.org/10.1097/JSM.0000000000000185>.

Alsalaheen, Bara, Adam McClafferty, Jamie Haines, Laura Smith, and Amy Yorke. 2016. "Reference Values for the Balance Error Scoring System in Adolescents." *Brain Injury* 30 (7): 914–18. <https://doi.org/10.3109/02699052.2016.1146965>.

Amit, Perlin, and Kroshus Emily. 2020. "Content Analysis of Concussion Education for Coaches of Youth and High School Sport." *Brain Injury* 34 (7): 905–13. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32362145>.

Anderson, Stevi L., Dustin Gatens, Colette Glatts, and Stephen A. Russo. 2019. "Normative Data Set of SWAY Balance Mobile Assessment in Pediatric Athletes." *Clinical Journal of Sport Medicine* 29 (5): 413–20. <https://doi.org/10.1097/JSM.0000000000000545>.

Anderson, Vicki, Gavin A. Davis, Michael Takagi, Kevin Dunne, Cathriona Clarke, Nicholas Anderson, Vanessa C. Rausa, et al. 2020. "Trajectories and Predictors of Clinician-Determined

Recovery after Child Concussion.” *Journal of Neurotrauma* 37 (12): 1392–1400.  
<https://doi.org/10.1089/neu.2019.6683>.

Andrée-Anne, Ledoux, Barrowman Nicholas J, Boutis Kathy, Davis Adrienne, Reid Sarah, Sangha Gurinder, Farion Ken J, et al. 2019. “Multicentre, Randomised Clinical Trial of Paediatric Concussion Assessment of Rest and Exertion (PedCARE): A Study to Determine When to Resume Physical Activities Following Concussion in Children.” *British Journal of Sports Medicine* 53 (3): 195. <https://doi.org/10.1136/bjsports-2017-097981>.

Angela, Lumba-Brown, Tang Ken, Yeates Keith Owen, Zemek Roger, and Pediatric Emergency Research Canada (PERC. 2020. “Post-Concussion Symptom Burden in Children Following Motor Vehicle Collisions.” *Journal of the American College of Emergency Physicians Open* 1 (5): 938–46.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=pem6&NEWS=N&AN=33145544>.

Anthony, Christopher A, and Andrew R Peterson. 2015. “Utilization of a Text-Messaging Robot to Assess Intraday Variation in Concussion Symptom Severity Scores.” *Clinical Journal of Sport Medicine* 1. Shi F, (2): 149–52. <https://doi.org/10.1097/JSM.0000000000000115>.

Anzalone, Anthony J., Damond Blueitt, Tami Case, Tiffany McGuffin, Kalyssa Pollard, J. Craig Garrison, Margaret T. Jones, Robert Pavur, Stephanie Turner, and Jonathan M. Oliver. 2017. “A Positive Vestibular/Ocular Motor Screening (VOMS) Is Associated with Increased Recovery Time after Sports-Related Concussion in Youth and Adolescent Athletes.” *American Journal of Sports Medicine* 45 (2): 474–79. <https://doi.org/10.1177/0363546516668624>.

Aparna, Raghuram, Cotter Susan A, Gowrisankaran Sowjanya, Kanji Jameel, Howell David R, Meehan William P, and Shah Ankoor S. 2019. “Postconcussion: Receded Near Point of Convergence Is Not Diagnostic of Convergence Insufficiency.” *American Journal of Ophthalmology* 206: 235–44. <https://doi.org/10.1016/j.ajo.2019.04.008>.

Araujo, Gabriel C, Tanya N Antonini, Kerry Monahan, Carl Gelfius, Karl Klamar, Michelle Potts, Keith O Yeates, and Doug Bodin. 2014. “The Relationship between Suboptimal Effort and Post-Concussion Symptoms in Children and Adolescents with Mild Traumatic Brain Injury.” *Clinical Neuropsychologist* 28 (5): 786–801.  
<https://doi.org/10.1080/13854046.2014.896415>.

Argyropoulou Maria, Alexiou George A, Xydis Vassileios G, Adamsbaum Catherine, Chateil Jean Francois, Rossi Andrea, Girard Nadine, Vázquez Élida, and Astrakas Loukas G. 2020. “Pediatric Minor Head Injury Imaging Practices: Results from an ESPR Survey.” *Neuroradiology* 62 (2): 251–55. <https://doi.org/10.1007/s00234-019-02326-6>.

Argyropoulou, Maria I., George A. Alexiou, Vassileios G. Xydis, Catherine Adamsbaum, Jean-Francois Chateil, Andrea Rossi, Nadine Girard, Élida Vázquez, and Loukas G. Astrakas. 2020. “Pediatric Minor Head Injury Imaging Practices: Results from an ESPR Survey.” *Neuroradiology* 62 (2): 251–55. <https://doi.org/10.1007/s00234-019-02326-6>.

Arshad, Ali, Morfin Jussely, Mills Judith, Pasipanodya Elizabeth C, Maas Yvonne J, Huang Emily, Dirlikov Benjamin, Englander Jeffrey, and Zedlitz Aglaia. 2021. “Fatigue After Traumatic Brain Injury: A Systematic Review.” *The Journal of Head Trauma Rehabilitation*.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34354018>.

August, Joshua, and Alcy Torres. 2019. "Prevention of Concussion." *Seminars in Pediatric Neurology* 30 (July): 99–106. <https://doi.org/10.1016/j.spen.2019.03.015>.

Babcock, Lynn, Brad G. Kurowski, Nanhua Zhang, Judith W. Dexheimer, Jenna Dyas, and Shari L. Wade. 2017a. "Adolescents with Mild Traumatic Brain Injury Get SMART: An Analysis of a Novel Web-Based Intervention." *Telemedicine and E-Health* 23 (7): 600–607. <https://doi.org/10.1089/tmj.2016.0215>.

Babcock, Lynn, Terri Byczkowski, Shari L Wade, Mona Ho, Sohug Mookerjee, and Jeffrey J Bazarian. 2013. "Predicting Postconcussion Syndrome After Mild Traumatic Brain Injury in Children and Adolescents Who Present to the Emergency Department." *JAMA Pediatrics* 167 (2): 156. <https://doi.org/10.1001/jamapediatrics.2013.434>.

Babcock, Lynn, Terri Byczkowski, Shari L. Wade, Mona Ho, and Jeffrey J. Bazarian. 2013. "Inability of S100B to Predict Postconcussion Syndrome in Children Who Present to the Emergency Department with Mild Traumatic Brain Injury: A Brief Report." *Pediatric Emergency Care* 29 (4): 458–61. <https://doi.org/10.1097/PEC.0b013e31828a202d>.

Babcock, Lynn, Weihong Yuan, James Leach, Tiffany Nash, and Shari Wade. 2015. "White Matter Alterations in Youth with Acute Mild Traumatic Brain Injury." *Journal of Pediatric Rehabilitation Medicine* 8 (4): 285–96. <https://doi.org/10.3233/PRM-150347>.

Babikian, Talin, David McArthur, and Robert F. Asarnow. 2013a. "Predictors of 1-Month and 1-Year Neurocognitive Functioning from the UCLA Longitudinal Mild, Uncomplicated, Pediatric Traumatic Brain Injury Study." *Journal of the International Neuropsychological Society* 19 (2): 145–54. <https://doi.org/10.1017/S135561771200104X>.

Babl, Franz E., Diana Dionisio, Lucy Davenport, Amy Baylis, Stephen J.C. Hearps, Silvia Bressan, Emma J. Thompson, Vicki Anderson, Ed Oakley, and Gavin A. Davis. 2017. "Accuracy of Components of SCAT to Identify Children With Concussion." *Pediatrics* 1. Shi F, (2): e20163258. <https://doi.org/10.1542/peds.2016-3258>.

Bailey, Christopher, Jessica Meyer, Susannah Briskin, Christopher Tangen, S. Alan Hoffer, Jason Dundr, Bethany Brennan, and Paul Smith. 2019. "Multidisciplinary Concussion Management: A Model for Outpatient Concussion Management in the Acute and Post-Acute Settings." *Journal of Head Trauma Rehabilitation* 34 (6): 375–84. <https://doi.org/10.1097/HTR.0000000000000527>.

Baker John, Willer Barry S, Dwyer Michael G, and Leddy John J. 2020. "A Preliminary Investigation of Cognitive Intolerance and Neuroimaging among Adolescents Returning to School after Concussion." *Brain Injury* 34 (6): 818–27. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32324445>.

Baker, David A., Amy K. Connery, John W. Kirk, and Michael W. Kirkwood. 2014. "Embedded Performance Validity Indicators within the California Verbal Learning Test, Childrens Version." *Clinical Neuropsychologist* 1. Shi F, (1): 116–27. <https://doi.org/10.1080/13854046.2013.858184>.

Baker, John G., John J. Leddy, Scott R. Darling, Brian P. Rieger, Terry L. Mashtare, Tania Sharma, and Barry S. Willer. 2015. "Factors Associated with Problems for Adolescents Returning to the Classroom after Sport-Related Concussion." *Clinical Pediatrics* 54 (10): 961–68. <https://doi.org/10.1177/0009922815588820>.

Banesh, Jain, Das Anand Kumar, Agrawal Manish, Babal Rohit, and Purohit Devendra Kumar. 2021. “Implications of DTI in Mild Traumatic Brain Injury for Detecting Neurological Recovery and Predicting Long-Term Behavioural Outcome in Paediatric and Young Population-a Systematic Review.” *Child’s Nervous System : ChNS : Official Journal of the International Society for Pediatric Neurosurgery* 37 (8): 2475–86.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=34128118>.

Bara, Alsalaheen, Almeida Andrea, Eckner James, Freeman Jeremiah, Ichescio Ingrid, Popovich Michael, Streicher Nicholas, and Lorincz Matthew. 2021. “Do Male and Female Adolescents Report Symptoms Differently after Concussion?” *Brain Injury* 35 (6): 698–704.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=33689531>.

Bara, Alsalaheen, Carender Wendy, Grzesiak Melissa, Munday Cindy, Almeida Andrea, Lorincz Matthew, and Marchetti Gregory F. 2020. “Changes in Vestibular/Ocular-Motor Screen Scores in Adolescents Treated With Vestibular Therapy After Concussion.” *Pediatric Physical Therapy : The Official Publication of the Section on Pediatrics of the American Physical Therapy Association* 32 (4): 331–37.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32773522>.

Barker, Trevor, Stephen A. Russo, Gaytri Barker, Mark A. Rice, Mary G. Jeffrey, Gordon Broderick, and Travis J.A. Craddock. 2017. “A Case Matched Study Examining the Reliability of Using ImPACT to Assess Effects of Multiple Concussions.” *BMC Psychology* 5 (1): 1–9.

<https://doi.org/10.1186/s40359-017-0184-1>.

Barlow, Karen M, Brian L Brooks, Michael J Esser, Adam Kirton, Angelo Mikrogianakis, Roger L Zemek, Frank P. MacMaster, et al. 2020. “Efficacy of Melatonin in Children with Postconcussive Symptoms: A Randomized Clinical Trial.” *Pediatrics* 145 (4): e20192812.

<https://doi.org/10.1542/peds.2019-2812>.

Barlow, Karen M., Katherine A. Girgulis, Genevieve Goldstein, Erica G. Crowe, Mai K. Vo, Peter Su, Michael J. Esser, Deborah Dewey, and Valerie G. Kirk. 2020. “Sleep Parameters and Overnight Urinary Melatonin Production in Children With Persistent Post-Concussion Symptoms.” *Pediatric Neurology* 105 (April): 27–34.

<https://doi.org/10.1016/j.pediatrneurol.2019.11.006>.

Barlow, Karen M., Susan Crawford, Brian L. Brooks, Brenda Turley, and Angelo Mikrogianakis. 2015. “The Incidence of Postconcussion Syndrome Remains Stable Following Mild Traumatic Brain Injury in Children.” *Pediatric Neurology* 53 (6): 491–97.

<https://doi.org/10.1016/j.pediatrneurol.2015.04.011>.

Bazarian, Jeffrey J., Brian J. Blyth, Hua He, Sohug Mookerjee, Courtney Jones, Karin Kiechle, Ryan Moynihan, et al. 2013. “Classification Accuracy of Serum Apo A-I and S100B for the Diagnosis of Mild Traumatic Brain Injury and Prediction of Abnormal Initial Head Computed Tomography Scan.” *Journal of Neurotrauma* 30 (20): 1747–54.

<https://doi.org/10.1089/neu.2013.2853>.

Beauchamp Miriam, Aglipay Mary, Yeates Keith Owen, Désiré Naddley, Keightley Michelle, Anderson Peter, Brooks Brian L, et al. 2018. “Predictors of Neuropsychological Outcome after

Pediatric Concussion.” *Neuropsychology* 32 (4): 495–508.

<https://doi.org/10.1037/neu0000419>.

Beauchamp, Miriam H., Richard Beare, Michael Ditchfield, Lee Coleman, Franz E. Babl, Michael Kean, Louise Crossley, Cathy Catroppa, Keith O. Yeates, and Vicki Anderson. 2013. “Susceptibility Weighted Imaging and Its Relationship to Outcome after Pediatric Traumatic Brain Injury.” *Cortex* 49 (2): 591–98. <https://doi.org/10.1016/j.cortex.2012.08.015>.

Beebe, Dean W., Scott W. Powers, Eric W. Slattery, and Paul J. Gubanich. 2017. “Short Sleep and Adolescents’ Performance on a Concussion Assessment Battery: An Experimental Sleep Manipulation Study.” *Clinical Journal of Sport Medicine* 0 (0): 1.

<https://doi.org/10.1097/JSM.0000000000000454>.

Beek, Leen Van, Jolijn Vanderauwera, Pol Ghesquière, Lieven Lagae, and Bert De Smedt. 2015a. “Longitudinal Changes in Mathematical Abilities and White Matter Following Paediatric Mild Traumatic Brain Injury.” *Brain Injury* 29 (13–14): 1701–10.

<https://doi.org/10.3109/02699052.2015.1075172>.

Beek, Leen Van, Pol Ghesquière, Lieven Lagae, and Bert De Smedt. 2015a. “Mathematical Difficulties and White Matter Abnormalities in Subacute Pediatric Mild Traumatic Brain Injury.” *Journal of Neurotrauma* 32 (20): 1567–78. <https://doi.org/10.1089/neu.2014.3809>.

Bellerose, Jenny, Annie Bernier, Cindy Beaudoin, Jocelyn Gravel, and Miriam H. Beauchamp. 2017. “Long-Term Brain-Injury-Specific Effects Following Preschool Mild TBI: A Study of Theory of Mind.” *Neuropsychology* 31 (3): 229–41. <https://doi.org/10.1037/neu0000341>.

Bernard, Coco O., Jennie A Ponsford, Audrey McKinlay, Dean McKenzie, and David Krieser. 2016. “Predictors of Post-Concussive Symptoms in Young Children: Injury versus Non-Injury Related Factors.” *Journal of the International Neuropsychological Society* 22 (8): 793–803.

<https://doi.org/10.1017/S1355617716000709>.

Bernard, Coco O., Audrey McKinlay, David Krieser, and Jennie L. Ponsford. 2020.

“Postconcussive Symptoms Following Mild TBI and Extracranial Injury: What Are the Contributing Factors?” *Journal of the International Neuropsychological Society* 26 (5): 451–63.

<https://doi.org/10.1017/S1355617719001279>.

Bernard, Coco O., Jennie L. Ponsford, Audrey McKinlay, Dean McKenzie, and David Krieser. 2017. “Do Concussive Symptoms Really Resolve in Young Children?” *Journal of Head Trauma Rehabilitation* 32 (6): 413–24. <https://doi.org/10.1097/HTR.0000000000000298>.

Bernard, Coco, Audrey McKinlay, David Krieser, Renee Testa, and Jennie Ponsford. 2017. “Acute Post-Concussive Symptoms in Young Children.” *Brain Injury* 31 (11): 1414–21.

<https://doi.org/10.1080/02699052.2017.1350999>.

Berz, Kate, Jon Divine, Kim Barber Foss, Rachel Heyl, Kevin R. Ford, and Gregory D. Myer. 2013. “Sex-Specific Differences in the Severity of Symptoms and Recovery Rate Following Sports-Related Concussion in Young Athletes.” *Physician and Sportsmedicine* 41 (2): 58–63.

<https://doi.org/10.3810/psm.2013.05.2015>.

Białuńska, Anita, and Anthony P. Salvatore. 2017. “The Auditory Comprehension Changes over Time after Sport-Related Concussion Can Indicate Multisensory Processing Dysfunctions.” *Brain and Behavior* 7 (12): 1–8. <https://doi.org/10.1002/brb3.874>.

Biederman, Joseph, Leah Feinberg, James Chan, Bamidele O. Adeyemo, K. Yvonne Woodworth, Walter Panis, Neal McGrath, et al. 2015. "Mild Traumatic Brain Injury and Attention-Deficit Hyperactivity Disorder in Young Student Athletes." *Journal of Nervous and Mental Disease* 203 (11): 813–19. <https://doi.org/10.1097/NMD.0000000000000375>.

Billeck, Jeffrey, and Jason Peeler. 2020. "The Influence of Fatiguing Exercise on Sport Concussion Assessment Tool (SCAT) Scoring in a Female Pediatric Population." *Physician and Sportsmedicine*. <https://doi.org/10.1080/00913847.2020.1746979>.

Billeck, Jeffrey, Jason Peeler, Billeck Jeffrey, and Peeler Jason. 2020. "The Influence of Fatiguing Exercise on Sport Concussion Assessment Tool (SCAT) Scoring in a Female Pediatric Population." *Physician and Sportsmedicine* 48 (4): 458–62. <https://doi.org/10.1080/00913847.2020.1746979>.

Blaney Nicholas, Trbovich Alicia, Ernst Nathan, Eagle Shawn R, Collins Michael W, and Kontos Anthony P. 2020. "Influence of Sleep Dysfunction on Concussion Assessment Outcomes Among Adolescent Athletes After Concussion and Healthy Controls." *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=32941365>.

Blue, Rachel, Andrew I Yang, Cecilia Zhou, Emma De Ravin, Clare W Teng, Gabriel R Arguelles, Vincent Huang, et al. 2020. "Telemedicine in the Era of Coronavirus Disease 2019 (COVID-19): A Neurosurgical Perspective." *World Neurosurgery* 139: 549–57. <https://doi.org/https://dx.doi.org/10.1016/j.wneu.2020.05.066>.

Bock, Suzanne, Rod Grim, Todd F Barron, Andrew Wagenheim, Yaowen Eliot Hu, Matthew Hendell, John Deitch, and Ellen Deibert. 2015. "Factors Associated with Delayed Recovery in Athletes with Concussion Treated at a Pediatric Neurology Concussion Clinic." *Child's Nervous System* 31 (11): 2111–16. <https://doi.org/10.1007/s00381-015-2846-8>.

Bonfield, Christopher M, Sandi Lam, Yimo Lin, and Stephanie Greene. 2013. "The Impact of Attention Deficit Hyperactivity Disorder on Recovery from Mild Traumatic Brain Injury: Clinical Article." *Journal of Neurosurgery: Pediatrics* 12 (2): 97–102. <https://doi.org/10.3171/2013.5.PEDS12424>.

Bonow, Robert H., Seth D. Friedman, Francisco A. Perez, Richard G. Ellenbogen, Samuel R. Browd, Christine L. Mac Donald, Monica S. Vavilala, and Frederick P. Rivara. 2017. "Prevalence of Abnormal Magnetic Resonance Imaging Findings in Children with Persistent Symptoms after Pediatric Sports-Related Concussion." *Journal of Neurotrauma* 34 (19): 2706–12. <https://doi.org/10.1089/neu.2017.4970>.

Bosworth, Christopher, and Jonathan N. Dodd. 2020. "Noncredible Effort on the Nonverbal-Medical Symptom Validity Test (NV-MSVT): Impact on Cognitive Performance in Pediatric Mild Traumatic Brain Injury." *Applied Neuropsychology: Child* 9 (4): 367–74. <https://doi.org/10.1080/21622965.2020.1742717>.

Botchway, Edith N., Celia Godfrey, Vicki Anderson, and Cathy Catroppa. 2019. "A Systematic Review of Sleep-Wake Disturbances in Childhood Traumatic Brain Injury: Relationship with Fatigue, Depression, and Quality of Life." *The Journal of Head Trauma Rehabilitation* 34 (4): 241–56. <https://doi.org/10.1097/HTR.0000000000000446>.

- Boutis, Kathy, Kirstin Weerdenburg, Ellen Koo, Suzan Schneeweiss, and Roger Zemek. 2015. "The Diagnosis of Concussion in a Pediatric Emergency Department." *Journal of Pediatrics* 1. Shi F, (5): 1214-1220.e1. <https://doi.org/10.1016/j.jpeds.2015.02.013>.
- Bozan, G. Aksel, H. A. Kahraman, Giritli, and S. E. Eroğlu. 2019. "Comparison of PECARN and CATCH Clinical Decision Rules in Children with Minor Blunt Head Trauma." *European Journal of Trauma and Emergency Surgery* 45 (5): 849–55. <https://doi.org/10.1007/s00068-017-0865-8>.
- Bramley, Harry, Alyssa Henson, Mechelle M. Lewis, Lan Kong, Christy Stetter, and Matthew Silvis. 2017. "Sleep Disturbance Following Concussion Is a Risk Factor for a Prolonged Recovery." *Clinical Pediatrics* 56 (14): 1280–85. <https://doi.org/10.1177/0009922816681603>.
- Bramley, Harry, Steven Heverley, Mechelle M Lewis, Lan Kong, Rowena Rivera, and Matthew Silvis. 2015. "Demographics and Treatment of Adolescent Posttraumatic Headache in a Regional Concussion Clinic." *Pediatric Neurology* 52 (5): 493–98. <https://doi.org/10.1016/j.pediatrneurol.2015.01.008>.
- Brearly, Timothy W, Robert D Shura, Sarah L Martindale, Rory A Lazowski, David D Luxton, Brian V Shenal, and Jared A Rowland. 2017. "Neuropsychological Test Administration by Videoconference: A Systematic Review and Meta-Analysis." *Neuropsychology Review*, Comment in: *J Am Geriatr Soc*. 2020 Jul;68(7):1387-1389; PMID: 32343394 [<https://www.ncbi.nlm.nih.gov/pubmed/32343394>], 27 (2): 174–86. <https://doi.org/https://dx.doi.org/10.1007/s11065-017-9349-1>.
- Bresee, Natalie, Mary Aglipay, Alexander Sasha Dubrovsky, Andrée-anne Anne Ledoux, Franco Momoli, Jocelyn Gravel, Stephen B. Freedman, et al. 2018. "No Association between Metoclopramide Treatment in ED and Reduced Risk of Post-Concussion Headache." *American Journal of Emergency Medicine* 36 (12): 2225–31. <https://doi.org/10.1016/j.ajem.2018.04.007>.
- Bressan, Silvia, Cathriona J. Clarke, Vicki Anderson, Michael Takagi, Stephen J.C. Hearps, Vanessa Rausa, Nicholas Anderson, et al. 2020. "Use of the Sport Concussion Assessment Tools in the Emergency Department to Predict Persistent Post-Concussive Symptoms in Children." *Journal of Paediatrics and Child Health* 56 (8): 1249–56. <https://doi.org/10.1111/jpc.14910>.
- Brett, Benjamin L, Nathan Smyk, Gary Solomon, Brandon C Baughman, and Philip Schatz. 2016. "Long-Term Stability and Reliability of Baseline Cognitive Assessments in High School Athletes Using ImPACT at 1-, 2-, and 3-Year Test–Retest Intervals." *Archives of Clinical Neuropsychology* 1. Shi F, (August): 904–14. <https://doi.org/10.1093/arclin/acw055>.
- Brett, Benjamin L., and Gary S. Solomon. 2017. "The Influence of Validity Criteria on Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) Test–Retest Reliability among High School Athletes." *Journal of Clinical and Experimental Neuropsychology* 39 (3): 286–95. <https://doi.org/10.1080/13803395.2016.1224322>.
- Brett, Benjamin L., Scott L. Zuckerman, Douglas P. Terry, Gary S. Solomon, and Grant L. Iverson. 2018. "Normative Data for the Sway Balance System." *Clinical Journal of Sport Medicine*, no. 00: 1. <https://doi.org/10.1097/jsm.0000000000000632>.
- Brittany, Wright, K Wilmoth, S B Juengst, N Didehbani, R Maize, and C M Cullum. 2020. "Perceived Recovery and Self-Reported Functioning in Adolescents with Mild Traumatic Brain Injury: The Role of Sleep, Mood, and Physical Symptoms." *Developmental*

Neurorehabilitation, 1–7.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33356738>.

Broglio, Steven P., Andrew Lapointe, Kathryn L. O'Connor, and Michael McCrea. 2017. "Head Impact Density: A Model To Explain the Elusive Concussion Threshold." *Journal of Neurotrauma* 34 (19): 2675–83. <https://doi.org/10.1089/neu.2016.4767>.

Broglio, Steven P., Richelle Williams, Andrew Lapointe, Ashley Rettmann, Brandon Moore, Sean K. Meehan, and James T. Eckner. 2017. "Brain Network Activation Technology Does Not Assist with Concussion Diagnosis and Return to Play in Football Athletes." *Frontiers in Neurology* 8 (JUN). <https://doi.org/10.3389/fneur.2017.00252>.

Brooks, Brian L., Basil Kadoura, Brenda Turley, Susan Crawford, Angelo Mikrogianakis, and Karen M. Barlow. 2014. "Perception of Recovery after Pediatric Mild Traumatic Brain Injury Is Influenced by the 'Good Old Days' Bias: Tangible Implications for Clinical Practice and Outcomes Research." *Archives of Clinical Neuropsychology* 29 (2): 186–93. <https://doi.org/10.1093/arclin/act083>.

Brooks, Brian L., Carly D. McKay, Martin Mrazik, Karen M. Barlow, Willem H. Meeuwisse, and Carolyn A. Emery. 2013. "Subjective, but Not Objective, Lingering Effects of Multiple Past Concussions in Adolescents." *Journal of Neurotrauma* 1. Shi F, (17): 1469–75. <https://doi.org/10.1089/neu.2012.2720>.

Brooks, Brian L., Grant L. Iverson, Joseph E. Atkins, Ross Zafonte, and Paul D. Berkner. 2016. "Sex Differences and Self-Reported Attention Problems During Baseline Concussion Testing." *Applied Neuropsychology: Child* 5 (2): 119–26. <https://doi.org/10.1080/21622965.2014.1003066>.

Brooks, Brian L., Hussain Daya, Samna Khan, Helen L. Carlson, Angelo Mikrogianakis, and Karen M. Barlow. 2016. "Cognition in the Emergency Department as a Predictor of Recovery after Pediatric Mild Traumatic Brain Injury." *Journal of the International Neuropsychological Society* 22 (4): 379–87. <https://doi.org/10.1017/S1355617715001368>.

Brooks, Brian L., Martin Mrazik, Karen M. Barlow, Carly D. McKay, Willem H. Meeuwisse, and Carolyn A. Emery. 2014a. "Absence of Differences between Male and Female Adolescents with Prior Sport Concussion." *Journal of Head Trauma Rehabilitation* 29 (3): 257–64. <https://doi.org/10.1097/HTR.000000000000016>.

Brooks, Brian L., Payton Q. Sayers, Shane Virani, Alysha A. Rajaram, and Lianne Tomfohr-Madsen. 2019. "Insomnia in Adolescents with Slow Recovery from Concussion." *Journal of Neurotrauma* 36 (16): 2391–99. <https://doi.org/10.1089/neu.2018.6257>.

Brooks, Brian L., Rebekah Mannix, Bruce Maxwell, Ross Zafonte, Paul D. Berkner, and Grant L. Iverson. 2016. "Multiple Past Concussions in High School Football Players." *American Journal of Sports Medicine* 44 (12): 3243–51. <https://doi.org/10.1177/0363546516655095>.

Brooks, Brian L., Shane Virani, Aneesh Khetani, Helen Carlson, Zeanna Jadavji, Micaela Mauthner, Trevor A. Low, et al. 2020. "Functional Magnetic Resonance Imaging Study of Working Memory Several Years after Pediatric Concussion." *Brain Injury* 34 (7): 895–904. <https://doi.org/10.1080/02699052.2020.1753240>.

Brooks, Brian L., Trevor A. Low, Hussain Daya, Samna Khan, Angelo Mikrogianakis, and Karen M. Barlow. 2016. "Test or Rest? Computerized Cognitive Testing in the Emergency

Department after Pediatric Mild Traumatic Brain Injury Does Not Delay Symptom Recovery.” *Journal of Neurotrauma* 33 (23): 2091–96. <https://doi.org/10.1089/neu.2015.4301>.

Brooks, Brian L., Vickie Plourde, Miriam H. Beauchamp, Ken Tang, Keith Owen Yeates, Michelle Keightley, Peter Anderson, Naddley Désiré, Nick Barrowman, and Roger Zemek. 2019. “Predicting Psychological Distress after Pediatric Concussion.” *Journal of Neurotrauma* 36 (5): 679–85. <https://doi.org/10.1089/neu.2018.5792>.

Brooks, Talia M., Marissa M. Smith, Renee M. Silvis, Trudy Lerer, Christine Henry Mulvey, Ralynne Maitland, Amy L. Dunn, Kelsey Logan, and Sharon R. Smith. 2017. “Symptom-Guided Emergency Department Discharge Instructions for Children with Concussion.” *Pediatric Emergency Care* 33 (8): 553–63. <https://doi.org/10.1097/PEC.0000000000000797>.

Brown, Lisa, and James Camarinos. 2019. “The Role of Physical Therapy in Concussion Rehabilitation.” *Seminars in Pediatric Neurology* 30 (July): 68–78. <https://doi.org/10.1016/j.spen.2019.03.011>.

Brown, N. J., R. C. Mannix, M. J. O’Brien, D. Gostine, M. W. Collins, and W. P. Meehan. 2014a. “Effect of Cognitive Activity Level on Duration of Post-Concussion Symptoms.” *Pediatrics* 133 (2): e299–304. <https://doi.org/10.1542/peds.2013-2125>.

Bunt, Stephen C, Nyaz Didehbani, Tahnae Tarkenton, Heidi Rossetti, Cason Hicks, Bert Vargas, Cheryl Silver, Paul Nakonezny, Kathleen Bell, Hunt Batjer, C Munro Cullum, and †, Abpp \*. 2020. “Sex Differences and Reporting of SCAT-5 Concussion Symptoms in Adolescent Athletes.” <https://doi.org/10.1097/JSM.0000000000000788>.

Bunt, Stephen C., Nyaz Didehbani, Tahnae Tarkenton, Heidi Rossetti, Cason Hicks, Bert Vargas, Cheryl Silver, Paul Nakonezny, Kathleen Bell, Hunt Batjer, C. Munro Cullum, Bunt Stephen C, et al. 2020. “Sex Differences and Reporting of SCAT-5 Concussion Symptoms in Adolescent Athletes.” *Clinical Journal of Sport Medicine Publish Ah* (00). <https://doi.org/10.1097/JSM.0000000000000788>.

C, Bretzin Abigail, Anderson Morgan, Moran Ryan N, and Covassin Tracey. 2020. “Long-Term Test-Retest Evaluation of the King-Devick Test in Youth Soccer Athletes.” *Journal of the Neurological Sciences* 416: 116951. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=med18&NEWS=N&AN=32554153>.

C, Choe Meeryo, Rosenbaum Philip, Rivara Frederick P, Gioia Gerard A, Giza Christopher C, and Four Corners Youth Consortium. 2020. “A Multicenter Look at Multidisciplinary Youth Concussion/Mild Traumatic Brain Injury Programs: The Four Corners Youth Consortium (4CYC).” *Pediatric Neurology* 107: 84–85. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=med1&NEWS=N&AN=32173162>.

C, Hannah Theodore, Jumreornvong Oranicha, Marayati Naoum F, Spiera Zachary, Ali Muhammad, Li Adam Y, Durbin John R, et al. 2021. “A Multivariable Analysis to Evaluate the Presence or Absence of Gender Differences in Baseline ImPACT Composite Scores and Symptom Severity Ratings in Student-Athletes Ages 12-18 Years.” *Pediatric Exercise Science*, 1–8. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34517341>.

C, Hannah Theodore, Li Adam Y, Spiera Zachary, Kuohn Lindsey, Dai Jennifer, McAuley Fiona, Ali Muhammad, et al. 2021. “Sex-Related Differences in the Incidence, Severity, and Recovery of Concussion in Adolescent Student-Athletes Between 2009 and 2019.” *The American Journal of Sports Medicine*, 3635465211008596.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33955795>.

C, McDonald Catherine, Jain Divya, Storey Eileen P, Gonzalez Madeline, Master Christina L, and Arbogast Kristy B. 2020. “Changes in Driving Behaviors After Concussion in Adolescents.” *The Journal of Adolescent Health : Official Publication of the Society for Adolescent Medicine*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33339732>.

C, Merz Zachary, Lichtenstein Jonathan D, and Lace John W. 2021. “Methodological Considerations of Assessing Meaningful/Reliable Change in Computerized Neurocognitive Testing Following Sport-Related Concussion.” *Applied Neuropsychology.Child*, 1–9.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34293970>.

C, Rausa Vanessa, Shapiro Jesse, Seal Marc L, Davis Gavin A, Anderson Vicki, Babl Franz E, Veal Ryan, Parkin Georgia, Ryan Nicholas P, and Takagi Michael. 2020. “Neuroimaging in Paediatric Mild Traumatic Brain Injury: A Systematic Review.” *Neuroscience and Biobehavioral Reviews* 118: 643–53.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=32905817>.

Caccese, Jaclyn B., Ryan M. DeWolf, Thomas W. Kaminski, Steven P. Broglio, Thomas W. McAllister, Michael McCrea, Thomas A. Buckley, et al. 2019. “Estimated Age of First Exposure to American Football and Neurocognitive Performance Amongst NCAA Male Student-Athletes: A Cohort Study.” *Sports Medicine* 49 (3): 477–87.

<https://doi.org/10.1007/s40279-019-01069-x>.

Cantu, Robert C. 2019. “History of Concussion Including Contributions of 1940s Boston City Hospital Researchers.” *Seminars in Pediatric Neurology* 30 (July): 2–8.

<https://doi.org/10.1016/j.spen.2019.03.002>.

Cara, Powell, McCauley Brianna, Scott Brosky Zachary, Stephenson Tyler, and Hassen-Miller Amy. 2020. “THE EFFECT OF AEROBIC EXERCISE ON ADOLESCENT ATHLETES POST-CONCUSSION: A SYSTEMATIC REVIEW AND META-ANALYSIS.” *International Journal of Sports Physical Therapy* 15 (5): 650–58.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem6&NEWS=N&AN=33110684>.

Carol, Dematteo, Bednar E Dimitra, Randall Sarah, and Falla Katie. 2020. “Effectiveness of Return to Activity and Return to School Protocols for Children Postconcussion: A Systematic Review.” *BMJ Open Sport and Exercise Medicine* 6 (1): 1–10.

<https://doi.org/10.1136/bmjsem-2019-000667>.

Carol, DeMatteo, Greenspoon Dayna, Levac Danielle, Harper Jessica A, and Rubinoff Mandy. 2014. “Evaluating the Nintendo Wii for Assessing Return to Activity Readiness in Youth with

Mild Traumatic Brain Injury.” *Physical & Occupational Therapy In Pediatrics* 34 (3): 229–44.  
<https://doi.org/10.3109/01942638.2014.885103>.

CAROL, DEMATTEO, VOLTERMAN KIMBERLY A, BREITHAUPT PETER G, CLARIDGE EVERETT A, ADAMICH JOHN, and TIMMONS BRIAN W. 2015. “Exertion Testing in Youth with Mild Traumatic Brain Injury/Concussion.” *Medicine & Science in Sports & Exercise* 47 (11): 2283–90. <https://doi.org/10.1249/MSS.0000000000000682>.

Caze II, Todd, Gregory P Knell, John Abt, and Scott O Burkhart. 2020. “Management and Treatment of Concussions via Tele-Concussion in a Pediatric Setting: Methodological Approach and Descriptive Analysis.” *JMIR Pediatrics and Parenting* 3 (2): e19924.  
<https://doi.org/10.2196/19924>.

Chamard, Emilie, and Jonathan D. Lichtenstein. 2018. “A Systematic Review of Neuroimaging Findings in Children and Adolescents with Sports-Related Concussion.” *Brain Injury* 32 (7): 816–31. <https://doi.org/10.1080/02699052.2018.1463106>.

Champigny, Claire M., Jennine Rawana, Grant L. Iverson, Bruce Maxwell, Paul D. Berkner, and Magdalena Wojtowicz. 2020. “Influence of Anxiety on Baseline Cognitive Testing and Symptom Reporting in Adolescent Student Athletes.” *Journal of Neurotrauma* 37 (24): 2632–38. <https://doi.org/10.1089/neu.2020.7079>.

Chan, Catherine, Grant L. Iverson, Jacqueline Purtzki, Kathy Wong, Vivian Kwan, Isabelle Gagnon, Noah D. Silverberg, et al. 2018. “Safety of Active Rehabilitation for Persistent Symptoms After Pediatric Sport-Related Concussion: A Randomized Controlled Trial.” *Archives of Physical Medicine and Rehabilitation* 99 (2): 242–49.  
<https://doi.org/10.1016/j.apmr.2017.09.108>.

Chancellor, Sarah E., Erich S. Franz, Olga V. Minaeva, and Lee E. Goldstein. 2019. “Pathophysiology of Concussion.” *Seminars in Pediatric Neurology* 30 (July): 14–25.  
<https://doi.org/10.1016/j.spen.2019.03.004>.

Chand Manisha, Kanwar Sumit, Calvo Cecilia, and Peck Evan. 2020. “Influence of Sex and Previous Concussion History on Postconcussive Recovery in Young Athletes.” *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine* 30 Suppl 1: S36–41.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32132475>.

Charles, Feinberg, Carr Catherine, Zemek Roger, Yeates Keith Owen, Master Christina, Schneider Kathryn, Bell Michael J, Wisniewski Stephen, and Mannix Rebekah. 2021. “Association of Pharmacological Interventions With Symptom Burden Reduction in Patients With Mild Traumatic Brain Injury: A Systematic Review.” *JAMA Neurology*.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33464290>.

Charlotte, Gagner, Tuerk Carola, De Beaumont Louis, Bernier Annie, and Beauchamp Miriam H. 2021. “Brain-Derived Neurotrophic Factor Val66Met Polymorphism and Internalizing Behaviors after Early Mild Traumatic Brain Injury.” *Journal of Neurotrauma* 38 (1): 102–10.  
<https://doi.org/10.1089/neu.2019.6936>.

Chasle, Veronique, Laurent Riffaud, Romain Longuet, Marie Martineau-Curt, Yann Collet, Luc Le Fournier, and Patrick Pladys. 2016. “Mild Head Injury and Attention Deficit

Hyperactivity Disorder in Children.” *Child’s Nervous System* 32 (12): 2357–61.  
<https://doi.org/10.1007/s00381-016-3230-z>.

Chin, Esther Y., Lindsay D. Nelson, William B. Barr, Paul McCrory, and Michael A. McCrea. 2016. “Reliability and Validity of the Sport Concussion Assessment Tool-3 (SCAT3) in High School and Collegiate Athletes.” *American Journal of Sports Medicine* 44 (9): 2276–85.  
<https://doi.org/10.1177/0363546516648141>.

Chrisman Sara, Mendoza Jason A, Zhou Chuan, Palermo Tonya M, Gogue-Garcia Tierra, Janz Kathleen F, and Rivara Frederick P. 2021. “Pilot Study of Telehealth Delivered Rehabilitative Exercise for Youth With Concussion: The Mobile Subthreshold Exercise Program (MSTEP).” *Frontiers in Pediatrics* 9: 645814.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=pmnm&NEWS=N&AN=34123963>.

Chrisman Sara, Whitlock Kathryn B, Somers Elissa, Burton Monique S, Herring Stanley A, Rowhani-Rahbar Ali, and Rivara Frederick P. 2017. “Pilot Study of the Sub-Symptom Threshold Exercise Program (SSTEP) for Persistent Concussion Symptoms in Youth.” *NeuroRehabilitation* 40 (4): 493–99. <https://doi.org/10.3233/NRE-161436>.

Chrisman, Sara P.D., and Laura P. Richardson. 2014. “Prevalence of Diagnosed Depression in Adolescents with History of Concussion.” *Journal of Adolescent Health* 54 (5): 582–86.  
<https://doi.org/10.1016/j.jadohealth.2013.10.006>.

Chrisman, Sara P.D., Kathryn B. Whitlock, Elissa Somers, Monique S. Burton, Stanley A. Herring, Ali Rowhani-Rahbar, and Frederick P. Rivara. 2017a. “Pilot Study of the Sub-Symptom Threshold Exercise Program (SSTEP) for Persistent Concussion Symptoms in Youth.” *NeuroRehabilitation* 40 (4): 493–99. <https://doi.org/10.3233/NRE-161436>.

Chrisman, Sara P.D., Kathryn B. Whitlock, Jason A. Mendoza, Monique S. Burton, Ellie Somers, Albert Hsu, Lauren Fay, Tonya M. Palermo, and Frederick P. Rivara. 2020. “Corrigendum: Pilot Randomized Controlled Trial of an Exercise Program Requiring Minimal In-Person Visits for Youth With Persistent Sport-Related Concussion (Frontiers in Neurology, (2019), 10, (623), 10.3389/fneur.2019.00623).” *Frontiers in Neurology*. Frontiers Media S.A.  
<https://doi.org/10.3389/fneur.2020.00006>.

Christopher, Bailey, Meyer Jessica, Briskin Susannah, Tangen Christopher, Hoffer S Alan, Dunder Jason, Brennan Bethany, and Smith Paul. 2019. “Multidisciplinary Concussion Management: A Model for Outpatient Concussion Management in the Acute and Post-Acute Settings.” *Journal of Head Trauma Rehabilitation* 34 (6): 375–84.  
<https://doi.org/10.1097/HTR.0000000000000527>.

Christopher, Bosworth, and Dodd Jonathan N. 2020. “Noncredible Effort on the Nonverbal-Medical Symptom Validity Test (NV-MSVT): Impact on Cognitive Performance in Pediatric Mild Traumatic Brain Injury.” *Applied Neuropsychology: Child* 9 (4): 367–74.  
<https://doi.org/10.1080/21622965.2020.1742717>.

Chung Jane, Zynda Aaron J, Didehbani Nyaz, Hicks Cason, Hynan Linda S, Miller Shane M, Bell Kathleen R, and Cullum C Munro. 2019. “Association Between Sleep Quality and Recovery Following Sport-Related Concussion in Pediatrics” 34 (11): 639–45.

Chung, Ai Wern, Rebekah Mannix, Henry A. Feldman, P. Ellen Grant, and Kiho Im. 2019. “Longitudinal Structural Connectomic and Rich-Club Analysis in Adolescent MTBI Reveals

Persistent, Distributed Brain Alterations Acutely through to One Year Post-Injury.” *Scientific Reports* 9 (1): 18833. <https://doi.org/10.1038/s41598-019-54950-0>.

Clark, Ricketta, Ansley Grimes Stanfill, Clark Ricketta, and Stanfill Ansley Grimes. 2019. “A Systematic Review of Barriers and Facilitators for Concussion Reporting Behavior among Student Athletes.” *Journal of Trauma Nursing* 26 (6): 297–311. <https://doi.org/10.1097/JTN.0000000000000468>.

Collings, Laurel J, Nathan E Cook, Shaun Porter, Cody Kusch, Jonathan Sun, Naznin Virji-Babul, Grant L Iverson, and William J Panenka. 2017. “Attention-Deficit/Hyperactivity Disorder Is Associated with Baseline Child Sport Concussion Assessment Tool Third Edition Scores in Child Hockey Players.” *Brain Injury* 31 (11): 1479–85. <https://doi.org/10.1080/02699052.2017.1377351>.

Comeau, Douglas, and Nicholas Pfeifer. 2019. “Diagnosis of Concussion on the Sidelines.” *Seminars in Pediatric Neurology* 30 (July): 26–34. <https://doi.org/10.1016/j.spen.2019.03.005>.

Conder, Robert L., Alanna A. Conder, Johna Register-Mihalik, Lauren H. Conder, and Shannon Newton. 2015. “Preliminary Normative Data on the Penn State University Symbol Cancellation Task With Nonconcussed Adolescents.” *Applied Neuropsychology: Child* 4 (3): 141–47. <https://doi.org/10.1080/21622965.2013.816849>.

Connolly, Eric J., and Brandon F. McCormick. 2019. “Mild Traumatic Brain Injury and Psychopathology in Adolescence: Evidence From the Project on Human Development in Chicago Neighborhoods.” *Journal of Adolescent Health* 65 (1): 79–85. <https://doi.org/10.1016/j.jadohealth.2018.12.023>.

Cook, Nathan E, Donna S Huang, Noah D Silverberg, Brian L Brooks, Bruce Maxwell, Ross Zafonte, Paul D Berkner, and Grant L Iverson. 2017. “Baseline Cognitive Test Performance and Concussion-like Symptoms among Adolescent Athletes with ADHD: Examining Differences Based on Medication Use.” *Clinical Neuropsychologist* 1. Shi F, (8): 1341–52. <https://doi.org/10.1080/13854046.2017.1317031>.

Cook, Nathan E., Patricia M. Kelshaw, Shane V. Caswell, and Grant L. Iverson. 2019. “Children with Attention-Deficit/Hyperactivity Disorder Perform Differently on Pediatric Concussion Assessment.” *Journal of Pediatrics* 214: 168-174.e1. <https://doi.org/10.1016/j.jpeds.2019.07.048>.

Cook, Nathan E., Rosemarie G. Sapigao, Noah D. Silverberg, Bruce A. Maxwell, Ross Zafonte, Paul D. Berkner, and Grant L. Iverson. 2020. “Attention-Deficit/Hyperactivity Disorder Mimics the Post-Concussion Syndrome in Adolescents.” *Frontiers in Pediatrics* 8 (February). <https://doi.org/10.3389/fped.2020.00002>.

Copley, M., N. Jimenez, E. Kroshus, and S.P.D. P.D. Chrisman. 2020. “Disparities in Use of Subspecialty Concussion Care Based on Ethnicity.” *Journal of Racial and Ethnic Health Disparities* 7 (3): 571–76. <https://doi.org/10.1007/s40615-019-00686-6>.

Coralie, Rochefort, Legace Elizabeth, Boulay Chadwick, Macartney Gail, Goulet Kristian, Zemek Roger, and Sveistrup Heidi. 2020. “Balance Markers and Saccadic Eye-Movement Measures in Adolescents With Postconcussion Syndrome.” *Journal of Athletic Training* 55 (5): 475–81. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32216658>.

Corbin-Berrigan, Laurie Ann, and Isabelle Gagnon. 2017. "Postconcussion Symptoms as a Marker of Delayed Recovery in Children and Youth Who Recently Sustained a Concussion: A Brief Report." *Clinical Journal of Sport Medicine* 27 (3): 325–27.

<https://doi.org/10.1097/JSM.0000000000000355>.

Corbin-Berrigan, Laurie Ann, Kristina Kowalski, Jocelyn Faubert, Brian Christie, and Isabelle Gagnon. 2020. "Could Neurotracker Be Used as a Clinical Marker of Recovery Following Pediatric Mild Traumatic Brain Injury? An Exploratory Study." *Brain Injury* 34 (3): 385–89.

<https://doi.org/10.1080/02699052.2020.1723699>.

Cordingley, Dean, Richard Girardin, Karen Reimer, Lesley Ritchie, Jeff Leiter, Kelly Russell, and Michael J. Ellis. 2016a. "Graded Aerobic Treadmill Testing in Pediatric Sports-Related Concussion: Safety, Clinical Use, and Patient Outcomes." *Journal of Neurosurgery: Pediatrics* 18 (6): 693–702. <https://doi.org/10.3171/2016.5.PEDS16139>.

Corwin Daniel, McDonald Catherine C, Arbogast Kristy B, Mohammed Fairuz N, Grady Matthew F, and Master Christina L. 2021. "Visio-Vestibular Deficits in Healthy Child and Adolescent Athletes." *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34173781>.

Corwin, Daniel J., Douglas J. Wiebe, Mark R. Zonfrillo, Matthew F. Grady, Roni L. Robinson, Arlene M. Goodman, and Christina L. Master. 2015. "Vestibular Deficits Following Youth Concussion." *Journal of Pediatrics* 166 (5): 1221–25.

<https://doi.org/10.1016/j.jpeds.2015.01.039>.

Corwin, Daniel J., Kristy B. Arbogast, Casey Swann, Rebecca Haber, Matthew F. Grady, and Christina L. Master. 2020. "Reliability of the Visio-Vestibular Examination for Concussion among Providers in a Pediatric Emergency Department." *The American Journal of Emergency Medicine* 38 (9): 1847–53. <https://doi.org/10.1016/j.ajem.2020.06.020>.

Corwin, Daniel J., Mark R. Zonfrillo, Christina L. Master, Kristy B. Arbogast, Matthew F. Grady, Roni L. Robinson, Arlene M. Goodman, and Douglas J. Wiebe. 2014a. "Characteristics of Prolonged Concussion Recovery in a Pediatric Subspecialty Referral Population." *The Journal of Pediatrics* 165 (6): 1207–15. <https://doi.org/10.1016/j.jpeds.2014.08.034>.

Corwin, Daniel J., Mark R. Zonfrillo, Douglas J. Wiebe, Christina L. Master, Matthew F. Grady, and Kristy B. Arbogast. 2018. "Vestibular and Oculomotor Findings in Neurologically-Normal, Non-Concussed Children." *Brain Injury* 32 (6): 794–99.

<https://doi.org/10.1080/02699052.2018.1458150>.

Coslick, Alexis M., Kaitlyn E. Chin, Luther G. Kalb, Beth S. Slomine, Stacy J. Suskauer, Coslick Alexis M, Chin Kaitlyn E, Kalb Luther G, Slomine Beth S, and Suskauer Stacy J. 2020. "Participation in Physical Activity at Time of Presentation to a Specialty Concussion Clinic Is Associated With Shorter Time to Recovery." *PM and R* 12 (12): 1195–1204.

<https://doi.org/10.1002/pmrj.12443>.

Cossette, Isabelle, Marie-Ève Gagné, Marie-Christine Ouellet, Philippe Fait, Isabelle Gagnon, Katia Sirois, Sophie Blanchet, Natalie Le Sage, and Bradford J. McFadyen. 2016. "Executive Dysfunction Following a Mild Traumatic Brain Injury Revealed in Early Adolescence with Locomotor-Cognitive Dual-Tasks." *Brain Injury* 30 (13–14): 1648–55.

<https://doi.org/10.1080/02699052.2016.1200143>.

- Covassin, T, Rj Elbin, and B Crutcher. 2013. “The Relationship Between Coping, Neurocognitive Performance, and Concussion Symptoms in High School and Collegiate Athletes.” *The Sport Psychologist* 27 (4): 372–79. <https://doi.org/10.1123/tsp.27.4.372>.
- Covassin, Tracey, Bryan Crutcher, and Jessica Wallace. 2013. “Does a 20 Minute Cognitive Task Increase Concussion Symptoms in Concussed Athletes?” *Brain Injury* 27 (13–14): 1589–94. <https://doi.org/10.3109/02699052.2013.823656>.
- Covassin, Tracey, Bryan Crutcher, R.J. Elbin, Scott Burkhart, and Anthony Kontos. 2013. “The Relationship Between Coping, Neurocognitive Performance, and Concussion Symptoms in High School and Collegiate Athletes.” *The Sport Psychologist* 27 (4): 372–79. <https://doi.org/10.1123/tsp.27.4.372>.
- Covassin, Tracey, R.J. Elbin, Alisha Bleecker, Adam Lipchik, and Anthony P. Kontos. 2013. “Are There Differences in Neurocognitive Function and Symptoms Between Male and Female Soccer Players After Concussions?” *The American Journal of Sports Medicine* 41 (12): 2890–95. <https://doi.org/10.1177/0363546513509962>.
- Crichton, Alison Jayne, Vera Ignjatovic, Franz Babl, Ed Oakley, Mardee Greenham, Stephen J.C. Hearps, Carmel Delzoppo, et al. 2019. “Interleukin-8 Predicts Fatigue at 12 Months Post-Injury in Children with Traumatic Brain Injury.” *Journal of Neurotrauma*, December, neu.2018.6083. <https://doi.org/10.1089/neu.2018.6083>.
- Crichton, Alison, Ed Oakley, Franz E. Babl, Mardee Greenham, Stephen Hearps, Carmel Delzoppo, Miriam H. Beauchamp, et al. 2018. “Predicting Fatigue 12 Months after Child Traumatic Brain Injury: Child Factors and Postinjury Symptoms.” *Journal of the International Neuropsychological Society* 24 (3): 224–36. <https://doi.org/10.1017/S1355617717000893>.
- Crowe, Louise M., Vicki Anderson, Sarah Barton, Franz E. Babl, and Cathy Catroppa. 2014a. “Verbal Ability and Language Outcome Following Traumatic Brain Injury in Early Childhood.” *Journal of Head Trauma Rehabilitation* 29 (3): 217–23. <https://doi.org/10.1097/HTR.0b013e31829babfd>.
- Crowe, Louise, Alex Collie, Stephen Hearps, Julian Dooley, Helen Clausen, David Maddocks, Paul McCrory, Gavin Davis, and Vicki Anderson. 2016. “Cognitive and Physical Symptoms of Concussive Injury in Children: A Detailed Longitudinal Recovery Study.” *British Journal of Sports Medicine* 50 (5): 311–16. <https://doi.org/10.1136/bjsports-2015-094663>.
- Cushman, Daniel M., Lauren Borowski, Colby Hansen, John Hendrick, Troy Bushman, Masaru Teramoto, Cushman Daniel M, et al. 2019. “Gabapentin and Tricyclics in the Treatment of Post-Concussive Headache, a Retrospective Cohort Study.” *Headache* 59 (3): 371–82. <https://doi.org/10.1111/head.13451>.
- Custer, Aimee, Alicia Sufrinko, R J Elbin, Tracey Covassin, Micky Collins, and Anthony Kontos. 2016. “High Baseline Postconcussion Symptom Scores and Concussion Outcomes in Athletes.” *Journal of Athletic Training* 51 (2): 136–41. <https://doi.org/10.4085/1062-6050-51.2.12>.
- D, Lax Ilyse, Paniccia Melissa, Agnihotri Sabrina, Reed Nick, Garmaise Evan, Azadbakhsh Mahdis, Ng Justin, et al. 2015. “Developmental and Gender Influences on Executive Function Following Concussion in Youth Hockey Players.” *Brain Injury* 29 (12): 1409–19. <https://doi.org/10.3109/02699052.2015.1043344>.

D, Patel Rishi, and LaBella Cynthia R. 2021. “Contributions of PCSS, BESS, Tandem Gait, and Romberg Test for Identifying Balance Deficits in Pediatric Concussions.” *The Journal of Head Trauma Rehabilitation*.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34145162>.

D, Stockbridge Melissa, Doran Anthony, King Kristin, and Newman Rochelle S. 2018. “The Effects of Concussion on Rapid Picture Naming in Children.” *Brain Injury* 32 (4): 506–14.  
<https://doi.org/10.1080/02699052.2018.1429660>.

Darling Scott, Leddy John J, Baker John G, Williams Amy J, Surace Anthony, Miecznikowski Jeffrey C, and Willer Barry. 2014. “Evaluation of the Zurich Guidelines and Exercise Testing for Return to Play in Adolescents Following Concussion.” *Clinical Journal of Sport Medicine* 24 (2): 128–33. <https://doi.org/10.1097/JSM.0000000000000026>.

Darling, Scott R., John J. Leddy, John G. Baker, Amy J. Williams, Anthony Surace, Jeffrey C. Miecznikowski, and Barry Willer. 2014. “Evaluation of the Zurich Guidelines and Exercise Testing for Return to Play in Adolescents Following Concussion.” *Clinical Journal of Sport Medicine* 24 (2): 128–33. <https://doi.org/10.1097/JSM.0000000000000026>.

DAVID, HOWELL, OSTERNIG LOUIS, V A N DONKELAAR PAUL, MAYR ULRICH, and CHOU LI-SHAN. 2013. “Effects of Concussion on Attention and Executive Function in Adolescents.” *Medicine & Science in Sports & Exercise* 45 (6): 1030–37.  
<https://doi.org/10.1249/MSS.0b013e3182814595>.

David, Stillo, Danielli Ethan, Ho Rachelle A, DeMatteo Carol, Hall Geoffrey B, Bock Nicholas A, Connolly John F, and Noseworthy Michael D. 2021. “Localization and Identification of Brain Microstructural Abnormalities in Paediatric Concussion.” *Frontiers in Human Neuroscience* 15: 657374.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=pmnm&NEWS=N&AN=34135741>.

Dean, Cordingley, Girardin Richard, Reimer Karen, Ritchie Lesley, Leiter Jeff, Russell Kelly, and Ellis Michael J. 2016. “Graded Aerobic Treadmill Testing in Pediatric Sports-Related Concussion: Safety, Clinical Use, and Patient Outcomes.” *Journal of Neurosurgery: Pediatrics* 18 (6): 693–702. <https://doi.org/10.3171/2016.5.PEDS16139>.

Delefortrie, Quentin, François Lejeune, Benjamin Kerzmann, Raphaël Levy, Jean François Adam, Thierry Sottiaux, Alexandre Grimmelprez, Patrick Vankerhoven, and Said Hachimi-Idrissi. 2018. “Evaluation of the Roche® Elecsys and the Diasorin® Liaison S100 Kits in the Management of Mild Head Injury in the Emergency Room.” *Clinical Biochemistry* 52 (November 2017): 123–30. <https://doi.org/10.1016/j.clinbiochem.2017.11.004>.

DeMatteo Carol, Lin Chia-Yu A, Foster Gary, Giglia Lucia, Thabane Lehana, Claridge Everett, Noseworthy Michael D, Hall Geoffrey B, and Connolly John F. 2019. “Evaluating Adherence to Return to School and Activity Protocols in Children After Concussion.” *Clinical Journal of Sport Medicine Publish Ah* (00). <https://doi.org/10.1097/jsm.0000000000000800>.

DeMatteo, Carol A., Chia-Yu A Lin, Gary Foster, Lucia Giglia, Lehana Thabane, Everett Claridge, Michael D Noseworthy, Geoffrey B Hall, and John F Connolly. 2019. “Evaluating Adherence to Return to School and Activity Protocols in Children After Concussion.” *Clinical Journal of Sport Medicine Publish Ah* (December).  
<https://doi.org/10.1097/jsm.0000000000000800>.

DeMatteo, Carol A., Sarah Randall, Chia-Yu A. Yu A. Lin, and Everett A. Claridge. 2019. “What Comes First: Return to School or Return to Activity for Youth After Concussion? Maybe We Don’t Have to Choose.” *Frontiers in Neurology* 10 (JUL): 1–9. <https://doi.org/10.3389/fneur.2019.00792>.

DeMatteo, Carol, Dayna Greenspoon, Danielle Levac, Jessica A. Harper, and Mandy Rubinoff. 2014. “Evaluating the Nintendo Wii for Assessing Return to Activity Readiness in Youth with Mild Traumatic Brain Injury.” *Physical & Occupational Therapy In Pediatrics* 34 (3): 229–44. <https://doi.org/10.3109/01942638.2014.885103>.

Dematteo, Carol, Dayna Greenspoon, Danielle Levac, Jessica A. Harper, and Mandy Rubinoff. 2014. “Evaluating the Nintendo Wii for Assessing Return to Activity Readiness in Youth with Mild Traumatic Brain Injury.” *Physical and Occupational Therapy in Pediatrics* 34 (3): 229–44. <https://doi.org/10.3109/01942638.2014.885103>.

DeMatteo, Carol, E Dimitra Bednar, Sarah Randall, and Katie Falla. 2020. “Effectiveness of Return to Activity and Return to School Protocols for Children Postconcussion: A Systematic Review.” *BMJ Open Sport & Exercise Medicine* 6 (1): e000667. <https://doi.org/10.1136/bmjsem-2019-000667>.

DEMATTEO, CAROL, KIMBERLY A. VOLTERMAN, PETER G. BREITHAUPT, EVERETT A. CLARIDGE, JOHN ADAMICH, and BRIAN W. TIMMONS. 2015. “Exertion Testing in Youth with Mild Traumatic Brain Injury/Concussion.” *Medicine & Science in Sports & Exercise* 47 (11): 2283–90. <https://doi.org/10.1249/MSS.0000000000000682>.

Dillard, Charles, Nicole Ditchman, Karine Nersessova, Nicola Foster, Paul Wehman, Michael West, Brendalin Riedlinger, Eugenio Monasterio, Bill Shaw, and Julie Neblett. 2017. “Post-Concussion Symptoms in Mild Traumatic Brain Injury: Findings from a Paediatric Outpatient Clinic.” *Disability and Rehabilitation* 39 (6): 544–50. <https://doi.org/10.3109/09638288.2016.1152602>.

Dobney Danielle, Grilli Lisa, Kocilowicz Helen, Beaulieu Christine, Straub Meghan, Friedman Debbie, Gagnon Isabelle J, et al. 2018. “Is There an Optimal Time to Initiate an Active Rehabilitation Protocol for Concussion Management in Children? A Case Series.” *Journal of Head Trauma Rehabilitation* 33 (3): E11–17. <https://doi.org/10.1097/HTR.0000000000000339>.

Dobney, Danielle M., Lisa Grilli, Helen Kocilowicz, Christine Beaulieu, Meghan Straub, Debbie Friedman, and Isabelle Gagnon. 2017a. “Evaluation of an Active Rehabilitation Program for Concussion Management in Children and Adolescents.” *Brain Injury* 31 (13–14): 1753–59. <https://doi.org/10.1080/02699052.2017.1346294>.

Dobney, Danielle M., Lisa Grilli, Helen Kocilowicz, Christine Beaulieu, Meghan Straub, Debbie Friedman, and Isabelle J. Gagnon. 2018a. “Is There an Optimal Time to Initiate an Active Rehabilitation Protocol for Concussion Management in Children? A Case Series.” *Journal of Head Trauma Rehabilitation* 33 (3): E11–17. <https://doi.org/10.1097/HTR.0000000000000339>.

Dona, Olga, Michael D. Noseworthy, Carol DeMatteo, and John F. Connolly. 2017. “Fractal Analysis of Brain Blood Oxygenation Level Dependent (BOLD) Signals from Children with Mild Traumatic Brain Injury (MTBI).” *PLoS ONE* 12 (1). <https://doi.org/10.1371/journal.pone.0169647>.

Donald, Christine L. Mac, Jason Barber, Jason Wright, David Coppel, Nina De Lacy, Steve Ottinger, Suzanne Peck, et al. 2019. “Longitudinal Clinical and Neuroimaging Evaluation of Symptomatic Concussion in 10-to 14-Year-Old Youth Athletes.” *Journal of Neurotrauma* 36 (2): 264–74. <https://doi.org/10.1089/neu.2018.5629>.

Donders, Jacobus, and Christin DeWit. 2017. “Parental Ratings of Daily Behavior and Child Cognitive Test Performance after Pediatric Mild Traumatic Brain Injury.” *Child Neuropsychology* 23 (5): 554–70. <https://doi.org/10.1080/09297049.2016.1161015>.

Donnell, Zoe, Rosanne Hoffman, Kelly Sarmiento, and Cameron Hays. 2018. “Concussion Attitudes, Behaviors, and Education among Youth Ages 12–17: Results from the 2014 YouthStyles Survey.” *Journal of Safety Research* 64: 163–69. <https://doi.org/10.1016/j.jsr.2017.12.001>.

Dorman, Jason C., Verle D. Valentine, Thayne A. Munce, B. Joel Tjarks, Paul A. Thompson, and Michael F. Bergeron. 2015. “Tracking Postural Stability of Young Concussion Patients Using Dual-Task Interference.” *Journal of Science and Medicine in Sport* 18 (1): 2–7. <https://doi.org/10.1016/j.jsams.2013.11.010>.

DR, Howell, Potter MN, Provance AJ, Wilson PE, Kirkwood MW, and Wilson JC. 2020. “Sleep Problems and Melatonin Prescription After Concussion Among Youth Athletes.” *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine*, September. <https://doi.org/10.1097/JSM.0000000000000803>.

Dubrovsky, Alexander Sasha, Debbie Friedman, and Helen Kocilowicz. 2014. “Pediatric Post-Traumatic Headaches and Peripheral Nerve Blocks of the Scalp: A Case Series and Patient Satisfaction Survey.” *Headache* 54 (5): 878–87. <https://doi.org/10.1111/head.12334>.

Eagle Shawn, Puligilla Anish, Fazio-Sumrok Vanessa, Kegel Nathan, Collins Michael W, and Kontos Anthony P. 2020. “Association of Time to Initial Clinic Visit with Prolonged Recovery in Pediatric Patients with Concussion.” *Journal of Neurosurgery: Pediatrics* 26 (2): 165–70. <https://doi.org/10.3171/2020.2.PEDS2025>.

Eagle Shawn, Sparto Patrick J, Holland Cynthia L, Alkathiry Abdulaziz A, Blaney Nicholas A, Bitzer Hannah B, Collins Michael W, Furman Joseph M, and Kontos Anthony P. 2021. “Utility of a Postural Stability/Perceptual Inhibition Dual Task for Identifying Concussion in Adolescents.” *Journal of Sport Rehabilitation*, 1–6. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34525453>.

Eagle, Shawn R., Anish Puligilla, Vanessa Fazio-Sumrok, Nathan Kegel, Michael W. Collins, and Anthony P. Kontos. 2020. “Association of Time to Initial Clinic Visit with Prolonged Recovery in Pediatric Patients with Concussion.” *Journal of Neurosurgery: Pediatrics* 26 (2): 165–70. <https://doi.org/10.3171/2020.2.PEDS2025>.

Eagle, Shawn R., Anthony P. Kontos, Aaron Sinnott, Meaghan Beckner, Bradley C. Nindl, Shawn D. Flanagan, Mita Lovalekar, and Chris Connaboy. 2020. “Utility of a Novel Perceptual-Motor Control Test for Identification of Sport-Related Concussion beyond Current Clinical Assessments.” *Journal of Sports Sciences* 38 (15): 1799–1805. <https://doi.org/10.1080/02640414.2020.1756675>.

Eckner, James T., Tad Seifert, Allison Pescovitz, Max Zeiger, and Jeffrey S. Kutcher. 2017. “Is Migraine Headache Associated with Concussion in Athletes? A Case-Control Study.” *Clinical Journal of Sport Medicine* 27 (3): 266–70. <https://doi.org/10.1097/JSM.0000000000000346>.

Eisenberg, M A, W P Meehan, and R Mannix. 2014. “Duration and Course of Post-Concussive Symptoms.” *Pediatrics* 133 (6): 999–1006. <https://doi.org/10.1542/peds.2014-0158>.

Eisenberg, Matthew A., John Andrea, William Meehan, and Rebekah Mannix. 2013. “Time Interval between Concussions and Symptom Duration.” *Pediatrics* 132 (1): 8–17. <https://doi.org/10.1542/peds.2013-0432>.

Elbin, R J, Eagle Shawn R, Marchetti Gregory F, Anderson Morgan, Schatz Philip, Womble Melissa N, Stephenson Katie, et al. 2021. “Using Change Scores on the Vestibular Ocular Motor Screening (VOMS) Tool to Identify Concussion in Adolescents.” *Applied Neuropsychology.Child*, 1–7. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33896282>.

Elbin, R J, Stephenson Katie, Lipinski Damon, Maxey Kristin, Womble Melissa N, Reynolds Erin, Covert Kayla, and Kontos Anthony P. 2021. “In-Person Versus Telehealth for Concussion Clinical Care in Adolescents: A Pilot Study of Therapeutic Alliance and Patient Satisfaction.” *The Journal of Head Trauma Rehabilitation*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34320555>.

Elbin, R. J., A. Sufrinko, P. Schatz, J. French, L. Henry, S. Burkhart, M. W. Collins, and A. P. Kontos. 2016. “Removal From Play After Concussion and Recovery Time.” *Pediatrics* 138 (3): e20160910–e20160910. <https://doi.org/10.1542/peds.2016-0910>.

Elbin, R. J., Anthony P. Kontos, Nate Kegel, Eric Johnson, Scott Burkhart, and Philip Schatz. 2013. “Individual and Combined Effects of LD and ADHD on Computerized Neurocognitive Concussion Test Performance: Evidence for Separate Norms.” *Archives of Clinical Neuropsychology* 1. Shi F, (5): 476–84. <https://doi.org/10.1093/arclin/act024>.

Elbin, R. J., Nathan R D’Amico, Matthew McCarthy, Melissa N. Womble, Sydne O’Connor, Philip Schatz, D’Amico Nathan R, et al. 2020. “How Do ImPACT Quick Test Scores Compare with ImPACT Online Scores in Non-Concussed Adolescent Athletes?” *Archives of Clinical Neuropsychology* 35 (3): 326–31. <https://doi.org/10.1093/ARCLIN/ACZ072>.

Elizabeth, Teel, Brossard-Racine Marie, Corbin-Berrigan Laurie Ann, and Gagnon Isabelle. 2020. “Perceptual Cognitive Training Does Not Improve Clinical Outcomes at 4 and 12 Weeks Following Concussion in Children and Adolescents: A Randomized Controlled Trial.” *The Journal of Head Trauma Rehabilitation*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33201041>.

Ellis, Michael J, and Kelly Russell. 2019. “The Potential of Telemedicine to Improve Pediatric Concussion Care in Rural and Remote Communities in Canada.” *Frontiers in Neurology* 10: 840. <https://doi.org/https://dx.doi.org/10.3389/fneur.2019.00840>.

Ellis, Michael J, W Alan C Mutch, Lawrence N Ryner, M Ruth Graham, Brenden Dufault, Brian Gregson, Thomas Hall, et al. 2016. “Brain Magnetic Resonance Imaging CO 2 Stress

Testing in Adolescent Postconcussion Syndrome.” *Journal of Neurosurgery* 125 (3): 648–60. <https://doi.org/10.3171/2015.6.JNS15972>.

Ellis, Michael J., Dean Cordingley, Richard Girardin, Lesley Ritchie, and Janine Johnston. 2017. “Migraine with Aura or Sports-Related Concussion: Case Report, Pathophysiology, and Multidisciplinary Approach to Management.” *Current Sports Medicine Reports* 16 (1): 14–18. <https://doi.org/10.1249/JSR.0000000000000323>.

Ellis, Michael J., Dean Cordingley, Sara Vis, Karen Reimer, Jeff Leiter, and Kelly Russell. 2015. “Vestibulo-Ocular Dysfunction in Pediatric Sports-Related Concussion.” *Journal of Neurosurgery: Pediatrics* 16 (3): 248–55. <https://doi.org/10.3171/2015.1.PEDS14524>.

Ellis, Michael J., Dean M. Cordingley, Sara Vis, Karen M. Reimer, Jeff Leiter, and Kelly Russell. 2017. “Clinical Predictors of Vestibulo-Ocular Dysfunction in Pediatric Sports-Related Concussion.” *Journal of Neurosurgery: Pediatrics* 19 (1): 38–45. <https://doi.org/10.3171/2016.7.PEDS16310>.

Ellis, Michael J., Lesley J. Ritchie, Mark Koltek, Shahid Hosain, Dean Cordingley, Stephanie Chu, Erin Selci, Jeff Leiter, and Kelly Russell. 2015. “Psychiatric Outcomes after Pediatric Sports-Related Concussion.” *Journal of Neurosurgery: Pediatrics* 16 (6): 709–18. <https://doi.org/10.3171/2015.5.PEDS15220>.

Ellis, Michael J., Susan Boles, Vickie Derksen, Brenda Dawyduk, Adam Amadu, Karen Stelmack, Matthew Kowalchuk, and Kelly Russell. 2019. “Evaluation of a Pilot Paediatric Concussion Telemedicine Programme for Northern Communities in Manitoba.” *International Journal of Circumpolar Health* 78 (1): 1573163. <https://doi.org/10.1080/22423982.2019.1573163>.

Ellis, Michael, Cameron Krisko, Erin Selci, Kelly Russell, Ellis Michael, Krisko Cameron, Selci Erin, and Russell Kelly. 2018. “Effect of Concussion History on Symptom Burden and Recovery Following Pediatric Sports-Related Concussion.” *Journal of Neurosurgery: Pediatrics* 21 (4): 401–8. <https://doi.org/10.3171/2017.9.PEDS17392>.

Emer, Ryan, Kelly Lynne, Stacey Catherine, Duff Eimear, Huggard Dean, Leonard Ann, Boran Gerard, et al. 2021. “Traumatic Brain Injury in Children: Glial Fibrillary Acidic Protein and Clinical Outcomes.” *Pediatric Emergency Care*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34469402>.

Emery Carolyn, Warriyar Kv Vineetha, Black Amanda M, Palacios-Derflinger Luz, Sick Stacy, Debert Chantel, Brooks Brian L, et al. 2021. “Factors Associated With Clinical Recovery After Concussion in Youth Ice Hockey Players.” *Orthopaedic Journal of Sports Medicine* 9 (5): 23259671211013370. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=pmnm&NEWS=N&AN=34017881>.

Emily, Evans, Cook Nathan E, Iverson Grant L, Townsend Elise L, and Duhaime Ann Christine. 2020. “Monitoring Outcome after Hospital-Presenting Milder Spectrum Pediatric Traumatic Brain Injury Using the Glasgow Outcome Scale-Extended, Pediatric Revision.” *Journal of Neurotrauma* 1636: 1627–36. <https://doi.org/10.1089/neu.2019.6893>.

Emily, Gladstone, Narad Megan E, Hussain Fadhil, Quatman-Yates Catherine C, Hugentobler Jason, Wade Shari L, Gubanich Paul J, and Kurowski Brad G. 2019. “Neurocognitive and

Quality of Life Improvements Associated With Aerobic Training for Individuals With Persistent Symptoms After Mild Traumatic Brain Injury: Secondary Outcome Analysis of a Pilot Randomized Clinical Trial.” *Frontiers in Neurology* 10 (September): 1–9.

<https://doi.org/10.3389/fneur.2019.01002>.

Ensie, Abbassi, and Sirmon-Taylor Bess. 2017. “Recovery Progression and Symptom Resolution in Sport-Related Mild Traumatic Brain Injury.” *Brain Injury* 31 (12): 1667–73.

<https://doi.org/10.1080/02699052.2017.1357834>.

Erik, Lamoureux, Ishikawa Takuro, Yeates Keith Owen, Brooks Brian L, Beauchamp Miriam H, Craig William, Gravel Jocelyn, Zemek Roger, Doan Quynh, and Pediatric Emergency Research Canada (PERC. 2021. “Convergent Validity of Myheartsmap: A Pediatric Psychosocial Health Screening Tool.” *Child Psychiatry and Human Development*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34350505>.

Erin, Hammer, Hetzel Scott, Pfaller Adam, and McGuine Tim. 2020. “Longitudinal Assessment of Depressive Symptoms After Sport-Related Concussion in a Cohort of High School Athletes.” *Sports Health*, 1941738120938010.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=32857687>.

Evans, Emily, Nathan E. Cook, Grant L. Iverson, Elise L. Townsend, and Ann Christine Duhaime. 2020. “Monitoring Outcome after Hospital-Presenting Milder Spectrum Pediatric Traumatic Brain Injury Using the Glasgow Outcome Scale-Extended, Pediatric Revision.” *Journal of Neurotrauma* 37 (14): 1627–36. <https://doi.org/10.1089/neu.2019.6893>.

Ewing-Cobbs, Linda, Charles S. Cox, Amy E. Clark, Richard Holubkov, and Heather T. Keenan. 2018. “Persistent Postconcussion Symptoms after Injury.” *Pediatrics* 142 (5).

<https://doi.org/10.1542/peds.2018-0939>.

Eyal, Cohen, Rodean Jonathan, Diong Christina, Hall Matt, Freedman Stephen B, Aronson Paul L, Simon Harold K, et al. 2019. “Low-Value Diagnostic Imaging Use in the Pediatric Emergency Department in the United States and Canada.” *JAMA Pediatrics* 173 (8).

<https://doi.org/10.1001/jamapediatrics.2019.1439>.

Fabri, Tracy L, Katherine E Wilson, Nicole Holland, Andrea Hickling, James Murphy, Philippe Fait, and Nick Reed. 2017. “Using a Dual-Task Protocol to Investigate Motor and Cognitive Performance in Healthy Children and Youth.” *Gait and Posture* 54: 154–59.

<https://doi.org/10.1016/j.gaitpost.2017.03.002>.

Fakhran, Saeed, Karl Yaeger, Michael Collins, and Lea Alhilali. 2014. “Sex Differences in White Matter Abnormalities after Mild Traumatic Brain Injury: Localization and Correlation with Outcome.” *Radiology* 272 (3): 815–23. <https://doi.org/10.1148/radiol.14132512>.

Faris, Gregory, Terri Byczkowski, Mona Ho, and Lynn Babcock. 2016. “Prediction of Persistent Postconcussion Symptoms in Youth Using a Neuroimaging Decision Rule.” *Academic Pediatrics* 16 (4): 336–42. <https://doi.org/10.1016/j.acap.2015.10.007>.

Fedorchak, Gregory, Aakanksha Rangnekar, Cayce Onks, Andrea C Loeffert, Jayson Loeffert, Robert P Olympia, Samantha DeVita, et al. 2021. “Saliva RNA Biomarkers Predict Concussion Duration and Detect Symptom Recovery: A Comparison with Balance and Cognitive Testing.” *Journal of Neurology* 268 (11): 4349–61. <https://doi.org/10.1007/s00415-021-10566-x>.

Fehr, Shayne D., Lindsay D. Nelson, Kyle R. Scharer, Elizabeth A. Traudt, Joshua M. Veenstra, Sergey S. Tarima, Xue Cheng Liu, Kevin D. Walter, et al. 2019. "Risk Factors for Prolonged Symptoms of Mild Traumatic Brain Injury: A Pediatric Sports Concussion Clinic Cohort." *Clinical Journal of Sport Medicine* 29 (1): 11–17.  
<https://doi.org/10.1097/JSM.0000000000000494>.

Fehr, Shayne D., Lindsay D. Nelson, Kyle R. Scharer, Elizabeth A. Traudt, Joshua M. Veenstra, Sergey S. Tarima, Xue-Cheng Liu, and Kevin D. Walter. 2019. "Risk Factors for Prolonged Symptoms of Mild Traumatic Brain Injury." *Clinical Journal of Sport Medicine* 29 (1): 11–17. <https://doi.org/10.1097/JSM.0000000000000494>.

Finch, Emma, Anna Copley, Petrea Cornwell, and Crystal Kelly. 2016. "Systematic Review of Behavioral Interventions Targeting Social Communication Difficulties After Traumatic Brain Injury." *Archives of Physical Medicine and Rehabilitation* 97 (8): 1352–65.  
<https://doi.org/10.1016/j.apmr.2015.11.005>.

Fino, Peter C. 2016. "A Preliminary Study of Longitudinal Differences in Local Dynamic Stability between Recently Concussed and Healthy Athletes during Single and Dual-Task Gait." *Journal of Biomechanics* 49 (9): 1983–88.  
<https://doi.org/10.1016/j.jbiomech.2016.05.004>.

Fino, Peter C., Maury A. Nussbaum, and Per Gunnar Brolinson. 2016. "Locomotor Deficits in Recently Concussed Athletes and Matched Controls during Single and Dual-Task Turning Gait: Preliminary Results." *Journal of NeuroEngineering and Rehabilitation* 13 (1): 1–15.  
<https://doi.org/10.1186/s12984-016-0177-y>.

Fischer Jesse, Cirino Paul T, DeMaster Dana, Alfano Candice, Bick Johanna, Fan Weihua, and Ewing-Cobbs Linda. 2020. "Frontostriatal White Matter Integrity Relations with 'Cool' and 'Hot' Self-Regulation after Pediatric Traumatic Brain Injury." *Journal of Neurotrauma*.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=32993456>.

Fleur, Lorton, Simon-Pimmel Jeanne, Masson Damien, Launay Elise, Gras-Le Guen Christele, and Scherdel Pauline. 2021. "Impact of Routine S100B Protein Assay on CT Scan Use in Children with Mild Traumatic Brain Injury." *Clinical Chemistry and Laboratory Medicine* 59 (5): 875–82.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=33554555>.

Fremont, Pierre, Kathryn Schneider, Anne Laroche, Carolyn Emery, and Keith Yeates. 2020. "Could a Massive Open Online Course Be Part of the Solution to Sport-Related Concussion? Participation and Impact among 8368 Registrants." *BMJ Open Sport and Exercise Medicine* 6 (1): 1–7. <https://doi.org/10.1136/bmjsem-2019-000700>.

Furman, Gabriel R., Chia Cheng Lin, Jennica L. Bellanca, Gregory F. Marchetti, Michael W. Collins, and Susan L. Whitney. 2013. "Comparison of the Balance Accelerometer Measure and Balance Error Scoring System in Adolescent Concussions in Sports." *American Journal of Sports Medicine* 41 (6): 1404–10. <https://doi.org/10.1177/0363546513484446>.

Gabbe, Belinda J, Caroline Brooks, Joanne C Demmler, Steven Macey, Melanie A Hyatt, and Ronan A Lyons. 2014b. "The Association between Hospitalisation for Childhood Head Injury and Academic Performance: Evidence from a Population e-Cohort Study." *Journal of*

Epidemiology and Community Health 68 (5): 466–70. <https://doi.org/10.1136/jech-2013-203427>.

Gabbe, Belinda J., Caroline Brooks, Joanne C. Demmler, Steven Macey, Melanie A. Hyatt, and Ronan A. Lyons. 2014a. “The Association between Hospitalisation for Childhood Head Injury and Academic Performance: Evidence from a Population e-Cohort Study.” *Journal of Epidemiology and Community Health* 68 (5): 466–70. <https://doi.org/10.1136/jech-2013-203427>.

Gagner, Charlotte, Carola Beatrice Tuerk, Louis De Beaumont, Annie Bernier, and Miriam Helen Beauchamp. 2020. “BDNF Val66Met Polymorphism and Internalizing Behaviors after Early Mild Traumatic Brain Injury.” *Journal of Neurotrauma*, June, neu.2019.6936. <https://doi.org/10.1089/neu.2019.6936>.

Gagnon, I., L. Grilli, D. Friedman, and G. L. Iverson. 2016. “A Pilot Study of Active Rehabilitation for Adolescents Who Are Slow to Recover from Sport-Related Concussion.” *Scandinavian Journal of Medicine & Science in Sports* 26 (3): 299–306. <https://doi.org/10.1111/sms.12441>.

Gagnon, Isabelle, Elizabeth Teel, Gerard Gioia, Mary Aglipay, Nick Barrowman, Maegan Sady, Christopher Vaughan, Roger Zemek, et al. 2020. “Parent-Child Agreement on Postconcussion Symptoms in the Acute Postinjury Period.” *Pediatrics* 146 (1): e20192317. <https://doi.org/10.1542/peds.2019-2317>.

Galetta, Kristin M., Jennifer Morganroth, Nicholas Moehringer, Bridget Mueller, Lisena Hasanaj, Nikki Webb, Courtney Civitano, et al. 2015. “Adding Vision to Concussion Testing: A Prospective Study of Sideline Testing in Youth and Collegiate Athletes.” *Journal of Neuro-Ophthalmology* 35 (3): 235–41. <https://doi.org/10.1097/WNO.0000000000000226>.

Gardner, Ryan M., Aaron Yengo-Kahn, Christopher M. Bonfield, and Gary S. Solomon. 2017. “Comparison of Baseline and Post-Concussion ImPACT Test Scores in Young Athletes with Stimulant-Treated and Untreated ADHD.” *Physician and Sportsmedicine* 1. Shi F, (1): 1–10. <https://doi.org/10.1080/00913847.2017.1248221>.

Genc, Sila, Vicki Anderson, Nicholas P. Ryan, Charles B. Malpas, Cathy Catroppa, Miriam H. Beauchamp, and Timothy J. Silk. 2017. “Recovery of White Matter Following Pediatric Traumatic Brain Injury Depends on Injury Severity.” *Journal of Neurotrauma* 34 (4): 798–806. <https://doi.org/10.1089/neu.2016.4584>.

Gesa, Cohrs, Huhndorf Monika, Niemczyk Nils, Volz Lukas J, Bernsmeier Alexander, Singhal Ash, Larsen Naomi, et al. 2018. “MRI in Mild Pediatric Traumatic Brain Injury: Diagnostic Overkill or Useful Tool?” *Child’s Nervous System* 34 (7): 1345–52. <https://doi.org/10.1007/s00381-018-3771-4>.

Gibson, Sarah, Lise E. Nigrovic, Michael O’Brien, and William P. Meehan. 2013. “The Effect of Recommending Cognitive Rest on Recovery from Sport-Related Concussion.” *Brain Injury* 27 (7–8): 839–42. <https://doi.org/10.3109/02699052.2013.775494>.

Gidley Larson, Jennifer C., Lloyd Flaro, Robin L. Peterson, Amy K. Connery, David A. Baker, and Michael W. Kirkwood. 2015. “The Medical Symptom Validity Test Measures Effort Not Ability in Children: A Comparison between Mild TBI and Fetal Alcohol Spectrum Disorder Samples.” *Archives of Clinical Neuropsychology* 1. Shi F, (3): 192–99. <https://doi.org/10.1093/arclin/acv012>.

- Gillie, Brandon L., Vanessa Fazio-Sumrok, Shawn R. Eagle, Nathan Kegel, Alicia M. Trbovich, Michael W. Collins, and Anthony P. Kontos. 2020. "Clinical Predictors of Post-Injury Anxiety in Adolescent Patients Following Concussion." *Applied Neuropsychology: Child* 0 (0): 1–7. <https://doi.org/10.1080/21622965.2020.1799790>.
- Gladstone, Emily, Megan E. Narad, Fadhil Hussain, Catherine C. Quatman-Yates, Jason Hugentobler, Shari L. Wade, Paul J. Gubanich, and Brad G. Kurowski. 2019. "Neurocognitive and Quality of Life Improvements Associated With Aerobic Training for Individuals With Persistent Symptoms After Mild Traumatic Brain Injury: Secondary Outcome Analysis of a Pilot Randomized Clinical Trial." *Frontiers in Neurology* 10 (September): 1–9. <https://doi.org/10.3389/fneur.2019.01002>.
- Goldstein, Laura. 2019. "The Role of Psychology in Pediatric Concussion." *Seminars in Pediatric Neurology* 30 (July): 79–82. <https://doi.org/10.1016/j.spn.2019.03.012>.
- Gorman, Matthew, Suzanne Hecht, Andrew Samborski, Scott Lunos, Steven Elias, and Steven D. Stovitz. 2017. "SCAT3 Assessment of Non-Head Injured and Head Injured Athletes Competing in a Large International Youth Soccer Tournament." *Applied Neuropsychology: Child* 1. Shi F, (4): 364–68. <https://doi.org/10.1080/21622965.2016.1210011>.
- Gornall, Alice, Michael Takagi, Cathriona Clarke, Franz E. Babl, Gavin A. Davis, Kevin Dunne, Nicholas Anderson, et al. 2019. "Behavioral and Emotional Difficulties after Pediatric Concussion." *Journal of Neurotrauma*, 1–26. <https://doi.org/10.1089/neu.2018.6235>.
- Grabowski, Patrick, John Wilson, Alyssa Walker, Dan Enz, and Sijian Wang. 2017a. "Multimodal Impairment-Based Physical Therapy for the Treatment of Patients with Post-Concussion Syndrome: A Retrospective Analysis on Safety and Feasibility." *Physical Therapy in Sport* 23: 22–30. <https://doi.org/10.1016/j.ptsp.2016.06.001>.
- Gravel, Jocelyn, Kathy Boutis, Ken Tang, Miriam H. Beauchamp, Stephen B. Freedman, Alexander Sasha Dubrovsky, Isabelle Gagnon, et al. 2019. "Association between Ondansetron Use and Symptom Persistence in Children with Concussions: A 5P Substudy." *Canadian Journal of Emergency Medicine* 21 (2): 204–10. <https://doi.org/10.1017/cem.2018.384>.
- Graves, Janessa M., Megan Moore, Leanne Kehoe, Matthew Li, Anissa Chan, Kelsey Conrick, Wendy Williams-Gilbert, and Monica S. Vavilala. 2020. "Family Hardship Following Youth Concussion: Beyond the Medical Bills." *Journal of Pediatric Nursing* 51 (March): 15–20. <https://doi.org/10.1016/j.pedn.2019.11.016>.
- Green, Cassie M, John W Kirk, Amy K Connery, David A Baker, and Michael W Kirkwood. 2014. "The Use of the Rey 15-Item Test and Recognition Trial to Evaluate Noncredible Effort after Pediatric Mild Traumatic Brain Injury." *Journal of Clinical and Experimental Neuropsychology* 36 (3): 261–67. <https://doi.org/10.1080/13803395.2013.879096>.
- Green, Stephanie L, Michelle L. Keightley, Nancy J. Lobaugh, Deirdre R. Dawson, and Alex Mihailidis. 2018b. "Changes in Working Memory Performance in Youth Following Concussion." *Brain Injury* 32 (2): 182–90. <https://doi.org/10.1080/02699052.2017.1358396>.
- Green, Stephanie L., Michelle L. Keightley, Nancy J. Lobaugh, Deirdre R. Dawson, and Alex Mihailidis. 2018a. "Changes in Working Memory Performance in Youth Following Concussion." *Brain Injury* 32 (2): 182–90. <https://doi.org/10.1080/02699052.2017.1358396>.

Gregory, Fedorchak, Rangnekar Aakanksha, Onks Cayce, Loeffert Andrea C, Loeffert Jayson, Olympia Robert P, DeVita Samantha, et al. 2021. “Saliva RNA Biomarkers Predict Concussion Duration and Detect Symptom Recovery: A Comparison with Balance and Cognitive Testing.” *Journal of Neurology* 268 (11): 4349–61. <https://doi.org/10.1007/s00415-021-10566-x>.

Gregory, Knell, Caze Todd, and Burkhart Scott O. 2021. “Evaluation of the Vestibular and Ocular Motor Screening (VOMS) as a Prognostic Tool for Protracted Recovery Following Paediatric Sports-Related Concussion.” *BMJ Open Sport & Exercise Medicine* 7 (1): e000970. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=pmnm&NEWS=N&AN=33868706>.

Grool, Anne M., Mary Aglipay, Franco Momoli, William P. Meehan, Stephen B. Freedman, Keith Owen Yeates, Jocelyn Gravel, et al. 2016a. “Association Between Early Participation in Physical Activity Following Acute Concussion and Persistent Postconcussive Symptoms in Children and Adolescents.” *Jama* 316 (23): 2504. <https://doi.org/10.1001/jama.2016.17396>.

Grubenhoff, J. A., S. J. Deakyne, L. Brou, L. Bajaj, R. D. Comstock, and M. W. Kirkwood. 2014. “Acute Concussion Symptom Severity and Delayed Symptom Resolution.” *Pediatrics* 134 (1): 54–62. <https://doi.org/10.1542/peds.2013-2988>.

Grubenhoff, Joseph A., Dustin Currie, R. Dawn Comstock, Elizabeth Juarez-Colunga, Lalit Bajaj, and Michael W. Kirkwood. 2016. “Psychological Factors Associated with Delayed Symptom Resolution in Children with Concussion.” *The Journal of Pediatrics* 174 (303): 27–32.e1. <https://doi.org/10.1016/j.jpeds.2016.03.027>.

Guberman Guido, Houde Jean Christophe, Ptito Alain, Gagnon Isabelle, and Descoteaux Maxime. 2020. “Structural Abnormalities in Thalamo-Prefrontal Tracks Revealed by High Angular Resolution Diffusion Imaging Predict Working Memory Scores in Concussed Children.” *Brain Structure and Function* 225 (1): 441–59. <https://doi.org/10.1007/s00429-019-02002-8>.

Guberman, Guido I., Jean Christophe Houde, Alain Ptito, Isabelle Gagnon, and Maxime Descoteaux. 2020. “Structural Abnormalities in Thalamo-Prefrontal Tracks Revealed by High Angular Resolution Diffusion Imaging Predict Working Memory Scores in Concussed Children.” *Brain Structure and Function* 225 (1): 441–59. <https://doi.org/10.1007/s00429-019-02002-8>.

Guo, X., S.L. Edmed, and V. Anderson. 2017. “Neurocognitive Predictors of Posttraumatic Stress Disorder Symptoms in Children 6 Months after Traumatic Brain Injury: A Prospective Study.” *Neuropsychology* 31 (1): 84–92. <https://doi.org/http://dx.doi.org/10.1037/neu0000305>.

Guo, Xiaoyuan, Shannon L. Edmed, Vicki Anderson, and Justin Kenardy. 2017. “Neurocognitive Predictors of Posttraumatic Stress Disorder Symptoms in Children 6 Months after Traumatic Brain Injury: A Prospective Study.” *Neuropsychology* 31 (1): 84–92. <https://doi.org/10.1037/neu0000305>.

Gutierrez, Gregory M., Catherine Conte, and Kristian Lightbourne. 2014. “The Relationship between Impact Force, Neck Strength, and Neurocognitive Performance in Soccer Heading in Adolescent Females.” *Pediatric Exercise Science* 26 (1): 33–40. <https://doi.org/10.1123/pes.2013-0102>.

Haarbauer-Krupa, Juliet K., R. Dawn Comstock, Michael Lionbarger, Shawn Hirsch, Andrew Kavee, and Brooks Lowe. 2018. “Healthcare Professional Involvement and RTP Compliance

in High School Athletes with Concussion.” *Brain Injury* 32 (11): 1337–44.  
<https://doi.org/10.1080/02699052.2018.1482426>.

Haider, Mohammad N., Phillip R. Worts, Kaitlin B. Viera, Brendan Villarrubia, Charles G. Wilber, Barry S. Willer, and John J. Leddy. 2020. “Postexercise Slowing on the King-Devick Test and Longer Recovery From Sport-Related Concussion in Adolescents: A Validation Study.” *Journal of Athletic Training* 55 (5): 482–87. <https://doi.org/10.4085/1062-6050-264-19>.

Haider, Mohammad Nadir, John J. Leddy, Sonja Pavlesen, Melissa Kluczynski, John G. Baker, Jeffrey C. Miecznikowski, and Barry S. Willer. 2018. “A Systematic Review of Criteria Used to Define Recovery from Sport-Related Concussion in Youth Athletes.” *British Journal of Sports Medicine* 52 (18): 1179–90. <https://doi.org/10.1136/bjsports-2016-096551>.

Hanem, Ellethy, Chandra Shekhar S, and Nasrallah Fatima A. 2021. “The Detection of Mild Traumatic Brain Injury in Paediatrics Using Artificial Neural Networks.” *Computers in Biology and Medicine* 135: 104614.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=34229143>.

Hang, Brian, Lynn Babcock, Richard Hornung, Mona Ho, and Wendy J Pomerantz. 2015. “Can Computerized Neuropsychological Testing in the Emergency Department Predict Recovery for Young Athletes with Concussions?” *Pediatric Emergency Care* 31 (10): 688–93.  
<https://doi.org/10.1097/PEC.0000000000000438>.

Hansen, Colby, Dan Cushman, Nicholas Anderson, Wei Chen, Christine Cheng, Shirley D. Hon, and Man Hung. 2016. “A Normative Dataset of the Balance Error Scoring System in Children Aged between 5 and 14.” *Clinical Journal of Sport Medicine* 26 (6): 497–501.  
<https://doi.org/10.1097/JSM.0000000000000285>.

Hansen, Colby, Dan Cushman, Wei Chen, Jerry Bounsanga, and Man Hung. 2017. “Reliability Testing of the Balance Error Scoring System in Children between the Ages of 5 and 14.” *Clinical Journal of Sport Medicine* 27 (1): 64–68.  
<https://doi.org/10.1097/JSM.0000000000000293>.

Health, Child, Diagnostic Imaging, Health Sciences, Centre Children, Pan Am Clinic, Canada North, Concussion Network, et al. 2015. “Neuroimaging Findings in Pediatric Sports-Related Concussion.” *Journal of Neurosurgery. Pediatrics* 16 (September): 241–47.  
<https://doi.org/10.3171/2015.1.PEDS14510.disclosure>.

Hearps, Stephen J.C., Michael Takagi, Franz E. Babl, Silvia Bressan, Katherine Truss, Gavin A. Davis, Celia Godfrey, et al. 2017. “Validation of a Score to Determine Time to Postconcussive Recovery.” *Pediatrics* 139 (2): e20162003. <https://doi.org/10.1542/peds.2016-2003>.

Henry, Luke C, Rj Elbin, Michael W Collins, Gregory Marchetti, and Anthony P Kontos. 2016. “Examining Recovery Trajectories Following Sport-Related Concussion Using a Multimodal Clinical Assessment Approach.” *Neurosurgery* 78 (2): 232–41.  
<https://doi.org/10.1227/NEU.0000000000001041>.

Heyer, Geoffrey L, and Syed A Idris. 2014. “Does Analgesic Overuse Contribute to Chronic Post-Traumatic Headaches in Adolescent Concussion Patients?” *Pediatric Neurology* 50 (5): 464–68. <https://doi.org/10.1016/j.pediatrneurol.2014.01.040>.

- Heyer, Geoffrey L, Julie A Young, and Anastasia N Fischer. 2017. "Lightheadedness After Concussion: Not All Dizziness Is Vertigo." *Clinical Journal of Sport Medicine* 0 (0). <https://doi.org/10.1097/JSM.0000000000000445>.
- Heyer, Geoffrey L., Caroline E. Schaffer, Sean C. Rose, Julie A. Young, Kelly A. McNally, and Anastasia N. Fischer. 2016. "Specific Factors Influence Postconcussion Symptom Duration among Youth Referred to a Sports Concussion Clinic." *Journal of Pediatrics* 174: 33-38.e2. <https://doi.org/10.1016/j.jpeds.2016.03.014>.
- Heyer, Geoffrey L., Julie A. Young, Sean C. Rose, Kelly A. McNally, and Anastasia N. Fischer. 2015. "Post-Traumatic Headaches Correlate with Migraine Symptoms in Youth with Concussion." *Cephalalgia* 36 (4): 309–16. <https://doi.org/10.1177/0333102415590240>.
- Heyworth, Benton E., Kaitlin M. Carroll, Andrew J. Rizza, Kelly C. McInnis, and Thomas J. Gill. 2014a. "Treatment of Concussion in High School Athletes: A Proposed Protocol for Athletic and Academic Return to Activity." *Orthopaedic Journal of Sports Medicine* 2 (7): 2015. <https://doi.org/10.1177/2325967114S00079>.
- Higgins, Kathryn L., Robert L. Denney, and Arthur Maerlender. 2017. "Sandbagging on the Immediate Post-Concussion Assessment and Cognitive Testing (Impact) in a High School Athlete Population." *Archives of Clinical Neuropsychology* 1. Shi F, (3): 259–66. <https://doi.org/10.1093/arclin/acw108>.
- Ho, Rachelle A., Geoffrey B. Hall, Michael D. Noseworthy, and Carol DeMatteo. 2020. "Post-Concussive Depression: Evaluating Depressive Symptoms Following Concussion in Adolescents and Its Effects on Executive Function." *Brain Injury* 34 (4): 520–27. <https://doi.org/10.1080/02699052.2020.1725841>.
- Holmes, Acacia, Zhongxue Chen, Lilian Yahng, David Fletcher, and Keisuke Kawata. 2020. "Return to Learn: Academic Effects of Concussion in High School and College Student-Athletes." *Frontiers in Pediatrics* 8 (March). <https://doi.org/10.3389/fped.2020.00057>.
- Hon, Kam Lun, Alexander K.C. Leung, and Alcy R. Torres. 2019. "Concussion: A Global Perspective." *Seminars in Pediatric Neurology* 30 (July): 117–27. <https://doi.org/10.1016/j.spen.2019.03.017>.
- Houston, Megan N., R. Curtis Bay, and Tamara C. Valovich McLeod. 2016. "The Relationship between Post-Injury Measures of Cognition, Balance, Symptom Reports and Health-Related Quality-of-Life in Adolescent Athletes with Concussion." *Brain Injury* 30 (7): 891–98. <https://doi.org/10.3109/02699052.2016.1146960>.
- Howell, David R, Benjamin J Shore, Emily Hanson, and William P Meehan. 2016. "Evaluation of Postural Stability in Youth Athletes: The Relationship between Two Rating Systems." *Physician and Sportsmedicine* 44 (3): 304–10. <https://doi.org/10.1080/00913847.2016.1197763>.
- Howell, David R, Emily Hanson, Dai Sugimoto, Andrea Straccioli, and William P Meehan. 2017. "Assessment of the Postural Stability of Female and Male Athletes." *Clinical Journal of Sport Medicine* 27 (5): 444–49. <https://doi.org/10.1097/JSM.0000000000000374>.
- Howell, David R, Michael Beasley, Lisa Vopat, and William P Meehan. 2017. "The Effect of Prior Concussion History on Dual-Task Gait Following a Concussion." *Journal of Neurotrauma* 34 (4): 838–44. <https://doi.org/10.1089/neu.2016.4609>.

- Howell, David R, Michael J O'Brien, Michael A Beasley, Rebekah C Mannix, and William P Meehan. 2017. "Symptom Duration Following Concussion in Adolescents" 105 (9). <https://doi.org/10.1111/apa.13486>.Initial.
- Howell, David R, Michael J O'Brien, Aparna Raghuram, Ankoor S Shah, and William P Meehan. 2017. "Near Point of Convergence and Gait Deficits in Adolescents After Sport-Related Concussion." *Clinical Journal of Sport Medicine* 0 (0). <https://doi.org/10.1097/JSM.0000000000000439>.
- Howell, David R., Andrea Stracciolini, Ellen Geminiani, and William P. Meehan. 2017. "Dual-Task Gait Differences in Female and Male Adolescents Following Sport-Related Concussion." *Gait and Posture* 54 (November 2016): 284–89. <https://doi.org/10.1016/j.gaitpost.2017.03.034>.
- Howell, David R., Anna Brilliant, Brant Berkstresser, Francis Wang, Joana Fraser, and William P. Meehan. 2017. "The Association between Dual-Task Gait after Concussion and Prolonged Symptom Duration." *Journal of Neurotrauma* 34 (23): 3288–94. <https://doi.org/10.1089/neu.2017.5191>.
- Howell, David R., Anna N. Brilliant, Eileen P. Storey, Olivia E. Podolak, William P. Meehan, and Christina L. Master. 2018. "Objective Eye Tracking Deficits Following Concussion for Youth Seen in a Sports Medicine Setting." *Journal of Child Neurology* 33 (12): 794–800. <https://doi.org/10.1177/0883073818789320>.
- Howell, David R., Gregory D. Myer, Dustin Grooms, Jed Diekfuss, Weihong Yuan, and William P. Meehan. 2019. "Examining Motor Tasks of Differing Complexity After Concussion in Adolescents." *Archives of Physical Medicine and Rehabilitation* 100 (4): 613–19. <https://doi.org/10.1016/j.apmr.2018.07.441>.
- Howell, David R., Jessie R. Oldham, Anna N. Brilliant, and William P. Meehan. 2019. "Trouble Falling Asleep After Concussion Is Associated With Higher Symptom Burden Among Children and Adolescents." *Journal of Child Neurology* 34 (5): 256–61. <https://doi.org/10.1177/0883073818824000>.
- Howell, David R., Julie C. Wilson, Michael W. Kirkwood, and Joseph A. Grubenhoff. 2019. "Quality of Life and Symptom Burden 1 Month After Concussion in Children and Adolescents." *Clinical Pediatrics* 58 (1): 42–49. <https://doi.org/10.1177/0009922818806308>.
- Howell, David R., Louis R. Osternig, and Li Shan Chou. 2013. "Dual-Task Effect on Gait Balance Control in Adolescents with Concussion." *Archives of Physical Medicine and Rehabilitation* 94 (8): 1513–20. <https://doi.org/10.1016/j.apmr.2013.04.015>.
- Howell, David R., Louis R. Osternig, Anita D. Christie, and Li Shan Chou. 2016. "Return to Physical Activity Timing and Dual-Task Gait Stability Are Associated 2 Months Following Concussion." *Journal of Head Trauma Rehabilitation* 31 (4): 262–68. <https://doi.org/10.1097/HTR.0000000000000176>.
- Howell, David R., Louis R. Osternig, Michael C. Koester, and Li Shan Chou. 2014. "The Effect of Cognitive Task Complexity on Gait Stability in Adolescents Following Concussion." *Experimental Brain Research* 232 (6): 1773–82. <https://doi.org/10.1007/s00221-014-3869-1>.
- Howell, David R., Michael J. O'Brien, Aparna Raghuram, Ankoor S. Shah, and William P. Meehan. 2018. "Near Point of Convergence and Gait Deficits in Adolescents after Sport-

Related Concussion.” *Clinical Journal of Sport Medicine* 28 (3): 262–67.

<https://doi.org/10.1097/JSM.0000000000000439>.

Howell, David R., Michael J. O’Brien, Joana Fraser, and William P. Meehan. 2018. “Continuing Play, Symptom Severity, and Symptom Duration After Concussion in Youth Athletes.” *Clinical Journal of Sport Medicine* 0 (0): 1.

<https://doi.org/10.1097/jsm.0000000000000570>.

Howell, David R., Rebekah C. Mannix, Bridget Quinn, J. Andrew Taylor, Can Ozan Tan, and William P. Meehan. 2015. “Physical Activity Level and Symptom Duration Are Not Associated after Concussion.” *American Journal of Sports Medicine* 44 (4): 1040–46.

<https://doi.org/10.1177/0363546515625045>.

Howell, David R., Vipul Lugade, Morgan N. Potter, Gregory Walker, and Julie C. Wilson. 2019. “A Multifaceted and Clinically Viable Paradigm to Quantify Postural Control Impairments among Adolescents with Concussion.” *Physiological Measurement* 40 (8): 084006. <https://doi.org/10.1088/1361-6579/ab3552>.

HOWELL, DAVID, LOUIS OSTERNIG, PAUL VAN DONKELAAR, ULRICH MAYR, and LI-SHAN CHOU. 2013. “Effects of Concussion on Attention and Executive Function in Adolescents.” *Medicine & Science in Sports & Exercise* 45 (6): 1030–37.

<https://doi.org/10.1249/MSS.0b013e3182814595>.

Hubley, Sam, Sarah B Lynch, Christopher Schneck, Marshall Thomas, and Jay Shore. 2016. “Review of Key Telepsychiatry Outcomes.” *World Journal of Psychiatry* 6 (2): 269–82.

<https://doi.org/https://dx.doi.org/10.5498/wjp.v6.i2.269>.

Hugentobler, Jason A., Resmi Gupta, Robert Slater, Mark V. Paterno, Michael A. Riley, and Catherine Quatman-Yates. 2016. “Influence of Age on Postconcussive Postural Control Measures and Future Implications for Assessment.” *Clinical Journal of Sport Medicine* 26 (6): 510–17.

<https://doi.org/10.1097/JSM.0000000000000286>.

Hunt, Anne Williams, Melissa Paniccia, Nick Reed, and Michelle Keightley. 2016. “Concussion-Like Symptoms in Child and Youth Athletes at Baseline: What Is ‘Typical’?” *Journal of Athletic Training* 51 (10): 749–57. <https://doi.org/10.4085/1062-6050-51.11.12>.

Irene, Renaud M, Lambregts Suzanne A.M, van de Port Ingrid G.L, Catsman-Berrevoets Coriene E, and van Heugten Caroline M. 2020. “Predictors of Activities and Participation Six Months after Mild Traumatic Brain Injury in Children and Adolescents.” *European Journal of Paediatric Neurology : EJPN : Official Journal of the European Paediatric Neurology Society* 25: 145–56.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=med17&NEWS=N&AN=31831269>.

Irene, Renaud M, van de Port Ingrid G.L, Catsman-Berrevoets Coriene E, Jellema Korne, Lambregts Suzanne A.M, and van Heugten Caroline M. 2020. “Activities and Participation in the First 6 Months After Mild Traumatic Brain Injury in Children and Adolescents.” *The Journal of Head Trauma Rehabilitation* 35 (6): E501–12.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=32472841>.

Iverson, Grant L, Noah D Silverberg, Rebekah Mannix, Bruce A Maxwell, Joseph E Atkins, Ross Zafonte, and Paul D Berkner. 2015. “Factors Associated with Concussion-like Symptom

Reporting in High School Athletes.” JAMA Pediatrics 169 (12): 1132–40.  
<https://doi.org/10.1001/jamapediatrics.2015.2374>.

Iverson, Grant L, Payton J Jones, Justin E Karr, Bruce Maxwell, Ross Zafonte, Paul D Berkner, Richard J McNally, et al. 2021. “Network Structure of Physical, Cognitive, and Emotional Symptoms at Preseason Baseline in Student Athletes with Attention-Deficit/Hyperactivity Disorder.” Archives of Clinical Neuropsychology 35 (7): 1109–22.  
<https://doi.org/10.1093/ARCLIN/ACAA030>.

Iverson, Grant L., Joseph E. Atkins, Ross Zafonte, and Paul D. Berkner. 2016. “Concussion History in Adolescent Athletes with Attention-Deficit Hyperactivity Disorder.” Journal of Neurotrauma 33 (23): 2077–80. <https://doi.org/10.1089/neu.2014.3424>.

Iverson, Grant L., Payton J. Jones, Justin E. Karr, Bruce Maxwell, Ross Zafonte, Paul D. Berkner, and Richard J. McNally. 2020. “Architecture of Physical, Cognitive, and Emotional Symptoms at Preseason Baseline in Adolescent Student Athletes With a History of Mental Health Problems.” Frontiers in Neurology 11 (March).  
<https://doi.org/10.3389/fneur.2020.00175>.

Iyer, Kartik K., Andrew Zalesky, Karen M. Barlow, and Luca Cocchi. 2019. “Default Mode Network Anatomy and Function Is Linked to Pediatric Concussion Recovery.” Annals of Clinical and Translational Neurology 6 (12): 2544–54. <https://doi.org/10.1002/acn3.50951>.

Iyer, Kartik K., Andrew Zalesky, Luca Cocchi, and Karen M. Barlow. 2020. “Neural Correlates of Sleep Recovery Following Melatonin Treatment for Pediatric Concussion: A Randomized Controlled Trial.” Journal of Neurotrauma 37 (24): 2647–55.  
<https://doi.org/10.1089/neu.2020.7200>.

Iyer, Kartik K., Karen M. Barlow, Brian Brooks, Zahra Ofoghi, Andrew Zalesky, and Luca Cocchi. 2019. “Relating Brain Connectivity with Persistent Symptoms in Pediatric Concussion.” Annals of Clinical and Translational Neurology 6 (5): 954–61.  
<https://doi.org/10.1002/acn3.764>.

Jacqueline, van Ierssel, Osmond Martin, Hamid Jemila, Sampson Margaret, and Zemek Roger. 2020. “What Is the Risk of Recurrent Concussion in Children and Adolescents Aged 5-18 Years? A Systematic Review and Meta-Analysis.” British Journal of Sports Medicine.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33077482>.

Jacque, van Ierssel, Ledoux Andree Anne, Tang Ken, Correll Rhonda, Yeates Keith Owen, Gioia Gerald, Freedman Stephen B, et al. 2020. “Symptom Burden, School Function, and Physical Activity One Year Following Pediatric Concussion.” The Journal of Pediatrics.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=32858032>.

Jennifer, Bogner, Brenner Lisa, Malec James, Yumul Joy Noelle, McKinlay Audrey, Than Martin, Anderson Vicki, et al. 2020. “Concussive Symptoms Following Pediatric Mild Traumatic Brain Injury.” Journal of Head Trauma Rehabilitation 35 (4): 279–87.  
<https://doi.org/10.1097/HTR.0000000000000565>.

Jenny, Bellerose, Bernier Annie, Beaudoin Cindy, Gravel Jocelyn, and Beauchamp Miriam H. 2017. “Long-Term Brain-Injury-Specific Effects Following Preschool Mild TBI: A Study of Theory of Mind.” Neuropsychology 31 (3): 229–41. <https://doi.org/10.1037/neu0000341>.

- Jérôme, Gauvin-Lepage, Friedman Debbie, Grilli Lisa, Sufrategui Maria, De Matteo Carol, Iverson Grant L, Gagnon Isabelle, et al. 2018. "Effectiveness of an Exercise-Based Active Rehabilitation Intervention for Youth Who Are Slow to Recover After Concussion." *Clinical Journal of Sport Medicine* 00 (00): 1. <https://doi.org/10.1097/jsm.0000000000000634>.
- Jerry, Hsu, Stec Magdalena, Ranaivo Hantamalala Ralay, Srdanovic Nina, and Kurup Sudhi P. 2020. "Concussion Alters Dynamic Pupillary Light Responses in Children." *Journal of Child Neurology*, 883073820964040. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33059540>.
- Jessica, Wallace, Moran Ryan, Beidler Erica, Allister Deitrick Jamie, Shina James, and Covassin Tracey. 2020. "Disparities on Baseline Performance Using Neurocognitive and Oculomotor Clinical Measures of Concussion." *The American Journal of Sports Medicine* 48 (11): 2774–82. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=32804545>.
- Jessica, Watson, Brown Colin, Hirst Rayna B, Thompson Ryan C, Jessica Watson, Colin Brown, Rayna B Hirst, and Ryan C Thompson. 2020. "Commonality in Abnormality: 'Abnormal' Neuropsychological Scores Are Common in Baseline Testing of Youth Athletes." *Archives of Clinical Neuropsychology* 35 (5): 469–81. <https://doi.org/10.1093/arclin/acia015>.
- Jill, Daugherty, DePadilla Lara, and Sarmiento Kelly. 2020. "Assessment of HEADS UP Online Training as an Educational Intervention for Sports Officials/Athletic Trainers." *Journal of Safety Research* 74: 133–41. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem6&NEWS=N&AN=32951774>.
- Jimenez, Nathalia, Alex Quistberg, Monica S. Vavilala, Kenneth M. Jaffe, and Frederick P. Rivara. 2017. "Utilization of Mental Health Services after Mild Pediatric Traumatic Brain Injury." *Pediatrics* 139 (3). <https://doi.org/10.1542/peds.2016-2462>.
- Jingzhen, Yang, Xu Menglin, Sullivan Lindsay, Taylor H Gerry, and Yeates Keith Owen. 2020. "Bidirectional Association Between Daily Physical Activity and Postconcussion Symptoms Among Youth." *JAMA Network Open* 3 (11): e2027486. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=33201231>.
- Jocelyn, Gravel, Ledoux Andrée Ann, Tang Ken, Yeates Keith Owens, Craig William, Osmond Martin, Boutis Kathy, et al. 2020. "Early versus Delayed Emergency Department Presentation Following Mild Traumatic Brain Injury and the Presence of Symptom at 1, 4 and 12 Weeks in Children." *Emergency Medicine Journal* 37 (6): 338–43. <https://doi.org/10.1136/emmermed-2019-209054>.
- John, Leddy, Lesh Kevin, Haider Mohammad N, Czuczman Natalie, Baker John G, Miecznikowski Jeffrey, and Willer Barry. 2021. "Derivation of a Focused, Brief Concussion Physical Examination for Adolescents With Sport-Related Concussion." *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine* 31 (1): 7–14. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=30418219>.

Jones, Kelly M., Nicola J. Starkey, Alice Theadom, Alina Gheorghe, Dawn Willix-Payne, Philip Prah, and Valery L. Feigin. 2018. "Parent and Child Ratings of Child Behaviour Following Mild Traumatic Brain Injury." *Brain Injury* 32 (11): 1397–1404. <https://doi.org/10.1080/02699052.2018.1496477>.

Jones, Kelly M., Philip Prah, Nicola Starkey, Alice Theadom, Suzanne Barker-Collo, Shanthi Ameratunga, Valery L. Feigin, et al. 2019. "Longitudinal Patterns of Behavior, Cognition, and Quality of Life after Mild Traumatic Brain Injury in Children: BIONIC Study Findings." *Brain Injury* 33 (7): 884–93. <https://doi.org/10.1080/02699052.2019.1606445>.

Jones, Kelly M., Suzanne Barker-Collo, Priya Parmar, Nicola Starkey, Alice Theadom, Shanthi Ameratunga, and Valery L. Feigin. 2018. "Trajectories in Health Recovery in the 12 Months Following a Mild Traumatic Brain Injury in Children: Findings from the BIONIC Study." *Journal of Primary Health Care* 10 (1): 81–89. <https://doi.org/10.1071/HC17038>.

Joshua, Kamins, Richards Rachel, Barney Bradley J, Locandro Christopher, Pacchia Christina F, Charles Andrew C, Cook Lawrence J, Gioia Gerard, Giza Christopher C, and Blume Heidi K. 2021. "Evaluation of Posttraumatic Headache Phenotype and Recovery Time After Youth Concussion." *JAMA Network Open* 4 (3): e211312. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=med18&NEWS=N&AN=33683335>.

Juengst, B, Maria Kajankova, Brittany Wright, and Lauren Terhorst. 2020. "Factor Analysis of the Adolescent Version of the Behavioural Assessment Screening Tool (BAST-A) in Adolescents with Concussion." *Brain Injury*, no. bra, 8710358 PG-1-8: 1–8. NS -.

K, Greenberg Jacob, Yan Yan, Carpenter Christopher R, Lumba-Brown Angela, Keller Martin S, Pineda Jose A, Brownson Ross C, et al. 2018. "Development of the CIDSS2 Score for Children with Mild Head Trauma without Intracranial Injury." *Journal of Neurotrauma* 35 (22): 2699–2707. <https://doi.org/10.1089/neu.2017.5324>.

K, Haarbauer-Krupa Juliet, Register-Mihalik Johna K, Nedimyer Aliza K, Chandran Avinash, Kay Melissa C, Gildner Paula, and Kerr Zachary Y. 2021. "Factors Associated with Concussion Symptom Knowledge and Attitudes towards Concussion Care-Seeking among Parents of Children Aged 5-10years." *Journal of Safety Research* 78: 203–9. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=34399916>.

K, Iyer Kartik, Zalesky Andrew, Barlow Karen M, and Cocchi Luca. 2019. "Default Mode Network Anatomy and Function Is Linked to Pediatric Concussion Recovery." *Annals of Clinical and Translational Neurology* 6 (12): 2544–54. <https://doi.org/10.1002/acn3.50951>.

K, Iyer Kartik, Zalesky Andrew, Cocchi Luca, and Barlow Karen M. 2020. "Neural Correlates of Sleep Recovery Following Melatonin Treatment for Pediatric Concussion: A Randomized Controlled Trial." *Journal of Neurotrauma*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=32772826>.

K, Martin Alexia, Petersen Ashley J, Sesma Heather W, Koolmo Mary B, Ingram Katherine M, Slifko Katie B, Nguyen Victoria N, Doss Robert C, and Linabery Amy M. 2020. "Concussion Symptomology and Recovery in Children and Adolescents with Pre-Existing Anxiety." *Journal of Neurology, Neurosurgery and Psychiatry* 91 (10): 1060–66. <https://doi.org/10.1136/jnnp-2020-323137>.

- K, Purcell Laura, Davis Gavin A, and Gioia Gerard A. 2019. “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* 53 (4): 250. <https://doi.org/10.1136/bjsports-2017-097853>.
- K, Satchell Emma, Friedman Seth D, Bompadre Viviana, Poliakov Andrew, Oron Assaf, and Jinguji Thomas M. 2019. “Use of Diffusion Tensor Imaging in the Evaluation of Pediatric Concussions.” *Musculoskeletal Science and Practice* 42 (May): 162–65. <https://doi.org/10.1016/j.msksp.2019.05.002>.
- Kaldoja, Mari Liis, and Anneli Kolk. 2015. “Does Gender Matter? Differences in Social-Emotional Behavior among Infants and Toddlers before and after Mild Traumatic Brain Injury: A Preliminary Study.” *Journal of Child Neurology* 30 (7): 860–67. <https://doi.org/10.1177/0883073814544705>.
- Kaldoja, Mari-Liis, and Anneli Kolk. 2015a. “Does Gender Matter? Differences in Social-Emotional Behavior Among Infants and Toddlers Before and After Mild Traumatic Brain Injury.” *Journal of Child Neurology* 30 (7): 860–67. <https://doi.org/10.1177/0883073814544705>.
- Kanani, Anand Nitin, Stuart Hartshorn, Kanani Anand Nitin, and Hartshorn Stuart. 2018. “Resumption of Physical Activity within 7 Days of a Concussion Was Associated with Lower Rates of Persistent Postconcussive Symptoms (PPCS).” *Archives of Disease in Childhood: Education and Practice Edition* 103 (2): 110. <https://doi.org/10.1136/archdischild-2017-313141>.
- Kaori, Tamura, Furutani Troy, Oshiro Ross, Oba Yukiya, Ling Ayaka, and Murata Nathan. 2020. “Concussion Recovery Timeline of High School Athletes Using a Stepwise Return-to-Play Protocol: Age and Sex Effects.” *Journal of Athletic Training* 55 (1): 6–10. <https://doi.org/10.4085/1062-6050-452-18>.
- Kathy, Boutis, Gravel Jocelyn, Freedman Stephen B, Craig William, Tang Ken, DeMatteo Carol A, Dubrovsky Alexander Sasha, et al. 2018. “The Diagnosis of Concussion in Pediatric Emergency Departments: A Prospective Multicenter Study.” *Journal of Emergency Medicine* 54 (6): 757–65. <https://doi.org/10.1016/j.jemermed.2018.02.041>.
- Kazl, Cassandra, and Alcy Torres. 2019. “Definition, Classification, and Epidemiology of Concussion.” *Seminars in Pediatric Neurology* 30 (July): 9–13. <https://doi.org/10.1016/j.spen.2019.03.003>.
- Keenan Heather, Clark Amy E, Holubkov Richard, Cox Charles S Jr, and Ewing-Cobbs Linda. 2021. “Trajectories of Children’s Executive Function After Traumatic Brain Injury.” *JAMA Network Open* 4 (3): e212624. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=33739432>.
- Keenan, Ryan P., Kathleen Lovanio, Garry Lapidus, Danielle Chenard, and Sharon Smith. 2020. “Improved Concussion Discharge Instructions in a Pediatric Emergency Department.” *Advanced Emergency Nursing Journal* 42 (1): 63–70. <https://doi.org/10.1097/TME.0000000000000280>.
- Keightley, Michelle L., Rajeet Singh Saluja, Jen-Kai Chen, Isabelle Gagnon, Gabriel Leonard, Michael Petrides, and Alain Ptito. 2014. “A Functional Magnetic Resonance Imaging Study of

Working Memory in Youth after Sports-Related Concussion: Is It Still Working?” *Journal of Neurotrauma* 31 (5): 437–51. <https://doi.org/10.1089/neu.2013.3052>.

Kelly, Russell, Hutchison Michael G, Selci Erin, Leiter Jeff, Chateau Daniel, and Ellis Michael J. 2016. “Academic Outcomes in High-School Students after a Concussion: A Retrospective Population-Based Analysis.” Edited by Wylie Glenn R. *PLOS ONE* 11 (10): e0165116–e0165116. <https://doi.org/10.1371/journal.pone.0165116>.

Kelly, Russell, Selci Erin, Black Brian, Cochrane Karis, and Ellis Michael. 2019. “Academic Outcomes Following Adolescent Sport-Related Concussion or Fracture Injury: A Prospective Cohort Study.” *PLoS ONE* 14 (4): 1–14. <https://doi.org/10.1371/journal.pone.0215900>.

Kelly, Sarmiento, Daugherty Jill, and DePadilla Lara. 2019. “Youth and High School Sports Coaches’ Experience with and Attitudes about Concussion and Access to Athletic Trainers by Sport Type and Age of Athlete Coached.” *Journal of Safety Research* 69: 217–25. <https://doi.org/10.1016/j.jsr.2019.01.005>.

Kelly, Sarmiento, Donnell Zoe, Bell Elizabeth, and Hoffman Rosanne. 2019. “From the CDC: A Qualitative Study of Middle and High School Professionals’ Experiences and Views on Concussion: Identifying Opportunities to Support the Return to School Process.” *Journal of Safety Research* 68 (February): 223–29. <https://doi.org/10.1016/j.jsr.2018.10.010>.

Kelly, Sarmiento, Donnell Zoe, Bell Elizabeth, Tennant Bethany, and Hoffman Rosanne. 2019. “A Qualitative Study of Barriers and Opportunities for Concussion Communication and Management among Parents of Youth Sports Athletes.” *Journal of Concussion* 3: 205970021986186–205970021986186. <https://doi.org/10.1177/2059700219861863>.

Kerr, Zachary Y., Scott L. Zuckerman, Erin B. Wasserman, Christina B. Vander Vegt, Aaron Yengo-Kahn, Thomas A. Buckley, Gary S. Solomon, Allen K. Sills, and Thomas P. Dompier. 2018. “Factors Associated with Post-Concussion Syndrome in High School Student-Athletes.” *Journal of Science and Medicine in Sport* 21 (5): 447–52. <https://doi.org/10.1016/j.jsams.2017.08.025>.

Kerrigan, Julia Morrow, and Christopher C. Giza. 2019. “The Rise of the Concussion Clinic for Diagnosis of Pediatric Mild Traumatic Brain Injury.” *Seminars in Pediatric Neurology* 30 (July): 45–53. <https://doi.org/10.1016/j.spen.2019.03.008>.

Khetani, Aneesh M, Brian L Brooks, Angelo Mikrogianakis, and Karen M Barlow. 2016. “Incorporating a Computerized Cognitive Battery Into the Emergency Department Care of Pediatric Mild Traumatic Brain Injuries — Is It Feasible ?” *00* (00): 1–6. <https://doi.org/10.1097/PEC.0000000000000959>.

Kim, Sungwon, and Daniel P. Connaughton. 2020. “Youth Soccer Parents’ Attitudes and Perceptions About Concussions.” *Journal of Adolescent Health* 68 (1): 184–90. <https://doi.org/10.1016/j.jadohealth.2020.04.029>.

King, Laurie A, Fay B Horak, Martina Mancini, Donald Pierce, Kelsey C Priest, James Chesnutt, Patrick Sullivan, and Julie C Chapman. 2014. “Instrumenting the Balance Error Scoring System for Use with Patients Reporting Persistent Balance Problems after Mild Traumatic Brain Injury.” *Archives of Physical Medicine and Rehabilitation* 95 (2): 353–59. <https://doi.org/10.1016/j.apmr.2013.10.015>.

King, Regan, Adam Kirton, Ephrem Zewdie, Trevor A. Seeger, Patrick Ciechanski, and Karen M. Barlow. 2019. “Longitudinal Assessment of Cortical Excitability in Children and

- Adolescents with Mild Traumatic Brain Injury and Persistent Post-Concussive Symptoms.” *Frontiers in Neurology* 10 (MAY): 8–18. <https://doi.org/10.3389/fneur.2019.00451>.
- King, Regan, Melody N. Grohs, Adam Kirton, Catherine Lebel, Michael J. Esser, and Karen M. Barlow. 2019. “Microstructural Neuroimaging of White Matter Tracts in Persistent Post-Concussion Syndrome: A Prospective Controlled Cohort Study.” *NeuroImage: Clinical* 23 (April): 101842. <https://doi.org/10.1016/j.nicl.2019.101842>.
- Kirk, John W., Christa F. Huttaff-Lee, Amy K. Connery, David A. Baker, and Michael W. Kirkwood. 2014. “The Relationship Between the Self-Report BASC-2 Validity Indicators and Performance Validity Test Failure After Pediatric Mild Traumatic Brain Injury.” *Assessment* 1. Shi F, (5): 562–69. <https://doi.org/10.1177/1073191114520626>.
- Kirkwood, M. W., R. L. Peterson, A. K. Connery, D. A. Baker, and J. A. Grubenhoff. 2014. “Postconcussive Symptom Exaggeration After Pediatric Mild Traumatic Brain Injury.” *Pediatrics* 1. Shi F, (4): 643–50. <https://doi.org/10.1542/peds.2013-3195>.
- Kirkwood, Michael W., Robin L. Peterson, Amy K. Connery, David A. Baker, and Jeri Forster. 2016. “A Pilot Study Investigating Neuropsychological Consultation as an Intervention for Persistent Postconcussive Symptoms in a Pediatric Sample.” *Journal of Pediatrics* 169: 244–249e1. <https://doi.org/10.1016/j.jpeds.2015.10.014>.
- Königs, M., H. A. Heij, J. A. van der Sluijs, R. J. Vermeulen, J. C. Goslings, J. S. K. Luitse, B. T. Poll-The, et al. 2015a. “Pediatric Traumatic Brain Injury and Attention Deficit.” *Pediatrics* 136 (3): 534–41. <https://doi.org/10.1542/peds.2015-0437>.
- Königs, Marsh, Hugo A Heij, Johannes A Van Der Sluijs, R Jeroen Vermeulen, J Carel Goslings, Jan S K Luitse, Bwee Tien Poll-Thé, et al. 2015. “Pediatric Traumatic Brain Injury and Attention Deficit.” *Pediatrics* 136 (3): 534–41. <https://doi.org/10.1542/peds.2015-0437>.
- Königs, Marsh, Wouter D. Weeda, L. W. Ernest Van Heurn, R. Jeroen Vermeulen, J. Carel Goslings, Jan S.K. Luitse, Bwee Tien Poll-Thé, et al. 2015. “Impaired Visual Integration in Children with Traumatic Brain Injury: An Observational Study.” *PLoS ONE* 10 (12): 1–15. <https://doi.org/10.1371/journal.pone.0144395>.
- Kontos Anthony, Jorgensen-Wagers Kendra, Trbovich Alicia M, Ernst Nathan, Emami Kouros, Gillie Brandon, French Jonathan, et al. 2020. “Association of Time since Injury to the First Clinic Visit with Recovery Following Concussion.” *JAMA Neurology* 77 (4): 435–40. <https://doi.org/10.1001/jamaneurol.2019.4552>.
- Kontos Anthony, R J Elbin, Sufrinko Alicia, Marchetti Gregory, Holland Cyndi L, and Collins Michael W. 2019. “Recovery Following Sport-Related Concussion: Integrating Pre- and Postinjury Factors Into Multidisciplinary Care.” *The Journal of Head Trauma Rehabilitation* 34 (6): 394–401.
- Kontos, Anthony P., R. J. Elbin, Brian Lau, Steven Simensky, Brin Freund, Jonathan French, and Michael W. Collins. 2013. “Posttraumatic Migraine as a Predictor of Recovery and Cognitive Impairment after Sport-Related Concussion.” *American Journal of Sports Medicine* 41 (7): 1497–1504. <https://doi.org/10.1177/0363546513488751>.
- Kostyun, Regina O., and Imran Hafeez. 2015. “Protracted Recovery From a Concussion: A Focus on Gender and Treatment Interventions in an Adolescent Population.” *Sports Health* 7 (1): 52–57. <https://doi.org/10.1177/1941738114555075>.

Kostyun, Regina O., Matthew D. Milewski, and Imran Hafeez. 2015. "Sleep Disturbance and Neurocognitive Function during the Recovery from a Sport-Related Concussion in Adolescents." *American Journal of Sports Medicine* 43 (3): 633–40.

<https://doi.org/10.1177/0363546514560727>.

Kraus, Nina, Elaine C. Thompson, Jennifer Krizman, Katherine Cook, Travis White-Schwoch, and Cynthia R. LaBella. 2016. "Auditory Biological Marker of Concussion in Children." *Scientific Reports* 6 (August): 1–10. <https://doi.org/10.1038/srep39009>.

Kristen, Lambrinakos-Raymond, Dubrovsky Alexander Sasha, Gagnon Isabelle, Zemek Roger, and Burstein Brett. 2021. "Management of Pediatric Post-Concussion Headaches: National Survey of Abortive Therapies Used in the Emergency Department." *Journal of Neurotrauma*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33787343>.

Kristina, Safar, Zhang Jing, Emami Zahra, Gharehgazlou Avidah, Ibrahim George, and Dunkley Benjamin T. 2021. "Mild Traumatic Brain Injury Is Associated with Dysregulated Neural Network Functioning in Children and Adolescents." *Brain Communications* 3 (2): fcab044.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=pmnm&NEWS=N&AN=34095832>.

Kriz, Peter K., Cynthia Stein, Janet Kent, Danielle Ruggieri, Emilie Dolan, Michael O'Brien, and William P. Meehan. 2016. "Physical Maturity and Concussion Symptom Duration among Adolescent Ice Hockey Players." *Journal of Pediatrics* 171: 234–239e2.

<https://doi.org/10.1016/j.jpeds.2015.12.006>.

Kriz, Peter K., Rebekah Mannix, Alex M. Taylor, Danielle Ruggieri, and William P. Meehan. 2017. "Neurocognitive Deficits of Concussed Adolescent Athletes at Self-Reported Symptom Resolution in the Zurich Guidelines Era." *Orthopaedic Journal of Sports Medicine* 5 (11): 1–7.

<https://doi.org/10.1177/2325967117737307>.

Kroshus, Emily, Deborah Bowen, Douglas Opel, Sara P. D. Chrisman, Frederick P. Rivara, Kroshus Emily, Bowen Deborah, Opel Douglas, Chrisman Sara P.D, and Rivara Frederick P. 2020. "Understanding Decision Making by Families About Youth Football Participation Postconcussion." *Health Promotion Practice*, July, 1–11.

<https://doi.org/10.1177/1524839920945255>.

Kuczynski, Andrea, Susan Crawford, Lisa Bodell, Deborah Dewey, and Karen M Barlow. 2013. "Characteristics of Post-Traumatic Headaches in Children Following Mild Traumatic Brain Injury and Their Response to Treatment: A Prospective Cohort." *Developmental Medicine and Child Neurology* 55 (7): 636–41. <https://doi.org/10.1111/dmcn.12152>.

Kuemmerle, Karamah, and William P. Meehan. 2019. "Treatment of Pediatric Concussion." *Seminars in Pediatric Neurology* 30 (July): 60–67. <https://doi.org/10.1016/j.spen.2019.03.010>.

Kuhn, Andrew Warren, and Gary S Solomon. 2014. "Supervision and Computerized Neurocognitive Baseline Test Performance in High School Athletes: An Initial Investigation." *Journal of Athletic Training* 1. Shi F, (6): 800–805. <https://doi.org/10.4085/1062-6050-49.3.66>.

Kundu, S, A Ghodadra, S Fakhran, L M Alhilali, and G K Rohde. 2019b. "Assessing Postconcussive Reaction Time Using Transport-Based Morphometry of Diffusion Tensor

Images.” American Journal of Neuroradiology 40 (7): 1117–23.  
<https://doi.org/10.3174/ajnr.A6087>.

Kundu, S., A. Ghodadra, S. Fakhra, L. M. Alhilali, and G. K. Rohde. 2019a. “Assessing Postconcussive Reaction Time Using Transport-Based Morphometry of Diffusion Tensor Images.” In American Journal of Neuroradiology, 40:1117–23. American Society of Neuroradiology. <https://doi.org/10.3174/ajnr.A6087>.

Kurowski Brad, Hugentobler Jason, Quatman-Yates Catherine, Taylor Jennifer, Gubanich Paul J, Altaye Mekibib, and Wade Shari L. 2017. “Aerobic Exercise for Adolescents With Prolonged Symptoms After Mild Traumatic Brain Injury: An Exploratory Randomized Clinical Trial.” Journal of Head Trauma Rehabilitation 32 (2): 79–89.  
<https://doi.org/10.1097/HTR.0000000000000238>.

Kurowski, Brad G., Jason Hugentobler, Catherine Quatman-Yates, Jennifer Taylor, Paul J. Gubanich, Mekibib Altaye, and Shari L. Wade. 2017a. “Aerobic Exercise for Adolescents with Prolonged Symptoms after Mild Traumatic Brain Injury: An Exploratory Randomized Clinical Trial.” Journal of Head Trauma Rehabilitation 32 (2): 79–89.  
<https://doi.org/10.1097/HTR.0000000000000238>.

Laliberté, Durish Christianne, Yeates Keith Owen, Brooks Brian L, Christianne Laliberté Durish, Keith Owen Yeates, and Brian L. Brooks. 2018. “Psychological Resilience as a Predictor of Persistent Post-Concussive Symptoms in Children with Single and Multiple Concussion.” Journal of the International Neuropsychological Society 24 (8): 759–68.  
<https://doi.org/10.1017/S1355617718000437>.

Lancaster, Melissa A., Daniel V. Olson, Michael A. McCrea, Lindsay D. Nelson, Ashley A. LaRoche, and L. Tugan Muftuler. 2016. “Acute White Matter Changes Following Sport-Related Concussion: A Serial Diffusion Tensor and Diffusion Kurtosis Tensor Imaging Study.” Human Brain Mapping 37 (11): 3821–34. <https://doi.org/10.1002/hbm.23278>.

Landry-Roy, Catherine, Annie Bernier, Jocelyn Gravel, and Miriam H. Beauchamp. 2018. “Executive Functions and Their Relation to Sleep Following Mild Traumatic Brain Injury in Preschoolers.” Journal of the International Neuropsychological Society 24 (8): 769–80.  
<https://doi.org/10.1017/S1355617718000401>.

Lara, DePadilla PhD, Miller PhD Gabrielle F, Everett Jones PhD, MPH, JD, and Sherry. 2020. “Characteristics of Schools with Youth Sports Concussion-Related Educational Policies and Practices.” Journal of School Health 90 (7): 520–26. <https://doi.org/10.1111/josh.12900>.

Lara, DePadilla PhD, Miller PhD Gabrielle F, Everett Jones PhD, MPH, JD, Sherry, Lara DePadilla PhD, Gabrielle F. Miller PhD, and Sherry Everett Jones PhD, MPH, JD. 2020. “Characteristics of Schools with Youth Sports Concussion-Related Educational Policies and Practices.” Journal of School Health 90 (7): 520–26. <https://doi.org/10.1111/josh.12900>.

LaRovere, Kerri L, and Robert C Tasker. 2019. “Diagnosis of Concussion in the Hospital.” Seminars in Pediatric Neurology 30 (July): 54–59. <https://doi.org/10.1016/j.spen.2019.03.009>.

Laufer, Offir, Amir Geva, Jonathan D. Ellis, Kim Barber Foss, Maayan Ettinger, Yaki Stern, Todd Arthur, Jeffrey Kutcher, Gregory Myer, and Amit Reches. 2020. “Prospective Longitudinal Investigation Shows Correlation of Event-Related Potential to Mild Traumatic Brain Injury in Adolescents.” Brain Injury 34 (7): 871–80.  
<https://doi.org/10.1080/02699052.2020.1763459>.

Lax, Ilyse D., Melissa Paniccia, Sabrina Agnihotri, Nick Reed, Evan Garmaise, Mahdis Azadbakhsh, Justin Ng, et al. 2015a. "Developmental and Gender Influences on Executive Function Following Concussion in Youth Hockey Players." *Brain Injury* 29 (12): 1409–19. <https://doi.org/10.3109/02699052.2015.1043344>.

Leah, Chadwick, Roth Elizabeth, Minich Nori, Taylor H Gerry, Bigler Erin D.P, Cohen Daniel M, Bacevice Ann, et al. 2021. "Cognitive Outcomes in Children with Mild Traumatic Brain Injury: An Examination Using the National Institutes of Health Toolbox Cognition Battery." *Journal of Neurotrauma*.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33906429>.

Leddy, John J., Mohammad N. Haider, Andrea L. Hinds, Scott Darling, Barry S. Willer, Leddy John J, Haider Mohammad N, Hinds Andrea L, Darling Scott, and Willer Barry S. 2019. "A Preliminary Study of the Effect of Early Aerobic Exercise Treatment for Sport-Related Concussion in Males." *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine* 29 (5): 353–60. <https://doi.org/10.1097/JSM.0000000000000663>.

Leddy, John J., Mohammad N. Haider, Michael J. Ellis, Rebekah Mannix, Scott R. Darling, Michael S. Freitas, Heidi N. Suffoletto, Jeff Leiter, Dean M. Cordingley, and Barry Willer. 2019. "Early Subthreshold Aerobic Exercise for Sport-Related Concussion: A Randomized Clinical Trial." *JAMA Pediatrics* 173 (4): 319–25.  
<https://doi.org/10.1001/jamapediatrics.2018.4397>.

Ledoux, Andrée Anne, Ken Tang, Keith O. Yeates, Martin V. Pusic, Kathy Boutis, William R. Craig, Jocelyn Gravel, et al. 2019. "Natural Progression of Symptom Change and Recovery from Concussion in a Pediatric Population." *JAMA Pediatrics* 173 (1): 1–11.  
<https://doi.org/10.1001/jamapediatrics.2018.3820>.

Lee, Young M, Mitchell J Odom, Scott L Zuckerman, Gary S Solomon, and Allen K Sills. 2013. "Does Age Affect Symptom Recovery after Sports-Related Concussion? A Study of High School and College Athletes: Clinical Article." *Journal of Neurosurgery: Pediatrics* 12 (6): 537–44. <https://doi.org/10.3171/2013.7.PEDS12572>.

Lee, Young M., Adela Wu, Scott L. Zuckerman, Kevin M. Stanko, Gregory Y. LaChaud, Gary S. Solomon, and Allen K. Sills. 2016. "Obesity and Neurocognitive Recovery after Sports-Related Concussion in Athletes: A Matched Cohort Study." *Physician and Sportsmedicine* 44 (3): 217–22. <https://doi.org/10.1080/00913847.2016.1216718>.

Leen, Van Beek, Ghesquière Pol, Lagae Lieven, and De Smedt Bert. 2015. "Mathematical Difficulties and White Matter Abnormalities in Subacute Pediatric Mild Traumatic Brain Injury." *Journal of Neurotrauma* 32 (20): 1567–78. <https://doi.org/10.1089/neu.2014.3809>.

Leen, Van Beek, Vanderauwera Jolijn, Ghesquière Pol, Lagae Lieven, and De Smedt Bert. 2015. "Longitudinal Changes in Mathematical Abilities and White Matter Following Paediatric Mild Traumatic Brain Injury." *Brain Injury* 29 (13–14): 1701–10.  
<https://doi.org/10.3109/02699052.2015.1075172>.

Liang, Goh Mark Sen, Looi Dawn Shu Hui, Goh Jia Ling, Sultana Rehena, Goh Sharon Si Min, Lee Jan Hau, and Chong Shu Ling. 2021. "The Impact of Traumatic Brain Injury on Neurocognitive Outcomes in Children: A Systematic Review and Meta-Analysis." *Journal of Neurology, Neurosurgery, and Psychiatry*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33789922>.

Lianne, Tomfohr-Madsen, Madsen Joshua W, Bonneville Dominique, Virani Shane, Plourde Vickie, Barlow Karen M, Yeates Keith Owen, and Brooks Brian L. 2020. "A Pilot Randomized Controlled Trial of Cognitive-Behavioral Therapy for Insomnia in Adolescents With Persistent Postconcussion Symptoms." *The Journal of Head Trauma Rehabilitation* 35 (2): E103–12. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=31246882>.

Lichtenstein, Jonathan D, Rosemarie Scolaro Moser, and Philip Schatz. 2014. "Age and Test Setting Affect the Prevalence of Invalid Baseline Scores on Neurocognitive Tests." *American Journal of Sports Medicine* 42 (2): 479–84. <https://doi.org/10.1177/0363546513509225>.

Liller, Karen D, Barbara Morris, Jessica Fillion, Yingwei Yang, and Omonigho M Bubu. 2017. "Analysis of Baseline Computerized Neurocognitive Testing Results among 5-11-Year-Old Male and Female Children Playing Sports in Recreational Leagues in Florida." *International Journal of Environmental Research and Public Health* 14 (9). <https://doi.org/10.3390/ijerph14091028>.

Lin, Katerina, and Cynthia Tung. 2016. "Acupuncture for Recovery from Pediatric Sport-Related Concussion." *Medical Acupuncture* 28 (4): 217–22. <https://doi.org/10.1089/acu.2016.1181>.

Linden, Michael. 2015. "The Effects of QEEG-Guided Neurofeedback on Postconcussion Syndrome." *Biofeedback* 43 (1): 42–44. <https://doi.org/10.5298/1081-5937-43.1.08>.

Linder, Susan M., Jason Cruickshank, Nicole M. Zimmerman, Richard Figler, and Jay L. Alberts. 2019. "A Technology-Enabled Electronic Incident Report to Document and Facilitate Management of Sport Concussion: A Cohort Study of Youth and Young Adults." *Medicine* 98 (14): e14948. <https://doi.org/10.1097/MD.00000000000014948>.

Linder, Susan M., Sarah J. Ozinga, Mandy Miller Koop, Tanujit Dey, Richard Figler, Jason Cruickshank, and Jay L. Alberts. 2018. "Cleveland Clinic Postural Stability Index Norms for the Balance Error Scoring System." *Medicine and Science in Sports and Exercise* 50 (10): 1998–2006. <https://doi.org/10.1249/MSS.0000000000001660>.

Liou, Ying Jay, Han Ting Wei, Mu Hong Chen, Ju Wei Hsu, Kai Lin Huang, Ya Mei Bai, Tung Ping Su, et al. 2018. "Risk of Traumatic Brain Injury Among Children, Adolescents, and Young Adults With Attention-Deficit Hyperactivity Disorder in Taiwan." *Journal of Adolescent Health* 63 (2): 233–38. <https://doi.org/10.1016/j.jadohealth.2018.02.012>.

Liqun, Zou, Li Hong, Jiang Zhen, He Bin, Xie Yong, Zhang Wei, Jiang Jingyuan, and Nie Hu. 2020. "Modified Decision-Making Rule Supported by Scheduled Telephone Follow-up Reduces Head Computed Tomography Utilization in Children with Mild Traumatic Brain Injury: A Cohort Study." *Medicine* 99 (18): e20088–e20088. <https://doi.org/10.1097/MD.00000000000020088>.

Little, C. Elaine, Carolyn Emery, Stephen H. Scott, Willem Meeuwisse, Luz Palacios-Derflinger, and Sean P. Dukelow. 2016. "Do Children and Adolescent Ice Hockey Players with and without a History of Concussion Differ in Robotic Testing of Sensory, Motor and Cognitive Function?" *Journal of NeuroEngineering and Rehabilitation* 13 (1): 1–19. <https://doi.org/10.1186/s12984-016-0195-9>.

Lovell, Mark R, and Gary S Solomon. 2013. “Neurocognitive Test Performance and Symptom Reporting in Cheerleaders with Concussions.” *Journal of Pediatrics* 163 (4): 1192–1195.e1. <https://doi.org/10.1016/j.jpeds.2013.05.061>.

Ludwig, Rebecca, Linda D’Silva, Prasanna Vaduvathirayan, Michael A. Rippee, and Catherine Siengsukon. 2019. “Sleep Disturbances in the Acute Stage of Concussion Are Associated With Poorer Long-Term Recovery: A Systematic Review.” *PM and R. John Wiley and Sons Inc.* <https://doi.org/10.1002/pmrj.12309>.

Lugones, Micaela, Georgia Parkin, Stefan Bjelosevic, Michael Takagi, Cathriona Clarke, Vicki Anderson, and Vera Ignjatovic. 2018. “Blood Biomarkers in Paediatric Mild Traumatic Brain Injury: A Systematic Review.” *Neuroscience and Biobehavioral Reviews* 87 (January): 206–17. <https://doi.org/10.1016/j.neubiorev.2018.02.006>.

Lumba-Brown, Angela, Jim Harley, Simon Lucio, Florin Vaida, and Mary Hilfiker. 2014. “Hypertonic Saline as a Therapy for Pediatric Concussive Pain.” *Pediatric Emergency Care* 30 (3): 139–45. <https://doi.org/10.1097/PEC.0000000000000084>.

Lumba-Brown, Angela, Keith Owen Yeates, Kelly Sarmiento, Matthew J. Breiding, Tamara M. Haegerich, Gerard A. Gioia, Michael Turner, et al. 2018. “Diagnosis and Management of Mild Traumatic Brain Injury in Children: A Systematic Review.” *JAMA Pediatrics* 172 (11). <https://doi.org/10.1001/jamapediatrics.2018.2847>.

Lumba-Brown, Angela, Masaru Teramoto, O Josh Bloom, David Brody, James Chesnutt, James R Clugston, Michael Collins, et al. 2019. “Concussion Guidelines Step 2: Evidence for Subtype Classification.” *Neurosurgery* 0 (0): 1–12. <https://doi.org/10.1093/neuros/nyz332>.

Lynch, James M., Megan Anderson, Brooke Benton, and Sue Stanley Green. 2015. “The Gaming of Concussions: A Unique Intervention in Postconcussion Syndrome.” *Journal of Athletic Training* 50 (3): 270–76. <https://doi.org/10.4085/1062-6050-49.3.78>.

Lynn, Babcock, Kurowski Brad G, Zhang Nanhua, Dexheimer Judith W, Dyas Jenna, and Wade Shari L. 2017. “Adolescents with Mild Traumatic Brain Injury Get SMART: An Analysis of a Novel Web-Based Intervention.” *Telemedicine and E-Health* 23 (7): 600–607. <https://doi.org/10.1089/tmj.2016.0215>.

Lyons, Todd W., Kelsey A. Miller, Andrew F. Miller, Rebekah Mannix, Lyons Todd W, Miller Kelsey A, Miller Andrew F, and Mannix Rebekah. 2019. “Racial and Ethnic Differences in Emergency Department Utilization and Diagnosis for Sports-Related Head Injuries.” *Frontiers in Neurology* 10 (JUL): 1–8. <https://doi.org/10.3389/fneur.2019.00690>.

Maayan, Shorer, Segev Shira, Rassovsky Yuri, Fennig Silvana, Apter Alan, and Peleg Tammy Pilowsky. 2020. “Efficacy of Psychological Intervention for Children with Concurrent Posttraumatic Stress Disorder and Mild Traumatic Brain Injury.” *Journal of Traumatic Stress* 33 (3): 330–37. <https://doi.org/10.1002/jts.22512>.

Macartney, Gail, Michelle Woodfield, Ivan Terekhov, Michael Vassilyadi, and Kristian Goulet. 2020. “Anxiety, Depression, and Symptom Experience in Concussed Children and Youth.” *Journal for Specialists in Pediatric Nursing*. <https://doi.org/10.1111/jspn.12310>.

MacDonald, James, and Drew Duerson. 2015. “Reliability of a Computerized Neurocognitive Test in Baseline Concussion Testing of High School Athletes.” *Clinical Journal of Sport Medicine* 1. Shi F, (4): 367–72. <https://doi.org/10.1097/JSM.0000000000000139>.

- MacDonald, James, Neha Patel, Julie Young, and Emily Stuart. 2018. "Returning Adolescents to Driving after Sports-Related Concussions: What Influences Physician Decision-Making." *Journal of Pediatrics* 194: 177–81. <https://doi.org/10.1016/j.jpeds.2017.10.032>.
- Manikas, Vicky, Franz E. Babl, Stephen Hearps, Julian Dooley, and Vicki Anderson. 2017a. "Impact of Exercise on Clinical Symptom Report and Neurocognition after Concussion in Children and Adolescents." *Journal of Neurotrauma* 34 (11): 1932–38. <https://doi.org/10.1089/neu.2016.4762>.
- Manning, Kathryn Y., Amy Schranz, Robert Bartha, Gregory A. Dekaban, Christy Barreira, Arthur Brown, Lisa Fischer, et al. 2017. "Multiparametric MRI Changes Persist beyond Recovery in Concussed Adolescent Hockey Players." *Neurology* 89 (21): 2157–66. <https://doi.org/10.1212/WNL.0000000000004669>.
- Mannix, Rebekah, and Richard Bachur. 2019. "Diagnosis of Concussion in the Pediatric Emergency Department." *Seminars in Pediatric Neurology* 30 (July): 35–39. <https://doi.org/10.1016/j.spen.2019.03.006>.
- Mannix, Rebekah, Grant L Iverson, Bruce Maxwell, Joseph E Atkins, Ross Zafonte, and Paul D Berkner. 2014. "Multiple Prior Concussions Are Associated with Symptoms in High School Athletes." *Annals of Clinical and Translational Neurology* 1 (6): 433–38. <https://doi.org/10.1002/acn3.70>.
- Mannix, Rebekah, Rachel Levy, Roger Zemek, Keith Owen Yeates, Kristy Arbogast, William P. Meehan, John Leddy, et al. 2020. "Fluid Biomarkers of Pediatric Mild Traumatic Brain Injury: A Systematic Review." *Journal of Neurotrauma*. Mary Ann Liebert Inc. <https://doi.org/10.1089/neu.2019.6956>.
- Manzano, Sergio, Iris Bachmann Holzinger, Christian J. Kellenberger, Laurence Lacroix, Dagmar Klima-Lange, Martin Hersberger, Giorgio La Scala, Stefan Altermatt, and Georg Staubli. 2016. "Diagnostic Performance of S100B Protein Serum Measurement in Detecting Intracranial Injury in Children with Mild Head Trauma." *Emergency Medicine Journal* 33 (1): 42–46. <https://doi.org/10.1136/emered-2014-204513>.
- Maree, Cassimatis, Orr Rhonda, Fyffe Andrew, and Browne Gary. 2021. "Early Injury Evaluation Following Concussion Is Associated with Improved Recovery Time in Children and Adolescents." *Journal of Science and Medicine in Sport*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34244083>.
- Margot, Gray, Wilson Julie C, Potter Morgan, Provance Aaron J, and Howell David R. 2020. "Female Adolescents Demonstrate Greater Oculomotor and Vestibular Dysfunction than Male Adolescents Following Concussion." *Physical Therapy in Sport : Official Journal of the Association of Chartered Physiotherapists in Sports Medicine* 42: 68–74. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=31935640>.
- Maria, Barlow Karen, Iyer Kartik, Yan Tingting, Scurfield Alex, Carlson Helen L, and Wang Yang. 2021. "Cerebral Blood Flow Predicts Recovery in Children with Persistent Post-Concussion Symptoms Following Mild Traumatic Brain Injury." *Journal of Neurotrauma*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33430707>.

Maria, Barlow Karen, Kirk Valerie, Brooks Brian, Esser Michael Joachim, Yeates Keith Owen, Zemek Roger, Kirton Adam, et al. 2020. “Efficacy of Melatonin for Sleep Disturbance in Children with Persistent Post-Concussion Symptoms: Secondary Analysis of a Randomized Controlled Trial.” *Journal of Neurotrauma*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=32988292>.

Mari-Liis, Kaldoja, and Kolk Anneli. 2015. “Does Gender Matter? Differences in Social-Emotional Behavior Among Infants and Toddlers Before and After Mild Traumatic Brain Injury.” *Journal of Child Neurology* 30 (7): 860–67.

<https://doi.org/10.1177/0883073814544705>.

Marin, Jennifer R., Jonathan Rodean, Matt Hall, Elizabeth R. Alpern, Paul L. Aronson, Pradip P. Chaudhari, Eyal Cohen, et al. 2020. “Trends in Use of Advanced Imaging in Pediatric Emergency Departments, 2009-2018.” *JAMA Pediatrics* 174 (9): e202209.

<https://doi.org/10.1001/jamapediatrics.2020.2209>.

Markus-Doornbosch, F. van, E. Peeters, S. van der Pas, T. Vliet Vlieland, and J. Meesters. 2019. “Physical Activity after Mild Traumatic Brain Injury: What Are the Relationships with Fatigue and Sleep Quality?” *European Journal of Paediatric Neurology* 23 (1): 53–60.

<https://doi.org/10.1016/j.ejpn.2018.11.002>.

Marshall, Cameron M., Nicole Chan, Pauline Tran, Carol DeMatteo, Marshall Cameron M, Chan Nicole, Tran Pauline, and DeMatteo Carol. 2019. “The Use of an Intensive Physical Exertion Test as a Final Return to Play Measure in Concussed Athletes: A Prospective Cohort.” *Physician and Sportsmedicine* 47 (2): 158–66.

<https://doi.org/10.1080/00913847.2018.1542258>.

Martin, Alexia K., Ashley J. Petersen, Heather W. Sesma, Mary B. Koolmo, Katherine M. Ingram, Katie B. Slifko, Victoria N. Nguyen, Robert C. Doss, and Amy M. Linabery. 2020. “Concussion Symptomology and Recovery in Children and Adolescents with Pre-Existing Anxiety.” *Journal of Neurology, Neurosurgery & Psychiatry* 91 (10): 1060–66.

<https://doi.org/10.1136/jnnp-2020-323137>.

Martin, Gariepy, Gravel Jocelyn, Legare France, Melnick Edward R, Hess Erik P, Witteman Holly O, Lelaidier-Hould Lania, et al. 2020. “Head CT Overuse in Children with a Mild Traumatic Brain Injury within Two Canadian Emergency Departments.” *Paediatrics & Child Health* 25 (1): 26–32.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=33390737>.

Master, Christina L, Allison E Curry, Melissa R Pfeiffer, Kristina B Metzger, Ronni S Kessler, Juliet Haarbauer-Krupa, Lara DePadilla, Arlene Greenspan, Matthew J Breiding, and Kristy B Arbogast. 2020b. “Characteristics of Concussion in Elementary School-Aged Children: Implications for Clinical Management.” *Journal of Pediatrics* 223: 128–35.

<https://doi.org/10.1016/j.jpeds.2020.04.001>.

Master, Christina L., Allison E. Curry, Melissa R. Pfeiffer, Kristina B. Metzger, Ronni S. Kessler, Juliet Haarbauer-Krupa, Lara DePadilla, Arlene Greenspan, Matthew J. Breiding, and Kristy B. Arbogast. 2020a. “Characteristics of Concussion in Elementary School-Aged Children: Implications for Clinical Management.” *The Journal of Pediatrics* 223 (August): 128–35.

<https://doi.org/10.1016/j.jpeds.2020.04.001>.

- Master, Christina L., Mitchell Scheiman, Michael Gallaway, Arlene Goodman, Roni L. Robinson, Stephen R. Master, and Matthew F. Grady. 2016. "Vision Diagnoses Are Common after Concussion in Adolescents." *Clinical Pediatrics* 55 (3): 260–67. <https://doi.org/10.1177/0009922815594367>.
- Master, Christina L., Stephen R. Master, Douglas J. Wiebe, Eileen P. Storey, Julia E. Lockyer, Olivia E. Podolak, Matthew F. Grady, et al. 2018. "Vision and Vestibular System Dysfunction Predicts Prolonged Concussion Recovery in Children." *Clinical Journal of Sport Medicine* 28 (2): 139–45. <https://doi.org/10.1097/JSM.0000000000000507>.
- Matveev, Roman, Lauren Sergio, Jessica Fraser-Thomas, and Alison K. Macpherson. 2018. "Trends in Concussions at Ontario Schools Prior to and Subsequent to the Introduction of a Concussion Policy - An Analysis of the Canadian Hospitals Injury Reporting and Prevention Program from 2009 to 2016." *BMC Public Health* 18 (1): 1–10. <https://doi.org/10.1186/s12889-018-6232-9>.
- Mautner, Kenneth, Walter I. Sussman, Matthew Axtman, Yahya Al-Farsi, and Samir Al-Adawi. 2015. "Relationship of Attention Deficit Hyperactivity Disorder and Postconcussion Recovery in Youth Athletes." *Clinical Journal of Sport Medicine* 25 (4): 355–60. <https://doi.org/10.1097/JSM.0000000000000151>.
- Max, Jeffrey E., Keren Friedman, Elisabeth A. Wilde, Erin D. Bigler, Gerri Hanten, Russell J. Schachar, Ann E. Saunders, et al. 2015. "Psychiatric Disorders in Children and Adolescents 24 Months after Mild Traumatic Brain Injury." *Journal of Neuropsychiatry and Clinical Neurosciences* 27 (2): 112–20. <https://doi.org/10.1176/appi.neuropsych.13080190>.
- Mayer, Andrew R., David D. Stephenson, Andrew B. Dodd, Sidney R. Robertson-Benta, Sharvani Pabbathi Reddy, Nicholas A. Shaff, Keith Owen Yeates, et al. 2020. "Comparison of Methods for Classifying Persistent Post-Concussive Symptoms in Children." *Journal of Neurotrauma* 37 (13): 1504–11. <https://doi.org/10.1089/neu.2019.6805>.
- Mayer, Andrew R., David D. Stephenson, Christopher J. Wertz, Andrew B. Dodd, Nicholas A. Shaff, Josef M. Ling, Grace Park, et al. 2019. "Proactive Inhibition Deficits with Normal Perfusion after Pediatric Mild Traumatic Brain Injury." *Human Brain Mapping* 40 (18): 5370–81. <https://doi.org/10.1002/hbm.24778>.
- Mayer, Andrew R., Faith M. Hanlon, and Josef M. Ling. 2015. "Gray Matter Abnormalities in Pediatric Mild Traumatic Brain Injury." *Journal of Neurotrauma* 32 (10): 723–30. <https://doi.org/10.1089/neu.2014.3534>.
- McCart, Melissa, Ann E. Glang, Jody Slocumb, Jeff Gau, Laura Beck, and Doug Gomez. 2019. "A Quasi-Experimental Study Examining the Effects of Online Traumatic Brain Injury Professional Development on Educator Knowledge, Application, and Efficacy in a Practitioner Setting." *Disability and Rehabilitation* 0 (0): 1–7. <https://doi.org/10.1080/09638288.2019.1578423>.
- McCarty Carolyn, Zatzick Douglas F, Marcynyszyn Lyscha A, Wang Jin, Hilt Robert, Jinguji Thomas, Quitiquit Celeste, Chrisman Sara P.D, and Rivara Frederick P. 2021. "Effect of Collaborative Care on Persistent Postconcussive Symptoms in Adolescents: A Randomized Clinical Trial." *JAMA Network Open* 4 (2): e210207. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=33635325>.

- McCarty, C. A., D. Zatzick, E. Stein, J. Wang, R. Hilt, and F. P. Rivara. 2016. “Collaborative Care for Adolescents With Persistent Postconcussive Symptoms: A Randomized Trial.” *Pediatrics* 138 (4): e20160459–e20160459. <https://doi.org/10.1542/peds.2016-0459>.
- McConnell, Blake, Tyler Duffield, Trevor Hall, Juan Piantino, Dylan Seitz, Daniel Soden, and Cydni Williams. 2019. “Post-Traumatic Headache After Pediatric Traumatic Brain Injury: Prevalence, Risk Factors, and Association With Neurocognitive Outcomes.” *Journal of Child Neurology* 35 (1): 63–70. <https://doi.org/10.1177/0883073819876473>.
- McCormick, Brandon F., Eric J. Connolly, and David V. Nelson. 2020. “Mild Traumatic Brain Injury as a Predictor of Classes of Youth Internalizing and Externalizing Psychopathology.” *Child Psychiatry and Human Development*, May. <https://doi.org/10.1007/s10578-020-00992-9>.
- McCrea, Michael, Kevin Guskiewicz, Christopher Randolph, William B Barr, Thomas A Hammeke, Stephen W Marshall, Matthew R Powell, Kwang Woo Ahn, Yanzhi Wang, and James P Kelly. 2013. “Incidence, Clinical Course, and Predictors of Prolonged Recovery Time Following Sport-Related Concussion in High School and College Athletes. [References].” *Journal of the International Neuropsychological Society* 19 (1): 22–33.
- McEvoy, Haley, David Borsook, and Scott A. Holmes. 2020. “Clinical Features and Sex Differences in Pediatric Post-Traumatic Headache: A Retrospective Chart Review at a Boston Area Concussion Clinic.” *Cephalalgia* 40 (7): 701–11. <https://doi.org/10.1177/0333102419896754>.
- McEvoy, Haley, David Borsook, Scott A. Holmes, McEvoy Haley, Borsook David, Holmes Scott A, Haley McEvoy, David Borsook, and Scott A. Holmes. 2019. “Clinical Features and Sex Differences in Pediatric Post-Traumatic Headache: A Retrospective Chart Review at a Boston Area Concussion Clinic.” *Cephalalgia* 0 (0): 1–11. <https://doi.org/10.1177/0333102419896754>.
- McGrath, Neal, and Janelle Eloi. 2019. “The Role of Neuropsychology in the Evaluation of Concussion.” *Seminars in Pediatric Neurology* 30 (July): 83–95. <https://doi.org/10.1016/j.spen.2019.03.013>.
- McGrath, Neal, Wayne M. Dinn, Michael W. Collins, Mark R. Lovell, R. J. Elbin, and Anthony P. Kontos. 2013a. “Post-Exertion Neurocognitive Test Failure among Student-Athletes Following Concussion.” *Brain Injury* 27 (1): 103–13. <https://doi.org/10.3109/02699052.2012.729282>.
- McGuine, Timothy A., Adam Y. Pfaller, Eric G. Post, Scott J. Hetzel, Alison Brooks, and Steven P. Broglio. 2018. “The Influence of Athletic Trainers on the Incidence and Management of Concussions in High School Athletes.” *Journal of Athletic Training* 53 (11): 1017–24. <https://doi.org/10.4085/1062-6050-209-18>.
- McGuire, Conrick Kelsey, Moore Megan, Abbotts Laurel, Widdice Laura, Hoag Samara, Kroshus Emily, Philipson Erik Bruce, et al. 2020. “Community-Engaged Approach to the Development and Implementation of a Student-Centered Return to Learn Care Plan After Concussion.” *The Journal of School Health* 90 (11): 842–48. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=32959394>.
- McKay, Carly D, Kathryn J Schneider, Brian L Brooks, Martin Mrazik, and Carolyn A Emery. 2014. “Baseline Evaluation in Youth Ice Hockey Players: Comparing Methods for

Documenting Prior Concussions and Attention or Learning Disorders.” *Journal of Orthopaedic & Sports Physical Therapy* 44 (5): 329–35. <https://doi.org/10.2519/jospt.2014.5053>.

Mckinlay, Audrey, Veronica Ligteringen, and Martin Than. 2014. “A Comparison of Concussive Symptoms Reported by Parents for Preschool versus School-Aged Children.” *Journal of Head Trauma Rehabilitation* 29 (3): 233–38. <https://doi.org/10.1097/HTR.0b013e3182a2dd7f>.

McNally, Kelly A., Kristina E. Patrick, Jacob E. LaFleur, Jana B. Dykstra, Kerry Monahan, and Kristen R. Hoskinson. 2018. “Brief Cognitive Behavioral Intervention for Children and Adolescents with Persistent Post-Concussive Symptoms: A Pilot Study.” *Child Neuropsychology* 24 (3): 396–412. <https://doi.org/10.1080/09297049.2017.1280143>.

Meehan, William P., Rebekah C. Mannix, Andrea Straccioli, R.J. Elbin, and Michael W. Collins. 2013. “Symptom Severity Predicts Prolonged Recovery after Sport-Related Concussion, but Age and Amnesia Do Not.” *The Journal of Pediatrics* 163 (3): 721–25. <https://doi.org/10.1016/j.jpeds.2013.03.012>.

Meehan, William P., Rebekah C. Mannix, Michael J. O’brien, and Michael W. Collins. 2013. “The Prevalence of Undiagnosed Concussions in Athletes.” *Clinical Journal of Sport Medicine* 23 (5): 339–42. <https://doi.org/10.1097/JSM.0b013e318291d3b3>.

Meehan, William P., Rebekah Mannix, Michael C. Monuteaux, Cynthia J. Stein, and Richard G. Bachur. 2014. “Early Symptom Burden Predicts Recovery after Sport-Related Concussion.” *Neurology* 83 (24): 2204–10. <https://doi.org/10.1212/WNL.0000000000001073>.

Meier, Timothy B., Lindsay D. Nelson, Daniel L. Huber, Jeffrey J. Bazarian, Ronald L. Hayes, and Michael A. McCrea. 2017. “Prospective Assessment of Acute Blood Markers of Brain Injury in Sport-Related Concussion.” *Journal of Neurotrauma* 1: neu.2017.5046. <https://doi.org/10.1089/neu.2017.5046>.

Melissa, Hunfalvay, Murray Nicholas P, and Carrick Frederick Robert. 2021. “Fixation Stability as a Biomarker for Differentiating Mild Traumatic Brain Injury from Age Matched Controls in Pediatrics.” *Brain Injury* 35 (2): 209–14. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=33356610>.

Melissa, Hunfalvay, Murray Nicholas P, Roberts Claire Marie, Tyagi Ankur, Barclay Kyle William, and Carrick Frederick Robert. 2020. “Oculomotor Behavior as a Biomarker for Differentiating Pediatric Patients With Mild Traumatic Brain Injury and Age Matched Controls.” *Frontiers in Behavioral Neuroscience* 14: 581819. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=33281574>.

Michael, Popovich, Almeida Andrea, Freeman Jeremiah, Eckner James T, Alsalaheen Bara, Lorincz Matthew, and Sas Andrew. 2021. “Use of Supervised Exercise During Recovery Following Sports-Related Concussion.” *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine* 31 (2): 127–32. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=30768444>.

Michael, Popovich, Almeida Andrea, Lorincz Matthew, Eckner James T, Freeman Jeremiah, Streicher Nicholas, and Alsalaheen Bara. 2021. “Does Exercise Increase Vestibular and Ocular

Motor Symptom Detection After Sport-Related Concussion?" *Journal of Neurologic Physical Therapy* : JNPT 45 (3): 214–20.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=33782346>.

Michael, Popovich, Sas Andrew, Almeida Andrea Ana, Freeman Jeremiah, Alsalaheen Bara, Lorincz Matthew, and Eckner James T. 2021. "Symptom Provocation During Aerobic and Dynamic Supervised Exercise Challenges in Adolescents With Sport-Related Concussion." *Journal of Athletic Training*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33428736>.

Mihalik, Jason P, Johna Register-Mihalik, Zachary Y Kerr, Stephen W Marshall, Michael C McCrea, and Kevin M Guskiewicz. 2013. "Recovery of Posttraumatic Migraine Characteristics in Patients after Mild Traumatic Brain Injury." *American Journal of Sports Medicine* 41 (7): 1490–96. <https://doi.org/10.1177/0363546513487982>.

Miller, Joseph H., Clarence Gill, Elizabeth N. Kuhn, Brandon G. Rocque, Joshua Y. Menendez, Jilian A. O'Neill, Bonita S. Agee, et al. 2016. "Predictors of Delayed Recovery Following Pediatric Sports-Related Concussion: A Case-Control Study." *Journal of Neurosurgery: Pediatrics* 17 (4): 491–96. <https://doi.org/10.3171/2015.8.PEDS14332>.

Molly, Winston, Zhou Amy, Rand Casey M, Dunne Emma C, Warner Justin J, Volpe Lena J, Pigneri Brooke A, et al. 2020. "Pupillometry Measures of Autonomic Nervous System Regulation with Advancing Age in a Healthy Pediatric Cohort." *Clinical Autonomic Research : Official Journal of the Clinical Autonomic Research Society* 30 (1): 43–51.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=31555934>.

Moor, H M, R C Eisenhauer, K D Killian, N Proudfoot, A A Henriques, J A Congeni, and J C Reneker. 2015. "The Relationship between Adherence Behaviors and Recovery Time in Adolescents after a Sports-Related Concussion: An Observational Study." *Int J Sports Phys Ther* 10 (2): 225–33.

Moran, Ryan N., and Tracey Covassin. 2018. "King-Devick Test Normative Reference Values and Internal Consistency in Youth Football and Soccer Athletes." *Scandinavian Journal of Medicine and Science in Sports* 28 (12): 2686–90. <https://doi.org/10.1111/sms.13286>.

Morgan, Anderson, R J Elbin, Schatz Philip, Henry Luke, and Covassin Tracey. 2021. "Comparing Before- and After-School Neurocognitive Performance in High School Athletes: Implications for Concussion Management." *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine* 31 (1): 31–35.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=33326199>.

Morgan, Clinton D, Scott L Zuckerman, Young M Lee, Lauren King, Susan Beird, Allen K Sills, and Gary S Solomon. 2015. "Predictors of Postconcussion Syndrome after Sports-Related Concussion in Young Athletes: A Matched Case-Control Study" 15 (June): 589–98.

<https://doi.org/10.3171/2014.10.PEDS14356.Disclosure>.

Morgan, Clinton D., Scott L. Zuckerman, Lauren E. King, Susan E. Beird, Allen K. Sills, and Gary S. Solomon. 2015. "Post-Concussion Syndrome (PCS) in a Youth Population: Defining

the Diagnostic Value and Cost-Utility of Brain Imaging.” *Child’s Nervous System* 31 (12): 2305–9. <https://doi.org/10.1007/s00381-015-2916-y>.

Moser, Rosemarie Scolaro, and Philip Schatz. 2017. “Increased Symptom Reporting in Young Athletes Based on History of Previous Concussions.” *Developmental Neuropsychology* 42 (4): 276–83. <https://doi.org/10.1080/87565641.2017.1334785>.

Moser, Rosemarie Scolaro, Lauren Olek, and Philip Schatz. 2019. “Gender Differences in Symptom Reporting on Baseline Sport Concussion Testing Across the Youth Age Span.” *Archives of Clinical Neuropsychology : The Official Journal of the National Academy of Neuropsychologists* 34 (1): 50–59. <https://doi.org/10.1093/arclin/acy007>.

Moser, Rosemarie Scolaro, Philip Schatz, Emily Grosner, and Kelly Kollias. 2017. “One Year Test–Retest Reliability of Neurocognitive Baseline Scores in 10- to 12-Year Olds.” *Applied Neuropsychology: Child* 6 (2): 166–71. <https://doi.org/10.1080/21622965.2016.1138310>.

Moser, Rosemarie Scolaro, Philip Schatz, Megan Glenn, Kelly E. Kollias, and Grant L. Iverson. 2015a. “Examining Prescribed Rest as Treatment for Adolescents Who Are Slow to Recover from Concussion.” *Brain Injury* 29 (1): 58–63. <https://doi.org/10.3109/02699052.2014.964771>.

Mrazik, Martin, Brian L. Brooks, Andrea Jubinville, Willem H. Meeuwisse, and Carolyn A. Emery. 2016. “Psychosocial Outcomes of Sport Concussions in Youth Hockey Players.” *Archives of Clinical Neuropsychology* 31 (4): 297–304. <https://doi.org/10.1093/arclin/acw013>.

Mucha, Anne, Michael W Collins, R J Elbin, Joseph M Furman, Cara Troutman-Enseki, Ryan M DeWolf, Greg Marchetti, and Anthony P Kontos. 2014. “A Brief Vestibular/Ocular Motor Screening (VOMS) Assessment to Evaluate Concussions.” *The American Journal of Sports Medicine* 42 (10): 2479–86. <https://doi.org/10.1177/0363546514543775>.

Munia, Tamanna T.K., Ali Haider, Charles Schneider, Mark Romanick, and Reza Fazel-Rezai. 2017. “A Novel EEG Based Spectral Analysis of Persistent Brain Function Alteration in Athletes with Concussion History.” *Scientific Reports* 7 (1): 1–13. <https://doi.org/10.1038/s41598-017-17414-x>.

Munro Cullum, C, L S Hynan, M Grosch, M Parikh, and M F Weiner. 2014. “Teleneuropsychology: Evidence for Video Teleconference-Based Neuropsychological Assessment.” *Journal of the International Neuropsychological Society : JINS*, Comment in: *J Am Geriatr Soc.* 2020 Jul;68(7):1387-1389; PMID: 32343394 [<https://www.ncbi.nlm.nih.gov/pubmed/32343394>], 20 (10): 1028–33. <https://doi.org/https://dx.doi.org/10.1017/S1355617714000873>.

Murata, Nathan M, Ross S Oshiro, Troy Furutani, Pauline Mashima, Emily Thibault, and Henry L Lew. 2019. “Hawai’i Concussion Awareness & Management Program (HCAMP): Impact.” *Hawai’i Journal of Medicine & Public Health : A Journal of Asia Pacific Medicine & Public Health* 78 (5): 155–62.

Murdaugh, Donna L., Kim E. Ono, Andrew Reisner, and Thomas G. Burns. 2018. “Assessment of Sleep Quantity and Sleep Disturbances During Recovery From Sports-Related Concussion in Youth Athletes.” *Archives of Physical Medicine and Rehabilitation* 99 (5): 960–66. <https://doi.org/10.1016/j.apmr.2018.01.005>.

Murdaugh, Donna L., Tricia Z. King, Binjian Sun, Richard A. Jones, Kim E. Ono, Andrew Reisner, and Thomas G. Burns. 2018. “Longitudinal Changes in Resting State Connectivity

and White Matter Integrity in Adolescents with Sports-Related Concussion.” *Journal of the International Neuropsychological Society* 24 (8): 781–92.  
<https://doi.org/10.1017/S1355617718000413>.

Murray, Nicholas G, V N Pradeep Ambati, Monica M Contreras, Anthony P Salvatore, and Rebecca J Reed-Jones. 2014. “Assessment of Oculomotor Control and Balance Post-Concussion: A Preliminary Study for a Novel Approach to Concussion Management.” *Brain Injury* 28 (4): 496–503. <https://doi.org/10.3109/02699052.2014.887144>.

Mutch, W. Alan C., Michael J. Ellis, Lawrence N. Ryner, Marc P. Morissette, Philip J. Pries, Brenden Dufault, Marco Essig, David J. Mikulis, James Duffin, and Joseph A. Fisher. 2016. “Longitudinal Brain Magnetic Resonance Imaging CO2 Stress Testing in Individual Adolescent Sports-Related Concussion Patients: A Pilot Study.” *Frontiers in Neurology* 7 (July): 1–8. <https://doi.org/10.3389/fneur.2016.00107>.

Mutch, W. Alan C., Michael J. Ellis, Lawrence N. Ryner, Patrick J. McDonald, Marc P. Morissette, Philip Pries, Marco Essig, David J. Mikulis, James Duffin, and Joseph A. Fisher. 2018. “Patient-Specific Alterations in CO2 Cerebrovascular Responsiveness in Acute and Sub-Acute Sports-Related Concussion.” *Frontiers in Neurology* 9 (JAN): 1–11.  
<https://doi.org/10.3389/fneur.2018.00023>.

Nadir, Haider M, Patel Kush S, Willer Barry S, Videira Victoria, Wilber Charles G, Mayer Andrew R, Master Christina L, et al. 2021. “Symptoms upon Postural Change and Orthostatic Hypotension in Adolescents with Concussion.” *Brain Injury* 35 (2): 226–32.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=prem&NEWS=N&AN=33459038>.

Nadir, Haider Mohammad, Cunningham Adam, Darling Scott, Suffoletto Heidi N, Freitas Michael S, Jain Rajiv K, Willer Barry, and Leddy John J. 2021. “Derivation of the Buffalo Concussion Physical Examination Risk of Delayed Recovery (RDR) Score to Identify Children at Risk for Persistent Postconcussive Symptoms.” *British Journal of Sports Medicine*.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34510003>.

Nathan, Ernst, Schatz Philip, Trbovich Alicia M, Emami Kouros, Eagle Shawn R, Mucha Anne, Collins Michael W, and Kontos Anthony P. 2020. “Utility of 1 Measurement Versus Multiple Measurements of Near Point of Convergence After Concussion.” *Journal of Athletic Training* 55 (8): 850–55.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32577736>.

Neal, McGrath, Dinn Wayne M, Collins Michael W, Lovell Mark R, R J Elbin, and Kontos Anthony P. 2013. “Post-Exertion Neurocognitive Test Failure among Student-Athletes Following Concussion.” *Brain Injury* 27 (1): 103–13.  
<https://doi.org/10.3109/02699052.2012.729282>.

Nelson, Eve-Lynn, Sharon Cain, and Susan Sharp. 2017. “Considerations for Conducting Telemental Health with Children and Adolescents.” *Child and Adolescent Psychiatric Clinics of North America* 26 (1): 77–91. <https://doi.org/https://dx.doi.org/10.1016/j.chc.2016.07.008>.

Nelson, Lindsay D., Adam Y. Pfaller, Lisa E. Rein, and Michael A. McCrea. 2015. “Rates and Predictors of Invalid Baseline Test Performance in High School and Collegiate Athletes for 3

Computerized Neurocognitive Tests: NAM, Axon Sports, and ImPACT.” *American Journal of Sports Medicine* 43 (8): 2018–26. <https://doi.org/10.1177/0363546515587714>.

Newcomer, R Renee, and Frank M Perna. 2003. “Adolescent Athletes.” *Journal of Athletic Training* 38 (2): 163–66.

Newman, Julie B., Jennifer H. Reesman, Christopher G. Vaughan, and Gerard A. Gioia. 2013. “Assessment of Processing Speed in Children with Mild Tbi: A ‘First Look’ at the Validity of Pediatric ImPACT.” *Clinical Neuropsychologist* 27 (5): 779–93. <https://doi.org/10.1080/13854046.2013.789552>.

Newsome, Mary R., Xiaoqi Li, Xiaodi Lin, Elisabeth A. Wilde, Summer Ott, Brian Biekman, Jill V. Hunter, Pramod K. Dash, Brian A. Taylor, and Harvey S. Levin. 2016. “Functional Connectivity Is Altered in Concussed Adolescent Athletes despite Medical Clearance to Return to Play: A Preliminary Report.” *Frontiers in Neurology* 7 (JUL): 1–9. <https://doi.org/10.3389/fneur.2016.00116>.

Nikles, Catherine J., Lynne McKinlay, Geoffrey K. Mitchell, Sue Ann S. Carmont, Hugh E. Senior, Mary Clare A. Waugh, Adrienne Epps, Philip J. Schluter, and Owen T. Lloyd. 2014. “Aggregated N-of-1 Trials of Central Nervous System Stimulants versus Placebo for Paediatric Traumatic Brain Injury - a Pilot Study.” *Trials* 15 (1): 1–11. <https://doi.org/10.1186/1745-6215-15-54>.

Noelle, Yumul Joy, Crowe Louise, Catroppa Cathy, Anderson Vicki, and McKinlay Audrey. 2021. “Post-Concussive Signs and Symptoms in Preschool Children: A Systematic Review.” *Neuropsychology Review*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34390464>.

Novak, Zuzana, Mary Aglipay, Nick Barrowman, Keith O. Yeates, Miriam H. Beauchamp, Jocelyn Gravel, Stephen B. Freedman, et al. 2016. “Association of Persistent Postconcussion Symptoms with Pediatric Quality of Life.” *JAMA Pediatrics* 170 (12): 1–8. <https://doi.org/10.1001/jamapediatrics.2016.2900>.

Nowacki, R., N. van Eldik, M. Eikens, R. Roijen, N. Haga, D. Schott, T. Simons-Sporcken, and M. Wennekes. 2017. “Evaluation of a Follow-up Program for Mild Traumatic Brain Injury in Schoolchildren.” *European Journal of Paediatric Neurology* 21 (2): 382–87. <https://doi.org/10.1016/j.ejpn.2016.10.009>.

O’Brien, Katy H. 2020. “Overcoming Knowledge Barriers for Inclusion of School-Based Speech-Language Pathologists in the Management of Students with Mild Traumatic Brain Injury.” *Seminars in Speech and Language* 41 (2): 195–208. <https://doi.org/10.1055/s-0040-1701687>.

O’Brien, Michael J, David R Howell, Michael J Pepin, and William P Meehan. 2017b. “Sport-Related Concussions: Symptom Recurrence after Return to Exercise.” *Orthopaedic Journal of Sports Medicine* 5 (10): 1–6. <https://doi.org/10.1177/2325967117732516>.

O’Brien, Michael J., David R. Howell, Michael J. Pepin, and William P. Meehan. 2017a. “Sport-Related Concussions: Symptom Recurrence After Return to Exercise.” *Orthopaedic Journal of Sports Medicine* 5 (10): 232596711773251. <https://doi.org/10.1177/2325967117732516>.

O'Rourke, Daniel J., Ronald E. Smith, Stephanie Punt, David B. Coppel, and David Breiger. 2017. "Psychosocial Correlates of Young Athletes' Self-Reported Concussion Symptoms during the Course of Recovery." *Sport, Exercise, and Performance Psychology* 6 (3): 262–76. <https://doi.org/10.1037/spy0000097>.

Offir, Laufer, Geva Amir, Ellis Jonathan D, Barber Foss, Kim, Ettinger Maayan, Stern Yaki, et al. 2020. "Prospective Longitudinal Investigation Shows Correlation of Event-Related Potential to Mild Traumatic Brain Injury in Adolescents." *Brain Injury* 34 (7): 871–80. <https://doi.org/10.1080/02699052.2020.1763459>.

Olson, Ashley, Michael J. Ellis, Erin Selci, Kelly Russell, Olson Ashley, Ellis Michael J, Selci Erin, and Russell Kelly. 2020. "Delayed Symptom Onset Following Pediatric Sport-Related Concussion." *Frontiers in Neurology* 11 (April): 1–8. <https://doi.org/10.3389/fneur.2020.00220>.

Orban, Sarah A, Jeffery N Epstein, Devon Carr, Kelsey Logan, Paul J Gubanich, Craig Sidol, and Gregory D Myer. 2020. "Attention-Deficit/Hyperactivity Disorder Status and Sex Moderate Mild Traumatic Brain Injury Symptom Severity in Children and Adolescents: Implications for Clinical Management." <https://doi.org/10.1097/JSM.0000000000000821>.

Oris, Charlotte, Bruno Pereira, Julie Durif, Jeanne Simon-Pimmel, Christoph Castellani, Sergio Manzano, Vincent Sapin, and Damien Bouvier. 2018. "The Biomarker S100b and Mild Traumatic Brain Injury: A Meta-Analysis." *Pediatrics* 141 (6). <https://doi.org/10.1542/peds.2018-0037>.

Orr, Catherine A., Matthew D. Albaugh, Richard Watts, Hugh Garavan, Trevor Andrews, Joshua P. Nickerson, Jay Gonyea, et al. 2016. "Neuroimaging Biomarkers of a History of Concussion Observed in Asymptomatic Young Athletes." *Journal of Neurotrauma* 33 (9): 803–10. <https://doi.org/10.1089/neu.2014.3721>.

Orr, Rhonda, Tina Bogg, Andrew Fyffe, Lawrence T. Lam, Gary J. Browne, Orr Rhonda, Bogg Tina, Fyffe Andrew, Lam Lawrence T, and Browne Gary J. 2018. "Graded Exercise Testing Predicts Recovery Trajectory of Concussion in Children and Adolescents." *Clinical Journal of Sport Medicine* 00 (00): 1. <https://doi.org/10.1097/jsm.0000000000000683>.

Ott, Summer, Philip Schatz, Gary Solomon, and Joseph J. Ryan. 2014. "Neurocognitive Performance and Symptom Profiles of Spanish-Speaking Hispanic Athletes on the Impact Test." *Archives of Clinical Neuropsychology* 1. Shi F, (2): 152–63. <https://doi.org/10.1093/arclin/act091>.

Oyefunmike, Oyegbile Temitayo, Delasobera Bronson Elizabeth, Zecavati Nassim, Temitayo Oyefunmike Oyegbile, Bronson Elizabeth Delasobera, and Nassim Zecavati. 2018. "Postconcussive Symptoms After Single and Repeated Concussions in 10- to 20-Year-Olds: A Cross-Sectional Study." *Journal of Child Neurology* 33 (6): 383–88. <https://doi.org/10.1177/0883073818759436>.

Oyefunmike, Oyegbile Temitayo, Dougherty Andrew, Tanveer Sarah, Zecavati Nassim, and Delasobera Bronson Elizabeth. 2020. "High Sleep Disturbance and Longer Concussion Duration in Repeat Concussions." *Behavioral Sleep Medicine* 18 (2): 241–48. <https://doi.org/10.1080/15402002.2019.1578223>.

Oyegbile, Temitayo Oyefunmike, Andrew Dougherty, Sarah Tanveer, Nassim Zecavati, and Bronson Elizabeth Delasobera. 2020. "High Sleep Disturbance and Longer Concussion

Duration in Repeat Concussions.” Behavioral Sleep Medicine 18 (2): 241–48.

<https://doi.org/10.1080/15402002.2019.1578223>.

Ozinga, Sarah J., Susan M. Linder, Mandy Miller Koop, Tanujit Dey, Richard Figler, Andrew N. Russman, Richard So, Alan H. Rosenthal, Jason Cruickshank, and Jay L. Alberts. 2018. “Normative Performance on the Balance Error Scoring System by Youth, High School, and Collegiate Athletes.” Journal of Athletic Training 53 (7): 636–45. <https://doi.org/10.4085/1062-6050-129-17>.

Paniccia, M, C Ippolito, S McFarland, J Murphy, and N Reed. 2020b. “Health-Related Quality of Life in Non-Concussed Children: A Normative Study to Inform Concussion Management.” Developmental Neurorehabilitation 23 (8): 534–41. <https://doi.org/10.1080/17518423.2020.1736683>.

Paniccia, M., C. Ippolito, S. McFarland, J. Murphy, and N. Reed. 2020a. “Health-Related Quality of Life in Non-Concussed Children: A Normative Study to Inform Concussion Management.” Developmental Neurorehabilitation 23 (8): 534–41. <https://doi.org/10.1080/17518423.2020.1736683>.

Papa, Linda, Manoj K Mittal, Jose Ramirez, Michelle Ramia, Sara Kirby, Salvatore Silvestri, Philip Giordano, et al. 2016. “In Children and Youth with Mild and Moderate Traumatic Brain Injury, Glial Fibrillary Acidic Protein Out-Performs S100β in Detecting Traumatic Intracranial Lesions on Computed Tomography.” Journal of Neurotrauma 33 (1): 58–64. <https://doi.org/10.1089/neu.2015.3869>.

Papa, Linda, Manoj K. Mittal, Jose Ramirez, Salvatore Silvestri, Philip Giordano, Carolina F. Braga, Ciara N. Tan, et al. 2017. “Neuronal Biomarker Ubiquitin C-Terminal Hydrolase Detects Traumatic Intracranial Lesions on Computed Tomography in Children and Youth with Mild Traumatic Brain Injury.” Journal of Neurotrauma 34 (13): 2132–40. <https://doi.org/10.1089/neu.2016.4806>.

Papa, Linda, Mark R Zonfrillo, Robert D Welch, Lawrence M Lewis, Carolina F Braga, Ciara N Tan, Neema J Ameli, et al. 2019. “Evaluating Glial and Neuronal Blood Biomarkers GFAP and UCH-L1 as Gradients of Brain Injury in Concussive, Subconcussive and Non-Concussive Trauma: A Prospective Cohort Study.” BMJ Paediatrics Open 3 (1): e000473. <https://doi.org/10.1136/bmjpo-2019-000473>.

Parkin, Georgia M., Cathriona Clarke, Michael Takagi, Stephen Hearps, Franz E. Babl, Gavin A. Davis, Vicki Anderson, and Vera Ignjatovic. 2019. “Plasma Tumor Necrosis Factor Alpha Is a Predictor of Persisting Symptoms Post-Concussion in Children.” Journal of Neurotrauma 36 (11): 1768–75. <https://doi.org/10.1089/neu.2018.6042>.

Pasek, Tracy Annz, Lisa W. Locasto, Joseph Reichard, Vanessa C. Fazio Sumrok, Eric W. Johnson, and Anthony P. Kontos. 2015. “The Headache Electronic Diary for Children with Concussion.” Clinical Nurse Specialist 29 (2): 80–88. <https://doi.org/10.1097/NUR.000000000000108>.

Patrick, Grabowski, Wilson John, Walker Alyssa, Enz Dan, and Wang Sijian. 2017. “Multimodal Impairment-Based Physical Therapy for the Treatment of Patients with Post-Concussion Syndrome: A Retrospective Analysis on Safety and Feasibility.” Physical Therapy in Sport 23 (January): 22–30. <https://doi.org/10.1016/j.ptsp.2016.06.001>.

- Patsimas, Tatiana, David R. Howell, Morgan N. Potter, Aaron J. Provance, Michael W. Kirkwood, Julie C. Wilson, Patsimas Tatiana, et al. 2020. "Concussion-Symptom Rating Correlation between Pediatric Patients and Their Parents." *Journal of Athletic Training* 55 (10): 1020–26. <https://doi.org/10.4085/1062-6050-200-19>.
- Pavlou, Marousa, Susan L. Whitney, Abdulaziz A. Alkathiry, Marian Huett, Linda M. Luxon, Ewa Raglan, Emma L. Godfrey, and Doris Eva Bamiou. 2017. "Visually Induced Dizziness in Children and Validation of the Pediatric Visually Induced Dizziness Questionnaire." *Frontiers in Neurology* 8 (DEC): 1–9. <https://doi.org/10.3389/fneur.2017.00656>.
- Pawlukiewicz, Alec, Aaron M. Yengo-Kahn, and Gary Solomon. 2017. "The Effect of Pretest Exercise on Baseline Computerized Neurocognitive Test Scores." *Orthopaedic Journal of Sports Medicine* 1. Shi F, (10): 1–6. <https://doi.org/10.1177/2325967117734496>.
- Pearce, Kelly L, Alicia Sufrinko, Brian C Lau, Luke Henry, Michael W Collins, and Anthony P Kontos. 2015. "Near Point of Convergence After a Sport-Related Concussion." *The American Journal of Sports Medicine* 43 (12): 3055–61. <https://doi.org/10.1177/0363546515606430>.
- Pearson, Rachel, Desiree Levyim, Meeryo Choe, Sharief Taraman, and Raquel Langdon. 2019. "Survey of Child Neurologists on Management of Pediatric Post-Traumatic Headache." *Journal of Child Neurology* 34 (12): 739–47. <https://doi.org/10.1177/0883073819856837>.
- Peltonen, Kati, Matti Vartiainen, Tiina Laitala-Leinonen, Sanna Koskinen, Teemu Luoto, Jon Pertab, and Laura Hokkanen. 2019. "Adolescent Athletes with Learning Disability Display Atypical Maturational Trajectories on Concussion Baseline Testing: Implications Based on a Finnish Sample." *Child Neuropsychology* 25 (3): 336–51. <https://doi.org/10.1080/09297049.2018.1474865>.
- Peterson, Robin L., Amy K. Connery, David A. Baker, and Michael W. Kirkwood. 2015. "Preinjury Emotional-Behavioral Functioning of Children With Lingering Problems After Mild Traumatic Brain Injury." *The Journal of Neuropsychiatry and Clinical Neurosciences* 27 (4): 280–86. <https://doi.org/10.1176/appi.neuropsych.14120373>.
- Pieper, Pam, and Cynthia Garvan. 2014. "Health-Related Quality-of-Life in the First Year Following a Childhood Concussion." *Brain Injury* 28 (1): 105–13. <https://doi.org/10.3109/02699052.2013.847208>.
- Plourde, Vickie, Hussain Daya, Trevor A. Low, Karen M. Barlow, and Brian L. Brooks. 2019. "Evaluating Anxiety and Depression Symptoms in Children and Adolescents with Prior Mild Traumatic Brain Injury: Agreement between Methods and Respondents." *Child Neuropsychology* 25 (1): 44–59. <https://doi.org/10.1080/09297049.2018.1432585>.
- Plourde, Vickie, Janice Y. Kung, Allison Gates, Shelly Jun, Brian L. Brooks, Meghan Sebastiani, Plourde Vickie, et al. 2020. "How Perceptions Impact Recovery from Concussion in Childhood and Adolescence: A Systematic Review." *Neuropsychology Review* 30 (1): 142–63. <https://doi.org/10.1007/s11065-020-09430-y>.
- Porter, Shaun, Jenna Smith-Forrester, Najah Alhajri, Cody Kusch, Jonathan Sun, Bill Barrable, William J Panenka, and Naznin Virji-Babul. 2015. "The Child Sport Concussion Assessment Tool (Child SCAT3): Normative Values and Correspondence between Child and Parent Symptom Scores in Male Child Athletes." *BMJ Open Sport and Exercise Medicine* 1 (1): 1–6. <https://doi.org/10.1136/bmjsem-2015-000029>.

- Povolo, Christopher A., Jennifer N. Reid, Salimah Z. Shariff, Blayne Welk, and Sarah A. Morrow. 2020. "Concussion in Adolescence and the Risk of Multiple Sclerosis: A Retrospective Cohort Study." *Multiple Sclerosis Journal*, February, 135245852090803. <https://doi.org/10.1177/1352458520908037>.
- Poysophon, Poyrung, and Ashwin L. Rao. 2018. "Neurocognitive Deficits Associated With ADHD in Athletes: A Systematic Review." *Sports Health* 10 (4): 317–26. <https://doi.org/10.1177/1941738117751387>.
- Priyanka, Madaan, Gupta Deepak, Agrawal Deepak, Kumar Atin, Jauhari Prashant, Chakrabarty Biswaroop, Sharma Shobha, et al. 2021. "Neurocognitive Outcomes and Their Diffusion Tensor Imaging Correlates in Children With Mild Traumatic Brain Injury." *Journal of Child Neurology*, 883073821996095. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33624545>.
- Pulsipher Dalin, Rettig Eman K, Krapf Erica M, and Stanford Lisa D. 2021. "A Cross-Sectional Cohort Study of Post-Concussive Symptoms and Their Relationships with Depressive Symptoms in Youth with and without Concussion." *Brain Injury* 35 (8): 964–70. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=34184599>.
- Purcell, Laura K., Gavin A. Davis, and Gerard A. Gioia. 2019. "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* 53 (4): 250–250. <https://doi.org/10.1136/bjsports-2017-097853>.
- Quatman-Yates, Catherine C., Scott Bonnette, Jason A. Hugentobler, Butovens Médé, Adam W. Kiefer, Brad G. Kurowski, and Michael A. Riley. 2015. "Postconcussion Postural Sway Variability Changes in Youth: The Benefit of Structural Variability Analyses." *Pediatric Physical Therapy* 27 (4): 316–27. <https://doi.org/10.1097/PEP.0000000000000193>.
- Quatman-Yates, Catherine, Jason Hugentobler, Robin Ammon, Najima Mwase, Brad Kurowski, and Gregory D. Myer. 2014. "The Utility of the Balance Error Scoring System for Mild Brain Injury Assessments in Children and Adolescents." *Physician and Sportsmedicine* 42 (3): 32–38. <https://doi.org/10.3810/psm.2014.09.2073>.
- Quinn de Launay, Keelia, Martino Amanda, Riggs Lily, Reed Nick, and Beal Deryk S. 2021. "Pediatric Concussion Working Memory Outcomes: A Scoping Review." *Brain Injury*, 1–13. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34506212>.
- Rabinowitz, Amanda R., Xiaoqi Li, Stephen R. McCauley, Elisabeth A. Wilde, Amanda Barnes, Gerri Hanten, Donna Mendez, James J. McCarthy, and Harvey S. Levin. 2015. "Prevalence and Predictors of Poor Recovery from Mild Traumatic Brain Injury." *Journal of Neurotrauma* 32 (19): 1488–96. <https://doi.org/10.1089/neu.2014.3555>.
- Raghuram, Aparna, Susan A. Cotter, Sowjanya Gowrisankaran, Jameel Kanji, David R. Howell, William P. Meehan, and Ankoor S. Shah. 2019. "Postconcussion: Receded Near Point of Convergence Is Not Diagnostic of Convergence Insufficiency." *American Journal of Ophthalmology* 206 (October): 235–44. <https://doi.org/10.1016/j.ajo.2019.04.008>.

Raji, Cyrus A., Maxwell B. Wang, Nhu Nhu Nguyen, Julia P. Owen, Eva M. Palacios, Esther L. Yuh, and Pratik Mukherjee. 2020. "Connectome Mapping with Edge Density Imaging Differentiates Pediatric Mild Traumatic Brain Injury from Typically Developing Controls: Proof of Concept." *Pediatric Radiology* 50 (11): 1594–1601. <https://doi.org/10.1007/s00247-020-04743-9>.

Ransom, D. M., C. G. Vaughan, L. Pratson, M. D. Sady, C. A. McGill, and G. A. Gioia. 2015. "Academic Effects of Concussion in Children and Adolescents." *PEDIATRICS* 135 (6): 1043–50. <https://doi.org/10.1542/peds.2014-3434>.

Ransom, Danielle M., Alison R. Burns, Eric A. Youngstrom, Christopher G. Vaughan, Maegan D. Sady, and Gerard A. Gioia. 2016a. "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): 1038–49. <https://doi.org/10.1017/S1355617716000916>.

Ransom, Danielle M., Christopher G. Vaughan, Lincoln Pratson, Maegan D. Sady, Catherine A. McGill, and Gerard A. Gioia. 2015. "Academic Effects of Concussion in Children and Adolescents." *Pediatrics* 135 (6): 1043–50. <https://doi.org/10.1542/peds.2014-3434>.

Rausa, Vanessa C., Jesse Shapiro, Marc L. Seal, Gavin A. Davis, Vicki Anderson, Franz E. Babl, Ryan Veal, Georgia Parkin, Nicholas P. Ryan, and Michael Takagi. 2020. "Neuroimaging in Paediatric Mild Traumatic Brain Injury: A Systematic Review." *Neuroscience & Biobehavioral Reviews* 118 (November): 643–53. <https://doi.org/10.1016/j.neubiorev.2020.08.017>.

Rebecca, Ludwig, D'Silva Linda, Vaduvathiriyana Prasanna, Rippee Michael A, and Siengsukon Catherine. 2020. "Sleep Disturbances in the Acute Stage of Concussion Are Associated With Poorer Long-Term Recovery: A Systematic Review." *PM and R* 12 (5): 500–511. <https://doi.org/10.1002/pmrj.12309>.

Rebecca, Ludwig, Nelson Eryen, Vaduvathiriyana Prasanna, Rippee Michael A, and Siengsukon Catherine. 2021. "Sleep Quality in the Chronic Stage of Concussion Is Associated with Poorer Recovery: A Systematic Review." *Journal of Concussion* 5 (January): 20597002211020880. <https://doi.org/10.1177/20597002211020881>.

Rebekah, Mannix, Levy Rachel, Zemek Roger, Yeates Keith Owen, Arbogast Kristy, Meehan William P, Leddy John, et al. 2020. "Fluid Biomarkers of Pediatric Mild Traumatic Brain Injury: A Systematic Review." *Journal of Neurotrauma* 37 (19): 2029–44. <https://doi.org/10.1089/neu.2019.6956>.

Rebekah, Mannix, Zemek Roger, Yeates Keith Owen, Arbogast Kristy, Atabaki Shireen, Badawy Mohammed, Beauchamp Miriam H, et al. 2019. "Practice Patterns in Pharmacological and Non-Pharmacological Therapies for Children with Mild Traumatic Brain Injury: A Survey of 15 Canadian and United States Centers." *Journal of Neurotrauma* 36 (20): 2886–94. <https://doi.org/10.1089/neu.2018.6290>.

Reches, A., J. Kutcher, R. J. Elbin, H. Or-Ly, B. Sadeh, J. Greer, D. J. McAllister, A. Geva, and A. P. Kontos. 2017. "Preliminary Investigation of Brain Network Activation (BNA) and Its Clinical Utility in Sport-Related Concussion." *Brain Injury* 31 (2): 237–46. <https://doi.org/10.1080/02699052.2016.1231343>.

Reddy, Cara Camiolo, Michael Collins, Mark Lovell, and Anthony P. Kontos. 2013. “Efficacy of Amantadine Treatment on Symptoms and Neurocognitive Performance among Adolescents Following Sports-Related Concussion.” *Journal of Head Trauma Rehabilitation* 28 (4): 260–65. <https://doi.org/10.1097/HTR.0b013e318257fbc6>.

Reed, N., T. Taha, G. Monette, and M. Keightley. 2016. “A Preliminary Exploration of Concussion and Strength Performance in Youth Ice Hockey Players.” *International Journal of Sports Medicine* 37 (9): 708–13. <https://doi.org/10.1055/s-0042-104199>.

Reesman, Jennifer, Jill Pineda, Jenny Carver, Patrick J Brice, T Andrew Zabel, and Philip Schatz. 2016. “Utility of the ImPACT Test with Deaf Adolescents.” *Clinical Neuropsychologist* 1. Shi F, (2): 318–27. <https://doi.org/10.1080/13854046.2016.1142613>.

Register-Mihalik, Johna K., Valerie J. De Maio, Holly L. Tibbo-Valeriotte, and John D. Wooten. 2014. “Characteristics of Pediatric and Adolescent Concussion Clinic Patients With Postconcussion Amnesia.” *Clinical Journal of Sport Medicine* 27599: 1. <https://doi.org/10.1097/JSM.0000000000000161>.

Renaud, M Irene, Carina Klees, Jolanda C M van Haastregt, Coriene E Catsman-Berrevoets, Ingrid G L van de Port, Suzanne A M Lambregts, and Caroline M van Heugten. 2020. “Process Evaluation of ‘Brains Ahead!’: An Intervention for Children and Adolescents with Mild Traumatic Brain Injury within a Randomized Controlled Trial.” *Clinical Rehabilitation* 34 (5): 688–97. <https://doi.org/10.1177/0269215520911439>.

Renaud, M. Irene, Suzanne A.M. Lambregts, Ingrid G.L. van de Port, Coriene E. Catsman-Berrevoets, and Caroline M. van Heugten. 2020. “Predictors of Activities and Participation Six Months after Mild Traumatic Brain Injury in Children and Adolescents.” *European Journal of Paediatric Neurology* 25 (March): 145–56. <https://doi.org/10.1016/j.ejpn.2019.11.008>.

Reynolds, Erin, Vanessa C. Fazio, Natalie Sandel, Philip Schatz, and Luke C. Henry. 2016. “Cognitive Development and the Immediate Postconcussion Assessment and Cognitive Testing: A Case for Separate Norms in Preadolescents.” *Applied Neuropsychology: Child* 5 (4): 283–93. <https://doi.org/10.1080/21622965.2015.1057637>.

Rhine, Tara D., Terri L. Byczkowski, Ross A. Clark, and Lynn Babcock. 2016. “Investigating the Feasibility and Utility of Bedside Balance Technology Acutely after Pediatric Concussion: A Pilot Study.” *Clinical Journal of Sport Medicine* 26 (3): 221–25. <https://doi.org/10.1097/JSM.0000000000000234>.

Rhine, Tara, Catherine Quatman-Yates, and Ross A Clark. 2017. “A Longitudinal Examination of Postural Impairments in Children with Mild Traumatic Brain Injury: Implications for Acute Testing.” *Journal of Head Trauma Rehabilitation* 32 (2): E18--E23. <https://doi.org/10.1097/HTR.0000000000000192>.

Rhine, Tara, Lynn Babcock, Nanhua Zhang, James Leach, and Shari L. Wade. 2016. “Are UCH-L1 and GFAP Promising Biomarkers for Children with Mild Traumatic Brain Injury?” *Brain Injury* 30 (10): 1231–38. <https://doi.org/10.1080/02699052.2016.1178396>.

Richard, Lowry, Haarbauer-Krupa Juliet K, Breiding Matthew J, Thigpen Sally, Rasberry Catherine N, and Lee Sarah M. 2019. “Concussion and Academic Impairment Among U.S. High School Students” 57 (6): 733–40.

Rieger, Brian P., Lawrence J. Lewandowski, James M. Callahan, Laura Spenceley, Adrea Truckenmiller, Rebecca Gathje, and Laura A. Miller. 2013. “A Prospective Study of Symptoms

- and Neurocognitive Outcomes in Youth with Concussion vs Orthopaedic Injuries.” *Brain Injury* 27 (2): 169–78. <https://doi.org/10.3109/02699052.2012.729290>.
- Robyn, Feiss, Lutz Molly, Reiche Elaine, Moody Justin, Pangelinan Melissa, Robyn Feiss, Molly Lutz, Elaine Reiche, Justin Moody, and Melissa Pangelinan. 2020. “A Systematic Review of the Effectiveness of Concussion Education Programs for Coaches and Parents of Youth Athletes.” *International Journal of Environmental Research and Public Health* 17 (8): 2665. <https://doi.org/10.3390/ijerph17082665>.
- Rocha, Piedade Sergio, Hutchinson Mark R, Ferreira Daniel Miranda, Cristante Alexandre Fogaca, and Maffulli Nicola. 2021. “The Management of Concussion in Sport Is Not Standardized. A Systematic Review.” *Journal of Safety Research* 76: 262–68. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=mexx&NEWS=N&AN=33653558>.
- Rocheffort, Coralie, Coren Walters-Stewart, Mary Aglipay, Nick Barrowman, Roger Zemek, and Heidi Sveistrup. 2017a. “Balance Markers in Adolescents at 1 Month Postconcussion.” *Orthopaedic Journal of Sports Medicine* 5 (3): 1–7. <https://doi.org/10.1177/2325967117695507>.
- Rodriguez Amanda, Chiao Jonathan, and Spencer Gretchen. 2021. “Vestibular-Evoked Myogenic Potential Outcomes Associated with Pediatric Sports-Related Concussion.” *The Laryngoscope*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34363397>.
- Root, Jeremy M., Noel S. Zuckerbraun, Li Wang, Daniel G. Winger, David Brent, Anthony Kontos, and Robert W. Hickey. 2016. “History of Somatization Is Associated with Prolonged Recovery from Concussion.” *Journal of Pediatrics* 174: 39-44.e1. <https://doi.org/10.1016/j.jpeds.2016.03.020>.
- Rose, Sean C., Caroline E. Schaffer, Julie A. Young, Kelly A. McNally, Anastasia N. Fischer, and Geoffrey L. Heyer. 2017. “Utilization of Conventional Neuroimaging Following Youth Concussion.” *Brain Injury* 31 (2): 260–66. <https://doi.org/10.1080/02699052.2016.1235285>.
- Rossi, Gianluca Del, Thomas Anania, and Rebecca M. Lopez. 2020. “Early Aerobic Exercise for the Treatment of Acute Pediatric Concussions.” *Journal of Athletic Training* 55 (7): 649–57. <https://doi.org/10.4085/1062-6050-404-19>.
- Roth, David E, Ujjwal Ramtekkar, and Sofija Zekovic-Roth. 2019. “Telepsychiatry: A New Treatment Venue for Pediatric Depression.” *Child and Adolescent Psychiatric Clinics of North America* 28 (3): 377–95. <https://doi.org/https://dx.doi.org/10.1016/j.chc.2019.02.007>.
- Rozbacher, Adrian, Erin Selci, Jeff Leiter, Michael Ellis, and Kelly Russell. 2017. “The Effect of Concussion or Mild Traumatic Brain Injury on School Grades, National Examination Scores, and School Attendance: A Systematic Review.” *Journal of Neurotrauma* 34 (14): 2195–2203. <https://doi.org/10.1089/neu.2016.4765>.
- Ruikang, Liu, and Hicks Steven D. 2021. “Discrepancies in Child and Parent Reporting of Concussion Symptoms.” *Brain Injury*, 1–7. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33646888>.

Russell, Kelly, Erin Selci, Brian Black, and Michael J. Ellis. 2019. “Health-Related Quality of Life Following Adolescent Sports-Related Concussion or Fracture: A Prospective Cohort Study.” *Journal of Neurosurgery: Pediatrics* 23 (4): 455–64.

<https://doi.org/10.3171/2018.8.PEDS18356>.

Russell, Kelly, Erin Selci, Brian Black, Karis Cochrane, and Michael Ellis. 2019. “Academic Outcomes Following Adolescent Sport-Related Concussion or Fracture Injury: A Prospective Cohort Study.” *PLoS ONE* 14 (4): 1–14. <https://doi.org/10.1371/journal.pone.0215900>.

Russell, Kelly, Erin Selci, Stephanie Chu, Samuel Fineblit, Lesley Ritchie, and Michael J. Ellis. 2017. “Longitudinal Assessment of Health-Related Quality of Life Following Adolescent Sports-Related Concussion.” *Journal of Neurotrauma* 34 (13): 2147–53.

<https://doi.org/10.1089/neu.2016.4704>.

Russell, Kelly, Michael G. Hutchison, Erin Selci, Jeff Leiter, Daniel Chateau, and Michael J. Ellis. 2016a. “Academic Outcomes in High-School Students after a Concussion: A Retrospective Population-Based Analysis.” *PLoS ONE* 11 (10): 1–12.

<https://doi.org/10.1371/journal.pone.0165116>.

Ryan Nicholas, Catroppa Cathy, Beare Richard, Coleman Lee, Ditchfield Michael, Crossley Louise, Beauchamp Miriam H, and Anderson Vicki A. 2015. “Predictors of Longitudinal Outcome and Recovery of Pragmatic Language and Its Relation to Externalizing Behaviour after Pediatric Traumatic Brain Injury.” *Brain and Language* 142 (March): 86–95.

<https://doi.org/10.1016/j.bandl.2015.01.007>.

Ryan, Nicholas P., Cathy Catroppa, Richard Beare, Lee Coleman, Michael Ditchfield, Louise Crossley, Miriam H. Beauchamp, and Vicki A. Anderson. 2015a. “Predictors of Longitudinal Outcome and Recovery of Pragmatic Language and Its Relation to Externalizing Behaviour after Pediatric Traumatic Brain Injury.” *Brain and Language* 142: 86–95.

<https://doi.org/10.1016/j.bandl.2015.01.007>.

Ryan, Nicholas P., Loeka van Bijnen, Cathy Catroppa, Miriam H. Beauchamp, Louise Crossley, Stephen Hearps, and Vicki Anderson. 2016. “Longitudinal Outcome and Recovery of Social Problems after Pediatric Traumatic Brain Injury (TBI): Contribution of Brain Insult and Family Environment.” *International Journal of Developmental Neuroscience* 49: 23–30.

<https://doi.org/10.1016/j.ijdevneu.2015.12.004>.

Sady, Maegan D., Christopher G. Vaughan, and Gerard A. Gioia. 2014. “Psychometric Characteristics of the Postconcussion Symptom Inventory in Children and Adolescents.” *Archives of Clinical Neuropsychology* 29 (4): 348–63. <https://doi.org/10.1093/arclin/acu014>.

Sage, Natalie Le, Pier Alexandre Tardif, Jérôme Frenette, Marcel Émond, Jean Marc Chauny, Lynne Moore, Patrick Archambault, Jeffrey Perry, and Antoine Boulanger-Piette. 2019. “Detection of S-100 $\beta$  Protein in Plasma and Urine after a Mild Traumatic Brain Injury.” *Canadian Journal of Neurological Sciences* 46 (5): 599–602.

<https://doi.org/10.1017/cjn.2019.61>.

Saleem Ghazala, Slomine Beth S, and Suskauer Stacy J. 2020. “Sleep Symptoms Predict School Attendance After Pediatric Concussion.” *Clinical Pediatrics* 59 (6): 580–87.

<https://doi.org/10.1177/0009922820913960>.

Saleem, Ghazala T., Beth S. Slomine, and Stacy J. Suskauer. 2020. "Sleep Symptoms Predict School Attendance After Pediatric Concussion." *Clinical Pediatrics* 59 (6): 580–87. <https://doi.org/10.1177/0009922820913960>.

Salinas, Christine M., Preston Dean, Anthony LoGalbo, Michael Dougherty, Melvin Field, and Frank M. Webbe. 2016. "Attention-Deficit Hyperactivity Disorder Status and Baseline Neurocognitive Performance in High School Athletes." *Applied Neuropsychology: Child* 5 (4): 264–72. <https://doi.org/10.1080/21622965.2015.1052814>.

Salmon, Danielle M., Jody McGowan, S. John Sullivan, Ian Murphy, Simon Walters, Chris Whatman, Sierra Keung, Amanda Clacy, and Janelle Romanchuk. 2020. "What They Know and Who They Are Telling: Concussion Knowledge and Disclosure Behaviour in New Zealand Adolescent Rugby Union Players." *Journal of Sports Sciences* 38 (14): 1585–94. <https://doi.org/10.1080/02640414.2020.1749409>.

Saluja, Rajeet Singh, Jen Kai Chen, Isabelle J. Gagnon, Michelle Keightley, and Alain Ptito. 2015. "Navigational Memory Functional Magnetic Resonance Imaging: A Test for Concussion in Children." *Journal of Neurotrauma* 32 (10): 712–22. <https://doi.org/10.1089/neu.2014.3470>.

Samantha, Schilling, Mansour Adam, Sullivan Lindsay, Ding Kele, Pommering Thomas, and Yang Jingzhen. 2020. "Symptom Burden and Profiles in Concussed Children with and without Prolonged Recovery." *International Journal of Environmental Research and Public Health* 17 (1). <https://doi.org/10.3390/ijerph17010351>.

Sambasivan, Krithika, Lisa Grilli, and Isabelle Gagnon. 2015. "Balance and Mobility in Clinically Recovered Children and Adolescents after a Mild Traumatic Brain Injury." *Journal of Pediatric Rehabilitation Medicine* 8 (4): 335–44. <https://doi.org/10.3233/PRM-150351>.

Sandel, Natalie K., Philip Schatz, Kenneth B. Goldberg, and Mary Lazar. 2017. "Sex-Based Differences in Cognitive Deficits and Symptom Reporting among Acutely Concussed Adolescent Lacrosse and Soccer Players." *American Journal of Sports Medicine* 45 (4): 937–44. <https://doi.org/10.1177/0363546516677246>.

Sandel, Natalie K., Phillip R. Worts, Scott Burkhart, and Luke Henry. 2018. "Comparison of Baseline ImPACT Performance in Amateur Motocross Riders to Football and Basketball Athletes." *Brain Injury* 32 (4): 493–97. <https://doi.org/10.1080/02699052.2018.1429020>.

Santo, Ashley, Robert C. Lynall, Kevin M. Guskiewicz, and Jason P. Mihalik. 2017. "Clinical Utility of the Sport Concussion Assessment Tool 3 (SCAT3) Tandem-Gait Test in High School Athletes." *Journal of Athletic Training* 52 (12): 1096–1100. <https://doi.org/10.4085/1062-6050-52.11.26>.

Sarah, Gibson, Nigrovic Lise E, O'Brien Michael, and Meehan William P. 2013. "The Effect of Recommending Cognitive Rest on Recovery from Sport-Related Concussion." *Brain Injury* 27 (7–8): 839–42. <https://doi.org/10.3109/02699052.2013.775494>.

Sarah, Reinking, Seehusen Corrine N, Walker Gregory A, Wilson Julie C, and Howell David R. 2021. "Transitory Kinesiophobia after Sport-Related Concussion and Its Correlation with Reaction Time." *Journal of Science and Medicine in Sport*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34404602>.

Sarmiento, Kelly, Jill Daugherty, and Lara DePadilla. 2019. "Youth and High School Sports Coaches' Experience with and Attitudes about Concussion and Access to Athletic Trainers by

Sport Type and Age of Athlete Coached.” *Journal of Safety Research* 69 (June): 217–25.  
<https://doi.org/10.1016/j.jsr.2019.01.005>.

Sarmiento, Kelly, Zoe Donnell, Elizabeth Bell, and Rosanne Hoffman. 2019. “From the CDC: A Qualitative Study of Middle and High School Professionals’ Experiences and Views on Concussion: Identifying Opportunities to Support the Return to School Process.” *Journal of Safety Research* 68 (February): 223–29. <https://doi.org/10.1016/j.jsr.2018.10.010>.

Sarmiento, Kelly, Zoe Donnell, Elizabeth Bell, Bethany Tennant, and Rosanne Hoffman. 2019. “A Qualitative Study of Barriers and Opportunities for Concussion Communication and Management among Parents of Youth Sports Athletes.” *Journal of Concussion* 3 (January): 205970021986186. <https://doi.org/10.1177/2059700219861863>.

Satchell, Emma K., Seth D. Friedman, Viviana Bompadre, Andrew Poliakov, Assaf Oron, and Thomas M. Jinguji. 2019. “Use of Diffusion Tensor Imaging in the Evaluation of Pediatric Concussions.” *Musculoskeletal Science and Practice* 42 (July): 162–65.  
<https://doi.org/10.1016/j.msksp.2019.05.002>.

Schatz, Philip, and Stacey Robertshaw. 2014. “Comparing Post-Concussive Neurocognitive Test Data to Normative Data Presents Risks for under-Classifying ‘above Average’ Athletes.” *Archives of Clinical Neuropsychology* 1. Shi F, (7): 625–32.  
<https://doi.org/10.1093/arclin/acu041>.

Schatz, Philip, Mary Corcoran, Anthony P Kontos, and R J Elbin. 2020. “Youth Soccer Parents’ Perceptions of Long-Term Effects of Concussion .” *Developmental Neuropsychology* 45 (3): 110–17. <https://doi.org/10.1080/87565641.2020.1766464>.

Schatz, Philip, Timothy Kelley, Summer D Ott, Gary S Solomon, R J Elbin, Kate Higgins, and Rosemarie Sclaro Moser. 2014. “Utility of Repeated Assessment after Invalid Baseline Neurocognitive Test Performance.” *Journal of Athletic Training* 1. Shi F, (5): 659–64.  
<https://doi.org/10.4085/1062-6050-49.3.37>.

Scheiman, Mitchell M., Henry Talasan, G. Lynn Mitchell, and Tara L. Alvarez. 2017. “Objective Assessment of Vergence after Treatment of Concussion-Related CI: A Pilot Study.” *Optometry and Vision Science* 94 (1): 74–88.  
<https://doi.org/10.1097/OPX.0000000000000936>.

Schilling, Samantha, Adam Mansour, Lindsay Sullivan, Kele Ding, Thomas Pommering, and Jingzhen Yang. 2020. “Symptom Burden and Profiles in Concussed Children with and without Prolonged Recovery.” *International Journal of Environmental Research and Public Health* 17 (1). <https://doi.org/10.3390/ijerph17010351>.

Schmidt, Adam T., Xiaoqi Li, Gerri R. Hanten, Stephen R. McCauley, Jessica Faber, and Harvey S. Levin. 2015. “A Longitudinal Investigation of Sleep Quality in Adolescents and Young Adults after Mild Traumatic Brain Injury.” *Cognitive and Behavioral Neurology* 28 (2): 53–62. <https://doi.org/10.1097/WNN.0000000000000056>.

Schmidt, Julia, Kathryn S. Hayward, Katlyn E. Brown, Jill G. Zwicker, Jennie Ponsford, Paul Van Donkelaar, Shelina Babul, and Lara A. Boyd. 2018. “Imaging in Pediatric Concussion: A Systematic Review.” *Pediatrics* 141 (5). <https://doi.org/10.1542/peds.2017-3406>.

Schneider, Edna, and Sarah Van Auken. 2018. “Bridging the Gap: Pragmatic Language Group Approach for Cognitive-Communication Deficits Postconcussion.” *Perspectives of the ASHA Special Interest Groups* 3 (2): 31–43. <https://doi.org/10.1044/persp3.sig2.31>.

- Schneider, Kathryn J, Willem H Meeuwisse, Alberto Nettel-Aguirre, Karen Barlow, Lara Boyd, Jian Kang, and Carolyn A Emery. 2014. "Cervicovestibular Rehabilitation in Sport-Related Concussion: A Randomised Controlled Trial." *British Journal of Sports Medicine* 48 (17): 1294–98. <https://doi.org/10.1136/bjsports-2013-093267>.
- Scolaro, Moser Rosemarie, Schatz Philip, Glenn Megan, Kollias Kelly E, and Iverson Grant L. 2015. "Examining Prescribed Rest as Treatment for Adolescents Who Are Slow to Recover from Concussion." *Brain Injury* 29 (1): 58–63. <https://doi.org/10.3109/02699052.2014.964771>.
- Seeger Trevor, Tabor Jason, Sick Stacy, Schneider Kathryn J, Jenne Craig, La Parker, Talai Aron Sahand, et al. 2020. "The Association of Saliva Cytokines and Pediatric Sports-Related Concussion Outcomes." *The Journal of Head Trauma Rehabilitation* 35 (5): 354–62. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32881769>.
- Seeger, Trevor A, Serena Orr, Lisa Bodell, Lisette Lockyer, Thilinie Rajapakse, and Karen M Barlow. 2015. "Occipital Nerve Blocks for Pediatric Posttraumatic Headache: A Case Series." *Journal of Child Neurology* 30 (9): 1142–46. <https://doi.org/10.1177/0883073814553973>.
- Seehusen Corrine, Wilson Julie C, Walker Gregory A, Reinking Sarah E, and Howell David R. 2021. "More Physical Activity after Concussion Is Associated with Faster Return to Play among Adolescents." *International Journal of Environmental Research and Public Health* 18 (14). <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=34299824>.
- Segev, Shira, Maayan Shorer, Yuri Rassovsky, Tammy Pilowsky Peleg, Alan Apter, and Silvana Fennig. 2016. "The Contribution of Posttraumatic Stress Disorder and Mild Traumatic Brain Injury to Persistent Post Concussive Symptoms Following Motor Vehicle Accidents." *Neuropsychology* 30 (7): 800–810. <https://doi.org/10.1037/neu0000299>.
- Seiger, Ashley, Eva Goldwater, and Ellen Deibert. 2015. "Does Mechanism of Injury Play a Role in Recovery from Concussion?" *Journal of Head Trauma Rehabilitation* 30 (3): E52–56. <https://doi.org/10.1097/HTR.0000000000000051>.
- Shane, Virani, Barton Alexander, Goodyear Bradley G, Yeates Keith Owen, and Brooks Brian L. 2021. "Susceptibility-Weighted Magnetic Resonance Imaging (MRI) of Microbleeds in Pediatric Concussion." *Journal of Child Neurology*, 8830738211002946. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33966537>.
- Shapiro, Jesse S., Tim Silk, Michael Takagi, Nicholas Anderson, Cathriona Clarke, Gavin A. Davis, Kevin Dunne, et al. 2020. "Examining Microstructural White Matter Differences between Children with Typical and Those with Delayed Recovery Two Weeks Post-Concussion." *Journal of Neurotrauma* 37 (11): 1300–1305. <https://doi.org/10.1089/neu.2019.6768>.
- Shaw, James, Trevor Jamieson, Payal Agarwal, Bailey Griffin, Ivy Wong, and R Sacha Bhatia. 2018. "Virtual Care Policy Recommendations for Patient-Centred Primary Care: Findings of a Consensus Policy Dialogue Using a Nominal Group Technique." *Journal of Telemedicine and Telecare* 24 (9): 608–15. <https://doi.org/https://dx.doi.org/10.1177/1357633X17730444>.

- Shaw, Lauren, Maria Morozova, and Ishaq Abu-Arafeh. 2018. "Chronic Post-Traumatic Headache in Children and Adolescents: Systematic Review of Prevalence and Headache Features." *Pain Management* 8 (1): 57–64. <https://doi.org/10.2217/pmt-2017-0019>.
- Sheehy, James P. 2019. "A Pediatrician's Approach to Concussion Management." *Seminars in Pediatric Neurology* 30 (July): 40–44. <https://doi.org/10.1016/j.spen.2019.03.007>.
- Shendell Derek, Gonzalez Lauren, Listwan Tracy A, Pancella Joseph, Blackborow Mary, and Boyd Joanna. 2019. "Developing and Piloting a School-Based Online Adolescent Student-Athlete Concussion Surveillance System." *Journal of School Health* 89 (7): 527–35. <https://doi.org/10.1111/josh.12775>.
- Shendell, Derek G., Lauren Gonzalez, Tracy A. Listwan, Joseph Pancella, Mary Blackborow, and Joanna Boyd. 2019a. "Developing and Piloting a School-Based Online Adolescent Student-Athlete Concussion Surveillance System." *Journal of School Health* 89 (7): 527–35. <https://doi.org/10.1111/josh.12775>.
- Shorer, Maayan, Shira Segev, Yuri Rassovsky, Silvana Fennig, Alan Apter, and Tammy Pilowsky Peleg. 2020. "Efficacy of Psychological Intervention for Children with Concurrent Posttraumatic Stress Disorder and Mild Traumatic Brain Injury." *Journal of Traumatic Stress* 33 (3): 330–37. <https://doi.org/10.1002/jts.22512>.
- Silverberg, Noah D., Grant L. Iverson, Michael McCrea, Jennifer N. Apps, Thomas A. Hammeke, and Danny G. Thomas. 2016a. "Activity-Related Symptom Exacerbations after Pediatric Concussion." *JAMA Pediatrics* 170 (10): 946–53. <https://doi.org/10.1001/jamapediatrics.2016.1187>.
- Sinnott, Aaron M., R. J. Elbin, Michael W. Collins, Valerie L. Reeves, Cyndi L. Holland, and Anthony P. Kontos. 2019. "Persistent Vestibular-Ocular Impairment Following Concussion in Adolescents." *Journal of Science and Medicine in Sport* 22 (12): 1292–97. <https://doi.org/10.1016/j.jsams.2019.08.004>.
- Sinopoli, Katia J., Jen-Kai Chen, Greg Wells, Philippe Fait, Alain Ptito, Tim Taha, and Michelle Keightley. 2014. "Imaging 'Brain Strain' in Youth Athletes with Mild Traumatic Brain Injury during Dual-Task Performance." *Journal of Neurotrauma* 31 (22): 1843–59. <https://doi.org/10.1089/neu.2014.3326>.
- Snook, Meredith L., Luke C. Henry, Joseph S. Sanfilippo, Anthony J. Zeleznik, and Anthony P. Kontos. 2017. "Association of Concussion with Abnormal Menstrual Patterns in Adolescent and Young Women." *JAMA Pediatrics* 171 (9): 879–86. <https://doi.org/10.1001/jamapediatrics.2017.1140>.
- Snyder, Aliyah R., and Christopher C. Giza. 2019. "The Future of Concussion." *Seminars in Pediatric Neurology* 30 (July): 128–37. <https://doi.org/10.1016/j.spen.2019.03.018>.
- Snyder, Aliyah R., and Russell M. Bauer. 2014. "A Normative Study of the Sport Concussion Assessment Tool (SCAT2) in Children and Adolescents." *The Clinical Neuropsychologist* 28 (7): 1091–1103. <https://doi.org/10.1080/13854046.2014.952667>.
- Sowjanya, Gowrisankaran, Shah Ankoor S, Roberts Tawna L, Wiecek Emily, Chinn Ryan N, Hawash Karamah K, O'Brien Michael J, Howell David R, Meehan William P, and Raghuram Aparna. 2021. "Association between Post-Concussion Symptoms and Oculomotor Deficits among Adolescents." *Brain Injury*, 1–11.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=34383619>.

Starkey, Nicola J., Kelly Jones, Rosalind Case, Alice Theadom, Suzanne Barker-Collo, and Valery Feigin. 2018. “Post-Concussive Symptoms after a Mild Traumatic Brain Injury during Childhood and Adolescence.” *Brain Injury* 32 (5): 617–26.

<https://doi.org/10.1080/02699052.2018.1439533>.

Stazyk, Kathy, Carol DeMatteo, Sandra Moll, and Cheryl Missiuna. 2017. “Depression in Youth Recovering from Concussion: Correlates and Predictors.” *Brain Injury* 31 (5): 631–38.

<https://doi.org/10.1080/02699052.2017.1283533>.

Stein, Elizabeth, Waylon Howard, Ali Rowhani-Rahbar, Frederick P. Rivara, Douglas Zatzick, and Carolyn A. McCarty. 2017. “Longitudinal Trajectories of Post-Concussive and Depressive Symptoms in Adolescents with Prolonged Recovery from Concussion.” *Brain Injury* 31 (13–14): 1736–44. <https://doi.org/10.1080/02699052.2017.1380843>.

Stephen, Kara, Crosswell Hannah, Forch Katherine, Cavadino Alana, McGeown Josh, Fulcher Mark, Stephen Kara, et al. 2020. “Less Than Half of Patients Recover Within 2 Weeks of Injury After a Sports-Related Mild Traumatic Brain Injury: A 2-Year Prospective Study.” *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine* 30 (2): 96–101. <https://doi.org/10.1097/JSM.0000000000000811>.

Stephens, Jaclyn A., Peiying Liu, Hanzhang Lu, and Stacy J. Suskauer. 2018. “Cerebral Blood Flow after Mild Traumatic Brain Injury: Associations between Symptoms and Post-Injury Perfusion.” *Journal of Neurotrauma* 35 (2): 241–48. <https://doi.org/10.1089/neu.2017.5237>.

Stewart, Shapiro Jesse, Hearps Stephen J.C, Rausa Vanessa C, Anderson Vicki, Anderson Nicholas, Pugh Remy, Chau Tracey, et al. 2021. “Validation of the SCAT5 and Child SCAT5 Word-List Memory Task.” *Journal of Neurotrauma*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33765839>.

Stewart, Shapiro Jesse, Takagi Michael, Silk Tim J, Anderson Nicholas, Clarke Cathriona, Davis Gavin, Hearps Stephen J.C, et al. 2021. “No Evidence of a Difference in SWI Lesion Burden or Functional Network Connectivity between Children with Typical and Delayed Recovery Two Weeks Post-Concussion.” *Journal of Neurotrauma*.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33823646>.

Stockbridge, Melissa D, Anthony Doran, Kristin King, and Rochelle S Newman. 2018. “The Effects of Concussion on Rapid Picture Naming in Children.” *Brain Injury* 32 (4): 506–14.

<https://doi.org/10.1080/02699052.2018.1429660>.

Stockbridge, Melissa D., Rochelle S. Newman, Andrea Zukowski, Kristin K. Slawson, Anthony Doran, and Nan Bernstein Ratner. 2020. “Language Profiles in Children with Concussion.” *Brain Injury* 34 (4): 567–74. <https://doi.org/10.1080/02699052.2020.1725836>.

Storey, Eileen P., Douglas J. Wiebe, Bernadette A. D’Alonzo, Kim Nixon-Cave, Janet Jackson-Coty, Arlene M. Goodman, Matthew F. Grady, and Christina L. Master. 2018. “Vestibular Rehabilitation Is Associated with Visuo-vestibular Improvement in Pediatric Concussion.” *Journal of Neurologic Physical Therapy* 42 (3): 134–41.

<https://doi.org/10.1097/NPT.0000000000000228>.

Storey, Eileen P., Stephen R. Master, Julia E. Lockyer, Olivia E. Podolak, Matthew F. Grady, and Christina L. Master. 2017. "Near Point of Convergence after Concussion in Children." *Optometry and Vision Science* 94 (1): 96–100.

<https://doi.org/10.1097/OPX.0000000000000910>.

Studer, Martina, Barbara Goeggel Simonetti, Alexander Joeris, Katja Margelisch, Maja Steinlin, Claudia Maria Roebbers, and Theda Heinks. 2014. "Post-Concussive Symptoms and Neuropsychological Performance in the Post-Acute Period Following Pediatric Mild Traumatic Brain Injury." *Journal of the International Neuropsychological Society* 20 (10): 982–93.

<https://doi.org/10.1017/S1355617714000927>.

Studer, Martina, Barbara Goeggel Simonetti, Theda Heinks, Maja Steinlin, Alexander Leichtle, Steffen Berger, and Alexander Joeris. 2015. "Acute S100B in Serum Is Associated with Cognitive Symptoms and Memory Performance 4 Months after Paediatric Mild Traumatic Brain Injury." *Brain Injury* 29 (13–14): 1667–73.

<https://doi.org/10.3109/02699052.2015.1075250>.

Sufrinko, Alicia M., Anne Mucha, Tracey Covassin, Greg Marchetti, R. J. Elbin, Michael W. Collins, and Anthony P. Kontos. 2017. "Sex Differences in Vestibular/Ocular and Neurocognitive Outcomes after Sport-Related Concussion." *Clinical Journal of Sport Medicine* 27 (2): 133–38. <https://doi.org/10.1097/JSM.0000000000000324>.

Sufrinko, Alicia M., Anthony P. Kontos, Jennifer N. Apps, Michael McCrea, Robert W. Hickey, Michael W. Collins, and Danny G. Thomas. 2017a. "The Effectiveness of Prescribed Rest Depends on Initial Presentation After Concussion." *Journal of Pediatrics* 185: 167–72.

<https://doi.org/10.1016/j.jpeds.2017.02.072>.

Sufrinko, Alicia M., Gregory F. Marchetti, Paul E. Cohen, R. J. Elbin, Valentina Re, and Anthony P. Kontos. 2017. "Using Acute Performance on a Comprehensive Neurocognitive, Vestibular, and Ocular Motor Assessment Battery to Predict Recovery Duration after Sport-Related Concussions." *American Journal of Sports Medicine* 45 (5): 1187–94.

<https://doi.org/10.1177/0363546516685061>.

Sufrinko, Alicia, Jamie McAllister-Deitrick, Rj Elbin, Michael W. Collins, and Anthony P. Kontos. 2018. "Family History of Migraine Associated with Posttraumatic Migraine Symptoms Following Sport-Related Concussion." *Journal of Head Trauma Rehabilitation* 33 (1): 7–14.

<https://doi.org/10.1097/HTR.0000000000000315>.

Sullivan, Lindsay, Alison Newton, Junxin Shi, Teng Jen Chang, and Jingzhen Yang. 2020. "Concussion-Related Health Care Utilization Among Medicaid Insured Children in Ohio: Rural and Urban Differences." *Journal of Rural Health* 00 (1): 1–8.

<https://doi.org/10.1111/jrh.12484>.

Sundaram, Vandana, Victoria Y Ding, Manisha Desai, Angela Lumba-Brown, and Jessica Little. 2019. "Reliable Sideline Ocular-Motor Assessment Following Exercise in Healthy Student Athletes." *Journal of Science and Medicine in Sport* 22 (12): 1287–91.

<https://doi.org/10.1016/j.jsams.2019.07.015>.

Sungwon, Kim, and Connaughton Daniel P. 2021. "Youth Soccer Parents' Attitudes and Perceptions About Concussions." *Journal of Adolescent Health* 68 (1): 184–90.

<https://doi.org/10.1016/j.jadohealth.2020.04.029>.

Sussman, Walter I, Ken Mautner, R Amadeus Mason, Kathryn Bonecutter, and Anna K Shealy. 2017. "Sphenopalatine Ganglion Block for Management of Refractory Chronic Posttraumatic Headaches after a Sport-Related Concussion." *Clinical Journal of Sport Medicine* 27 (2): e6--e8. <https://doi.org/10.1097/JSM.0000000000000325>.

Sutton, Mitchell, Vincy Chan, Michael Escobar, Tatyana Mollayeva, Zheng Hu, and Angela Colantonio. 2019. "Neck Injury Comorbidity in Concussion-Related Emergency Department Visits: A Population-Based Study of Sex Differences Across the Life Span." *Journal of Women's Health* 28 (4): 473–82. <https://doi.org/10.1089/jwh.2018.7282>.

Swanson, Mark W., Katherine K. Weise, Laura E. Dreer, James Johnston, Richard D. Davis, Drew Ferguson, Matthew Heath Hale, et al. 2017. "Academic Difficulty and Vision Symptoms in Children with Concussion." *Optometry and Vision Science* 94 (1): 60–67. <https://doi.org/10.1097/OPX.0000000000000977>.

Takagi, Michael, Stephen J.C. Hearps, Franz E. Babl, Nicholas Anderson, Silvia Bressan, Cathriona Clarke, Gavin A. Davis, et al. 2019. "Does a Computerized Neuropsychological Test Predict Prolonged Recovery in Concussed Children Presenting to the ED?" *Child Neuropsychology* 00 (00): 1–15. <https://doi.org/10.1080/09297049.2019.1639653>.

Talin, Babikian, McArthur David, and Asarnow Robert F. 2013. "Predictors of 1-Month and 1-Year Neurocognitive Functioning from the UCLA Longitudinal Mild, Uncomplicated, Pediatric Traumatic Brain Injury Study." *Journal of the International Neuropsychological Society* 19 (2): 145–54. <https://doi.org/10.1017/S135561771200104X>.

Tamura, Kaori, Troy Furutani, Ross Oshiro, Yukiya Oba, Ayaka Ling, and Nathan Murata. 2020. "Concussion Recovery Timeline of High School Athletes Using a Stepwise Return-to-Play Protocol: Age and Sex Effects." *Journal of Athletic Training* 55 (1): 6–10. <https://doi.org/10.4085/1062-6050-452-18>.

Tanveer, Sarah, Nassim Zecavati, Elizabeth Bronson Delasobera, and Temitayo Oyefunmike Oyegbile. 2017. "Gender Differences in Concussion and Postinjury Cognitive Findings in an Older and Younger Pediatric Population." *Pediatric Neurology* 70: 44–49. <https://doi.org/10.1016/j.pediatrneurol.2017.02.001>.

Tator, Charles, Jill Starkes, Gillian Dolansky, Julie Quet, Jean Michaud, and Michael Vassilyadi. 2019. "Rowan's Rugby Fatality Prompts Canada's First Concussion Legislation." *Canadian Journal of Neurological Sciences*. Cambridge University Press. <https://doi.org/10.1017/cjn.2019.15>.

Taubman, Bruce, Florence Rosen, Jennifer McHugh, Matthew F. Grady, and Okan U. Elci. 2016. "The Timing of Cognitive and Physical Rest and Recovery in Concussion." *Journal of Child Neurology* 31 (14): 1555–60. <https://doi.org/10.1177/0883073816664835>.

Taylor, Kathryn M., Marianthi Anna Kioumourtzoglou, Jim Clover, Brent A. Coull, Jack T. Dennerlein, David C. Bellinger, and Marc G. Weisskopf. 2018. "Concussion History and Cognitive Function in a Large Cohort of Adolescent Athletes." *American Journal of Sports Medicine* 46 (13): 3262–70. <https://doi.org/10.1177/0363546518798801>.

Teel Elizabeth, Marshall Stephen W, Shankar Viswanathan, McCrea Michael, and Guskiewicz Kevin M. 2017. "Predicting Recovery Patterns After Sport-Related Concussion." *Journal of Athletic Training* 52 (3): 288–98. <https://doi.org/10.4085/1062-6050-52.1.12>.

- Teel, Elizabeth F., Roger L. Zemek, Kenneth Tang, Gerard Gioia, Christopher Vaughan, Maegan Sady, and Isabelle J. Gagnon. 2019. “The Stability of Retrospective Pre-Injury Symptom Ratings Following Pediatric Concussion.” *Frontiers in Neurology* 10 (JUN). <https://doi.org/10.3389/fneur.2019.00672>.
- Teel, Elizabeth F., Stephen W. Marshall, Viswanathan Shankar, Michael McCrea, and Kevin M. Guskiewicz. 2017a. “Predicting Recovery Patterns After Sport-Related Concussion.” *Journal of Athletic Training* 52 (3): 288–98. <https://doi.org/10.4085/1062-6050-52.1.12>.
- Teh, Zoe, Michael Takagi, Stephen J.C. Hearps, Franz E. Babl, Nicholas Anderson, Cathriona Clarke, Gavin A. Davis, Kevin Dunne, Vanessa C. Rausa, and Vicki Anderson. 2020. “Acute Cognitive Postconcussive Symptoms Follow Longer Recovery Trajectories than Somatic Postconcussive Symptoms in Young Children.” *Brain Injury* 34 (3): 350–56. <https://doi.org/10.1080/02699052.2020.1716996>.
- Tenforde, Adam S, Jaye E Hefner, Jodi E Kodish-Wachs, Mary A Iaccarino, and Sabrina Paganoni. 2017. “Telehealth in Physical Medicine and Rehabilitation: A Narrative Review.” *PM & R : The Journal of Injury, Function, and Rehabilitation* 9 (5S): S51–58. <https://doi.org/https://dx.doi.org/10.1016/j.pmrj.2017.02.013>.
- Terry, Douglas P, Preethi J Reddi, Nathan E Cook, Tad Seifert, Bruce A Maxwell, Ross Zafonte, Paul D Berkner, et al. 2019. “Acute Effects of Concussion in Youth With Pre-Existing Migraines.” *Clinical Journal of Sport Medicine Publish Ah* (00). <https://doi.org/10.1097/jsm.0000000000000791>.
- Terwilliger, Virginia K., Lincoln Pratson, Christopher G. Vaughan, and Gerard A. Gioia. 2016. “Additional Post-Concussion Impact Exposure May Affect Recovery in Adolescent Athletes.” *Journal of Neurotrauma* 33 (8): 761–65. <https://doi.org/10.1089/neu.2015.4082>.
- Tham, See Wan, Jessica Fales, and Tonya M. Palermo. 2015. “Subjective and Objective Assessment of Sleep in Adolescents with Mild Traumatic Brain Injury.” *Journal of Neurotrauma* 32 (11): 847–52. <https://doi.org/10.1089/neu.2014.3559>.
- Theadom, Alice, Nicola Starkey, Kelly Jones, Mark Cropley, Priya Parmar, Suzanne Barker-Collo, and Valery L. Feigin. 2016. “Sleep Difficulties and Their Impact on Recovery Following Mild Traumatic Brain Injury in Children.” *Brain Injury* 30 (10): 1243–48. <https://doi.org/10.1080/02699052.2016.1183171>.
- Theodore, Macnow, Curran Tess, Tolliday Courtney, Martin Kirsti, McCarthy Madeline, Ayturk Didem, Babu Kavita M, and Mannix Rebekah. 2021. “Effect of Screen Time on Recovery From Concussion: A Randomized Clinical Trial.” *JAMA Pediatrics*, September. <https://doi.org/10.1001/jamapediatrics.2021.2782>.
- Thomas, D. G., J. N. Apps, R. G. Hoffmann, M. McCrea, and T. Hammeke. 2015. “Benefits of Strict Rest After Acute Concussion: A Randomized Controlled Trial.” *PEDIATRICS* 135 (2): 213–23. <https://doi.org/10.1542/peds.2014-0966>.
- Thomas, Danny George, Jennifer N. Apps, Raymond G. Hoffmann, Michael McCrea, and Thomas Hammeke. 2015. “Benefits of Strict Rest After Acute Concussion: A Randomized Controlled Trial.” *PEDIATRICS* 135 (2): 213–23. <https://doi.org/10.1542/peds.2014-0966>.
- Todd, Caze, Knell Gregory P, Abt John, and Burkhart Scott O. 2020. “Management and Treatment of Concussions via Tele-Concussion in a Pediatric Setting: Methodological

Approach and Descriptive Analysis.” *JMIR Pediatrics and Parenting* 3 (2).  
<https://doi.org/10.2196/19924>.

Tomczyk, Christopher P., Megan Mormile, Megan S. Wittenberg, Jody L. Langdon, and Tamerah N. Hunt. 2018. “An Examination of Adolescent Athletes and Nonathletes on Baseline Neuropsychological Test Scores.” *Journal of Athletic Training* 53 (4): 404–9.  
<https://doi.org/10.4085/1062-6050-84-17>.

Torres, Alcy R. 2019. “Editorial.” *Seminars in Pediatric Neurology* 30 (July): 1.  
<https://doi.org/10.1016/j.spen.2019.03.001>.

Torres, Alcy R., and Belen Espinosa. 2019. “Prognosis of Concussion in Children.” *Seminars in Pediatric Neurology* 30 (July): 96–98. <https://doi.org/10.1016/j.spen.2019.03.014>.

Tracey, Covassin, Crutcher Bryan, R J Elbin, Burkhart Scott, and Kontos Anthony. 2013. “The Relationship Between Coping, Neurocognitive Performance, and Concussion Symptoms in High School and Collegiate Athletes.” *The Sport Psychologist* 27 (4): 372–79.  
<https://doi.org/10.1123/tsp.27.4.372>.

Tracey, Covassin, R J Elbin, Bleecker Alisha, Lipchik Adam, and Kontos Anthony P. 2013. “Are There Differences in Neurocognitive Function and Symptoms Between Male and Female Soccer Players After Concussions?” *The American Journal of Sports Medicine* 41 (12): 2890–95. <https://doi.org/10.1177/0363546513509962>.

Truss, Katherine, Celia Godfrey, Michael Takagi, Franz E. Babl, Silvia Bressan, Stephen Hearps, Cathriona Clarke, Kevin Dunne, and Vicki Anderson. 2017. “Trajectories and Risk Factors for Post-Traumatic Stress Symptoms Following Pediatric Concussion.” *Journal of Neurotrauma* 34 (14): 2272–79. <https://doi.org/10.1089/neu.2016.4842>.

Truss, Katie, Stephen J C Hearps, Franz E Babl, Michael Takagi, Gavin A Davis, Cathriona Clarke, Nicholas Anderson, et al. 2020. “Trajectories and Risk Factors for Pediatric Postconcussive Symptom Recovery.” *Neurosurgery* 88 (1): 36–45.  
<https://doi.org/10.1093/neuros/nyaa310>.

Tsushima William, Jordan Ahriika, Tsushima Vincent G, and Murata Nathan M. 2020. “Effects of a Single Concussion During the School Year on the Academic Performance and Neuropsychological Functioning of High School Athletes.” *Hawai’i Journal of Health & Social Welfare* 79 (7): 212–16.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=32666054>.

Tsushima, William T., Andrea M. Siu, Annina M. Pearce, Guangxiang Zhang, and Ross S. Oshiro. 2016. “Two-Year Test-Retest Reliability of ImPACT in High School Athletes.” *Archives of Clinical Neuropsychology* 1. Shi F, (1): 105–11.  
<https://doi.org/10.1093/arclin/acv066>.

Tsushima, William T., Nicole Shirakawa, and Olga Geling. 2013. “Neurocognitive Functioning and Symptom Reporting of High School Athletes Following a Single Concussion.” *Applied Neuropsychology: Child* 2 (1): 13–16. <https://doi.org/10.1080/09084282.2011.643967>.

Tsushima, William T., Olga Geling, Monica Arnold, and Ross Oshiro. 2016. “Effects of Two Concussions on the Neuropsychological Functioning and Symptom Reporting of High School Athletes.” *Applied Neuropsychology: Child* 5 (1): 9–13.  
<https://doi.org/10.1080/21622965.2014.902762>.

- Tsushima, William T., Vincent G. Tsushima, and Nathan M. Murata. 2018. “ImPACT Normative Data of Ethnically Diverse Adolescent Athletes.” *Clinical Journal of Sport Medicine* 38 (2): 1. <https://doi.org/10.1097/jsm.0000000000000567>.
- Tsushima, William T., Vincent G. Tsushima, Ross O. Oshiro, and Nathan M. Murata. 2017. “Role of Native Language in Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) of Youth Athletes.” *Archives of Clinical Neuropsychology* 32 (4): 450–55. <https://doi.org/10.1093/arclin/acx025>.
- Tylicka, Marzena, Ewa Matuszczak, Wojciech Dębek, Adam Hermanowicz, and Halina Ostrowska. 2014. “Circulating Proteasome Activity Following Mild Head Injury in Children.” *Child’s Nervous System* 30 (7): 1191–96. <https://doi.org/10.1007/s00381-014-2409-4>.
- Urban, Karolina J., Karen M. Barlow, Jon J. Jimenez, Bradley G. Goodyear, and Jeff F. Dunn. 2015. “Functional Near-Infrared Spectroscopy Reveals Reduced Interhemispheric Cortical Communication after Pediatric Concussion.” *Journal of Neurotrauma* 32 (11): 833–40. <https://doi.org/10.1089/neu.2014.3577>.
- Urban, Karolina J., Lily Riggs, Greg D. Wells, Michelle Keightley, Jen-Kai Chen, Alain Ptito, Philippe Fait, Tim Taha, and Katia J. Sinopoli. 2017. “Cortical Thickness Changes and Their Relationship to Dual-Task Performance Following Mild Traumatic Brain Injury in Youth.” *Journal of Neurotrauma* 34 (4): 816–23. <https://doi.org/10.1089/neu.2016.4502>.
- Vargas, Bert B, Dwight D Channer, David W Dodick, and Bart M Demaerschalk. 2012. “Teleconcussion: An Innovative Approach to Screening, Diagnosis, and Management of Mild Traumatic Brain Injury.” *Telemedicine Journal and E-Health : The Official Journal of the American Telemedicine Association* 18 (10): 803–6. <https://doi.org/https://dx.doi.org/10.1089/tmj.2012.0118>.
- Vargas, Bert B, Morgan Shepard, Joseph G Hentz, Cherisse Kuttyreff, L George Hershey, and Amaal J Starling. 2017. “Feasibility and Accuracy of Teleconcussion for Acute Evaluation of Suspected Concussion.” *Neurology* 88 (16): 1580–83. <https://doi.org/https://dx.doi.org/10.1212/WNL.0000000000003841>.
- Vasiukova, O R, M I Akhlebinina, A V Manzhurtsev, P E Menshchikov, M V Ublinskiy, A N Yakovlev, T A Akhadov, and N A Semenova. 2020b. “The Diffusion-Tensor Imaging Reveals Alterations in Water Diffusion Parameters in Acute Pediatric Concussion.” *Acta Neurologica Belgica*, no. 0123456789. <https://doi.org/10.1007/s13760-020-01347-w>.
- Vasiukova, O. R., M. I. Akhlebinina, A. V. Manzhurtsev, P. E. Menshchikov, M. V. Ublinskiy, A. N. Yakovlev, T. A. Akhadov, and N. A. Semenova. 2020a. “The Diffusion-Tensor Imaging Reveals Alterations in Water Diffusion Parameters in Acute Pediatric Concussion.” *Acta Neurologica Belgica*, April. <https://doi.org/10.1007/s13760-020-01347-w>.
- Vassilyadi, Michael, Gail Macartney, Nick Barrowman, Peter Anderson, and Karen Dube. 2015. “Symptom Experience and Quality of Life in Children after Sport-Related Head Injuries: A Cross-Sectional Study.” *Pediatric Neurosurgery* 50 (4): 196–203. <https://doi.org/10.1159/000431232>.
- Vaughan, Christopher G., Elyssa H. Gerst, Maegan D. Sady, Julie B. Newman, and Gerard A. Gioia. 2014. “The Relation between Testing Environment and Baseline Performance in Child and Adolescent Concussion Assessment.” *American Journal of Sports Medicine* 1. Shi F, (7): 1716–23. <https://doi.org/10.1177/0363546514531732>.

Vernau, Brian T., Matthew F. Grady, Arlene Goodman, Douglas J. Wiebe, Luke Basta, Yong Park, Kristy B. Arbogast, and Christina L. Master. 2015. "Oculomotor and Neurocognitive Assessment of Youth Ice Hockey Players: Baseline Associations and Observations after Concussion." *Developmental Neuropsychology* 1. Shi F, (1): 7–11.  
<https://doi.org/10.1080/87565641.2014.971955>.

Veronik, Sicard, Hergert Danielle C, Pabbathi Reddy Sharvani, Robertson-Benta Cidney R, Dodd Andrew B, Shaff Nicholas A, Stephenson David D, et al. 2020. "Severity of Ongoing Post-Concussive Symptoms as a Predictor of Cognitive Performance Following a Pediatric Mild Traumatic Brain Injury." *Journal of the International Neuropsychological Society : JINS*, 1–11.  
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33243310>.

Vicki, Anderson, Davis Gavin A, Takagi Michael, Dunne Kevin, Clarke Cathriona, Anderson Nicholas, Rausa Vanessa C, et al. 2020. "Trajectories and Predictors of Clinician-Determined Recovery after Child Concussion." *Journal of Neurotrauma* 37 (12): 1392–1400.  
<https://doi.org/10.1089/neu.2019.6683>.

Vickie, Plourde, Yeates Keith Owen, Brooks Brian L, Vickie Plourde, Keith Owen Yeates, and Brian L. Brooks. 2018. "Predictors of Long-Term Psychosocial Functioning and Health-Related Quality of Life in Children and Adolescents with Prior Concussions." *Journal of the International Neuropsychological Society* 24 (6): 540–48.  
<https://doi.org/10.1017/S1355617718000061>.

Vicky, Manikas, Babl Franz E, Hearps Stephen, Dooley Julian, and Anderson Vicki. 2017. "Impact of Exercise on Clinical Symptom Report and Neurocognition after Concussion in Children and Adolescents." *Journal of Neurotrauma* 34 (11): 1932–38.  
<https://doi.org/10.1089/neu.2016.4762>.

Vierhile, Amy, Jane Tuttle, Heather Adams, Cynthia tenHooen, and Erin Baylor. 2018. "Feasibility of Providing Pediatric Neurology Telemedicine Care to Youth with Headache." *Journal of Pediatric Health Care : Official Publication of National Association of Pediatric Nurse Associates & Practitioners* 32 (5): 500–506.  
<https://doi.org/https://dx.doi.org/10.1016/j.pedhc.2018.02.004>.

Vivian, Kwan, Plourde Vickie, Yeates Keith Owen, Noel Melanie, Brooks Brian L, Vivian Kwan, Vickie Plourde, Keith Owen Yeates, Melanie Noel, and Brian L. Brooks. 2020. "Headache Long after Pediatric Concussion: Presence, Intensity, Interference, and Association with Cognition." *Brain Injury* 34 (4): 575–82. <https://doi.org/10.1080/02699052.2020.1725842>.

W, Hunt Anne, Agnihotri Sabrina, Sack Leah, Tint Ami, Greenspoon Dayna, Gauvin-Lepage Jerome, Gagnon Isabelle, Reed Nick, and Scratch Shannon. 2020. "Mood-Related Changes in Children and Adolescents with Persistent Concussion Symptoms Following a Six-Week Active Rehabilitation Program." *Brain Injury* 34 (8): 1068–73.  
<https://doi.org/10.1080/02699052.2020.1776396>.

W, Hunt Anne, Laupacis Dylan, Kawaguchi Emily, Greenspoon Dayna, and Reed Nick. 2018. "Key Ingredients to an Active Rehabilitation Programme Post-Concussion: Perspectives of Youth and Parents." *Brain Injury* 32 (12): 1534–40.  
<https://doi.org/10.1080/02699052.2018.1502894>.

Walker Gregory, Wilson Julie C, Seehusen Corrine N, Provance Aaron J, and Howell David R. 2021. “Is near Point of Convergence Associated with Symptom Profiles or Recovery in Adolescents after Concussion?” *Vision Research* 184: 52–57.

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33866266>.

Wang, Yang, John D. West, Jessica N. Bailey, Daniel R. Westfall, Hui Xiao, Todd W. Arnold, Patrick A. Kersey, Andrew J. Saykin, and Brenna C. McDonald. 2015. “Decreased Cerebral Blood Flow in Chronic Pediatric Mild TBI: An MRI Perfusion Study.” *Developmental Neuropsychology* 40 (1): 40–44. <https://doi.org/10.1080/87565641.2014.979927>.

Wang, Yang, Lindsay D. Nelson, Ashley A. LaRoche, Adam Y. Pfaller, Andrew S. Nencka, Kevin M. Koch, and Michael A. McCrea. 2016. “Cerebral Blood Flow Alterations in Acute Sport-Related Concussion.” *Journal of Neurotrauma* 33 (13): 1227–36. <https://doi.org/10.1089/neu.2015.4072>.

Ware, Ashley L., Ayushi Shukla, Naomi J. Goodrich-Hunsaker, Catherine Lebel, Elisabeth A. Wilde, Tracy J. Abildskov, Erin D. Bigler, et al. 2020. “Post-Acute White Matter Microstructure Predicts Post-Acute and Chronic Post-Concussive Symptom Severity Following Mild Traumatic Brain Injury in Children.” *NeuroImage: Clinical* 25 (January): 102106. <https://doi.org/10.1016/j.nicl.2019.102106>.

Wasserman Erin, Bazarian Jeffrey J, Mapstone Mark, Block Robert, and van Wijngaarden Edwin. 2016. “Academic Dysfunction After a Concussion Among US High School and College Students.” *American Journal of Public Health* 106 (7): 1247–53. <https://doi.org/10.2105/AJPH.2016.303154>.

Wasserman, Erin B., Jeffrey J. Bazarian, Mark Mapstone, Robert Block, and Edwin van Wijngaarden. 2016. “Academic Dysfunction After a Concussion Among US High School and College Students.” *American Journal of Public Health* 106 (7): 1247–53. <https://doi.org/10.2105/AJPH.2016.303154>.

Wasserman, Erin B., Jeffrey J. Bazarian, Mark Mapstone, Robert Block, and Edwin Van Wijngaarden. 2016. “Academic Dysfunction after a Concussion among US High School and College Students.” *American Journal of Public Health* 106 (7): 1247–53. <https://doi.org/10.2105/AJPH.2016.303154>.

Wechsler, Lawrence R, Jack W Tsao, Steven R Levine, Rebecca J Swain-Eng, Robert J Adams, Bart M Demaerschalk, David C Hess, et al. 2013. “Teleneurology Applications: Report of the Telemedicine Work Group of the American Academy of Neurology.” *Neurology* 80 (7): 670–76. <https://doi.org/https://dx.doi.org/10.1212/WNL.0b013e3182823361>.

Wern, Chung Ai, Mannix Rebekah, Feldman Henry A, Grant P Ellen, and Im Kiho. 2019. “Longitudinal Structural Connectomic and Rich-Club Analysis in Adolescent MTBI Reveals Persistent, Distributed Brain Alterations Acutely through to One Year Post-Injury.” *Scientific Reports* 9 (1): 1–11. <https://doi.org/10.1038/s41598-019-54950-0>.

Westfall, Daniel R., John D. West, Jessica N. Bailey, Todd W. Arnold, Patrick A. Kersey, Andrew J. Saykin, and Brenna C. McDonald. 2015. “Increased Brain Activation during Working Memory Processing after Pediatric Mild Traumatic Brain Injury (MTBI).” *Journal of Pediatric Rehabilitation Medicine* 8 (4): 297–308. <https://doi.org/10.3233/PRM-150348>.

Willer, Barry S., Mohammad N. Haider, Itai Bezherano, Charles G. Wilber, Rebekah Mannix, Katherine Kozlowski, and John J. Leddy. 2019. "Comparison of Rest to Aerobic Exercise and Placebo-like Treatment of Acute Sport-Related Concussion in Male and Female Adolescents." *Archives of Physical Medicine and Rehabilitation*, 1–9. <https://doi.org/10.1016/j.apmr.2019.07.003>.

Wilmoth, Kristin, Nicholas Curcio, Tahnae Tarkenton, Tawny Meredith-Duliba, Alexander Tan, Nyaz Didehbani, Linda S Hynan, Shane M Miller, Kathleen R Bell, and C Munro Cullum. 2019. "Utility of Brief Psychological Measures for Prediction of Prolonged Symptom Clearance in Concussed Student Athletes." *Archives of Clinical Neuropsychology*, November. <https://doi.org/10.1093/arclin/acw061>.

Wiseman-Hakes, Catherine, Nadia Gosselin, Bhanu Sharma, Laura Langer, and Isabelle Gagnon. 2019. "A Longitudinal Investigation of Sleep and Daytime Wakefulness in Children and Youth With Concussion." *ASN Neuro* 11. <https://doi.org/10.1177/1759091418822405>.

Womble, Melissa N., Erin Reynolds, Philip Schatz, Kishan M. Shah, and Anthony P. Kontos. 2016. "Test-Retest Reliability of Computerized Neurocognitive Testing in Youth Ice Hockey Players." *Archives of Clinical Neuropsychology* 1. Shi F, (4): 305–12. <https://doi.org/10.1093/arclin/acw011>.

Wu, Trevor, Tricia L Merkley, Elisabeth A Wilde, Amanda Barnes, Xiaoqi Li, Zili David Chu, Stephen R McCauley, Jill V Hunter, and Harvey S Levin. 2018. "A Preliminary Report of Cerebral White Matter Microstructural Changes Associated with Adolescent Sports Concussion Acutely and Subacutely Using Diffusion Tensor Imaging." *Brain Imaging and Behavior* 12 (4): 962–73. <https://doi.org/10.1007/s11682-017-9752-5>.

Wyndham, Lawrence David, Richards Doug, Comper Paul, and Hutchison Michael G. 2018. "Earlier Time to Aerobic Exercise Is Associated with Faster Recovery Following Acute Sport Concussion." *PLoS ONE* 13 (4): 1–12. <https://doi.org/10.1371/journal.pone.0196062>.

Xiaotian, Shen, Gao Bixi, Wang Zilan, Yang Yanbo, Chen Zhouqing, Yu Lelin, and Wang Zhong. 2020. "Therapeutic Effect of Aerobic Exercise for Adolescents After Mild Traumatic Brain Injury and Sport-Related Concussion: A Meta-Analysis from Randomized Controlled Trials." *World Neurosurgery*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33010508>.

Xiaoyuan, Guo, Edmed Shannon L, Anderson Vicki, and Kenardy Justin. 2017. "Neurocognitive Predictors of Posttraumatic Stress Disorder Symptoms in Children 6 Months after Traumatic Brain Injury: A Prospective Study." *Neuropsychology* 31 (1): 84–92. <https://doi.org/10.1037/neu0000305>.

Y, Li Adam, Schupper Alexander J, Quinones Addison, Shuman William H, Ali Muhammad, Hannah Theodore C, Durbin John R, et al. 2021. "Sport Contact Level Affects Post-Concussion Neurocognitive Performance in Young Athletes." *Archives of Clinical Neuropsychology : The Official Journal of the National Academy of Neuropsychologists*. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medp&NEWS=N&AN=33829227>.

Yang, Max N., Kristen Clements-Nolle, Brian Parrish, and Wei Yang. 2019. “Adolescent Concussion and Mental Health Outcomes: A Population-Based Study.” *American Journal of Health Behavior* 43 (2): 258–65. <https://doi.org/10.5993/AJHB.43.2.3>.

Yeates, Keith Owen, Kenneth Tang, Nick Barrowman, Stephen B. Freedman, Jocelyn Gravel, Isabelle Gagnon, Gurinder Sangha, et al. 2019. “Derivation and Initial Validation of Clinical Phenotypes of Children Presenting with Concussion Acutely in the Emergency Department: Latent Class Analysis of a Multi-Center, Prospective Cohort, Observational Study.” *Journal of Neurotrauma* 36 (11): 1758–67. <https://doi.org/10.1089/neu.2018.6009>.

Yengo-Kahn, Aaron Michael, and Gary Solomon. 2015. “Are Psychotropic Medications Associated with Differences in Baseline Neurocognitive Assessment Scores for Young Athletes? A Pilot Study.” *Physician and Sportsmedicine* 43 (3): 227–35. <https://doi.org/10.1080/00913847.2015.1071638>.

Yue, John K., Pavan S. Upadhyayula, Lauro N. Avalos, and Tene A. Cage. 2020. “Pediatric Traumatic Brain Injury in the United States: Rural-Urban Disparities and Considerations.” *Brain Sciences* 10 (3): 135. <https://doi.org/10.3390/brainsci10030135>.

Zalneraitis, Brian H, Aaron M Yengo-Kahn, Alec J Pawlukiewicz, and Gary S Solomon. 2017. “Self-Reported History of Seizure and Baseline Neurocognitive Test Performance in Student-Athletes: An Initial Investigation.” *Physician and Sportsmedicine* 1. Shi F, (4): 470–74. <https://doi.org/10.1080/00913847.2017.1372035>.

Zamani, Akram, Nicholas P. Ryan, David K. Wright, Karen Caeyenberghs, and Bridgette D. Semple. 2020. “The Impact of Traumatic Injury to the Immature Human Brain: A Scoping Review with Insights from Advanced Structural Neuroimaging.” *Journal of Neurotrauma*. Mary Ann Liebert Inc. <https://doi.org/10.1089/neu.2019.6895>.

Zemek, Roger, Nick Barrowman, Stephen B. Freedman, Jocelyn Gravel, Isabelle Gagnon, Candice McGahern, Mary Aglipay, Gurinder Sangha, Kathy Boutis, Darcy Beer, William Craig, Emma Burns, Ken J. Farion, Angelo Mikrogianakis, Karen Barlow, Alexander S. Dubrovsky, Willem Meeuwisse, Gerard Gioia, William P. Meehan, Miriam H. Beauchamp, Yael Kamil, Anne M. Grool, Blaine Hoshizaki, Peter Anderson, Brian L. Brooks, Keith Owen Yeates, Michael Vassilyadi, Terry Klassen, Michelle Keightley, Lawrence Richer, Carol De Matteo, et al. 2016. “Clinical Risk Score for Persistent Postconcussion Symptoms among Children with Acute Concussion in the ED.” *JAMA - Journal of the American Medical Association* 315 (10): 1014–25. <https://doi.org/10.1001/jama.2016.1203>.

Zewdie, E, P Ciechanski, H C Kuo, A Giuffre, C Kahl, R King, L Cole, et al. 2020b. “Safety and Tolerability of Transcranial Magnetic and Direct Current Stimulation in Children: Prospective Single Center Evidence from 3.5 Million Stimulations.” *Brain Stimulation* 13 (3): 565–75. <https://doi.org/10.1016/j.brs.2019.12.025>.

Zewdie, E., P. Ciechanski, H. C. Kuo, A. Giuffre, C. Kahl, R. King, L. Cole, et al. 2020a. “Safety and Tolerability of Transcranial Magnetic and Direct Current Stimulation in Children: Prospective Single Center Evidence from 3.5 Million Stimulations.” *Brain Stimulation* 13 (3): 565–75. <https://doi.org/10.1016/j.brs.2019.12.025>.

Zhou, Guangwei, and Jacob R. Brodsky. 2015. “Objective Vestibular Testing of Children with Dizziness and Balance Complaints Following Sports-Related Concussions.” *Otolaryngology - Head and Neck Surgery (United States)* 152 (6): 1133–39. <https://doi.org/10.1177/0194599815576720>.

Zoe, Teh, Takagi Michael, Hearps Stephen J.C, Babl Franz E, Anderson Nicholas, Clarke Cathriona, Davis Gavin A, Dunne Kevin, Rausa Vanessa C, and Anderson Vicki. 2020. “Acute Cognitive Postconcussive Symptoms Follow Longer Recovery Trajectories than Somatic Postconcussive Symptoms in Young Children.” *Brain Injury* 34 (3): 350–56.

<https://doi.org/10.1080/02699052.2020.1716996>.

Zonfrillo, Mark R., Dennis R. Durbin, Thomas D. Koepsell, Jin Wang, Nancy R. Temkin, Andrea M. Dorsch, Monica S. Vavilala, Kenneth M. Jaffe, and Frederick P. Rivara. 2014. “Prevalence of and Risk Factors for Poor Functioning after Isolated Mild Traumatic Brain Injury in Children.” *Journal of Neurotrauma* 31 (8): 722–27.

<https://doi.org/10.1089/neu.2013.3088>.

Zou, Liqun, Hong Li, Zhen Jiang, Bin He, Yong Xie, Wei Zhang, Jingyuan Jiang, and Hu Nie. 2020. “Modified Decision-Making Rule Supported by Scheduled Telephone Follow-up Reduces Head Computed Tomography Utilization in Children with Mild Traumatic Brain Injury: A Cohort Study.” *Medicine* 99 (18): e20088.

<https://doi.org/10.1097/MD.00000000000020088>.

Zuckerbraun, N. S., S. Atabaki, M. W. Collins, D. Thomas, and G. A. Gioia. 2014. “Use of Modified Acute Concussion Evaluation Tools in the Emergency Department.” *Pediatrics* 133 (4): 635–42. <https://doi.org/10.1542/peds.2013-2600>.

Zuckerman, Scott L, Rachel P Apple, Mitchell J Odom, Young M Lee, Gary S Solomon, and Allen K Sills. 2014. “Effect of Sex on Symptoms and Return to Baseline in Sport-Related Concussion: Clinical Article.” *Journal of Neurosurgery: Pediatrics* 13 (1): 72–81.

<https://doi.org/10.3171/2013.9.PEDS13257>.

Zynda, Aaron J, Meagan J Sabatino, Henry B Ellis, and Shane M Miller. 2020. “Continued Play Following Sport-Related Concussion in United States Youth Soccer.” *International Journal of Exercise Science* 13 (6): 87–100. <http://www.intjexersci.com>.



## TOOL 1.1: Pediatric Concussion: The Role of School Boards, Community Sports Organizations, and Centres

School boards, community sports organizations, and centres must ensure updated policies are in place to recognize and accommodate a child/adolescent who has sustained a concussion.

- Publicize these policies widely among schools, staff, and sports organizations.
- Schools and their staff should be ready to promote the child/adolescent's safe and effective return-to-school.
- Immediate removal from play/activity is the first step in mitigating prolonged recovery.
- Allow the child/adolescent:
  - Enough time away from school and sport to begin cognitive recovery
  - Accommodations to support cognitive deficits such as additional time for homework and/or exams during recovery

Links to toolkits that are useful for developing school board concussion policies:

- [Ontario Ministry of Education School Board Policies for Concussion](#)
- [SCHOOLFirst Handbook: Enabling successful return to school for Canadian youth following a concussion \(Holland Bloorview Kids Rehabilitation Hospital\)](#)
- [Pan-Canadian School Concussion Protocol Template](#): Concussion Protocol Harmonization Project

Links to tools that are useful for informing school policies:

- [An Educator's Guide to Concussions in the Classroom, 2nd Edition](#): Nationwide Children's Hospital, Columbus, OH.
- [Concussion Awareness Training Tool: CATT Online](#)
- [SCHOOLFirst Handbook: Enabling successful return to school for Canadian youth following a concussion \(Holland Bloorview Kids Rehabilitation Hospital\)](#)
- [Parachute Concussion Series: Concussion Guide for Teachers](#)
- Advice for gradually resuming activities after a concussion: Institut national d'excellence en sante et en services sociaux (INESSS – Québec)  
[English handout](#) / [French handout](#)
- [Canadian Guideline on Concussion in Sport Medical Assessment Letter](#)

**Link to toolkits that are useful for developing sports organization policies:**

- [A roadmap for implementing concussion management policies and protocols in sport \(Canadian Academy of Sport and Exercise Medicine\)](#)
- Advice for gradually resuming activities after a concussion: Institut national d'excellence en sante et en services sociaux (INESSS – Québec)  
[English handout](#) / [French handout](#)
- [Parachute: Canadian Guideline for Concussion in Sport](#)

**Links to tools that are useful for informing a policy for sports organizations:**

- [Parachute Concussion Series – After a Concussion: Return-to-Sport strategy](#)
- [2016 Berlin Consensus in Sport Group Statement](#)
- [HEADS UP Concussion and Helmet Safety App \(Centers for Disease Control and Prevention\)](#)
- [Concussion Ed – Parachute Concussion Education](#)
- Advice for gradually resuming activities after a concussion: Institut national d'excellence en sante et en services sociaux (INESSS – Québec)  
[English handout](#) / [French handout](#)
- [Canadian Guideline on Concussion in Sport Pre-Season Education Sheet \(Parachute\)](#)
- [Concussion recognition tool 5: To help identify concussion in children, adolescents and adults](#)
- [Canadian Guideline on Concussion in Sport Medical Assessment Letter](#)



## TOOL 1.2: Concussion Recognition Tool 5

### CONCUSSION RECOGNITION TOOL 5<sup>©</sup>

To help identify concussion in children, adolescents and adults



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#### RECOGNISE & REMOVE

Head impacts can be associated with serious and potentially fatal brain injuries. The Concussion Recognition Tool 5 (CRT5) is to be used for the identification of suspected concussion. It is not designed to diagnose concussion.

##### STEP 1: RED FLAGS – CALL AN AMBULANCE

If there is concern after an injury including whether ANY of the following signs are observed or complaints are reported then the player should be safely and immediately removed from play/game/activity. If no licensed healthcare professional is available, call an ambulance for urgent medical assessment:

- Neck pain or tenderness
- Double vision
- Weakness or tingling/burning in arms or legs
- Severe or increasing headache
- Seizure or convulsion
- Loss of consciousness
- Deteriorating conscious state
- Vomiting
- Increasingly restless, agitated or combative

##### Remember:

- In all cases, the basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Assessment for a spinal cord injury is critical.
- Do not attempt to move the player (other than required for airway support) unless trained to do so.
- Do not remove a helmet or any other equipment unless trained to do so safely.

If there are no Red Flags, identification of possible concussion should proceed to the following steps:

##### STEP 2: OBSERVABLE SIGNS

Visual clues that suggest possible concussion include:

- Lying motionless on the playing surface
- Slow to get up after a direct or indirect hit to the head
- Disorientation or confusion, or an inability to respond appropriately to questions
- Blank or vacant look
- Balance, gait difficulties, motor incoordination, stumbling, slow laboured movements
- Facial injury after head trauma

© Concussion in Sport Group 2017

##### STEP 3: SYMPTOMS

- Headache
- "Pressure in head"
- Balance problems
- Nausea or vomiting
- Drowsiness
- Dizziness
- Blurred vision
- Sensitivity to light
- Sensitivity to noise
- Fatigue or low energy
- "Don't feel right"
- More emotional
- More Irritable
- Sadness
- Nervous or anxious
- Neck Pain
- Difficulty concentrating
- Difficulty remembering
- Feeling slowed down
- Feeling like "in a fog"

##### STEP 4: MEMORY ASSESSMENT

(IN ATHLETES OLDER THAN 12 YEARS)

Failure to answer any of these questions (modified appropriately for each sport) correctly may suggest a concussion:

- "What venue are we at today?"
- "Which half is it now?"
- "Who scored last in this game?"
- "What team did you play last week/game?"
- "Did your team win the last game?"

##### Athletes with suspected concussion should:

- Not be left alone initially (at least for the first 1-2 hours).
- Not drink alcohol.
- Not use recreational/ prescription drugs.
- Not be sent home by themselves. They need to be with a responsible adult.
- Not drive a motor vehicle until cleared to do so by a healthcare professional.

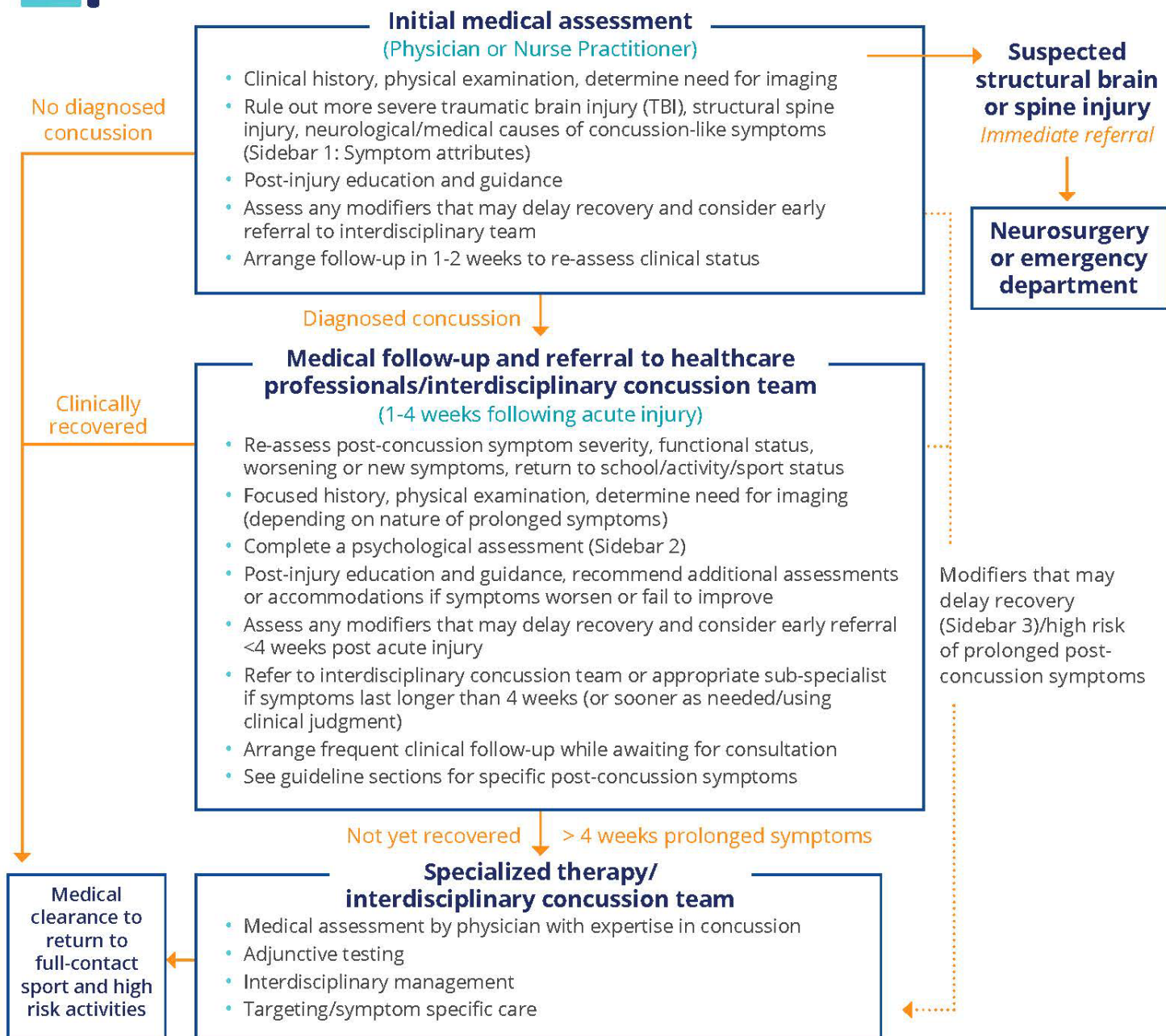
The CRT5 may be freely copied in its current form for distribution to individuals, teams, groups and organisations. Any revision and any reproduction in a digital form requires approval by the Concussion in Sport Group. It should not be altered in any way, rebranded or sold for commercial gain.

**ANY ATHLETE WITH A SUSPECTED CONCUSSION SHOULD BE IMMEDIATELY REMOVED FROM PRACTICE OR PLAY AND SHOULD NOT RETURN TO ACTIVITY UNTIL ASSESSED MEDICALLY, EVEN IF THE SYMPTOMS RESOLVE**

© Concussion in Sport Group 2017



## TOOL 1.3: Manage Acute and Prolonged Concussion Symptoms Algorithm



### Links to Recommendations:

- 1: Recognition and Directing to Care
- 2: Initial Medical Assessment and Management
- 3: Medical Follow-up
- 4: Medical Clearance: Full-contact sport or high-risk activity
- 5: Sport Concussion Considerations
- 6: Headache
- 7: Sleep
- 8: Mental Health
- 9: Cognition
- 10: Vision/vestibular/oculomotor
- 11: Fatigue
- 12: Return-to-School and Work

### SIDEBAR 1

#### > Symptom Attributes

- Duration, onset, triggers, location
- Intensity and impact
- Perception of symptoms
- Impact on functioning
- Previous episodes
- Previous treatment and response

### SIDEBAR 2

#### > Psychosocial Evaluation

- Support system
- Mental health history
- Comorbid conditions (chronic pain, mood/stress/personality disorder)
- Substance use disorder
- Absence from school or academic difficulties

### SIDEBAR 3:

#### Modifiers That May Delay Recovery:

- Age (increases with age)
- Sex (female)
- Personal and family history of migraines
- History of learning or behavioural difficulties
- Personal and family history of mental health
- Family socioeconomic status/education
- High pre-injury symptom presentation

Adapted with permission from the [Ontario Neurotrauma Foundation Standards for Post-Concussion Care - Post Concussion Care Pathway](#)



## TOOL 2.1: Physical Examination

All patients presenting with a suspected acute concussion in the emergency department or office setting should undergo a complete physical examination that includes a neurological examination and cervical spine examination, as well as examination for any other traumatic injury. Depending on the patient's presenting or prolonged symptoms, supplementary physical examination tests can be considered. This also depends on the healthcare professional's experience in performing and interpreting these objective tests.

### Core physical examination: neurological and cervical spine examination

#### Neurological examination

- Glasgow Coma Scale (GCS) scoring
- Vital signs (resting heart rate, blood pressure)
- Screen for signs of orbital trauma or calvarial or basilar skull fracture signs (raccoon eyes, battle sign, hemotympanum)
- Screening for other trauma
- Cranial nerve examination (fundoscopy, pupillary function, visual acuity, visual fields, extra-ocular movements, facial sensation and motor function, hearing, palate symmetry, trapezius strength, tongue movements)
- Pronator drift, motor function, and tone/bulk
- Sensory function
- Reflexes
- Cerebellar testing (finger-to-nose, rapid alternating movements)
- Balance (tandem stance, one leg stance, Romberg)
- Gait (tandem gait)
- Cognitive screen (concentration, immediate, and delayed recall components of the SCAT5 and Child SCAT5 can be considered)

#### Cervical spine examination

- Palpation of cervical spine and posterior and anterior paraspinal musculature (tenderness or reactive muscle guarding)
- Range of motion

### Supplemental tests

Healthcare professional experience and comfort with these tests may vary. If a child/adolescent develops prolonged post-concussion symptoms, consider referring to an interdisciplinary concussion team.

For patients with prolonged dizziness, vertigo, postural imbalance or motion sensitivity

- Dix-Hallpike test (to assess for benign paroxysmal positional vertigo)
- Head thrust test (to assess vestibulo-ocular reflex)
- Balance Error Scoring System (for balance)

For patients with prolonged blurred vision, difficulty focusing, headaches with visual stimulation, and motion sensitivity

- Cover/Uncover test
- Convergence
- Accommodation
- Horizontal and vertical saccades
- Smooth pursuits
- Head thrust testing

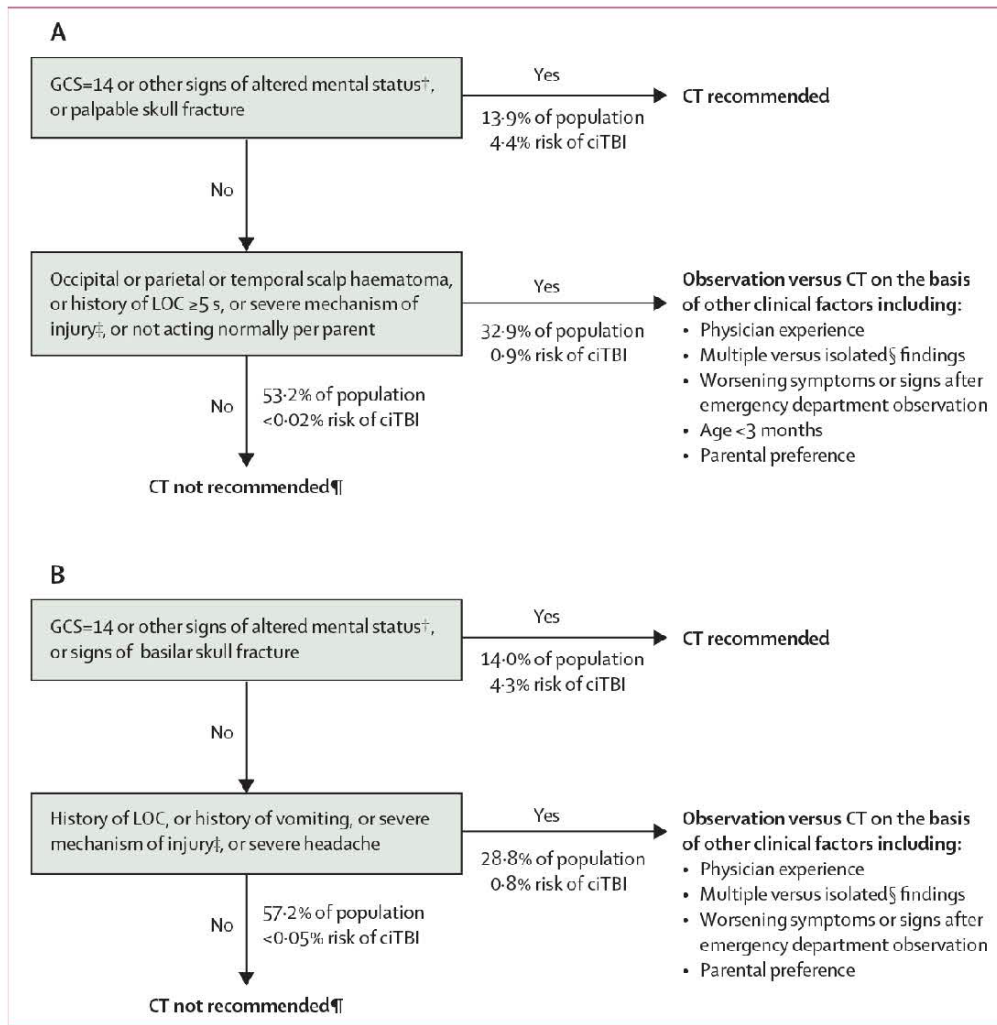
The healthcare professional should also note if performing these tests significantly recreates or exacerbates the patient's symptoms.

For patients with jaw/temporo-mandibular joint pain or discomfort

- Inspection of jaw alignment and occlusion
- Observation of active movements
- Palpation of the jaw and the temporo-mandibular joints
- Otoscopic examination



## TOOL 2.2: PECARN Management Algorithm for Children after Head Trauma



**Figure 3: Suggested CT algorithm for children younger than 2 years (A) and for those aged 2 years and older (B) with GCS scores of 14–15 after head trauma\***

GCS=Glasgow Coma Scale. ciTBI=clinically-important traumatic brain injury. LOC=loss of consciousness. \*Data are from the combined derivation and validation populations. †Other signs of altered mental status: agitation, somnolence, repetitive questioning, or slow response to verbal communication. ‡Severe mechanism of injury: motor vehicle crash with patient ejection, death of another passenger, or rollover; pedestrian or bicyclist without helmet struck by a motorised vehicle; falls of more than 0.9 m (3 feet) (or more than 1.5 m [5 feet] for panel B); or head struck by a high-impact object. §Patients with certain isolated findings (ie, with no other findings suggestive of traumatic brain injury), such as isolated LOC,<sup>39,40</sup> isolated headache,<sup>41</sup> isolated vomiting,<sup>41</sup> and certain types of isolated scalp haematomas in infants older than 3 months,<sup>31,42</sup> have a risk of ciTBI substantially lower than 1%. ¶Risk of ciTBI exceedingly low, generally lower than risk of CT-induced malignancies. Therefore, CT scans are not indicated for most patients in this group.

Source: Kuppermann N, Holmes JF, Dayan PS, Hoyle JD Jr, Atabaki SM, Holubkov R, Nadel FM, Monroe D, Stanley RM, Borgialli DA, Badawy MK, Schunk JE, Quayle KS, Mahajan P, Lichenstein R, Lillis KA, Tunik MG, Jacobs ES, Callahan JM, Gorelick MH, Glass TF, Lee LK, Bachman MC, Cooper A, Powell EC, Gerardi MJ, Melville KA, Muizelaar JP, Wisner DH, Zuspan SJ, Dean JM, Wootton-Gorges SL; Pediatric Emergency Care Applied Research Network (PECARN). Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. *Lancet*. 2009 Oct 3;374(9696):1160-70. Epub 2009 Sep 14. PubMed PMID: 19758692. Reproduced with permission from Elsevier.



## TOOL 2.3: The Canadian Assessment of Tomography for Childhood Head injury 2 (CATCH2) rule

**CT of the head is required for children with minor head injury\* and any 1 of these findings:**

- GCS score < 15 at 2 hours after injury
- Suspected open or depressed skull fracture
- History of worsening headache
- Irritability on examination
- Any sign of basal skull fracture†
- Large, boggy hematoma of the scalp
- Dangerous mechanism of injury‡
- ≥ 4 episodes of vomiting

Note: CT = computed tomography, GCS = Glasgow Coma Scale.

\* Minor head injury is defined as injury within the past 24 hours associated with witnessed loss of consciousness, definite amnesia, witnessed disorientation, persistent vomiting (> 1 episode) or persistent irritability (in a child aged < 2 yr) in a patient with a GCS score of 13–15.

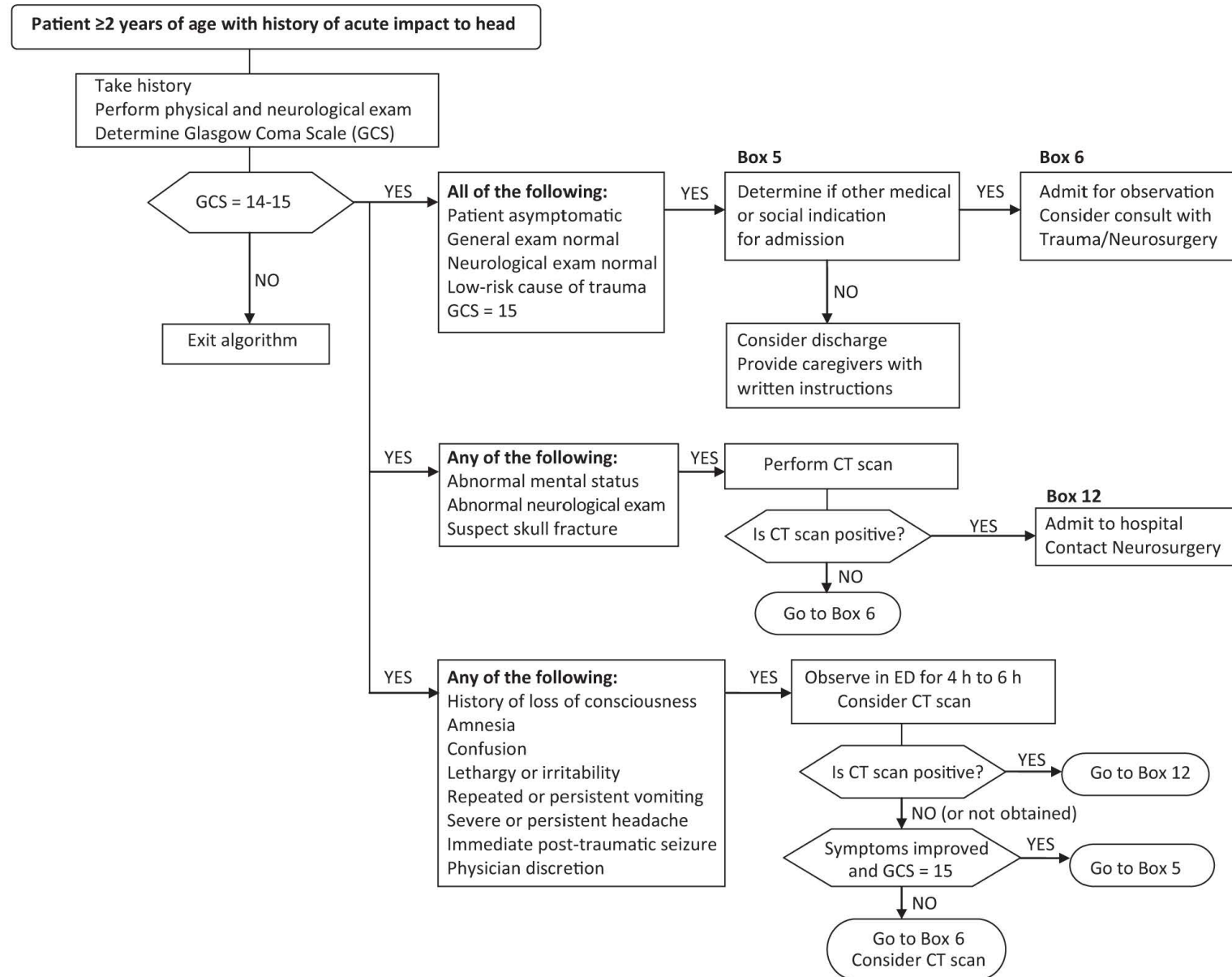
† Signs of basal skull fracture include hemotympanum, raccoon eyes, otorrhea or rhinorrhea of the cerebrospinal fluid, and Battle sign.

‡ Dangerous mechanism is a motor vehicle crash, a fall from elevation ≥ 3 ft (≥ 91 cm) or 5 stairs, or a fall from a bicycle with no helmet.

Reprinted from Osmond MH, Klassen TP, Wells GA, et al. Validation and refinement of a clinical decision rule for the use of computed tomography in children with minor head injury in the emergency department. CMAJ. 2018;190(27):E816–E822. <http://www.cmaj.ca/content/190/27/E816>. © Canadian Medical Association (2018). This work is protected by copyright and the making of this copy was with the permission of the Canadian Medical Association Journal ([www.cmaj.ca](http://www.cmaj.ca)) and Access Copyright. Any alteration of its content or further copying in any form whatsoever is strictly prohibited unless otherwise permitted by law.



## TOOL 2.4: Algorithm for the Management of the Pediatric Patient $\geq 2$ years with Minor Head Trauma



**Figure 1.** Algorithm for the management of the paediatric patient  $\geq 2$  years of age with minor head trauma.

CT Computed tomography; ED Emergency department

Source: Catherine A Farrell; Canadian Paediatric Society, Acute Care Committee. Management of the paediatric patient with acute head trauma. Paediatr Child Health 2013;18(5):253-8.



## TOOL 2.6: Post-Concussion Information Sheet

### What is a concussion?

A concussion is a brain injury that affects how the brain works. A concussion can't be seen on x-rays or brain scans.

### What causes a concussion?

Any blow or hit to the head, face, neck, or body that causes sudden shaking of the head can cause a concussion. Concussions can happen from falling, during sports like hockey, soccer, or volleyball, or during motor vehicle collisions.

### When should a concussion be suspected?

A concussion should be suspected in any child/adolescent who takes a blow to the head, face, neck, or body and shows ANY of the signs or symptoms of a concussion.

### What are the symptoms of a concussion?

Symptoms of concussion describe how someone feels after they are injured. A child/adolescent does not have to be knocked out (black out or unconscious) to have a concussion. Some symptoms may not appear until the next day.

Common symptoms of a concussion are:

- Headaches or head pressure
- Dizziness
- Nausea and vomiting
- Blurred or fuzzy vision
- Sensitivity to light or sound
- Balance problems
- Feeling slow, tired or having no energy
- Not thinking clearly
- Easily upset or angered
- Sadness
- Nervous or anxious
- Feeling more emotional
- Sleeping more or less
- Having a hard time falling asleep
- Difficulty working on a computer
- Difficulty reading or remembering

### What are the visible (can be seen) signs of a concussion?

Signs of concussion describe how a child/adolescent looks or acts when they are injured. Common signs of a concussion are:

- Lying still on the ground or ice
- Slow to get up
- Confusion or can't answer questions
- Emotional lability
- Blank stare
- Difficulty standing or walking
- Injury to the face or holding their head

### What should a child/adolescent do if they think they or a friend has a concussion?

All children/adolescents who may have a concussion should stop the activity they are doing right away and see a medical doctor or nurse practitioner. All children/adolescents with a concussion should get permission from a doctor or nurse practitioner before returning to full contact sport or high-risk activities.

### When should a child/adolescent with a concussion go back to see a doctor or nurse?

Children/adolescents with a concussion should see the doctor or nurse if they have any of the following signs or symptoms:

- Increased confusion
- Worsening headache
- Vomiting more than once
- Seizures
- Not waking up
- Trouble walking
- Difficulty talking
- Strange behaviour

### What can a child/adolescent do to help recover from a concussion?

It is important that all children/adolescents with a concussion give their brain time to heal. Here are some tips:

- Return to activities that can be tolerated and do not worsen symptoms
- Avoid activities that may involve contact or falling
- Get regular amounts of sleep
- Drink water and eat balanced meals
- Spend time with friends and family
- Avoid drugs and alcohol
- Go to all medical appointments
- If school is more difficult or if they feel sadder or more nervous than normal, they should tell someone they are comfortable with. This might be a trusted friend, family member, teacher, guidance counsellor, doctor, nurse, or Elder.

### What are red flag symptoms?

Red flag symptoms that may indicate a more serious injury (severe or worsening headache, neck pain or tenderness, double vision, seizures or convulsions, loss of consciousness, increase in confusion, restlessness, agitation, or aggressive behaviours, repeated vomiting, or slurred speech) call an ambulance as soon as possible. Symptoms may appear right away or up to a couple of days after the injury.

**When can a child/adolescent return-to-school, activities, and sports after a concussion?**

Begin by resting for the first 1-2 days. After this short rest, the child/adolescent should start activities (physical and thinking) that do not make symptoms worse or bring on new symptoms. These gentle activities are encouraged 1-2 days after a concussion, even if the child/adolescent still has symptoms. Avoid any activity where the child/adolescent could fall or hit their head. Resting completely for more than 1-2 days after a concussion may slow recovery.

It is important that all children/adolescents with a concussion make a gradual (step-by-step) return to school/activity/sport. Use the steps below to guide this gradual process. Each step should take about one day. If symptoms get worse, go back to the last step. Try it again until the child/adolescent can do it without bringing on new symptoms or making symptoms worse. It is important to get medical clearance from a Doctor before returning to full contact sport or high-risk activities. Missing more than one week of school is also not suggested.

**Return-to-activity/sport steps:**

Steps	Activity	Example
1	Complete rest (maximum 1-2 days)	Activities at home that do not make the person feel worse. Limit activities that increase the heart rate
2	Light physical activity	Jogging or stationary cycling at slow to medium speed. No weight training.
3	Sport-specific exercise	Running or skating drills. No drills with risk of head injury.
4	Non-contact activities	Practice without body contact. Gym class activities without risk of head injury.
5	Full-contact activities ( <i>Clearance from your doctor is required</i> )	Full activities/sports practices after doing full-time school and getting a doctor's note
6	Return to all activities and sports ( <i>Clearance from your doctor is required</i> )	Normal full-contact game play

**Return-to-school steps:**

Steps	Activity	Example
1	Complete rest (maximum of 1-2 days)	Mental and rest. Avoid school work, screened devices, and driving. Limit activities that increase the heart rate.
2	Activities at home that do not make symptoms worse or bring on new symptoms	Reading, texting, screen time and other activities that do not worsen symptoms. Start at 5-15 minutes at a time.
3	School activities	Homework, reading or other activities outside of the classroom
4	Return-to-school part-time	Getting back to school for a few hours or half days
5	Return-to-school full-time ( <i>Clearance from your doctor is not required</i> )	Gradual return to full days at school

**How long does it take a child/adolescent to recover after a concussion?**

Most children/adolescents with a concussion will recover in 1-4 weeks, but it can take longer for some people.

**What can happen if a child/adolescent goes back to full-contact sports or game-play too early after a concussion?**

If children/adolescents with a concussion go back to activities that include a risk of hitting their head or falling down again too early after a concussion, they can have another injury. Having another injury can lead to worse symptoms that last longer, or result in a more severe or fatal brain injury.

**How can children/adolescents help prevent concussions and their consequences?**

To prevent concussions, children/adolescents should follow the rules of their sport, respect their opponents, and avoid head contact. Youth should always wear helmets during outdoor activities such as skating or riding bikes, snowmobiles, or all-terrain vehicles.

It is important for children/adolescents to tell parents, teachers, or coaches if they think anyone may have a concussion.

Content from this tool was adapted with permission from the [Parachute Canadian Guideline on Concussion in Sport](#)



## TOOL 2.7: Strategies to Promote Good Sleep and Alertness

### Healthy habits to promote good sleep and alertness

Make sure the child/adolescent:

- Maintains the same sleep and wake times during the week and on weekends throughout the year, including in the summer, to the best of their ability. If this is challenging to maintain on weekends and holidays, try to keep the child/adolescent within one hour of weekday bed and wake times.
- Has a fixed bedtime routine. A warm bath about one hour before bed may help to facilitate sleep through relaxation. (Note: taking a warm bath too close to bedtime may raise body temperature, which can delay sleep.) If taking a warm bath or shower close to sleep time is unavoidable, it can be followed by a cool (not cold) rinse or shower to prevent the body temperature from rising.
- Turns off the computer and electronic devices including cell phones, at least 30 minutes before bedtime. This helps to ensure that the light emitted from these devices does not affect the ability to fall asleep or maintain sleep, and, that the cognitive or thinking activities involved with screens don't affect the ability to quiet the mind in preparation for sleep.
- Gets increased sleep and naps in the first few hours/days after a concussion. During this acute period, the child/adolescent should be allowed to sleep as much as needed throughout the day and night. Consult a physician or emergency department if the child/adolescent is not easily awoken in the first few hours or days after a concussion. After this acute period, those who have night-time sleep issues should avoid naps (unless it is part of the younger child's typical routine) to promote night-time sleep and gradual return-to-activity.
- Limits naps to once a day. If the child/adolescent is sleepy during the day and cannot avoid napping, then a nap should take place before 3 pm and for no longer than 30 minutes.
- Naps in bed, and not in another room or in front on the TV.

### Nutrition, exercise, and lifestyle

Make sure the child/adolescent:

- Avoids caffeine (coffee, tea, chocolate, some over-the-counter medications) within 4-6 hours of bedtime.

- Avoids energy drinks and alcohol altogether.
- Avoids eating heavy meals late in the evening.
- Avoids sugar 4 hours before bedtime. Try a bedtime snack containing proteins.
- Has a balanced diet. Foods such as Goji berries, walnuts, almonds, pineapple, bananas and oranges all contain substantial amounts of melatonin, a hormone produced in the brain that promotes sleep.
- Has an adequate amount of magnesium and zinc in the diet or by supplement. Zinc is known to regulate sleep and magnesium is also directly involved in sleep and relaxation. Magnesium and Zinc-rich foods include:
  - Dark leafy greens
  - Seeds and nuts, including sunflower and sesame seeds, cashews and almonds
  - Squash, broccoli, and other vegetables (magnesium)
  - Potatoes (zinc)
  - Legumes
  - Dairy products
  - Meat
  - Unprocessed whole grains.
- Does 30-60 minutes of vigorous exercise a day, when tolerated and medically indicated, and at least 2 hours before bedtime. Exercise during the 2 hours before bedtime can delay sleep while regular exercise earlier in the day can promote sleep.
- Gets some natural light during the day, especially in the morning.
- Gets 15-30 minutes of quiet time after periods of cognitive activity, if he/she has significant cognitive fatigue (not sleepiness) during the day. Ideally, quiet time should be in an environment with natural light and no electronic devices. This can also promote night-time sleep.
- Avoids loud music with a strong beat before bedtime. If the child/adolescent is used to listening to music before bed, make sure that it is music that promotes relaxation.

## **Sleeping environment**

Make sure the child/adolescent:

- Has a dark, cool and comfortable sleeping area.
- Removes all sources of light in the bedroom while sleeping.
- Opens the curtains and has natural light immediately upon awakening.
- Keeps the bedroom clean, tidy and quiet. Neutral or natural sounds can help to block out distracting sounds.
- Reserves the bed and bedroom for sleep, and does other activities (reading, watching TV, using the internet, playing games) in another room. Ideally, there should be no electronic equipment in the bedroom. If this is unavoidable, make sure that all computers, tablets, cell phones, etc. are turned off or are in —“sleep” mode.
- Turns any digital clocks with numbers that light up away from the bed during sleep.

Adapted with permission from the authors: C. Wiseman-Hakes (U of Toronto, Canada), M-C. Ouellet (U Laval) & S. Beaulieu-Bonneau (U Laval).



## TOOL 6.1: Post-Concussion Headache Algorithm

### Medical follow-up and referral to healthcare professionals/interdisciplinary concussion team (1-4 weeks following acute injury)

- Focused headache history, physical examination, determine need for imaging
- Post-injury education and guidance on use of over the counter analgesics
- Headache and medication diary
- Refer to healthcare professionals/interdisciplinary concussion clinic if symptoms last longer than 4 weeks post-concussion (or sooner as needed/using clinical judgment), or if the child has modifiers that may delay recovery
- Consider trial of conservative management or prophylactic or abortive headache medication

Consider early referral (< 4 weeks) if child/adolescent has modifiers that may delay recovery/high risk of prolonged post-concussion symptoms

Not yet recovered      Headache > 4 weeks post-concussion

### Healthcare professionals/ interdisciplinary concussion team

- Medical assessment by physician with expertise in concussion
- Adjunctive testing (graded aerobic exercise testing)
- Interdisciplinary management of post-concussion headache subtypes

Migraine, tension, cluster headache, other

Neurologist

Headaches with prolonged visual stimulation

Neurologist,  
Physiotherapist,  
Neurooptometrist

Physiological or exercise-induced headache

Physiotherapist,  
Athletic Therapist

Cervicogenic headaches

Neurologist,  
Physiotherapist,  
Chiropractor



## TOOL 6.2: General Considerations Regarding Pharmacotherapy

- Address significant psycho-social stressors before starting treatment ([Heads Up Checkup: Mental Health and Behavioral Risk Screening System](#)).
- Review current medications, including over-the-counter medicines and supplements, before starting treatment. If possible, minimize or withdraw agents that may exacerbate or maintain symptoms. Screen for overmedication headaches.
- Ideally a psychiatrist would be involved in the prescribing of psychotropic medication but an experienced family doctor or paediatrician, may initiate and monitor treatment. In severe cases, a psychiatrist should be consulted.
- Change only one medication at a time.
- Target drug therapy to specific symptoms (example: dysphoria, anxiety, mood swings, irritability, fatigue, sleep, headache and pain), and monitor during the course of treatment.
- Consider waiting until 12 weeks before starting a mood-altering medication unless the clinical scenario dictates otherwise.
- Choose therapies that minimize the impact of adverse effects on awakening, cognition, sleep and motor coordination, as well as on seizure threshold-domains in which children/adolescents with concussion may already be compromised.
- Start at the lowest effective dose and titrate slowly upwards, monitoring tolerability and clinical response, and also aiming for adequate dose and duration. Treatment often fails because either are insufficient. At times, you may have to prescribe the maximum tolerated doses.
- Aim to use a single agent to alleviate several symptoms. However, as individual symptoms may not show a coupled response to treatment, you may have to try a combination of strategies.
- Offer limited quantities of medications to those at a higher risk of suicide.
- Continue successful pharmacotherapy for at least 6 months, preferably 9 to 12 months for SSRIs, before tapering off on a trial basis.
- Use a specific SSRI as first-line treatment for mood and anxiety syndromes. Avoid using benzodiazepines as first-line therapy for anxiety. Avoid opiates.
- Follow-up regularly.

Adapted from Silver JM, Arciniegas DB, Yudovsky SC. Psychopharmacology. In: Silver JM, Arciniegas DB, Yudovsky SC, eds. Adapted with permission from the Textbook of Traumatic Brain Injury, (Copyright ©2005). American Psychiatric Association. All Rights Reserved.



## TOOL 6.3: Approved Medications for Pediatric Indications

Medications may be used as indicated or as off-label use for symptoms related to features of concussion (i.e., migraine headache, muscular discomfort, sleep, cognitive, and mood disorders) or for patients with an acute or prolonged concussion who also have co-existing medical diagnoses that may have been prescribed medications for other indications.

Use clinical judgment and discretion at all times when prescribing medication.

Drug	Health Canada Approval	FDA Approval	Dosage#
<b>Headache or Muscular Strain</b>			
> <b>Acetaminophen</b>	Treatment of mild/moderate pain and fever. All ages.	All ages for mild to moderate pain and fever	10-15 mg/kg/dose orally/rectal every 4h as needed (maximum 75 mg/kg/day or 4,000 mg/day)
> <b>Ibuprofen</b>	Pediatric patients for mild to moderate pain. Fever in pediatric patients.	Mild to moderate pain in patient's $\geq 6$ months old. Reduction in fever in patient's $\geq 6$ months old. Juvenile arthritis in pediatric patients.	5-10 mg/kg/dose orally every 6-8h as needed (max 600 mg/dose or 40 mg/kg/day)
> <b>Naproxen</b>	Children $\geq 2$ years of age: 1) osteoarthritis, ankylosing spondylitis, juvenile rheumatoid arthritis 2) aches/pains and mild to moderate pain due to sprains/strains 3) primary dysmenorrhea	> 2 years of age for analgesia, inflammatory disease	5 mg/kg/dose orally twice daily. Max 500 mg/dose, 1,000 mg/day (usual adult dose: 250-500 mg)
<b>Migraine Headache</b>			
> <b>Amitriptyline</b>	None	None	Chronic pain: 0.1 mg/kg, increase as needed to 0.5-2 mg/kg (off label dosing)
> <b>Diclofenac powder for oral suspension (Cambia®)</b>	No indication <18 years of age. Acute treatment of migraine attacks with or without aura in adults 18 years of age or older.	No indication <18 years of age. Acute treatment of migraine attacks with or without aura in adults 18 years of age or older.	Adult: 50 mg q24 hrs prn (max 15 doses/ month). *Note: the safety of taking a second dose has not been studied, as per the manufacturer.
> <b>Triptan (example: rizatriptan, sumatriptan)</b>	Almotriptan: acute treatment of migraine headache with or without aura in patients 12-17 years of age. Naratriptan: None Rizatriptan: None Sumatriptan: None Zolmitriptan: None	Almotriptan: acute treatment of migraine headache with or without aura in patients 12-17 years of age. Naratriptan: None Rizatriptan: > 6 years of age for acute treatment of migraine with or without aura Sumatriptan: None Zolmitriptan: None	Almotriptan: 6.25-12.5 mg, may repeat dose after 2 hours if needed (max 25 mg/day) Rizatriptan: $\leq 40$ kg: 5 mg/24 hrs, $\geq 40$ kg: 10 mg/24 hrs

Tool 6.3: Approved Medications for Pediatric Indications (cont'd)

Drug	Health Canada Approval	FDA Approval	Dosage#
> <b>Beta-blockers- Propranolol</b>	migraine prophylaxis	Adult-approved indication for migraine	0.5-4 mg/kg/day
> <b>Topiramate</b>		Adult- approved prevention of migraine headaches	2-16 years: initial dose: 1-3 mg/kg/day orally, increase every 1-2 weeks by 1-3 mg/kg/day divided twice per day. Maintenance dose 5-9 mg/kg/day divided twice per day. ≥ 17 yrs. 50 mg daily. Increase each week by 50 mg/day. Max dose 600 mg/day (Off label dosing)
<b>Sleep Disorders</b>			
> <b>Trazodone</b>	None	None	
> <b>Zopiclone</b>	None	None	
> <b>Magnesium Oxide</b>	Classified as a natural health product. For hypomagnesemia/dietary supplement. No age restrictions.	Magnesium supplement. No age restriction.	20-40 mg/kg/day
> <b>Melatonin</b>	Licensed Natural Health product –no Health Canada monograph	None	0.5-3 mg every night at bedtime (Max. 12 mg)
> <b>Zinc</b>	Licensed Natural Health Product – no Health Canada monograph	Treatment and prevention of zinc deficiency states.	Recommended dietary allowance: infants 5 mg/day, 1-10 years: 10 mg/day, > 11 years: 12-15 mg/day
> <b>Tryptophan</b>	None	None	
<b>Mood Disorders</b>			
> <b>Fluoxetine</b>	none	Major depressive disorder (≥ 8 years) Obsessive compulsive disorder (≥ 7 years)	Major depressive disorder: 10-20 mg/day Obsessive compulsive disorder: 10-30 mg/day. Up to 60 mg/day in higher weight children/ adolescents
> <b>Sertraline</b>	None	Obsessive-compulsive disorder (≥ 6 years)	6-12 years: 25 mg daily, increase as needed to a max of 200 mg/day 13-17 years: 50 mg/day, increase as needed to 200 mg
> <b>Fluvoxamine</b>	None	Obsessive-compulsive disorder (≥ 8 years)	8-17 years: 25 mg daily, increase as needed to a max of 200 mg in 8-11 years and 300 mg/day in adolescents
> <b>Paroxetine</b>	None	None	

Tool 6.3: Approved Medications for Pediatric Indications (cont'd)

Drug	Health Canada Approval	FDA Approval	Dosage#
> Citalopram	None	None	
> Escitalopram	None	Major depressive disorder ≥ 12 years	10 mg daily, increase as needed to a max of 20 mg
> Duloxetine	None	Generalized Anxiety Disorder: 7-17 years	Starting dose: 30mg daily Recommended dose: 30mg daily; max dose: 120mg daily
> Venlafaxine	None	None	
> Mirtazapine	None	None	
> Lurasidone	Depressive episodes associated with bipolar I disorder: 13-17 years Schizophrenia: 15-17 years	Depressive episodes associated with bipolar I disorder: 10-17 years Schizophrenia: 13-17 years	Bipolar I depression starting dose: 20mg po daily; recommended dose 20mg-80mg daily. Schizophrenia starting dose: 40mg daily; recommended dose: 40mg-80mg daily
> Prochlorperazine	≥ 2 years for or > 9 kg 1) psychotic disorders (agitation, confusion, delusion, tension, and anxiety) 2) nausea and vomiting 3) relief of excessive anxiety associated with psychoneurotic or somatic conditions	≥ 2 years or children > 9 kg for 1) nonsurgical nausea and vomiting 2) psychosis	Antiemetic: 0.4 mg/kg/day Psychosis: 2.5 mg orally increase as needed to 20 mg/day (off label dosing)
<b>Cognitive Problems</b>			
> Methylphenidate, extended release (Concerta®, Biphentin®)	Treatment of ADHD in children 6 years of age and older.	Treatment of ADHD in children 6 years of age and older for Concerta® only; Biphentin® not marketed in the USA.	<i>Concerta®</i> Children and adolescents: Initial - 18mg once a day. Increase daily dose by 18 mg at weekly intervals. Maximum of 54 mg in children and 72 mg in adolescents.  <i>Biphentin®</i> Children and adolescents: Initial – 10-20 mg once daily. Increase daily dose by 10 mg/day at weekly intervals. Typical maximum of 60 mg/day. However, manufacturer states in some children, higher doses up to a maximum of 1 mg/kg/day may be necessary.

Tool 6.3: Approved Medications for Pediatric Indications (cont'd)

Drug	Health Canada Approval	FDA Approval	Dosage#
> Concerta (OROS Methyphenidate Hydrochloride)	ADHD	ADHD	Children and adolescents between 6-18 years old. Starting dose: 18mg po qAM, with increases weekly as needed and as tolerated to a max of 54mg.
>Dextroamphetamine (Dexedrine®)  Dextroamphetamine, sustained release (Dexedrine Spansules®)	Treatment of ADHD and in the adjunctive treatment of narcolepsy in children 6 years of age and older.	Treatment of ADHD and in the adjunctive treatment of narcolepsy in children 6 years of age and older.	<p><i>ADHD</i> Children 6 years of age or older: Initial - 5 mg once or twice daily. Increase the daily dose by 5 mg at weekly intervals. *Dexedrine Spansules® may be used for once-a-day dosing where appropriate.</p> <p>Typical maximum of 40 mg/day, but may go up to 60 mg/day if needed.</p> <p><i>Narcolepsy</i> Children 6-12 years: Initial- 5 mg daily. Increase daily dose by 5 mg at weekly intervals. Maximum of 60 mg/day. Adolescents 12 years or older: Initial - 10 mg daily. Increase daily dose by 10 mg at weekly intervals. Maximum of 60 mg/day.</p>
> Lisdexamphetamine (Vyvanse®)	Treatment of ADHD in children 6 years of age and older.	Treatment of ADHD in children 6 years of age and older.	Children and adolescents: Initial – 20-30 mg once a day in the morning. Increase daily dose by 10-20 mg at weekly intervals. Max of 60 mg/day (Canada). Max of 70 mg/day (US).
> Clonidine (Catapres®)	<p>No indication &lt;18 years of age. No approved indications for ADHD at any age.</p> <p>Used off-label in children 6 years of age and older for ADHD treatment as monotherapy or adjunctive to stimulant medications.</p>	<p>Extended-release clonidine (Kapvay®) approved for ADHD treatment in children 6 years of age and older.</p> <p>*note: extended-release clonidine is not available in Canada.</p>	<p>Off label dosing: Children less than 45 kg: Initial – 0.05 mg at bedtime. Increase every 3-7 days in 0.05 mg/day increments given as 0.05 mg BID, then TID, then QID. Maximum daily dose for 27-40.5 kg = 0.2 mg/day. Maximum daily dose for 40.5-45 kg = 0.3 mg/day.</p> <p>Children and adolescents greater than 45 kg: Initial – 0.1 mg at bedtime. Increase every 3-7 days in 0.1 mg/day increments given as 0.1 mg BID, then TID, then QID. Max daily dose of 0.4 mg/day.</p>

Tool 6.3: Approved Medications for Pediatric Indications (cont'd)

Drug	Health Canada Approval	FDA Approval	Dosage#
> Amphetamine Mixed Salts, extended-release (Adderall XR®)	Treatment of ADHD in children 6 years of age and older.	Treatment of ADHD in children 6 years of age and older.	<p>Children 6-12 years of age: Initial – 5-10 mg daily in the morning. Increase daily dose by 5-10 mg at weekly intervals. Maximum of 30 mg/day.</p> <p>Adolescents 13-17 years of age: Initial – 10 mg once a day in the morning. Increase daily dose by 5-10 mg at weekly intervals. Maximum of 30 mg/day.</p>
> Atomoxetine (Strattera®)	Treatment of ADHD in children 6 years of age and older.	Treatment of ADHD in children 6 years of age and older.	<p>Children up to 70 kg: Initial: 0.5 mg/kg/day for 7-14 days. If tolerated, increase to 0.8 mg/kg/day for 7-14 days, then increase to 1.2 mg/kg/day given once daily or divided BID. Maximum 1.4 mg/kg/day or 100 mg, whichever is less.</p> <p>Adolescents greater than 70 kg: Initial – 40 mg/day for 7-14 days. If tolerated, increase to 60 mg/day for 7-14 days, then increase to 80 mg/day given once daily or divided BID. Maximum 100 mg/day.</p>
> Guanfacine, extended-release (Intuniv XR®)	Monotherapy or as adjunctive to stimulant medications for the treatment of ADHD in children 6 years of age and older.	Monotherapy or as adjunctive to stimulant medications for the treatment of ADHD in children 6 years of age and older.	<p>Children 6-12 years of age: Initial – 1 mg once daily. Increase daily dose by 1 mg at weekly intervals. Maximum of 4 mg/day.</p> <p>Adolescents 13-17 years of age: Initial – 1 mg once daily. Increase daily dose by 1 mg at weekly intervals. Maximum of 7 mg/day for monotherapy, or 4 mg/day for adjunctive therapy to stimulants.</p>

Tool 6.3: Approved Medications for Pediatric Indications (cont'd)

Drug	Health Canada Approval	FDA Approval	Dosage#
> Amantadine	No indications less than 18 years of age for ADHD.	No indication less than 18 years of age for ADHD.	<p>(off label use in children 5 years of age and older as an adjunctive agent to stimulants for ADHD treatment, and to target irritability and hyperactivity in ASD)</p> <p>ADHD</p> <p>Children 5 years of age and older:</p> <p>Initial – 50 mg/day. Increase daily dose by 50 mg at 4-7 day intervals. Typical range: 50-150 mg/day in divided doses 1-3 times daily.</p> <p>Maximum of 100 mg/day in children less than 30 kg.</p> <p>Maximum of 150 mg/day in children and adolescents 30 kg and greater.</p>

Abbreviations: Attention deficit hyperactivity disorder (ADHD), autism spectrum disorder (ASD); Per os (po); bis in die (two times a day- BID); hour (h); IV (intravenous); omne in die -once a day (od); every morning (qAM); ter in die- three times a day (TID); as needed dosing (prn).

Dosages from Sick Kids 2013/2014 Drug Handbook and Formulary, Lexicomp Pediatric Dosage Handbook 19th Edition, CHEO Pediatric Doses of Commonly Prescribed Medications 2011, <https://www.accessdata.fda.gov/scripts/cder/daf/>, Clinical Handbook of Psychotropic Drugs for Children and Adolescents, 4th ed. 2019.



## TOOL 7.1: Prolonged Post-concussion Sleep Disturbances Algorithm

### Medical follow-up

(Sleep disturbances >1-4 weeks)

- Screen for medical conditions, current medication use, comorbid psychopathology, and risk factors for sleep disturbances (Sidebar 1)
- Reinforce the importance of sleep hygiene and physical and cognitive activity
- Assess return to school and return to sport status
- Consider treating with cognitive behavioural therapy (CBT) or refer to interdisciplinary concussion team if symptoms last longer than 4 weeks (or sooner as needed/using clinical judgment)

Sleep disturbances persist > 4 weeks post-concussion

### Cognitive behavioural therapy or referral to healthcare professionals/ interdisciplinary concussion team

1. Cognitive behaviour therapy (CBT): treatment of choice
2. Daily supplements: magnesium, melatonin, and zinc
3. If CBT is not available: monitor behavioural interventions weekly, consider referral to an interdisciplinary concussion clinic or occupational therapist

Sleep disturbances persist > 6 weeks post-concussion and interventions at 4-weeks have been unsuccessful

### Referral to healthcare professionals/ interdisciplinary concussion team

#### Refer to a sleep specialist for consultation

Particularly if sleep hygiene can't be optimized and poor sleep quality is impacting ability to return to school or ability to recondition.

Ideal specialist: a specialist who has experience with mTBI and polysomnography.

#### Pharmacological treatment

Consider prescribing medication on a short-term basis if sleep has not improved > 6 weeks post-injury. Ensure that medications do not result in dependency and that patient has minimal adverse effects. The aim is to establish a more routine sleep pattern. (Sidebar 2)

### SIDEBAR 1

#### Factors that may influence the child/adolescent's sleep/wake cycle

##### > Medical conditions

- Endocrine dysfunction
- Metabolic dysfunction
- Obesity
- Enlarged tonsils
- Obstruction
- Sleep-related breathing disorders
- Early morning headaches

##### > Current medication use

Verify if patient's prescribed or non-prescribed medications impact sleep:

- Inadequate medication
- Dosage
- Timing of administration
- Screen for stimulants

##### > Comorbid psychopathology

- Mood and anxiety disorders
- Post-traumatic stress disorder (PTSD)
- Query nightmares and/or night terrors

##### > Unhealthy habits

- Lack of exercise
- Variable sleep-wake schedule
- Excessive napping
- Excessive time spent in bed
- Exercising close to bedtime
- Screen time
- Use of nicotine, caffeine, energy drinks, processed foods, processed sugars, alcohol and drugs

### SIDEBAR 2

#### Potential medication options – short-term basis only

- Trazodone 12.5 mg
- Amitriptyline 5.0 – 10.0 mg



## TOOL 7.2: Factors that may Influence the Child/Adolescent's Sleep/Wake Cycle

### Examples of factors and considerations

<b>Medical Conditions</b>	<ul style="list-style-type: none"><li>• Endocrine dysfunction</li><li>• Metabolic</li><li>• Obesity</li><li>• Enlarged tonsils</li><li>• Obstruction</li><li>• Sleep-related breathing disorders (possibly sleep apnea)</li><li>• Early morning headaches</li></ul>
<b>Current Medication Use</b>	<p>Verify if prescribed or non-prescribed medications that are being taken have an impact on sleep and screen for stimulants.</p> <p>Factors to consider:</p> <ul style="list-style-type: none"><li>• Type of medication (adequate/inadequate type)</li><li>• Dosage</li><li>• Timing of administration</li></ul>
<b>Comorbid Psychopathology</b>	<ul style="list-style-type: none"><li>• Mood and anxiety disorders (Domain 8: Mental health considerations)</li><li>• Post-traumatic stress disorder (PTSD)</li><li>• Query nightmares and/or night terrors</li></ul>
<b>Unhealthy Habits</b>	<ul style="list-style-type: none"><li>• Lack of exercise</li><li>• Variable sleep-wake schedule</li><li>• Excessive napping</li><li>• Excessive time spent in bed</li><li>• Exercising close to bedtime</li><li>• Screen time (hours per day)</li><li>• Use of nicotine, caffeine, and/or energy drinks</li><li>• Diet: Consumption of processed foods, processed sugars, alcohol, and/or drugs</li></ul>

Adapted from Guidelines for Concussion/Mild Traumatic Brain Injury and Persistent Symptoms, Third Edition



## TOOL 8.1: Post-concussion Mental Health Considerations Algorithm

### Medical follow-up and referral to healthcare professionals/interdisciplinary concussion team

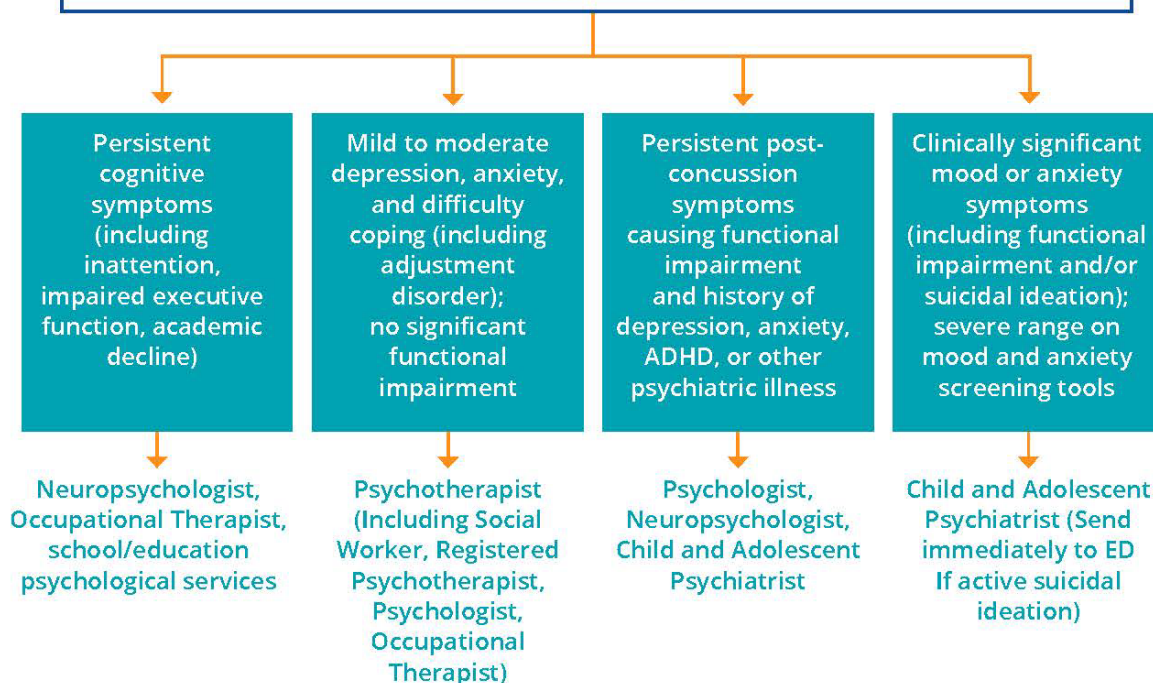
(1-4 weeks following acute injury)

- Focused clinical history, physical examination, determine need for imaging
- Screen for possible complicating factors that may impede recovery e.g. previous mental illness, family history of mental illness, migraine, current stress level, and any other modifiers that may delay recovery. Consider early referral to specialist or interdisciplinary team.
- Screen for mood, anxiety, and cognitive symptoms
- Send immediately to the emergency department (ED) if active suicidal ideation
- Review pre-injury mental health status (including pre-injury symptoms or diagnoses of depression, anxiety disorders, ADHD, and behavior disturbances)
- Review previous school history (attendance, learning, behavior) using information from school records if possible
- Post-injury education and guidance on symptom management (including advice regarding pacing of activities and general recovery expectations within the context of pre-existing circumstances)
- Refer to healthcare professionals/interdisciplinary concussion team if symptoms last longer than 4 weeks (or sooner as needed/using clinical judgment)

Consider early referral (< 4 weeks) if child/adolescent has modifiers that may delay recovery/high risk of prolonged post-concussion symptoms

Not yet recovered      Symptoms lasting > 4 weeks post-concussion

### Specialist or interdisciplinary concussion team

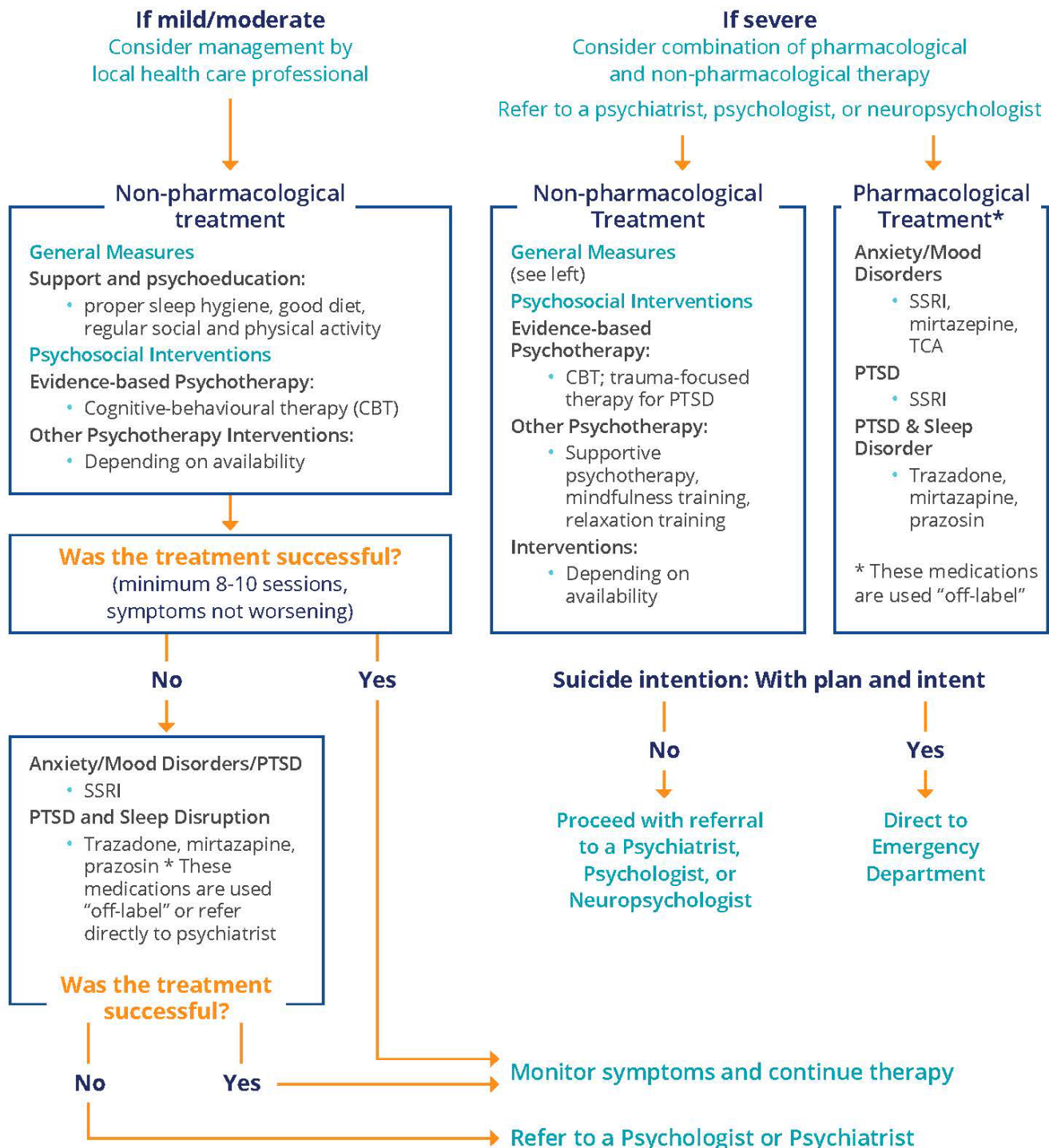


Acronyms: attention deficit hyperactivity disorder (ADHD)

Living Guideline for Diagnosing and Managing Pediatric Concussion



## TOOL 8.2: Management of Prolonged Mental Health Disorders Algorithm



Adapted from *Guideline for Concussion/Mild Traumatic Brain Injury and Persistent Symptoms*, Third Edition  
Acronyms: Post-traumatic stress disorder (PTSD); Selective serotonin reuptake inhibitors (SSRI); Tricyclic antidepressants (TCA)



## TOOL 10.1: Post-concussion Vision, Vestibular, and Oculomotor Disturbances Algorithm

### Medical follow-up and referral to healthcare professionals/interdisciplinary concussion team

(1-4 weeks following acute injury)

- Focused vision and vestibular history, physical examination, determine need for imaging
- Post-injury education and guidance on symptom management
- Refer to healthcare professionals/interdisciplinary concussion team if symptoms last longer than 4 weeks (or sooner as needed/using clinical judgment), or if the child has modifiers that may delay recovery
- Consider particle re-positioning for BPPV (e.g. Epley)

Consider early referral (< 4 weeks) if child/adolescent has modifiers that may delay recovery/ high risk of prolonged post-concussion symptoms

Not yet recovered

Symptoms lasting >4 weeks post-concussion

### Healthcare professionals/interdisciplinary concussion team

- Medical assessment by physician with expertise in concussion
- Adjunctive testing (graded aerobic exercise testing, formal vestibular testing, automated visual field testing)
- Interdisciplinary management of vision and vestibular disorders

BPPV, vestibular hypofunction, balance

Physiotherapist\*

Central vestibulopathy  
SSCD

Otolaryngologist/  
Neuro-Otologist,  
Neuro-  
Ophthalmologist,  
Physiotherapist\*

Vision or oculomotor disorder

Neuro-  
Ophthalmologist,  
Neuro-  
Optometrist,  
Physiotherapist\*

Cervicogenic dizziness

Physiotherapist\*,  
Chiropractor\*

Acronyms: paroxysmal positional vertigo (BPPV); superior semicircular canal dehiscence syndrome (SSCD)

\*denotes health care professional with competency-based training in vestibular or visual system rehabilitation



## TOOL 12.1: Concussion Implications and Interventions for the Classroom

Area of concern after concussion	Possible classroom behaviour that indicates difficulty	Proactive solution for student
> Physical	Headaches in school	Allow for rest breaks; hydration; quieter location.
	Dizziness	Provide calm environment without multiple distractions.
	Fatigue: Sleeping more or less than usual	Allow for rest breaks; plan daily schedule with a variety of classes with different levels of difficulty interspersed (e.g. difficult vs less difficult).
	Vision problems with sensitivity to lights	Avoid fluorescent lights when possible; decrease brightness on computers, smart phones, tablets; limit time on computers; electronic gaming devices.
	Hearing issues with noise (gyms, concerts, music causing irritability)	Avoid loud activities, including gym classes, loud music from headphones, dances or parties.
> Cognitive-communication	Unable to concentrate	Provide information in smaller chunks; assign less material for task completion.
	Forgetting recently learned information or conversations	Allow for written and verbal cues; use note taker or provide written notes for reference.
	Slow to process information (verbally or written)	Allow additional time for response; provide alternative methods for test taking; breakdown complex directions into simple steps; decrease length of assignments or do not give any.
	Asks for repeats	Provide written and verbal cues and notes; post schedule and assignments.
	Word finding/naming (vocabulary) difficulty	Pre-teach new vocabulary; cue using categorization and association.
	Poor social interactions with others (easy to anger, rude, interrupts with irrelevant information)	Do not punish unacceptable behaviours; work on social skills one on one.

Area of concern after concussion	Possible classroom behaviour that indicates difficulty	Proactive solution for student
> Cognitive-communication	Confused about recent activities/ experiences	Use technology (tablets, smart phones) to record cues as activities occur; use day organizer for reference.
	Unable to attend to task completion	Break tasks into smaller pieces so each portion is successfully completed.
> Social/emotional/behavioural	More irritable in the classroom	Provide clear schedule for the day; recognize beginning of irritable behaviour and provide alternative activity.
	Feeling anxious or tense	Provide time for rest during the day; provide clear schedule of activities for the day; less required work.
	Feeling depressed	Point out strengths and successes during each day.
	Easily overwhelmed by school requirements or activities	Diminish schedule to reasonable load that can be successfully accomplished; add activities only when success is demonstrated; decrease or eliminate homework.

Adapted from DePompei, R.& Blosser J. *Pediatric traumatic brain injury: proactive interventions*. (2019). Plural Press: San Diego.



## TOOL 12.2: Template for Concussion Team's Letter to the Child/Adolescent's School

Name:

Date:

School:

Address:

Re: Concussed student name

DOB:

Dear \_\_\_\_\_,

This letter is to update the school regarding \_\_\_\_\_ (Student's name) recovery from a concussion sustained on \_\_\_\_\_ (Date). We take this opportunity to let you know what to expect during the recovery period.

Current best practice guidelines on concussion management emphasize the importance of recovery and return to function, and encourages students to return-to-school as soon as possible, with accommodations, even though they may still be symptomatic.

Please be aware of signs and symptoms the student may display: (Check those relevant to this student)

- |  |   |
|--|---|
| <input type="checkbox"/> Decreased short term memory | <input type="checkbox"/> Decreased attention span |
| <input type="checkbox"/> Slower processing speed     | <input type="checkbox"/> Irritability             |
| <input type="checkbox"/> Fatigue                     | <input type="checkbox"/> Headaches                |
| <input type="checkbox"/> Photo/audio sensitivity     | <input type="checkbox"/> Other _____              |

In the classroom, students with these symptoms may exhibit difficulty paying attention, difficulty following lessons, and sensitivity to noisy/busy classrooms and environments (e.g. assemblies, shop classes).

We have advised your student to pace him/herself with regards to their return-to-school and to use accommodations at school as needed. The following accommodations are recommended: (Check the recommendations for this student)

- ☐ Allowed to take short breaks from the classroom; access to a quiet workspace
- ☐ Class notes provided to assist focus and reduce writing/copying demands
- ☐ Allowed to photograph the teacher's board notes with a smartphone
- ☐ Extended deadlines; modified demands for homework/assignments
- ☐ Access to technology as needed (e.g. audiobooks, Google read and write)
- ☐ Chunking of tests/exams; allowed extra time and quiet, alternative setting
- ☐ Close monitoring and communication with the student regarding his/her progress
- ☐ Rest periods during the day as needed
- ☐ It is recommended that all non-essential missed workload expectations be forgiven to allow student to prioritize essential knowledge building areas and focus on current curriculum rather than missed work
- ☐ Other \_\_\_\_\_

Thank you for your assistance in supporting \_\_\_\_\_ (Student's name). The parents and the concussion team will monitor the student and work with the school, as accommodations need to be adjusted to support the student's recovery.

Please do not hesitate to contact us with any questions or concerns regarding this information, or if we can be of further assistance.

Sincerely,

Adapted with permission from the authors: Sinclair Elder AJ, Kadel R, O'Keefe EK. Headin' for Healin' Teacher's Letter. Colorado Springs, CO: University of Colorado Colorado.

Living Guideline for Diagnosing and Managing Pediatric Concussion



## TOOL 12.3: Template for Physician's Letter to the Child/ Adolescent's School

Name \_\_\_\_\_

Date: \_\_\_\_\_

School \_\_\_\_\_

Address \_\_\_\_\_

Re: Concussed student name \_\_\_\_\_

DOB: \_\_\_\_\_

Dear \_\_\_\_\_,

\_\_\_\_\_ (Student's name) was diagnosed with a concussion on \_\_\_\_\_ (Date), and has now been medically cleared to return-to-school.

Current best practice guidelines on concussion management emphasize the importance of recovery and return to function, and encourages students to return-to-school as soon as possible, with accommodations, even though they may still be symptomatic.

Please identify a "point person" within the school environment (example: guidance counsellor, homeroom teacher, vice principal) who can help the student implement a return-to-school plan, communicate it to teachers/school staff involved in the student's activities, and modify it as needed. The attached document outlines accommodations that may be helpful while your student is reintegrating back into the school environment.

Feel free to contact me with additional questions.

Sincerely,



## TOOL 12.4: Sample Letter/Email from School to Parents

Dear \_\_\_\_\_ (Parents' names)

We are happy to hear that your child is feeling well enough to start the return-to-learn process after his/her concussion. To make sure teachers and staff are prepared, we would like your insight on the following symptoms. Please check the answers that best fit your child.

### Fatigue

My child ☐ tires easily ☐ has the normal amount of energy.

My child has the most energy in the ☐ morning ☐ afternoon ☐ evening.

### Behaviour

My child ☐ is easily frustrated ☐ isn't easily frustrated.

My child has been acting ☐ the same ☐ different compared to before concussion.

### Memory

My child's memory seems ☐ fine ☐ impaired.

### Cognition

My child seems to be able to understand complex thoughts and ideas. ☐ Yes ☐ No

My child is able to read for ☐ less than ½ hour ☐ ½ to 1 hour ☐ more than 1 hour.

My child can handle different technologies (example: TV, computers). ☐ Yes ☐ No

My child can complete some homework. ☐ Yes ☐ No

### Stamina

My child makes it through a day without a period of rest. ☐ Yes ☐ No

### Social

My child is becoming isolated or has different friends than before the concussion. ☐ Yes ☐ No

My child can handle noisy/busy environments. ☐ Yes ☐ No

### Awareness

My child feels like there is nothing wrong with him/her after the concussion. ☐ Yes ☐ No

My child understands that there have been changes and would like help. ☐ Yes ☐ No

Please elaborate on any other changes you've noticed in your child. We want to be ready to manage your child's return-to-learn process and make accommodations to ensure success.

Sincerely,

\_\_\_\_\_ (school contact person's name)

Telephone/email \_\_\_\_\_

Source: [Developed by Vermont's concussion task force, used with permission from the Brain Injury Association of Vermont.](#)

