

# Child-SCAT3™



## Sport Concussion Assessment Tool for children ages 5 to 12 years

For use by medical professionals only

### What is childSCAT3?<sup>1</sup>

The ChildSCAT3 is a standardized tool for evaluating injured children for concussion and can be used in children aged from 5 to 12 years. It supersedes the original SCAT and the SCAT2 published in 2005 and 2009, respectively<sup>2</sup>. For older persons, ages 13 years and over, please use the SCAT3. The ChildSCAT3 is designed for use by medical professionals. If you are not qualified, please use the Sport Concussion Recognition Tool<sup>1</sup>. Preseason baseline testing with the ChildSCAT3 can be helpful for interpreting post-injury test scores.

Specific instructions for use of the ChildSCAT3 are provided on page 3. If you are not familiar with the ChildSCAT3, please read through these instructions carefully. This tool may be freely copied in its current form for distribution to individuals, teams, groups and organizations. Any revision and any reproduction in a digital form require approval by the Concussion in Sport Group.

**NOTE:** The diagnosis of a concussion is a clinical judgment, ideally made by a medical professional. The ChildSCAT3 should not be used solely to make, or exclude, the diagnosis of concussion in the absence of clinical judgement. An athlete may have a concussion even if their ChildSCAT3 is "normal".

### What is a concussion?

A concussion is a disturbance in brain function caused by a direct or indirect force to the head. It results in a variety of non-specific signs and/or symptoms (like those listed below) and most often does not involve loss of consciousness. Concussion should be suspected in the presence of any one or more of the following:

- Symptoms (e.g., headache), or
- Physical signs (e.g., unsteadiness), or
- Impaired brain function (e.g. confusion) or
- Abnormal behaviour (e.g., change in personality).

## SIDELINE ASSESSMENT

### Indications for Emergency Management

**NOTE:** A hit to the head can sometimes be associated with a more severe brain injury. If the concussed child displays any of the following, then do not proceed with the ChildSCAT3; instead activate emergency procedures and urgent transportation to the nearest hospital:

- Glasgow Coma score less than 15
- Deteriorating mental status
- Potential spinal injury
- Progressive, worsening symptoms or new neurologic signs
- Persistent vomiting
- Evidence of skull fracture
- Post traumatic seizures
- Coagulopathy
- History of Neurosurgery (eg Shunt)
- Multiple injuries

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### Glasgow coma scale (GCS)

#### Best eye response (E)

No eye opening	1
Eye opening in response to pain	2
Eye opening to speech	3
Eyes opening spontaneously	4

#### Best verbal response (V)

No verbal response	1
Incomprehensible sounds	2
Inappropriate words	3
Confused	4
Oriented	5

#### Best motor response (M)

No motor response	1
Extension to pain	2
Abnormal flexion to pain	3
Flexion/Withdrawal to pain	4
Localizes to pain	5
Obeys commands	6

**Glasgow Coma score (E + V + M)** of 15

GCS should be recorded for all athletes in case of subsequent deterioration.

### Potential signs of concussion?

If any of the following signs are observed after a direct or indirect blow to the head, the child should stop participation, be evaluated by a medical professional and **should not be permitted to return to sport the same day** if a concussion is suspected.

- Any loss of consciousness?  Y  N
- "If so, how long?" \_\_\_\_\_
- Balance or motor incoordination (stumbles, slow/laboured movements, etc.)?  Y  N
- Disorientation or confusion (inability to respond appropriately to questions)?  Y  N
- Loss of memory:  
"If so, how long?" \_\_\_\_\_
- "Before or after the injury?" \_\_\_\_\_
- Blank or vacant look:  Y  N
- Visible facial injury in combination with any of the above:  Y  N

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### Sideline Assessment – child-Maddocks Score<sup>3</sup>

"I am going to ask you a few questions, please listen carefully and give your best effort."

Modified Maddocks questions (1 point for each correct answer)

Where are we at now?	0	1
Is it before or after lunch?	0	1
What did you have last lesson/class?	0	1
What is your teacher's name?	0	1
<b>child-Maddocks score</b>	<b>of 4</b>	

Child-Maddocks score is for sideline diagnosis of concussion only and is not used for serial testing.

**Any child with a suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration (i.e., should not be left alone). No child diagnosed with concussion should be returned to sports participation on the day of Injury.**

## BACKGROUND

Name: \_\_\_\_\_ Date/Time of Injury: \_\_\_\_\_  
 Examiner: \_\_\_\_\_ Date of Assessment: \_\_\_\_\_  
 Sport/team/school: \_\_\_\_\_  
 Age: \_\_\_\_\_ Gender:  M  F  
 Current school year/grade: \_\_\_\_\_  
 Dominant hand:  right  left  neither  
 Mechanism of Injury ("tell me what happened?"): \_\_\_\_\_

#### For Parent/carer to complete:

- How many concussions has the child had in the past? \_\_\_\_\_
- When was the most recent concussion? \_\_\_\_\_
- How long was the recovery from the most recent concussion? \_\_\_\_\_
- Has the child ever been hospitalized or had medical imaging done (CT or MRI) for a head injury?  Y  N
- Has the child ever been diagnosed with headaches or migraines?  Y  N
- Does the child have a learning disability, dyslexia, ADD/ADHD, seizure disorder?  Y  N
- Has the child ever been diagnosed with depression, anxiety or other psychiatric disorder?  Y  N
- Has anyone in the family ever been diagnosed with any of these problems?  Y  N
- Is the child on any medications? If yes, please list:  Y  N

## SYMPTOM EVALUATION

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### Child report

Name: _____	never	rarely	sometimes	often
I have trouble paying attention	0	1	2	3
I get distracted easily	0	1	2	3
I have a hard time concentrating	0	1	2	3
I have problems remembering what people tell me	0	1	2	3
I have problems following directions	0	1	2	3
I daydream too much	0	1	2	3
I get confused	0	1	2	3
I forget things	0	1	2	3
I have problems finishing things	0	1	2	3
I have trouble figuring things out	0	1	2	3
It's hard for me to learn new things	0	1	2	3
I have headaches	0	1	2	3
I feel dizzy	0	1	2	3
I feel like the room is spinning	0	1	2	3
I feel like I'm going to faint	0	1	2	3
Things are blurry when I look at them	0	1	2	3
I see double	0	1	2	3
I feel sick to my stomach	0	1	2	3
I get tired a lot	0	1	2	3
I get tired easily	0	1	2	3

**Total number of symptoms** (Maximum possible 20) \_\_\_\_\_

**Symptom severity score** (Maximum possible 20x3=60) \_\_\_\_\_

self rated     clinician interview     self rated and clinician monitored

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### Parent report

The child	never	rarely	sometimes	often
has trouble sustaining attention	0	1	2	3
Is easily distracted	0	1	2	3
has difficulty concentrating	0	1	2	3
has problems remembering what he/she is told	0	1	2	3
has difficulty following directions	0	1	2	3
tends to daydream	0	1	2	3
gets confused	0	1	2	3
is forgetful	0	1	2	3
has difficulty completing tasks	0	1	2	3
has poor problem solving skills	0	1	2	3
has problems learning	0	1	2	3
has headaches	0	1	2	3
feels dizzy	0	1	2	3
has a feeling that the room is spinning	0	1	2	3
feels faint	0	1	2	3
has blurred vision	0	1	2	3
has double vision	0	1	2	3
experiences nausea	0	1	2	3
gets tired a lot	0	1	2	3
gets tired easily	0	1	2	3

**Total number of symptoms** (Maximum possible 20) \_\_\_\_\_

**Symptom severity score** (Maximum possible 20x3=60) \_\_\_\_\_

Do the symptoms get worse with physical activity?  Y  N

Do the symptoms get worse with mental activity?  Y  N

parent self rated     clinician interview     parent self rated and clinician monitored

**Overall rating** for parent/teacher/coach/carer to answer.

How different is the child acting compared to his/her usual self?

Please circle one response:

no different     very different     unsure     N/A

Name of person completing Parent-report: \_\_\_\_\_

Relationship to child of person completing Parent-report: \_\_\_\_\_

**Scoring on the ChildSCAT3 should not be used as a stand-alone method to diagnose concussion, measure recovery or make decisions about an athlete's readiness to return to competition after concussion.**

## COGNITIVE & PHYSICAL EVALUATION

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### Cognitive assessment

**Standardized Assessment of Concussion – Child Version (SAC-C)<sup>4</sup>**

**Orientation** (1 point for each correct answer)

What month is it?	0	1
What is the date today?	0	1
What is the day of the week?	0	1
What year is it?	0	1

**Orientation score** \_\_\_\_\_ of 4

**Immediate memory**

List	Trial 1	Trial 2	Trial 3	Alternative word list
elbow	0 1	0 1	0 1	candle baby finger
apple	0 1	0 1	0 1	paper monkey penny
carpet	0 1	0 1	0 1	sugar perfume blanket
saddle	0 1	0 1	0 1	sandwich sunset lemon
bubble	0 1	0 1	0 1	wagon iron insect
<b>Total</b>				

**Immediate memory score total** \_\_\_\_\_ of 15

**Concentration: Digits Backward**

List	Trial 1	Alternative digit list
6-2	0 1	5-2 4-1 4-9
4-9-3	0 1	6-2-9 5-2-6 4-1-5
3-8-1-4	0 1	3-2-7-9 1-7-9-5 4-9-6-8
6-2-9-7-1	0 1	1-5-2-8-6 3-8-5-2-7 6-1-8-4-3
7-1-8-4-6-2	0 1	5-3-9-1-4-8 8-3-1-9-6-4 7-2-4-8-5-6
<b>Total of 5</b>		

**Concentration: Days in Reverse Order** (1 pt. for entire sequence correct)

Sunday-Saturday-Friday-Thursday-Wednesday-Tuesday-Monday	0	1
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**Concentration score** \_\_\_\_\_ of 6

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### Neck Examination:

Range of motion    Tenderness    Upper and lower limb sensation & strength

**Findings:** \_\_\_\_\_

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### Balance examination

Do one or both of the following tests.

Footwear (shoes, barefoot, braces, tape, etc.) \_\_\_\_\_

**Modified Balance Error Scoring System (BESS) testing<sup>5</sup>**

Which foot was tested (i.e. which is the **non-dominant** foot)  Left  Right

Testing surface (hard floor, field, etc.) \_\_\_\_\_

**Condition**

Double leg stance: \_\_\_\_\_ Errors

Tandem stance (non-dominant foot at back): \_\_\_\_\_ Errors

**Tandem gait<sup>6,7</sup>**

Time taken to complete (best of 4 trials): \_\_\_\_\_ seconds

If child attempted, but unable to complete tandem gait, mark here

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### Coordination examination

**Upper limb coordination**

Which arm was tested:  Left  Right

**Coordination score** \_\_\_\_\_ of 1

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### SAC Delayed Recall<sup>4</sup>

**Delayed recall score** \_\_\_\_\_ of 5

**Since signs and symptoms may evolve over time, it is important to consider repeat evaluation in the acute assessment of concussion.**

# INSTRUCTIONS

Words in *Italics* throughout the ChildSCAT3 are the instructions given to the child by the tester.

## Sideline Assessment – child-Maddocks Score

To be completed on the sideline/in the playground, immediately following concussion. There is no requirement to repeat these questions at follow-up.

## Symptom Scale<sup>8</sup>

In situations where the symptom scale is being completed after exercise, it should still be done in a resting state, at least 10 minutes post exercise.

### On the day of injury

- the child is to complete the Child Report, according to how he/she feels now.

### On all subsequent days

- the child is to complete the Child Report, according to how he/she feels today, and  
- the parent/carer is to complete the Parent Report according to how the child has been over the previous 24 hours.

## Standardized Assessment of Concussion – Child Version (SAC-C)<sup>4</sup>

### Orientation

Ask each question on the score sheet. A correct answer for **each question scores 1 point**. If the child does not understand the question, gives an incorrect answer, or no answer, then the score for that question is 0 points.

### Immediate memory

*"I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order."*

### Trials 2 & 3:

*"I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before."*

Complete all 3 trials regardless of score on trial 1 & 2. Read the words at a rate of one per second. **Score 1 pt. for each correct response.** Total score equals sum across all 3 trials. Do not inform the child that delayed recall will be tested.

### Concentration

#### Digits Backward:

*"I am going to read you a string of numbers and when I am done, you repeat them back to me backwards, in reverse order of how I read them to you. For example, if I say 7-1, you would say 1-7."*

If correct, go to next string length. If incorrect, read trial 2. **One point possible for each string length.** Stop after incorrect on both trials. The digits should be read at the rate of one per second.

#### Days in Reverse Order:

*"Now tell me the days of the week in reverse order. Start with Sunday and go backward. So you'll say Sunday, Saturday ... Go ahead"*

**1 pt. for entire sequence correct**

### Delayed recall

The delayed recall should be performed after completion of the Balance and Coordination Examination.

*"Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order."*

Circle each word correctly recalled. **Total score equals number of words recalled.**

## Balance examination

These instructions are to be read by the person administering the childSCAT3, and each balance task **should be demonstrated to the child**. The child should then be asked to copy what the examiner demonstrated.

### Modified Balance Error Scoring System (BESS) testing<sup>5</sup>

This balance testing is based on a modified version of the Balance Error Scoring System (BESS)<sup>5</sup>. A stopwatch or watch with a second hand is required for this testing.

*"I am now going to test your balance. Please take your shoes off, roll up your pant legs above ankle (if applicable), and remove any ankle taping (if applicable). This test will consist of two different parts."*

#### (a) Double leg stance:

*The first stance is standing with the feet together with hands on hips and with eyes closed. The child should try to maintain stability in that position for 20 seconds. You should inform the child that you will be counting the number of times the child moves out of this position. You should start timing when the child is set and the eyes are closed.*

#### (b) Tandem stance:

*Instruct the child to stand heel-to-toe with the non-dominant foot in the back. Weight should be evenly distributed across both feet. Again, the child should try to maintain stability for 20 seconds with hands on hips and eyes closed. You should inform the child that you will be counting the number of times the child moves out of this position. If the child stumbles out of this position, instruct him/her to open the eyes and return to the start position and continue balancing. You should start timing when the child is set and the eyes are closed.*

### Balance testing – types of errors - Parts (a) and (b)

1. Hands lifted off iliac crest
2. Opening eyes
3. Step, stumble, or fall
4. Moving hip into > 30 degrees abduction
5. Lifting forefoot or heel
6. Remaining out of test position > 5 sec

Each of the 20-second trials is scored by counting the errors, or deviations from the proper stance, accumulated by the child. The examiner will begin counting errors only after the child has assumed the proper start position. **The modified BESS is calculated by adding one error point for each error during the two 20-second tests. The maximum total number of errors for any single condition is 10.** If a child commits multiple errors simultaneously, only one error is recorded but the child should quickly return to the testing position, and counting should resume once subject is set. Children who are unable to maintain the testing procedure for a minimum of **five seconds** at the start are assigned the highest possible score, ten, for that testing condition.

**OPTION:** For further assessment, the same 2 stances can be performed on a surface of medium density foam (e.g., approximately 50cmx40cmx6cm).

### Tandem Gait<sup>6,7</sup>

Use a clock (with a second hand) or stopwatch to measure the time taken to complete this task. Instruction for the examiner – **Demonstrate the following to the child:**

*The child is instructed to stand with their feet together behind a starting line (the test is best done with footwear removed). Then, they walk in a forward direction as quickly and as accurately as possible along a 38mm wide (sports tape), 3 meter line with an alternate foot heel-to-toe gait ensuring that they approximate their heel and toe on each step. Once they cross the end of the 3m line, they turn 180 degrees and return to the starting point using the same gait. **A total of 4 trials are done and the best time is retained.** Children fail the test if they step off the line, have a separation between their heel and toe, or if they touch or grab the examiner or an object. In this case, the time is not recorded and the trial repeated, if appropriate.*

Explain to the child that you will time how long it takes them to walk to the end of the line and back.

## Coordination examination

### Upper limb coordination

Finger-to-nose (FTN) task:

The tester should **demonstrate it to the child**.

*"I am going to test your coordination now. Please sit comfortably on the chair with your eyes open and your arm (either right or left) outstretched (shoulder flexed to 90 degrees and elbow and fingers extended). When I give a start signal, I would like you to perform five successive finger to nose repetitions using your index finger to touch the tip of the nose as quickly and as accurately as possible."*

**Scoring: 5 correct repetitions in < 4 seconds = 1**

**Note for testers:** Children fail the test if they do not touch their nose, do not fully extend their elbow or do not perform five repetitions. **Failure should be scored as 0.**

## References & Footnotes

1. This tool has been developed by a group of international experts at the 4th International Consensus meeting on Concussion in Sport held in Zurich, Switzerland in November 2012. The full details of the conference outcomes and the authors of the tool are published in The BJSM Injury Prevention and Health Protection, 2013, Volume 47, Issue 5. The outcome paper will also be simultaneously co-published in other leading biomedical journals with the copyright held by the Concussion in Sport Group, to allow unrestricted distribution, providing no alterations are made.
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