Child SCOAT6

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Child SCOAT6™

Sport Concussion Office Assessment Tool

For Children Ages 8 to 12 Years

What is the Child SCOAT6?*

The Child SCOAT6 is a tool for evaluating concussions in a controlled office environment by Health Care Professionals (HCP) typically from 72 hours (3 days) following a sport-related concussion.

Brief verbal instructions for some components of the Child SCOAT6 are included. Detailed instructions for use of the Child SCOAT6 are provided in an accompanying document. Please read through these instructions carefully before using the Child SCOAT6.

The diagnosis of concussion is a clinical determination made by an HCP. The various components of the Child SCOAT6 may assist with the clinical assessment and help guide individualised management.

The Child SCOAT6 is used for evaluating athletes aged 8 - 12 years. For athletes aged 13 years and older, please use the SCOAT6.

Completion Guide

Blue: Complete only at first assessment | Green: Recommended part of assessment | Orange: Optional part of assessment

Athlete's Name:

Date of Birth: Sex: Male Female Prefer Not To Say

Sport:

Age First Played Contact Sport: School Class/Grade/Level:

Handedness (Writing): L R Ambidextrous Handedness (Sport): L R Ambidextrous

Dominant Leg (Sport): L R Ambidextrous

Name of Accompanying Parent/Carer:

Examiner: Date of Examination:

Referring Physician's Name:

Referring Physician's Contact Details:

* In reviewing studies informing the SCOAT6 and Child SCOAT6, the period defined for the included papers was 3–30 days. HCPs may choose to use the Child SCOAT6 beyond this timeframe but should be aware of the parameters of the review.

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Developed by: The Concussion in Sport Group (CISG)

Supported by: International Olympic Committee, FEI, FIA, FIFA, IIHF, World Rugby

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For Children Ages 8 to 12 Years

Current Injury

Removal From Play: **Immediate** ☐ **Continued to play for** _____ **mins** ☐

Walked off ☐ **Assisted off** ☐ **Stretchered off** ☐

Date of Injury:

Description - include mechanism of injury, presentation, management since the time of injury and trajectory of care since injury:

Date Symptoms First Appeared: **Date Symptoms First Reported:**

History of Head Injuries

Date/Year	**Description -** include mechanism of injury, main symptoms, recovery time	**Management -** including time off school or sport

History of Any Neurological, Psychological, Psychiatric or Learning Disorders

Diagnosis	Year Diagnosed	Management Including Medication
☐ Migraine		
☐ Chronic headache		
☐ Depression		
☐ Anxiety		
☐ Syncope		
☐ Epilepsy/seizures		
☐ Attention deficit hyper-activity disorder (ADHD)		
☐ Learning disorder/ dyslexia		
☐ Developmental Co-ordination Disorder		
☐ Other_____		

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List All Current Medications - including over-the-counter, naturopathic and supplements

Item	Dose	Frequency	Reason Taken

Family History of Any Diagnosed Neurological, Psychological, Psychiatric, Cognitive or Developmental Disorders

Family Member	Diagnosis	Management Including Medication
	☐ Depression	
	☐ Anxiety	
	☐ Attention deficit hyper-activity disorder (ADHD)	
	☐ Learning disorder/ dyslexia	
	☐ Migraine	
	☐ Other_____	

Additional Notes:

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Child Report

Child to complete all 3 symptom boxes

Box 1

Symptom	Not at all/never	A little/rarely	Somewhat/ sometimes	A lot/often
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
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

Box 1: Total Number of Symptoms: _____ of 20 **Symptom Severity Score:** _____ of 60

Box 2

Symptom	Not at all/never	A little/rarely	Somewhat/ sometimes	A lot/often
My neck hurts	0	1	2	3
I have problems with bright lights	0	1	2	3
I have problems with loud noise	0	1	2	3
I feel sleepy or drowsy	0	1	2	3
I am sleeping more than usual	0	1	2	3
I have difficulty falling asleep or staying asleep at night	0	1	2	3
I have problems with balance	0	1	2	3
I am thinking more slowly	0	1	2	3
I am more emotional	0	1	2	3
Things annoy me easily	0	1	2	3
I am sad	0	1	2	3
I have problems looking up at the board after looking at work on my desk	0	1	2	3

Box 2: Total Number of Symptoms: _____ of 12 **Symptom Severity Score:** _____ of 36

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Child Report (Continued)

Box 3

Do the symptoms get worse with physical activity?	Y	N
Do the symptoms get worse with trying to think?	Y	N

Overall rating for child to answer:

On a scale of 0 to 10 (where 10 is normal), how do you feel now?	Very Bad 0 1 2 3 4 5 6 7 8 9 10 Very Good

If not 10, in what way do you feel different?

Child Report (Box 1 + Box 2)

Total Number of Symptoms: _____ of 32 **Symptom Severity Score:** _____ of 96

Parent Report

Parent to complete all 3 symptom boxes

Box 1

The Child...

Symptom	Not at all/never	A little/rarely	Somewhat/ sometimes	A lot/often
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
has trouble sustaining attention	0	1	2	3
is distracted easily	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

Box 1: Total Number of Symptoms: _____ of 20 **Symptom Severity Score:** _____ of 60

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Parent Report (Continued)

Box 2

The Child...

Symptom	Not at all/never	A little/rarely	Somewhat/ sometimes	A lot/often
has a sore neck	0	1	2	3
is sensitive to light	0	1	2	3
is sensitive to noise	0	1	2	3
appears drowsy	0	1	2	3
is sleeping more than usual	0	1	2	3
has difficulty falling alseep or staying asleep at night	0	1	2	3
has balance problems	0	1	2	3
is thinking more slowly	0	1	2	3
acts more emotional	0	1	2	3
acts irritable	0	1	2	3
appears sad	0	1	2	3
has difficulty shifting vision in the classroom (i.e. looking from work on a desk to board)	0	1	2	3

Box 2: Total Number of Symptoms: _____ of 12 **Symptom Severity Score:** _____ of 36

Box 3

Do the symptoms get worse with physical activity?	Y	N
Do the symptoms get worse with trying to think?	Y	N

Overall rating for parent/teacher/coach/carer to answer:

On a scale of 0 to 100% (where 100% is normal), how would you rate the child now?	

If not 100%, in what way does the child seem different? _____

Parent Report (Box 1 + Box 2)

Total Number of Symptoms: _____ of 32 **Symptom Severity Score:** _____ of 96

PACE Self-Efficacy Questionnaire - Self Report

A measure that indicates the degree of the child's confidence in their actions affecting recovery.

Questionnaire contained in Child SCOAT6 Supplementary Material

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Verbal Cognitive Tests

Immediate Memory

All 3 trials must be administered irrespective of the number correct on Trial 1. Administer at the rate of one word per second in a monotone voice.

Trial 1: Say *"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 and 3: Say *"I am going to repeat the same list. Repeat back as many words as you can remember in any order, even if you said the word before in a previous trial."*

Word list used: A ☐ B ☐ C ☐

List A	Trial 1	Trial 2	Trial 3	Alternate Lists: List B	List C
Jacket	0 1	0 1	0 1	Finger	Baby
Arrow	0 1	0 1	0 1	Penny	Monkey
Pepper	0 1	0 1	0 1	Blanket	Perfume
Cotton	0 1	0 1	0 1	Lemon	Sunset
Movie	0 1	0 1	0 1	Insect	Iron
Dollar	0 1	0 1	0 1	Candle	Elbow
Honey	0 1	0 1	0 1	Paper	Apple
Mirror	0 1	0 1	0 1	Sugar	Carpet
Saddle	0 1	0 1	0 1	Sandwich	Saddle
Anchor	0 1	0 1	0 1	Wagon	Bubble
Trial Total					

Immediate Memory Total _____ of 30

Time last trial completed:

Digits Backwards

Administer at the rate of one word per second in a monotone voice.

Say *"I am going to read a string of numbers and when I am done, you repeat them back to me in reverse order of how I read them to you. For example, if I say 7-1, you would say 1-7. So, if I said 6-8 you would say? (8-6)"*

Digit list used: A ☐ B ☐ C ☐

List A	List B	List C			
2-7	9-2	7-8	Y	N	0 1
5-9	6-1	5-1	Y	N	
7-8-2	3-8-2	2-7-1	Y	N	0 1
9-2-6	5-1-8	4-7-9	Y	N	
4-1-8-3	2-7-9-3	1-6-8-3	Y	N	0 1
9-7-2-3	2-1-6-9	3-9-2-4	Y	N	
1-7-9-2-6	4-1-8-6-9	2-4-7-5-8	Y	N	0 1
4-1-7-5-2	9-4-1-7-5	8-3-9-6-4	Y	N	
6-0-1-3-5-7	2-5-1-3-9-8	0-7-5-8-1-6	Y	N	0 1
6-1-2-8-0-7	0-8-5-1-9-4	0-2-8-4-7-1	Y	N	

Digits score of 4

Days in Reverse Order

Say *"Now tell me the days of the week in reverse order. Start with the last day and go backward. So you'll say Sunday, Saturday, and so on... Go ahead."* **Start stopwatch and CIRCLE each correct response:**

Sunday Saturday Friday Thursday Wednesday Tuesday Monday

Time Taken to Complete (secs): (N <30 sec) **Number of Errors:**

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Symbol Digit Modalities Test

A measure of psychomotor processing speed.

If clinically indicated based on symptoms and clinical findings

SDMT contained in Child SCOAT6 Supplementary Material

Examination

Orthostatic Vital Signs

Take the child's blood pressure and pulse via digital sphygmomanometer after lying supine for 2 minutes; and then again after standing unsupported for 2 minutes. An option is to perform an additional assessment between lying and standing: after sitting upright for 2 minutes. The child is asked if they experience any symptoms such as: dizziness or light-headedness, fainting, blurred or fading vision, nausea, fatigue, or lack of concentration.

Orthostatic Vital Signs	Supine (after 2 minutes)	Standing (after 2 minutes)
Blood Pressure (mmHg)		
Heart Rate (bpm)		
Symptoms[1] • Dizziness or light-headedness • Fainting • Blurred or fading vision • Nausea • Fatigue • Lack of concentration	No ☐ Yes ☐ If yes: Description	No ☐ Yes ☐ If yes: Description
Results	☐ Normal ☐ Abnormal	

Orthostatic hypotension: a drop in systolic BP ≥ 20 mmHg between supine and standing positions. Orthostatic tachycardia: an elevation in HR of ≥30 bpm when transitioning between the supine and standing positions, in the absence of orthostatic hypotension.

Cervical Spine Assessment

Cervical Spine Palpation	Signs and Symptoms	Location
Muscle Spasm	☐ Normal ☐ Abnormal	
Midline Tenderness	☐ Normal ☐ Abnormal	
Paravertebral Tenderness	☐ Normal ☐ Abnormal	

Cervical Active Range of Motion	Result
Flexion (50-80°)	☐ Normal ☐ Abnormal
Extension (45-95°)	☐ Normal ☐ Abnormal
Right Lateral Flexion (30-55°)	☐ Normal ☐ Abnormal
Left Lateral Flexion (30-55°)	☐ Normal ☐ Abnormal
Right Rotation (50-90°)	☐ Normal ☐ Abnormal
Left Rotation (50-90°)	☐ Normal ☐ Abnormal

Notes:

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Neurological Examination

Cranial Nerves

Normal ☐ Abnormal ☐ Not tested ☐

Notes:

Finger to Nose

Eyes Open:

Left Hand:	Normal ☐	Abnormal ☐	Not tested ☐
Right Hand:	Normal ☐	Abnormal ☐	Not tested ☐

Eyes Closed:

Left Hand:	Normal ☐	Abnormal ☐	Not tested ☐
Right Hand:	Normal ☐	Abnormal ☐	Not tested ☐

Other Neurological Findings

Limb Tone:	Normal ☐	Abnormal ☐	Not tested ☐
Strength:	Normal ☐	Abnormal ☐	Not tested ☐
Deep Tendon Reflexes:	Normal ☐	Abnormal ☐	Not tested ☐
Sensation:	Normal ☐	Abnormal ☐	Not tested ☐
Cerebellar Function:	Normal ☐	Abnormal ☐	Not tested ☐

Comments:

Balance

Barefoot on a firm surface with or without foam mat

Foot Tested: Left ☐ Right ☐ (i.e. test the **non-dominant** foot)

Modified BESS

Double Leg Stance:		of 10
Tandem Stance:		of 10
Single Leg Stance:		of 10
Total Errors:		of 30

On Foam

Double Leg Stance:		of 10
Tandem Stance:		of 10
Single Leg Stance:		of 10
Total Errors:		of 30

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Timed Tandem Gait

Place a 3-metre-long line on the floor/firm surface with athletic tape. The task should be timed.

Say ***"Please walk heel-to-toe quickly to the end of the tape, turn around and come back as fast as you can without separating your feet or stepping off the line."***

Time to Complete Tandem Gait Walking (seconds)				
Trial 1	Trial 2	Trial 3	Average 3 Trials	Fastest Trial

Abnormal/failed to complete ☐ **Unstable/sway** ☐ **Fall/over-step** ☐ **Dizzy/nauseated** ☐

Complex Tandem Gait

Forward

Say ***"Please walk heel-to-toe quickly five steps forward, then continue forward with eyes closed five steps"***
1 point for each step off the line, 1 point for truncal sway.

Forward Eyes Open **Points:**

Forward Eyes Closed **Points:**

Forward Total Points:

Backward

Say ***"Please walk heel-to-toe again, backwards five steps eyes open, then continue backwards five steps with eyes closed."*** 1 point for each step off the line, 1 point for truncal sway.

Backward Eyes Open **Points:**

Backward Eyes Closed **Points:**

Backward Total Points:

Total Points (Forward + Backward):

Dual Task Gait

Only perform if child successfully completes Complex Tandem Gait

Say ***"Now, while you are walking heel-to-toe, I will ask you to count backwards out loud by 7s (or 3s) / recite the months of the year (or days of the week) in reverse order"*** (select one cognitive task). Allow for a verbal practice attempt of the cognitive task selected.

Cognitive Tasks								
Trial 1 (Subtract serial 7s)	95	88	81	74	67	60	53	46
OR (Subtract serial 3s)	97	94	91	88	85	82	79	76
OR Trial 2 (Months backward) OR (Days backward)	December	November	October	September	August	July	June	May
	April	March	February	January				
	Thursday	Wednesday	Tuesday	Monday	Sunday	Saturday	Friday	

Before attempting the dual task: ***"Good. Now I will ask you to walk heel-to-toe calling the answers out loud at the same time. Are you ready?"***

Cognitive Accuracy: **Number Correct:** **Number Incorrect:** **Average Time (s):**

Comments:

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Visio-Vestibular Examination

Smooth Pursuits

Patient-reported Symptom Provocation:

Worsening Headache: Yes ☐ No ☐ **Dizziness:** Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ **Eye Pain:** Yes ☐ No ☐ **Nausea:** Yes ☐ No ☐

Or Physical Signs:

Jerky or Jumpy Eye Movements: Yes ☐ No ☐ **>3 Beats of Nystagmus:** Yes ☐ No ☐

Fast Saccades

Horizontal Saccades:

Worsening Headache: Yes ☐ No ☐ **Dizziness:** Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ **Eye Pain:** Yes ☐ No ☐ **Nausea:** Yes ☐ No ☐

Vertical Saccades:

Worsening Headache: Yes ☐ No ☐ **Dizziness:** Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ **Eye Pain:** Yes ☐ No ☐ **Nausea:** Yes ☐ No ☐

Gaze Stability Testing (The Angular Vestibular-Ocular Reflex)

Vertical Gaze Stability:

Worsening Headache: Yes ☐ No ☐ **Dizziness:** Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ **Eye Pain:** Yes ☐ No ☐ **Nausea:** Yes ☐ No ☐

Horizontal Gaze Stability:

Worsening Headache: Yes ☐ No ☐ **Dizziness:** Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ **Eye Pain:** Yes ☐ No ☐ **Nausea:** Yes ☐ No ☐

Near Point of Convergence Testing

Distance: _____ cm

Left and Right Monocular Accommodation

Left Eye Distance: _____ cm **Right Eye Distance:** _____ cm

Complex Tandem Gait (if not tested in Balance)

Complex Tandem Gait Score: _____

Pediatric Athlete Mental Health

Pediatric Anxiety – Short Form 8a

If clinically indicated based on symptoms and clinical findings

Pediatric Anxiety Questionnaire contained in Child SCOAT6 Supplementary Material

Pediatric Depressive Symptoms – Short Form 8a

If clinically indicated based on symptoms and clinical findings

Pediatric Depressive Questionnaire contained in Child SCOAT6 Supplementary Material

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Pediatric Athlete Mental Health (Continued)

Pediatric Sleep Disturbance – Short Form 4a

If clinically indicated based on symptoms and clinical findings

Pediatric Sleep Disturbance Questionnaire contained in Child SCOAT6 Supplementary Material

Pediatric Sleep-Related Impairment – Short Form 4a

If clinically indicated based on symptoms and clinical findings

Pediatric Sleep-Related Impairment Questionnaire contained in Child SCOAT6 Supplementary Material

The Pediatric Fear Avoidance Behavior after Traumatic Brain Injury Questionnaire (PFAB-TBI)

A measure to identify fear avoidance behaviour, which may contribute to poorer outcomes/persisting symptoms post concussion, which may benefit from psychological intervention.

PFAB-TBI Questionnaire contained in Child SCOAT6 Supplementary Material

Delayed Word Recall

Minimum of 5 minutes after immediate recall

Say ***"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."***

Word list used: A ☐ B ☐ C ☐

List A	Score	Alternate Lists	
		List B	List C
Jacket	0 1	Finger	Baby
Arrow	0 1	Penny	Monkey
Pepper	0 1	Blanket	Perfume
Cotton	0 1	Lemon	Sunset
Movie	0 1	Insect	Iron
Dollar	0 1	Candle	Elbow
Honey	0 1	Paper	Apple
Mirror	0 1	Sugar	Carpet
Saddle	0 1	Sandwich	Saddle
Anchor	0 1	Wagon	Bubble

Score: _____ of 10 **Record Actual Time (mins) Since Completing Immediate Recall:** _____

Computerised Cognitive Test Results (if used)

Not Done ☐

Test Battery Used:

Recent Baseline - if performed (Date):

Post-Injury Result (Rest):

Post-Injury Result (Post-Exercise Stress):

Graded Aerobic Exercise Test

Not Done ☐

Exclude contra-indications: cardiac condition, respiratory disease, significant vestibular symptoms, motor dysfunction, lower limb injuries, cervical spine injury.

Protocol Used:

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Overall Assessment

Summary:

Management and Follow-up Plan

Recommendations regarding return to:

School/Class:

Sport:

Assessment by: **Name:**

- ☐ Athletic Trainer/Therapist
- ☐ Exercise Physiologist
- ☐ Neurologist
- ☐ Neuropsychologist
- ☐ Neurosurgeon
- ☐ Opthalmologist
- ☐ Optometrist
- ☐ Paediatrician
- ☐ Physiatrist/Rehab Phys
- ☐ Physiotherapist
- ☐ Psychologist
- ☐ Psychiatrist
- ☐ Sport and Exercise Medicine Phys
- ☐ Other

Neuroimaging: Not Required ☐ Required and Requested ☐ Already Performed and Images Reviewed ☐

Details:

Brain: CT ☐ MRI ☐

Cervical Spine: XR ☐ CT ☐ MRI ☐ Other ☐

Details:

Pharmacotherapy Prescribed:

Date of Review: **Date of Follow-up:**

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Additional Clinical Notes

Return-to-Learn (RTL) Strategy

Facilitating RTL is a vital part of the recovery process for student-athletes. HCPs should work with stakeholders on education and school policies to facilitate academic support, including accommodations/learning adjustments for students with SRC when needed. Academic support should address risk factors for greater RTL duration (e.g., social determinants of health, higher symptom burden) by adjusting environmental, physical, curricular, and testing factors as needed. **Not all athletes will need a RTL strategy or academic support**. If symptom exacerbation occurs during cognitive activity or screen time, or difficulties with reading, concentration, or memory or other aspects of learning are reported, clinicians should consider implementation of a RTL strategy at the time of diagnosis and during the recovery process. When the RTL strategy is implemented, it can begin following an initial period of relative rest (Stage 1: 24-48 hrs), with an incremental increase in cognitive load (Stages 2 to 4). Progression through the strategy is symptom limited (i.e., no more than a mild exacerbation of current symptoms related to the current concussion) and its course may vary across individuals based on tolerance and symptom resolution. Further, while the RTL and RTS strategies can occur in parallel, student-athletes should complete full RTL before unrestricted RTS.

Step	Mental Activity	Activity at Each Step	Goal
1	Daily activities that do not result in more than a mild exacerbation* of symptoms related to the current concussion.	Typical activities during the day (e.g., reading) while minimizing screen time. Start with 5–15 min at a time and increase gradually.	Gradual return to typical activities.
2	School activities.	Homework, reading, or other cognitive activities outside of the classroom.	Increase tolerance to cognitive work.
3	Return to school part time.	Gradual introduction of schoolwork. May need to start with a partial school day or with greater access to rest breaks during the day.	Increase academic activities.
4	Return to school full time.	Gradually progress school activities until a full day can be tolerated without more than mild* symptom exacerbation.	Return to full academic activities and catch up on missed work.

NOTE: Following an initial period of relative rest (24-48 hours following injury at Step 1), athletes can begin a gradual and incremental increase in their cognitive load. Progression through the strategy for students should be slowed when there is more than a mild and brief symptom exacerbation.

*Mild and brief exacerbation of symptoms is defined as an increase of no more than 2 points on a 0-10 point scale (with 0 representing no symptoms and 10 the worst symptoms imaginable) for less than an hour when compared with the baseline value reported prior to cognitive activity.

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Return-to-Sport (RTS) Strategy

Return to sport participation after an SRC follows a graduated stepwise strategy, an example of which is outlined in Table 2. RTS occurs in conjunction with return to learn (see RTL strategy) and under the supervision of a qualified HCP. Following an initial period of relative rest (step 1: approximately 24-48 hours), clinicians can implement step 2 [i.e., light (step 2A) and then moderate (step 2B) aerobic activity] of the RTS strategy as a treatment of acute concussion. The athlete may then advance to steps 3-6 on a time course dictated by symptoms, cognitive function, clinical findings, and clinical judgement. Differentiating early activity (step 1), aerobic exercise (step 2), and individual sport-specific exercise (step 3) as part of the treatment of SRC from the remainder of the RTS progression (steps 4-6) can be useful for the athlete and their support network (e.g., parents, coaches, administrators, agents). Athletes may be moved into the later stages that involve risk of head impact (steps 4-6 and step 3 if there is any risk of head impact with sport-specific activity) of the RTS strategy following authorization by the HCP and after resolution of any new symptoms, abnormalities in cognitive function, and clinical findings related to the current concussion. Each step typically takes at least 24 hours. Clinicians and athletes can expect a minimum of 1 week to complete the full rehabilitation strategy, but typical unrestricted RTS can take up to one month post-SRC. The time frame for RTS may vary based on individual characteristics, necessitating an individualized approach to clinical management. Athletes having difficulty progressing through the RTS strategy or with symptoms and signs that are not progressively recovering beyond the first 2-4 weeks may benefit from rehabilitation and/or involvement of a multidisciplinary team of HCP experienced in managing SRC. Medical determination of readiness to return to at-risk activities should occur prior to returning to any activities at risk of contact, collision or fall (e.g. multiplayer training drills), which may be required prior to any of steps 3-6, depending on the nature of the sport or activity that the athlete is returning to and in keeping with local laws/requirements.

Step	Exercise Strategy	Activity at Each Step	Goal
1	Symptom-limited activity.	Daily activities that do not exacerbate symptoms (e.g., walking).	Gradual reintroduction of work/school.
2	Aerobic exercise **2A – Light** (up to approx. 55% max HR) **then** **2B – Moderate** (up to approximately 70% max HR)	Stationary cycling or walking at slow to medium pace. May start light resistance training that does not result in more than mild and brief exacerbation* of concussion symptoms.	Increase heart rate.
3	Individual sport-specific exercise **NOTE:** if sport-specific exercise involves any risk of head impact, medical determination of readiness should occur prior to step 3.	Sport-specific training away from the team environment (e.g., running, change of direction and/or individual training drills away from the team environment). No activities at risk of head impact.	Add movement, change of direction.
Steps 4-6 should begin after resolution of any symptoms, abnormalities in cognitive function, and any other clinical findings related to the current concussion, including with and after physical exertion.			
4	Non-contact training drills.	Exercise to high intensity including more challenging training drills (e.g., passing drills, multiplayer training). Can integrate into team environment.	Resume usual intensity of exercise, coordination, and increased thinking.
5	Full contact practice.	Participate in normal training activities.	Restore confidence and assess functional skills by coaching staff.
6	Return to sport.	Normal game play.	

maxHR = predicted maximal Heart Rate according to age (i.e., 220-age)

Age Predicted Maximal HR= 220-age	Mild Aerobic Exercise	Moderate Aerobic Exercise
55%	220-age x 0.55 = training target HR	
70%		220-age x 0.70 = training target HR

NOTE: *Mild and brief exacerbation of symptoms (i.e., an increase of no more than 2 points on a 0-10 point scale for less than an hour when compared with the baseline value reported prior to physical activity). Athletes may begin Step 1 (i.e., symptom-limited activity) within 24 hours of injury, with progression through each subsequent step typically taking a minimum of 24 hours. If more than mild exacerbation of symptoms (i.e., more than 2 points on a 0-10 scale) occurs during Steps 1 -3, the athlete should stop and attempt to exercise the next day. If an athlete experiences concussion-related symptoms during Steps 4-6, they should return to Step 3 to establish full resolution of symptoms with exertion before engaging in at-risk activities. Written determination of readiness to RTS should be provided by an HCP before unrestricted RTS as directed by local laws and/or sporting regulations.

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Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests GAD is a member of the Scientific Committee of the 6th International Consensus Conference on Concussion in Sport; an honorary member of the AFL Concussion Scientific Committee; Section Editor, Sport and Rehabilitation, NEUROSURGERY; and has attended meetings organised by sporting organisations including the NFL, NRL, IIHF, IOC and FIFA; however has not received any payment, research funding, or other monies from these groups other than for travel costs. Dr JSP, Editor BJSM (honorarium), Member of World Rugby Concussion Advisory Group (unpaid), Independent Concussion Consultant for World Rugby (fee per consultation), Medical consultant to South African Rugby (unpaid), Co-chair of the Scientific Committee, 6th International Conference on Concussion in Sport (unpaid), Board member of the Concussion in Sport Group (unpaid), Scientific Board member, EyeGuideTM (unpaid). 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Advisory Board (Compensated): Highmark Interactive Medicolegal: One or two cases annually Speaker's Bureau: None. Stock Shareholder: Highmark Interactive stock options (2018). Other Financial or Material Support: Book royalties – Blackwell/Wiley Publishing: Prioritized Neurological Differential Diagnosis Other: None. Dr KOY: is Editor-in-Chief of the journal Neuropsychology and receive an editorial stipend from the American Psychological Association. I am an unpaid consulting editor for the journals Archives of Clinical Neuropsychology and Journal of Head Trauma Rehabilitation. I am an unpaid member of the Scientific Advisory Committee for Brain Injury Canada. I am the chair of the Canadian Concussion Network, which is funded by a grant from Canadian Institutes of Health Research (CIHR) to my institution; I am principal applicant on the grant but receive no income from it. I am a principal investigator on another grant from CIHR from which I derive no income. 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My research is funded, in part, by philanthropic support from the National Hockey League Alumni Association through the CCG Pro-Am Tournament and a grant from a grant from the National Football League. POH - is an employee of Marker Diagnostics UK Ltd. He has worked on a sessional basis for the English RFU and FA. He has previously received research funding from the English RFU, ECB and The Drake Foundation. Dr ZP No COI to declare. Dr MP declares the following: Consultant, CMO, Major League Soccer, Senior Advisor, NFL Head, Neck NCAA-CARE-DoD 2.0, ended 2020. Have received honoraria and reimbursement for travel for speaking and conferences attended. Have written chapters for UpToDate and received royalties for the Netter's Sports Medicine textbook. Have provided work as an expert for cases involving concussion, team physician and other sports medicine topics. IJS - does not have any conflicts of interest to disclose. 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Patient consent for publication Not applicable.

Ethics approval Not applicable.

Provenance and peer review Not commissioned; internally peer reviewed.

► Additional supplemental material is published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/bjsports-2023-106984).

To cite Davis GA, Patricios JS, Purcell LK, *et al*. *Br J Sports Med* 2023;**57**:672–688.

Accepted 5 June 2023

Br J Sports Med 2023;**57**:672–688.
doi:10.1136/bjsports-2023-106984

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