

## Recommendations Summary

### Interpreting the recommendations

Evidence-based recommendations (EBR) have associated GRADE (Table 1) and GRADE Quality ratings (Table 2). Suggested Good practice points (GPP) and Precautionary Points (PP) were informed by the expertise of the Guideline Development Group.

Table 1. Summary of the strength of the evidence recommendations. The hierarchy is based on the GRADE approach (Schünemann et al., 2013).

Evidence Recommendation	Symbol	Explanation
<b>Strong evidence recommendation <u>FOR</u></b>	❖❖❖❖	The guideline panel is confident that they can recommend the intervention based on the evidence. A recommendation is made that the intervention <u>should</u> be implemented
<b>Conditional* evidence recommendation <u>FOR</u></b>	❖❖❖	The guideline panel is confident that they can probably recommend the intervention based on the evidence. A recommendation is made that the intervention <u>may</u> be implemented
<b>Conditional* evidence recommendation <u>AGAINST</u></b>	❖❖	The guideline panel is confident that they probably cannot recommend the intervention based on the evidence. A recommendation is made that the intervention <u>should not</u> be implemented
<b>Strong evidence recommendation <u>AGAINST</u></b>	❖	The guideline panel is confident that they cannot recommend the intervention based on the evidence. A recommendation is made that the intervention <u>should definitely not</u> be implemented
No recommendation	-	The guideline panel is unable to recommend for or against the intervention based on the evidence. A <u>consensus-based opinion statement will be made.</u>

\* This table has been adapted from Schünemann et al. (2013) by replacing the term 'weak' with 'conditional' to avoid the potential unintended negative connotations and confusion associated with the term 'weak'.

Table 2. GRADE levels of evidence quality

<b>Certainty</b>	<b>Symbol</b>	<b>Definition</b>
<b>High</b>	⊕⊕⊕⊕	We are very confident that the true effect lies close to that of the estimate of the effect
<b>Moderate</b>	⊕⊕⊕○	We are moderately confident in the effect estimate. The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
<b>Low</b>	⊕⊕○○	Our confidence in the effect estimate is limited. The true effect may be substantially different from the estimate of the effect
<b>Very low</b>	⊕○○○	We have very little confidence in the effect estimate. The true effect is likely to be substantially different from the estimate of effect

Table 3. Recommendations Summary

	Type	Recommendation	GRADE/Quality
<b>1</b>	<b>Aerobic exercise training in adults and older adults</b>		
1.1	<b>EBR</b>	For adults and older adults after moderate to severe traumatic brain injury, we suggest regular structured aerobic exercise that is individually-tailored and across the continuum of care.	◆◆◆ ⊕⊕○○
We suggest the following Good Practice Points (GPP) and Precautionary Points (PP):			
1.2	<b>GPP</b>	Aerobic exercise aims to achieve participation-level goals established collaboratively.	
1.3	<b>GPP</b>	Assessment of fitness is conducted prior to commencing an aerobic exercise program using a standardised or modified protocol and pre-exercise screening.	
1.4	<b>GPP</b>	Aerobic exercise is prescribed using the Frequency, Intensity, Time, and Type (FITT) principles according to American College of Sports Medicine guidelines for stroke and brain injury.	
1.5	<b>GPP</b>	That specificity of training is considered when prescribing mode of aerobic exercise.	
1.6	<b>GPP</b>	Exercise dosage is monitored (preferably using a heart rate monitor) when possible.	
1.7	<b>GPP</b>	Timing of aerobic exercise training considers the impact of fatigue on behaviour and participation in other activities including work and/or study.	
1.8	<b>GPP</b>	Aerobic exercise is transitioned from health settings to community-based physical activity settings where appropriate.	
1.9	<b>PP</b>	For adults on anti-epileptic medication, moderate to high intensity aerobic exercise may increase the risk of seizure if they are medically unwell or are not routinely taking their medication.	
1.10	<b>PP</b>	When calculating training heart rate for adults on beta-blocker medication, predicted maximum heart rate should be adjusted to account for the medications' heart rate lowering effect (HR <sub>max</sub> pred-adj = 85%(220-age).	
1.11	<b>PP</b>	In the acute stage of recovery, consider mode of exercise and seek medical advice prior to commencing aerobic exercise for adults with additional complications such as orthopaedic injuries or craniotomy.	

<b>2 Aerobic exercise training in children and adolescents</b>			
2.1	<b>EBR</b>	For children and adolescents after moderate to severe traumatic brain injury, we suggest regular energetic play and/or exercise that is individually-tailored and across the continuum of care.	◆◆◆ ⊕○○○
We suggest the following Good Practice Points (GPP) and Precautionary Points (PP):			
2.2	<b>GPP</b>	Energetic play and/or exercise aims to achieve participation-level goals established collaboratively where the child's voice is at the centre.	
2.3	<b>GPP</b>	Energetic play and/or exercise is incorporated into weekly routines and key supports (e.g., siblings, friends, teachers, support workers, and parents) are trained in facilitating this activity.	
2.4	<b>GPP</b>	Assessment of fitness is conducted for school aged children prior to commencing an energetic play and/or exercise program using a standardised or modified protocol and pre-exercise screening.	
2.5	<b>GPP</b>	Energetic play and/or exercise is prescribed using the Frequency, Intensity, Time, and Type (FITT) principles according to American College of Sports Medicine guidelines for stroke and brain injury.	
2.6	<b>GPP</b>	Timing of energetic play and/or exercise considers the impact of fatigue on behaviour and participation in other activities including school.	
2.7	<b>GPP</b>	Exercise dosage is monitored (preferably using a heart rate monitor) for older children and adolescents when possible.	
2.8	<b>GPP</b>	Energetic play and/or exercise is transitioned from health settings to community-based physical activity settings where appropriate.	
2.9	<b>PP</b>	For children and adolescents on anti-epileptic medication, moderate to high intensity energetic play and/or exercise may increase the risk of seizure if they are medically unwell or not routinely taking their medication.	
2.10	<b>PP</b>	When determining intensity of exercise, consider any medication that may influence heart rate or blood pressure.	
2.11	<b>PP</b>	In the acute stage of recovery, consider mode of energetic play and/or exercise and seek medical advice prior to commencing energetic play and/or exercise for children and adolescents with additional complications such as orthopaedic injuries or craniotomy.	

<b>3</b>			
<b>Muscle strength training for adults and older adults with moderate to severe traumatic brain injury</b>			
3.1	<b>EBR</b>	For adults and older adults after moderate to severe traumatic brain injury, we recommend individually-tailored muscle strengthening exercise, including ballistic training, across the continuum of care.	❖❖❖❖ ⊕⊕⊕⊙
We suggest the following Good Practice Points (GPP):			
3.2	<b>GPP</b>	Assessment of muscle strength is conducted prior to commencing strength training.	
3.3	<b>GPP</b>	For very weak muscles, strength training is set-up to make it as easy as possible to elicit muscle activity (e.g., reducing friction, reducing or removing gravity, working in mid-range, electrical stimulation and/or electromyographic biofeedback, and supported weight bearing) and high repetitions are encouraged.	
3.4	<b>GPP</b>	Health professionals consider the muscle groups involved, and their function, when developing muscle strength training programs to improve mobility and other functional tasks.	
3.5	<b>GPP</b>	Health professionals consider specificity of training (i.e., power vs strength vs endurance) when prescribing mode of muscle strength training.	
3.6	<b>GPP</b>	Muscle strength training dosage is prescribed according to American College of Sports Medicine guidelines.	
3.7	<b>GPP</b>	Muscle strength training is transitioned from health settings to community-based physical activity settings where appropriate.	
<b>4</b>			
<b>Muscle strength training for children and adolescents with moderate to severe traumatic brain injury</b>			
4.1	<b>EBR</b>	For children and adolescents after moderate to severe traumatic brain injury, we suggest regular muscle strengthening play and/or exercise that is individually-tailored and across the continuum of care.	❖❖❖
We suggest the following Good Practice Points (GPP):			
4.2	<b>GPP</b>	Muscle strength training aims to achieve goals established collaboratively where the child's voice is at the centre.	

4.3	<b>GPP</b>	Assessment of muscle strength is conducted for school aged children prior to commencing strength training.	
4.4	<b>GPP</b>	For very weak muscles, strength training is set-up to make it as easy as possible to elicit muscle activity (e.g., reducing friction, reducing or removing gravity, working in mid-range, electrical stimulation and/or electromyographic biofeedback, and supported weight bearing) and high repetitions are encouraged.	
4.5	<b>GPP</b>	Muscle strength training dosage is prescribed according to American College of Sports Medicine guidelines.	
4.6	<b>GPP</b>	Health professionals consider the muscle groups involved, and their function, when developing muscle strength training programs to improve mobility and other functional tasks.	
4.7	<b>GPP</b>	Health professionals consider specificity of training (i.e., power vs strength vs endurance) when prescribing mode of muscle strength training.	
4.8	<b>GPP</b>	Muscle strength training is transitioned from health settings to community-based physical activity settings where appropriate.	
<p><b>5 Mobility training for adults and older adults with moderate to severe traumatic brain injury</b></p>			
5.1	<b>EBR</b>	For adults and older adults after moderate to severe traumatic brain injury, we recommend task-specific mobility training across the continuum of care.	◆◆◆◆ ⊕⊕⊕○
We suggest the following Good Practice Points (GPP):			
5.2	<b>GPP</b>	Mobility training aims to achieve participation-level and activity-level goals established collaboratively.	
5.3	<b>GPP</b>	The setting and supervision requirements for adults with significant cognitive and/or behavioural impairments is considered to maximise participation in mobility training and the transfer of training to real life tasks.	
5.4	<b>GPP</b>	Virtual reality interventions and body weight support treadmill training (with or without robotics) may be used as options to train mobility.	
5.5	<b>GPP</b>	Mobility training is incorporated into weekly routines with key supports (e.g., family, friends, support workers) trained in facilitating this activity where appropriate.	

5.6	<b>GPP</b>	Mobility training incorporates motor learning principles of task-specific, repetitive intensive practice.	
<b>6</b>			
<b>Mobility training for children and adolescents with moderate to severe traumatic brain injury</b>			
6.1	<b>EBR</b>	For children and adolescents after moderate to severe traumatic brain injury, we suggest task-specific mobility training across the continuum of care.	◆◆◆ ⊕○○○
We suggest the following Good Practice Points (GPP):			
6.2	<b>GPP</b>	Mobility training aims to achieve participation-level and activity-level goals established collaboratively where the child's voice is at the centre.	
6.3	<b>GPP</b>	The setting and supervision requirements for children with significant cognitive and/or behavioural impairments is considered to maximise participation in mobility training and the transfer of training to real life tasks.	
6.4	<b>GPP</b>	Mobility training is incorporated into weekly routines with key supports (e.g., siblings, friends, teachers, support workers, and parents) trained in facilitating this activity.	
6.5	<b>GPP</b>	Mobility training is performed when the child is and isn't fatigued to enable practice of mobility at different capacities.	
6.6	<b>GPP</b>	Mobility training is delivered within an interdisciplinary model to enable management of any psychosocial impairments and/or adjustments to injury that may impact on training.	
6.7	<b>GPP</b>	Mobility training incorporates motor learning principles of task-specific, repetitive, intensive practice.	
<b>7</b>			
<b>Sport and physical recreation for adults and older adults with moderate to severe traumatic brain injury</b>			
7.1	<b>EBR</b>	For adults and older adults after moderate to severe traumatic brain injury, we suggest participation in sport and physical recreation across the continuum of care considering their personal preference and capability.	◆◆◆ ⊕○○○
We suggest the following Good Practice Points (GPP) and Precautionary Points (PP):			
7.2	<b>GPP</b>	Health professionals consider what sport and/or physical recreation the adult enjoyed and	

		participated in prior to their brain injury when developing their rehabilitation program. Pre-injury activities may be a facilitator or may cause distress if physical, cognitive, or behavioural impairments restrict participation.	
7.3	<b>GPP</b>	Health professionals consider all aspects of the inclusion spectrum when suggesting options for sport and/or physical recreation.	
7.4	<b>GPP</b>	Health professionals establish relationships and work with external service providers to facilitate access and opportunities for their clients to participate in sport and/or physical recreation.	
7.5	<b>GPP</b>	Health professionals support the adult to facilitate participation in sport and/or physical recreation, including supporting preparation of funding requests, and identifying modifications, support, and adaptive or specialised equipment necessary to ensure the safety and appropriateness of the activity.	
7.6	<b>PP</b>	A knock to the head from sport participation may cause a second brain injury. Risk vs. benefit should be considered and discussed by the interdisciplinary team and advice provided to the adult and their family (if appropriate).	
<p><b>8 Sport and physical recreation for children and adolescents with moderate to severe traumatic brain injury</b></p>			
8.1	<b>EBR</b>	For children and adolescents after moderate to severe traumatic brain injury, we suggest participation in sport and physical recreation across the continuum of care considering their personal preference and capability.	◆◆◆
We suggest the following Good Practice Points (GPP) and Precautionary Points (PP):			
8.2	<b>GPP</b>	Health professionals consider what sport and/or physical recreation the child or adolescent enjoyed and participated in prior to their brain injury when developing their rehabilitation program. Pre-injury activities may be a facilitator or may cause distress if physical, cognitive, or behavioural impairments restrict participation.	
8.3	<b>GPP</b>	Health professionals consider all aspects of the inclusion spectrum when suggesting options for sport and/or physical recreation.	
8.4	<b>GPP</b>	Health professionals establish relationships and work with external service providers to facilitate	



		access and opportunities for their clients to participate in sport and/or physical recreation.	
8.5	<b>GPP</b>	Health professionals support the child or adolescent and their family to facilitate participation in sport and/or physical recreation, including supporting preparation of funding requests, and identifying modifications, support, and adaptive or specialised equipment necessary to ensure the safety and appropriateness of the activity.	
8.6	<b>PP</b>	A knock to the head from sport participation may cause a second brain injury. Risk vs. benefit should be considered and discussed by the interdisciplinary team and advice provided to the child or adolescent and their family.	
<b>9</b>	<b>Overall physical activity promotion for adults or older adults with moderate to severe traumatic brain injury</b>		
9.1	<b>EBR</b>	For adults and older adults after moderate to severe traumatic brain injury, we suggest the promotion of physical activity across the continuum of care.	◆◆◆ ⊕⊕○○
We suggest the following Good Practice Points (GPP):			
9.2	<b>GPP</b>	Physical activity is promoted with consideration of current public health physical activity guideline recommendations for adults and older adults living with disability.	
9.3	<b>GPP</b>	Health professionals initiate conversations with clients about a return to physical activity as early as possible, mindful of the potential for the early rehabilitation phase of recovery to be an opportune time to establish short and long-term goals, positive behaviours, and support systems.	
9.4	<b>GPP</b>	Pre-injury physical activity is assessed, and health professionals consider building on what the adult has done before (i.e., supporting a return to previous activity).	
9.5	<b>GPP</b>	Key aspects of the promotion of overall physical activity include exploring the clients understanding of the benefits of physical activity, identification of goals, utilising evidence-based behaviour change techniques to support self-management, and implementing activities that broadly encourage physical activity.	
9.6	<b>GPP</b>	Health professionals seek to identify barriers to engaging in physical activity and implement strategies to support the uptake of physical activity.	

9.7	<b>GPP</b>	Physical activity is incorporated into weekly routines and key supports (e.g., family, friends, and support workers) are trained in facilitating opportunities for activity where appropriate.	
<b>10</b>	<b>Overall physical activity promotion for children and adolescents with moderate to severe traumatic brain injury</b>		
10.1	<b>EBR</b>	For children and adolescents after moderate to severe traumatic brain injury, we suggest the promotion of physical activity across the continuum of care.	◆◆◆
We suggest the following Good Practice Points (GPP):			
10.2	<b>GPP</b>	Health professionals initiate conversations with the child or adolescent and their family about a return to physical activity as early as possible, mindful of the potential for the early rehabilitation phase of recovery to be an opportune time to establish short and long-term goals, positive behaviours, and support systems.	
10.3	<b>GPP</b>	Physical activity is promoted with consideration of current public health physical activity guideline recommendations for children and adolescents living with disability.	
10.4	<b>GPP</b>	Pre-injury physical activity is assessed, and health professionals consider building on what a child or adolescent has done before (i.e., supporting a return to previous activity).	
10.5	<b>GPP</b>	Health professionals consider promoting opportunities for their clients to engage in physical activity within a fun and social setting e.g., play, school activities, sport.	
10.6	<b>GPP</b>	Physical activity is incorporated into weekly routines and key supports (e.g., siblings, friends, teachers, support workers, and parents) are trained in facilitating opportunities for activity.	
10.7	<b>GPP</b>	Health professionals seek to discuss barriers and facilitators to engaging in physical activity with the child or adolescent and key supports and implement strategies to support the uptake of physical activity.	