

The Role of Early Intervention in Improving the Level of Activities and Participation in Youths after Mild Traumatic Brain Injury: A scoping review

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Background and purpose of this review

Most children recover completely after an MTBI, but 6 to 43% of children experience post-concussive symptoms (PCS) up to 6 months after the injury and beyond. Persistent symptoms are found in the areas of physical, cognitive, emotional and behavioral functioning. These consequences can lead to limitations in activities and participation such as returning to school and play.

In general, children suffering the more severe forms of TBI (i.e., moderate and severe) are followed and receive rehabilitation treatment, but children with MTBI do not. Several intervention strategies can be considered, such as information and education, follow-up consultancies, involving the family, advice on cognitive and physical rest, and combined interventions.

In this review, clinical studies investigating interventions directed at improving the level of activities and participation in children and adolescents with MTBI are summarized, and clinical recommendations and directions for the future are provided.

MTBI definition (American Congress of Rehabilitation Medicine)

A Glasgow Coma Scale (GSC) score of 13-15 and at least one of the following: (1) loss of consciousness of no more than 30 minutes, (2), Post Traumatic Amnesia (PTA) no longer than 24 hours, (3) any alteration in mental state at the time of the injury, (4) focal neurological deficit(s) that may or may not be transient.

Search terms:

'mild brain injury', 'mild traumatic brain injury', 'mild head injury' and 'concussion' combined with 'children', 'childhood', 'youth', 'adolescents', 'adolescence', 'pediatric', 'paediatric' and 'interventions', 'activities', and 'participation'.

Study selection

Inclusion criteria

- Clinical studies with evaluation of intervention on activities and participation (ICF-framework) for children after MTBI;
- Studies in which children with MTBI together with moderate and severe TBI;
- Interventions for children with MTBI that might be suitable for preventing problems on activities and participation;
- Some potentially effective interventions from the literature on adult brain injury.

Exclusion criteria

- Studies measuring outcome solely in terms of functioning;
- Studies on interventions aiming at biochemical and neurochemical changes (e.g. pharmacological interventions).

Type of intervention	Important conclusions from the literature	Effectiveness
 Information & Education	Provided verbal and/ or in booklet. Should contain: <ul style="list-style-type: none"> - Reassurance: symptoms are common and can be dealt with - Information about signs and symptoms of MTBI - Contributing injury- and non-injury related factors - Recommendations for addressing any concerns - Coping strategies 	Effective in decreasing post-concussive symptoms. Might aid children in returning to their daily activities and routines.
 Family centered	Family centered problem-solving interventions have the potential to improve child-and family functioning and therefore the level of activities and participation. Parental education, age of the child, domain of functioning and severity of injury can influence the intervention's effectiveness.	Effective in improving child-and family functioning. May improve level of activities and participation. Has not yet been investigated for group of children with MTBI only.
 Follow-up	Provided in person or by telephone. Should contain: <ul style="list-style-type: none"> - Follow-up on the injury - Follow-up on any experienced symptoms after injury - Reassurance - Addressing individual concerns Preferably between 24h and 1 month after discharge.	Effective in reducing symptoms after MTBI. More effective compared to routine discharge. Has not yet been investigated for a group of children aged under 16 years old with MTBI and effect on activities and participation is unknown.
 Cognitive & physical rest	Recommended: <ul style="list-style-type: none"> - No more that 1-2 days of rest - Step-by-step and gradual return to activity, school and play 	More effective in preventing post-concussive symptoms in comparison to longer strict rest. Better in preventing a decrease in the level of activities and participation compared to longer rest. Has not been investigated for group of children with MTBI only.
 Combined intervention	Promising results on reduction of experienced symptoms for combinations such as: <ul style="list-style-type: none"> - Guided rehabilitation combined with follow-up - Education and advice combined with encouragement of exercise - Care management combined with cognitive behavioural therapy 	All these combined interventions were conducted with children and adolescents who experienced symptoms after MTBI. Although the results are promising, the influence on preventing symptoms in the first place was not studied, nor was the influence on activities and participation.

FUTURE DIRECTIONS

For interventions:

- ✓ Prevention rather than treatment
- ✓ Contain information and education on the injury and its possible consequences.
- ✓ Include follow-up consultations aimed at reassurance
- ✓ Family-centered
- ✓ Advice on step-by-step return to activities (Example: Brains Ahead! Intervention)

For research:

- ✓ High quality randomized studies
- ✓ Consensus on definitions, outcome domains and measurements increases comparability the evidence base.
- ✓ More focused on children
- ✓ More focused on MTBI only
- ✓ More focused on effectiveness on activities and participation

