

## Efficacy of rehabilitation in improving social cognition and behavioral outcomes of pediatric traumatic brain injury: An integrative review

Bandita Gupta\* and Ishika Upadhyay

Department of Occupational Therapy, Assistant Professor, NIMS University, Jaipur, Rajasthan- 303121, India.

### ARTICLE INFO

#### Article history:

Received 18 February 2025

Accepted as revised 18 August 2025

Available online 22 August 2025

#### Keywords:

Adolescents with TBI, cognitive outcomes in pediatric TBI, pediatric rehabilitation in neurological cases, pediatric traumatic brain injury, psychological aspect of pediatric TBI.

### ABSTRACT

**Background:** One of the main causes of long-term disability in kids and teenagers is pediatric traumatic brain injury (TBI), which frequently leads to deficiencies in behavioural and social cognition. Rehabilitation helps in enhancing these outcomes.

**Objectives:** The purpose of this integrative review is to assess the available data on how well rehabilitation works to improve behavioral and social cognition in children with traumatic brain injury.

**Materials and methods:** An extensive search of electronic databases and registries (PubMed, Scopus, Google Scholar, and Web of Science, among others) was conducted. Studies that looked at how rehabilitation therapies affected the social cognition and behavioural outcomes of pediatric TBI published between 2010 and 2024 were included.

**Results:** Eighteen studies met the inclusion criteria, which encompassed various rehabilitation interventions, including family-based interventions, social skills training, neurocognitive remediation, and cognitive-behavioural therapy (CBT). Overall, both behavioural outcomes, such as emotional regulation and adaptive behaviours, as well as social cognition, including theory of mind, emotional recognition, and social problem-solving abilities, were shown to improve with rehabilitation.

**Conclusion:** In children and adolescents with TBI, rehabilitation interventions—especially those centered on social skills training, cognitive-behavioural methods, and neurocognitive remediation—can greatly enhance social cognition and behavioural outcomes. The analysis underscores the necessity of customized, multidisciplinary rehabilitation programs and identifies research topics for the future, such as including neurobiological underpinnings and long-term monitoring to gauge how long therapy effects last.

### Introduction

Children may be more susceptible to traumatic brain injury (TBI) because of the critical brain development that takes place between infancy and childhood. Early childhood brain injuries have the potential to impede or postpone core neurodevelopment.<sup>1,2</sup>

Each year, on average, 634,000 children in the US suffer from TBI. Children under the age of four and teenagers aged 15 and up have the highest rates of TBI-related ER visits.<sup>3,4</sup> About 40% of head injuries that need hospitalization for children under 4 years old may be caused by falls, which are a significant cause of TBI in young children (<4 years old).<sup>3-6</sup> Injuries caused by child maltreatment, such as shaken infant syndrome, may be the cause of 20-70% of hospitalizations for young children. Accidents involving motor vehicles are the most common cause of injuries among older children.<sup>3</sup>

\* Corresponding contributor.

Author's Address: Department of Occupational Therapy, Assistant Professor, NIMS University, Jaipur, Rajasthan- 303121, India.

E-mail address: banditagupta9@gmail.com

doi: 10.12982/JAMS.2025.103

E-ISSN: 2539-6056

Acquired brain injury (ABI) is often treated during the acute phase, which includes ER care, potential inpatient hospitalization, outpatient treatment, and ultimately reintegration into the home and school setting.<sup>7</sup> Children who have had brain injuries should be regularly watched for unresolved functional deficits since they typically have persistent, unmet functional demands across numerous domains. Unmet therapy demands, especially in the domains of cognition and communication, were linked to longer recovery times following an injury and a diagnosis of complicated mild TBI.<sup>8,9</sup>

Cognition seems to be significantly compromised in moderate-to-severe TBI approximately one month after the injury or soon after post traumatic amnesia (PTA) resolves.<sup>10,11</sup> Patients with slight brain injuries typically recover cognitively quickly, returning nearly to “usual level performance” in three months.<sup>12,13</sup> Effective cognitive rehabilitation strategies started after TBI have been shown in trials and articles to speed up restoration and reduce loss of function.<sup>14</sup>

Adolescents with traumatic brain injuries often exceed their learning capacity, therefore, cognitive understanding is crucial.<sup>15,16</sup> Although the impact and manner of the trauma determine the level of impairment, intellectual, emotional, and psychological impairments might not become apparent for years following the injury.<sup>9,17</sup>

Despite physical recovery after pediatric TBI, cognitive and behavioural challenges often go unnoticed by caregivers and rehabilitation teams.<sup>7</sup> These “invisible” impairments significantly impact long-term reintegration into daily life and society. Although existing literature highlights the importance of cognitive and behavioural interventions post-TBI, there remains a critical gap in standardized, effective rehabilitation guidelines tailored for pediatric populations.<sup>18</sup> This integrative review aims to gather information from different sources and provide a generalized guideline for effective rehabilitation and promote the well-being of children with TBI.

### **Objectives of the study**

1. To understand how rehabilitation can improve emotional, social, and psychological outcomes in children with traumatic brain injury (TBI).
2. To evaluate how effective different rehabilitation therapies are by reviewing and combining results from multiple studies.
3. To provide evidence-based information that can guide researchers, doctors, and caregivers in improving rehabilitation for children with TBI.

### **Rationale**

This study is needed to comprehend the efficacy of comprehensive rehabilitation strategies in improving the quality of life in children with TBI by taking into consideration the behavioural and cognitive outcomes after TBI. It can also help the clinician and rehabilitation worker in providing better outcomes by combining various approaches to enhance the day-to-day lifestyle of children with TBI.

### **Materials and methods**

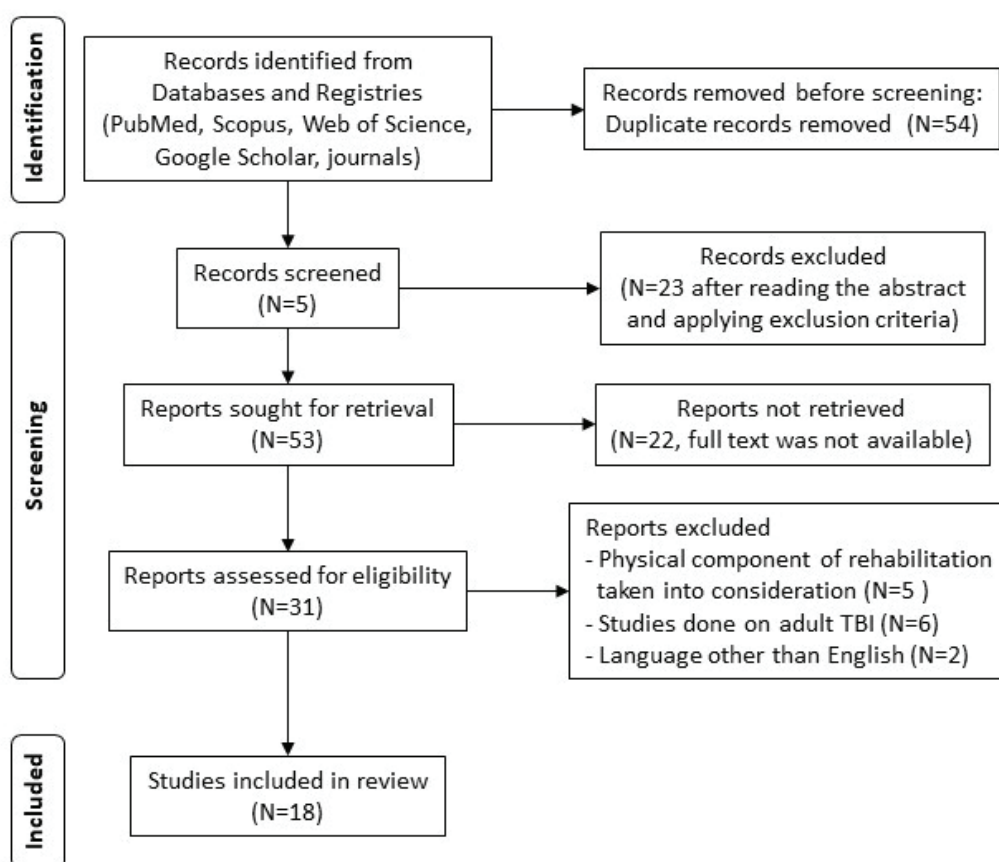
Secondary data analysis is used to study the research question. Various databases and registers like PubMed, Scopus, Google Scholar, Web of Science, Journals, and books were searched for articles relating to the rehabilitation of behavioural and psychosocial outcomes in pediatric patients experiencing Traumatic Brain Injury. Studies published between 2010-2024 in the English language were taken into account for this study.

### **Population**

Patients diagnosed as pediatric traumatic brain injury.

### **Study identification**

For this study, data were considered from correlational studies, systematic reviews, case reports, cross-sectional studies, and interventional studies (Figure 1).



**Figure 1.** Interventional studies.

### Eligibility criteria

- Studies published between 2010-2024.
- Studies in the English language.
- Studies involving pediatric TBI patients.
- Studies addressing the psychosocial aspect of pediatric TBI and its rehabilitation.

### Exclusion criteria

- Studies addressing the physical domain of rehabilitation.
- Studies concerning the medical management of pediatric.

### Results

By enhancing executive function, emotional regulation, social cognition, and adaptive behaviours, rehabilitation

interventions—from cognitive-behavioural therapies and metacognitive training to family-centered and game-based interventions—significantly improve psychosocial outcomes in pediatric traumatic brain injury, according to the literature. Multiple trial analysis reveals that although many rehabilitation techniques (such as Goal Management Training, Attention Process Training, and Acceptance and Commitment Therapy) are successful in the short term, they are not always addressed in the long run, which indicates significant gaps in current practices. When taken as a whole, these findings provide important, empirically supported insights that can help researchers, clinicians, and caregivers choose and modify rehabilitation strategies that are sensitive to the environment and development of children with TBI (Table 1).

**Table 1.** Review of literature.

No.	Author	Sample size	Methodology	Result
1	Wang C <i>et al.</i> <sup>19</sup>	60 children aged 6-12 years	The experimental group received a metaphorical intervention based on children's games.	The intervention group scored higher on the Mini-Mental State Examination (MMSE) and Loewenstein Occupational Therapy Cognitive Assessment (LOTCA) and had lower scores on the Child Behaviour Checklist (CBCL), depression inventory, and emotional disorder screening tools compared to the control group.
2	Sood NT <i>et al.</i> <sup>20</sup>	31 children post-TBI	Participants were randomly assigned to either the active control group (Lexia Reading Core5, N=15) or the treatment group (Cogmed, N=16). For five weeks, both groups underwent computerized instruction with a physician's assistance via an online video platform for five weeks.	A significant improvement was observed in verbal working memory after therapy, but no lasting cognitive changes were seen six months later.
3	Sargénus HL <sup>21</sup>	38 pediatric clients and their parents	Goal Management Training (GMT) and Psychoeducational Control (Pediatric Brain Health Workshop, pBHW) were used.	Both GMT and pBHW (Pediatric Brain Health Workshop) enhanced executive functions based on parental reports (Behaviour Rating Inventory of Executive Function, BRIEF).
4	On ZX <i>et al.</i> <sup>22</sup>	11 articles included 482 children with TBI	Systematic Review and meta-analysis.	Children with traumatic brain injury display significant social cognition impairments, especially in theory of mind and emotion recognition.
5	Polinder S <i>et al.</i> <sup>23</sup>		Review article	Early educational intervention, cognitive behavioural therapy (CBT), and neuropsychological rehabilitation are effective for cognitive symptoms following mild TBI in children.
6	Séguin M <i>et al.</i> <sup>24</sup>	17 children post-TBI	Standardized tests for attention and executive function, along with behavioural checklists, assessed pre- and post-intervention in children with attention issues randomized to receive either Homework Assistance (HWA) or Attention Process Training (APT).	The study showed improvements in cognitive flexibility, working memory, and inhibition.
7	Ryan NP <i>et al.</i> <sup>25</sup>	78 children with TBI, 40 typically developing children, and their parents	Parents completed surveys after one or two years regarding their child's social skills and environmental factors.	Recovery over time correlates with injury severity; social outcomes depend on family environment and caregiver coping skills.
8	Barman A <i>et al.</i> <sup>14</sup>		Review article	Advocates for using restorative and compensatory methods in cognitive rehabilitation.
9	Brown FL <i>et al.</i> <sup>26</sup>	59 caregivers of children with ABI	Caregivers were split into two groups: one received Acceptance and Commitment Therapy (ACT) combined with Stepping Stones Triple P (SSTP), and the other received usual care (CAU).	Post-therapy, the treatment group showed small to moderate improvements in parental mental health, emotional flexibility, confidence in managing behaviours, family adaptation, and peer-parent relationships compared to the CAU (care-as-usual) group.

**Table 1.** Review of literature (*continued*).

No.	Author	Sample size	Methodology	Result
10	Coyne JH <i>et al.</i> <sup>27</sup>	Children aged 8-16 post-TBI with below-average memory	Three intervention types—massive restudy (MR), spaced restudy (SR), and retrieval practice (RP)—using two stimulus types: verbal paired associates (VPAs) and face-name pairs (FNPs).	The learning condition significantly affected delayed recall; retrieval practice yielded higher recall of verbal paired associates (VPAs) and face-name pairs (FNPs) than massive restudy (MR) and spaced restudy (SR).
11	Cook LG <i>et al.</i> <sup>28</sup>	20 adolescents post-TBI	Cognitive training comparing gist reasoning versus rote memory, with 8 sessions of 45 minutes each.	The gist reasoning group (N=10) showed notable improvements in recall, ability to abstract meaning, and generalization to working memory and inhibitory control.
12	Krasny-Pacini A <i>et al.</i> <sup>29</sup>	Five children with severe TBI and significant executive functioning difficulties	1 per week of metacognitive training treatment over 5 months	Both prospective memory and executive functioning improved.
13	Bower J <i>et al.</i> <sup>30</sup>	One child with severe TBI	Videotaped data from before, during, and after music therapy sessions using the Agitated Behaviour Scale and micro-analysis.	The child displayed behaviours such as neutral, acceptance, recruitment, and rejection during sessions.
14	Haslam C <i>et al.</i> <sup>31</sup>	30 participants: 15 with ABI and 15 non-injured controls	Participants underwent errorless learning, self-generated learning, and errorful learning.	No significant differences were observed between groups or methods.
15	Ho J <i>et al.</i> <sup>32</sup>	15 children with ABI	Memory rehabilitation using diary training, self-instruction, and case examples: six sessions per week.	Significant improvements were seen in retrieving information for Activities of Daily Living (ADLs).
16	Chan DY <i>et al.</i> <sup>15</sup>	32 children with ABI	Metacognitive problem-solving training.	Using education level, IQ scores, and baseline data as covariates, significant changes were observed in post-test scores between the experimental and control groups.
17	Feeney TJ <sup>33</sup>	Two children with severe TBI	Documented combined cognitive and executive function therapies using a variety of standard approaches.	Post-intervention reduced challenging behaviours and improved school performance were observed.
18	Yeates KO <i>et al.</i> <sup>34</sup>	19 children with severe TBI, 56 with mild/moderate TBI, 99 with orthopedic injury (OI)	Analyzed the relationship between family environment and psychosocial outcomes over time using mixed model analysis.	Major differences in social behaviour were identified between the orthopedic injury (OI) and TBI groups. Adaptive functioning improved.

## Discussion

This integrative review explores various study designs to understand the role of rehabilitation in improving cognitive and psychosocial functions post-TBI in the pediatric population.

Wang C. found the use of metaphorical intervention relative to pediatrics games as a way to improve psychosocial abilities by reducing anxiety and depression and significantly improving the cognitive scores in children post-TBI.<sup>19</sup> Sood NT, *et al.* studied the effectiveness of Cogmed Working Memory Training during cognitive rehabilitation of children with TBI and supported the need for further studies to govern its efficacy for betterment of academic skills and quality of life of children with TBI.<sup>20</sup> Sargénus HL, *et al.* studied the effectiveness of Goal Management Training and pediatric psychoeducative control treatment in pediatric ABI using 2 2-year follow-up of RCT and extended continued executive functioning improvement from baseline.<sup>21</sup> On ZX, *et al.* conducted a systematic review and meta-analysis and found significant impairment in social cognition following TBI in children, mainly in 5 dimensions, including emotion recognition or perception, theory of Mind (ToM), pragmatic language, moral reasoning, and social problem solving.<sup>22</sup>

Polinder S, *et al.* presented a comprehensive approach for TBI using management of post-concussion symptoms. For psycho-cognitive management, they advocated the use of early educational treatment, CBT, to improve quality of life and neuropsychological rehabilitation to improve coping and cognitive regulation.<sup>23</sup> Seguin M, *et al.* studied the efficacy of an intensive attention training program for cognitive remediation following pediatric TBI. They supported the use of a combination of insight training and process-specific strategies for cognitive remediation.<sup>24</sup>

Ryan NP. found the correlation between social problems following pediatric TBI and family environment and emphasized improving family dynamics and coping strategies to improve socialization after TBI.<sup>25</sup>

Barman A. reported the use of various rehabilitation strategies for cognitive remediation following pediatric TBI, such techniques included Attention Process Training (APT) and compensatory techniques like memory notebook for attention, restorative techniques like word list, visual imagery, mnemonic strategies for memory, Virtual reality games for visuospatial perception and constraint induced aphasic treatment and Transcranial Direct Current Stimulation (tDCS) for language and communication, metacognitive training methods for executive functions. They also advocated the role of positive family environment on behaviour after pediatric TBI.<sup>14</sup>

Brown FL, *et al.* found parent skill training and acceptance and commitment therapy important to improve family bonding following childhood ABI.<sup>26</sup> Coyne JH. supported the use of retrieval practice to improve academic outcomes and learning difficulties following TBI.<sup>27</sup> Cook LG. compared the top-down gist training and bottom-up rote memory learning in adolescents with chronic stage TBI, finding the top-down approach better than the latter.<sup>28</sup> Pacini AG, *et al.* studied context-sensitive

Goal Management Training to improve ADL functioning following severe TBI; this technique was found significant but needed more generalization.<sup>29</sup>

Bower J, *et al.* supported the use of familiar music therapy to evoke patient's interest towards intervention and further improving the cognitive abilities in the acute phase post childhood TBI.<sup>30</sup> Haslam C, *et al.* applied the principles of errorless learning techniques to pediatric TBI but found no significant results for the application of the technique; hence, further studies may be needed to apply this technique in practice.<sup>31</sup>

Ho J, *et al.* applied diary training, self-instruction training, and case examples on children with ABI having memory deficits. She found the technique effective in improving memory deficits and the mental well-being of children with ABI.<sup>32</sup> Chan DYK, *et al.* studied the effect of problem-solving skills training to improve ADL functioning in students with ABI attending mainstream schools. Intervention included paying attention, remembering and organising, defining the problem and goal setting, planning and monitoring.<sup>15</sup>

Feeney TJ. suggested the application of a support-oriented approach that reduces problematic behaviours through the integration of positive behaviour therapies and reinforcements with adaptable, dependent on context, cognitive/behavioural scripts.<sup>33</sup> Yeates KO, *et al.* in their study with TBI children and orthopedic injuries reported the dynamics of family in moderating psychological and social outcomes. They suggested social competence was significantly different between both groups, better home environments led to safer conditions following TBI, and behaviour problems were pronounced with severe TBI, irrespective of the parenting styles.<sup>34</sup>

This review of studies highlights that children with TBI experience various behavioural and cognitive deficits post-injury; a positive family environment, along with directed cognitive remediation therapy, is needed to provide better outcomes for the children as well as improve the well-being of caregivers.

## Limitations

Variability in study designs, terminology, and measurement instruments among included studies may be one of the study's shortcomings, making comparisons difficult. Generalizability may be limited by the small sample sizes in certain studies and the variety of juvenile TBI populations (e.g., age, damage severity). Furthermore, many studies only provide short-term follow-ups and lack standardized rehabilitation techniques, which may limit the capacity to evaluate long-term efficacy. The review is made more difficult by reporting bias and the difficulty of assessing behavioural outcomes and social cognition. These elements emphasize the necessity for larger-scale, more regular studies in this field.

## Conclusion

The substantial influence of rehabilitation on enhancing social cognition and behavioural outcomes in children and adolescents with traumatic brain injury (TBI) is highlighted



in this integrated review. The results imply that specific rehabilitation techniques can improve social functioning, emotional control, and adaptive behaviours, especially those that emphasize cognitive-behavioural therapy, social skills training, and neurocognitive therapies. Further study is required to refine therapeutic techniques and determine the most effective interventions for various age groups and severity levels of TBI, even if the evidence supports the effectiveness of rehabilitation in this setting. Improving long-term results in this population requires a multidisciplinary approach and the incorporation of tailored, evidence-based treatment strategies.

Further research into the neurobiological causes of TBI and how it affects social cognition is essential to developing rehabilitation strategies and raising the standard of living for young TBI patients.

### Ethical approval

This self-study was conducted in line with the *Declaration of Helsinki* and ICMJE guidelines. As it involved only the researcher's personal reflections with no participant data, formal ethics approval was not required.

### Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

### Conflict of interest

The author declares no conflicts of interest related to this work.

### Credit authorship contribution statement

**Gupta Bandita**: conception and design of the study, data collection, initial drafting, and data analysis of the manuscript; **Upadhyay Ishika**: interpretation and critical revision of the manuscript for important intellectual content. Both authors approved the final version of the manuscript and agree to be accountable for all aspects of the work.

### Acknowledgements

The author would like to express sincere gratitude to all those who contributed to the completion of this work. Special thanks are extended to colleagues, mentors, and peers for their valuable guidance, constructive feedback, and encouragement throughout the process. The author also acknowledges the support of family and Mr Tarun Joshi for their patience and motivation.

### References

- [1] Gardner MT, O'Meara AM, Miller Ferguson N. Pediatric traumatic brain injury: an update on management. *Curr Pediatr Rep.* 2017; 5(4): 213-9. doi: 10.1007/s40124-017-0144-5.
- [2] Anderson V, Moore C. Age at injury as a predictor of outcome following pediatric head injury: a longitudinal perspective. *Child Neuropsychol.* 1995; 1(3): 187-202. doi: 10.1080/09297049508400224.
- [3] Li L, Liu J. The effect of pediatric traumatic brain injury on behavioural outcomes: a systematic review. *Dev Med Child Neurol.* 2013; 55(1): 37-45. doi: 10.1111/j.1469-8749.2012.04414.x.
- [4] Langlois JA, Rutland-Brown W, Thomas KE. Traumatic brain injury in the United States: emergency department visits, hospitalizations, and deaths. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2006. Available from: <https://stacks.cdc.gov/view/cdc/12294>
- [5] Bechtel K, Stoessel K, Leventhal JM, et al. Characteristics that distinguish accidental from abusive injury in hospitalized young children with head trauma. *Pediatrics.* 2004; 114(1): 165-8. doi: 10.1542/peds.114.1.165.
- [6] Billmire ME, Myers PA. Serious head injury in infants—accident or abuse? *Pediatrics.* 1985; 75(2): 340-2. doi: 10.1007/BF00335074.
- [7] Laatsch L, Harrington D, Hotz G, Marcantuono J, Mozzoni MP, Walsh V, et al. An evidence-based review of cognitive and behavioural rehabilitation treatment studies in children with acquired brain injury. *J Head Trauma Rehabil.* 2007; 22(4): 248-56. doi: 10.1097/01.HTR.0000281841.92720.0a.
- [8] Fuentes MM, Wang J, Haarbauer-Krupa J, Yeates KO, Durbin D, Zonfrillo MR, et al. Unmet rehabilitation needs after hospitalization for traumatic brain injury. *Pediatrics.* 2018; 141(5): e20172859. doi: 10.1542/peds.2017-2859.
- [9] Laatsch L, Dodd J, Brown T, Ciccio A, Connor F, Davis K, et al. Evidence-based systematic review of cognitive rehabilitation, emotional, and family treatment studies for children with acquired brain injury literature: From 2006 to 2017. *Neuropsychol Rehabil.* 2020; 30(1): 130-61. doi: 10.1080/09602011.2019.1678490.
- [10] DeLisa JA, Gans BM, Walsh NE. Physical medicine and rehabilitation: principles and practice. 4<sup>th</sup> Ed. Philadelphia: Lippincott Williams & Wilkins; 2005.
- [11] Köhler R, Wilhelm EE, Shoulson I. Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence. Washington, DC: National Academies Press; 2012. doi: 10.17226/13220.
- [12] Schretlen DJ, Shapiro AM. A quantitative review of the effects of traumatic brain injury on cognitive functioning. *Int Rev Psychiatry.* 2003; 15(4): 341-9. doi: 10.1080/09540260310001606728.
- [13] Vaishnavi S, Rao V, Fann JR. Neuropsychiatric problems after traumatic brain injury: unraveling the silent epidemic. *Psychosomatics.* 2009; 50(3): 198-205. doi: 10.1176/appi.psy.50.3.198.
- [14] Barman A, Chatterjee A, Bhide R. Cognitive impairment and rehabilitation strategies after traumatic brain injury. *Indian J Psychol Med.* 2016; 38(3): 172-81. doi: 10.4103/0253-7176.183086.
- [15] Chan DY, Fong KN. The effects of problem-solving skills training based on metacognitive principles for children with acquired brain injury attending mainstream schools: a controlled clinical trial. *Disability and Rehabilitation.* 2011; 33(21-22): 2023-

32. doi: 10.3109/09638288.2011.556207.
- [16] Hanten G, Bartha M, Levin HS. Metacognition following pediatric traumatic brain injury: a preliminary study. *Dev Neuropsychol.* 2000;18(3):383–98. doi: 10.1207/S1532694206Hanten
- [17] Popernack ML, Gray N, Reuter-Rice K. Moderate-to-severe traumatic brain injury in children: complications and rehabilitation strategies. *J Pediatr Health Care.* 2015; 29(3): e1-7. doi: 10.1016/j.pedhc.2014.09.003.
- [18] Resch C, Rosema S, Hurks P, de Kloet A, van Heugten C. Searching for effective components of cognitive rehabilitation for children and adolescents with acquired brain injury: a systematic review. *Brain Inj.* 2018; 32(6): 679-92. doi: 10.1080/02699052.2018.1458335.
- [19] Wang C, Li X, Liu Y. Influence of play-based metaphors on negative emotion and behaviour in children recovering from brain injury. *Chinese J Child Health Care.* 2024; 32(5): 566-71. doi: 10.11852/zgetbjzz2023-0742.
- [20] Sood NT, Godfrey C, Krasts D, Morrison E, Chavez Arana C, Hearps SJ, et al. Rehabilitation of Executive Function in Pediatric Traumatic Brain Injury (REPeT): outcomes of a pilot randomized controlled trial. *Neuropsychology.* 2024; 38(5): 392-402. doi: 10.1037/neu0000951.
- [21] Sargénus HL, Andersson S, Haugen I, Hypher R, Brandt AE, Finnanger TG, et al. Cognitive rehabilitation in paediatric acquired brain injury—a 2-year follow-up of a randomized controlled trial. *Front Neurol.* 2023; 14: 1173480. doi: 10.3389/fneur.2023.1173480.
- [22] On ZX, Ryan NP, Konjarski M, Catroppa C, Stargatt R. Social cognition in paediatric traumatic brain injury: A systematic review and meta-analysis. *Neuropsychol Rev.* 2022;32(4):924-945. doi:10.1007/s11065-022-09553-1
- [23] Polinder S, Cnossen MC, Real RGL, Covic A, Gorbunova A, Voormolen D, et al. A multidimensional approach to post-concussion symptoms in mild traumatic brain injury. *Front Neurol.* 2018; 9: 1113. doi: 10.3389/fneur.2018.01113.
- [24] Séguin M, Lahaie A, Matte-Gagné C, Beauchamp MH. Ready! Set? Let's Train!: Feasibility of an intensive attention training program and its beneficial effect after childhood traumatic brain injury. *Ann Phys Rehabil Med.* 2018; 61(4): 189-96. doi: 10.1016/j.rehab.2017.05.001.
- [25] Ryan NP, van Bijnen L, Catroppa C, Beauchamp MH, Crossley L, Hearps SJ, et al. Longitudinal outcome and recovery of social problems after pediatric traumatic brain injury (TBI): Contribution of brain insult and family environment. *Int J Dev Neurosci.* 2016; 49: 23-30. doi: 10.1016/j.ijdevneu.2015.12.004.
- [26] Brown FL, Whittingham K, Boyd RN, McKinlay L, Sofronoff K. Does Stepping Stones Triple P plus Acceptance and Commitment Therapy improve parent, couple, and family adjustment following paediatric acquired brain injury? A randomised controlled trial. *Behav Res Ther.* 2015; 73: 58-66. doi: 10.1016/j.brat.2015.07.001.
- [27] Coyne JH, Borg JM, DeLuca J, Glass L, Sumowski JF. Retrieval practice as an effective memory strategy in children and adolescents with traumatic brain injury. *Arch Phys Med Rehabil.* 2015; 96(4): 742-5. doi: 10.1016/j.apmr.2014.09.022.
- [28] Cook LG, Chapman SB, Elliott AC, Evenson NN, Vinton K. Cognitive gains from gist reasoning training in adolescents with chronic-stage traumatic brain injury. *Front Neurol.* 2014; 5: 87. doi: 10.3389/fneur.2014.00087.
- [29] Krasny-Pacini A, Limond J, Evans J, Hiebel J, Bendjelida K, Chevignard M. Context-sensitive goal management training for everyday executive dysfunction in children after severe traumatic brain injury. *J Head Trauma Rehabil.* 2014; 29(5): E49-64. doi: 10.1097/HTR.0000000000000015.
- [30] Bower J, Catroppa C, Groke D, Shoemark H. Music therapy for early cognitive rehabilitation post-childhood TBI: an intrinsic mixed methods case study. *Dev Neurorehabil.* 2014; 17(5): 339-46. doi: 10.3109/17518423.2013.778910.
- [31] Haslam C, Bazen-Peters C, Wright I. Errorless learning improves memory performance in children with acquired brain injury: a controlled comparison of standard and self-generation techniques. *Neuropsychol Rehabil.* 2012; 22(5): 697-715. doi: 10.1080/09602011.2012.686820.
- [32] Ho J, Epps A, Parry L, Poole M, Lah S. Rehabilitation of everyday memory deficits in paediatric brain injury: self-instruction and diary training. *Neuropsychol Rehabil.* 2011; 21(2): 183-207. doi: 10.1080/09602011.2010.547345.
- [33] Feeney TJ. Structured flexibility: the use of context-sensitive self-regulatory scripts to support young persons with acquired brain injury and behavioural difficulties. *J Head Trauma Rehabil.* 2010; 25(6): 416-25. doi: 10.1097/HTR.0b013e3181fbc0a2.
- [34] Yeates KO, Taylor HG, Walz NC, Stancin T, Wade SL. The family environment as a moderator of psychosocial outcomes following traumatic brain injury in young children. *Neuropsychology.* 2010; 24(3): 345-56. doi: 10.1037/a0018387.