

# Insufficient Sleep Following Pediatric Mild Traumatic Brain Injury Correlates With Neurocognitive Dysfunction

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## Introduction

Sleep disturbance of any nature is reported in more than half of all mild traumatic brain injury (mTBI) patients.<sup>1</sup> The pathophysiology of sleep disturbance following a mTBI is associated with structural and functional disruptions of sleep circuitry and circadian rhythm.<sup>2</sup> Specifically in the pediatric population, untreated sleep disturbance has been shown to delay mTBI recovery and compound other morbidities including neurocognitive dysfunction.<sup>3, 4</sup>

## Aims and Objectives

Analyze the impact of sleep disturbance on neurocognitive function in children recovering from mild traumatic brain injury.

## Methodology

A retrospective chart review of 118 pediatric patients (mean age = 14.56 +/- 2.03 years) recovering from a mTBI between January 2010 and May 2019 was performed. Epworth Sleepiness Scale (SF-8) results were analyzed in relation to CNS Vital Signs (CNSVS) neurocognitive test outcomes. SF-8 is a subjective estimation of a patient's daytime sleepiness. CNSVS uses a multitude of domains to objectively evaluate the overall neurocognitive status of a patient. Pearson correlations were calculated using a type I error of  $p < 0.05$  between variables.

## Results

Epworth Sleepiness Scale (SF-8) results showed 28.82% of participants were experiencing excessive daytime sleepiness sufficient enough to recommend medical attention. Upon further analysis, there was a significant negative correlation between SF-8 and CNSVS neurocognitive test outcomes including complex attention, cognitive flexibility, executive function, and simple attention scores (table 1). This means as SF-8 scores increased (participants defined as excessively sleepy), neurocognitive function scores in complex attention, cognitive flexibility, executive function, and simple attention decreased. There was not enough evidence to conclude a significant correlation between other CNSVS scores (composite memory, verbal memory, visual memory, processing speed, reasoning, working memory, and sustained attention) and SF-8 (all  $P > 0.05$ ).

### Significant Correlation Between SF-8 and CNSVS

Neurocognitive Test	R Value	P Value
Complex Attention	-0.37	0.0004
Cognitive Flexibility	-0.24	0.0151
Executive Function	-0.21	0.0350
Simple Attention	-0.36	0.0003

**Table 1:** Displays CNSVS neurocognitive test outcomes that resulted in a significant negative correlation with Epworth Sleepiness Scale (SF-8) results.

## Conclusion

Our findings support the concern of neurocognitive dysfunction among pediatric mTBI patients with sleep disturbance. Further analysis is needed to determine if mTBI is the primary source or an exacerbating factor of sleep disturbance within this population. Nonetheless, these findings suggest a need for thorough evaluation when treating sleep concerns, irrespective of a history of childhood mTBI.

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