Neuropsychological Functioning After TBI in Children Who Require Brief Hospitalization

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INTRODUCTION

- Estimated annual incidence of TBI in children under 15 years of age in the United States is 180 per 100,000
- The vast majority of children hospitalized for TBI have short admissions and do not require inpatient rehabilitation.
- Children who are hospitalized for TBI have significant unmet healthcare needs following TBI, particularly those with less severe TBIs.
- While neuropsychological deficits are common following TBI, children who are briefly hospitalized after TBI are often discharged without routine neuropsychological follow-up.
- Determining which children most in need of follow-up can be challenging.

METHODS

Participants

- 87 children and adolescents requiring overnight hospitalization following traumatic brain injury who were seen in a neurobehavioral screening clinic
- Mean hospitalization = 2.5 days, Range = 1-10 days
- Mean age = 11.2 years, Range = 5.2-17.6 years, 74% male
- Mean days evaluated post-injury = 41, Range = 14-135 days

Measures

- Clinical interview based on symptoms from the Acute Concussion Evaluation (ACE; See Table 1) to obtain report of symptoms any time following injury and within the week of evaluation.

Table 1: Acute Concussion Evaluation (ACE) Care Plan Symptom List (Gioia & Collins, 2008)

Physical		Cognitive	Emotional	Sleep
Headache	Sensitivity to light	Feeling mentally foggy	Irritability	Drowsiness
Nausea	Sensitivity to noise	Problems concentrating	Sadness	Sleeping more than usual
Fatigue	Numbness/Tingling	Problems remembering	Feeling more emotional	Sleeping less than usual
Visual problems	Vomiting	Feeling slowed down	Nervousness	Trouble falling asleep
Balance problems	Dizziness			

- Behavior Assessment Scale for Children – 2nd Edition (BASC-2)
- California Verbal Learning Test – Children's Version (CVLT-C)
- Test of Everyday Attention for Children (TEA-Ch)
- Delis-Kaplan Executive Function System (D-KEFS)

RESULTS

Table 2: Percent Symptom Types Ever and At Evaluation

Symptom Types	Symptoms Ever	Symptoms at Evaluation
Physical Symptoms	89%	64%
Cognitive Symptoms	61%	44%
Emotional Symptoms	70%	55%
Sleep Symptoms	55%	23%
Any Symptoms	97%	84%

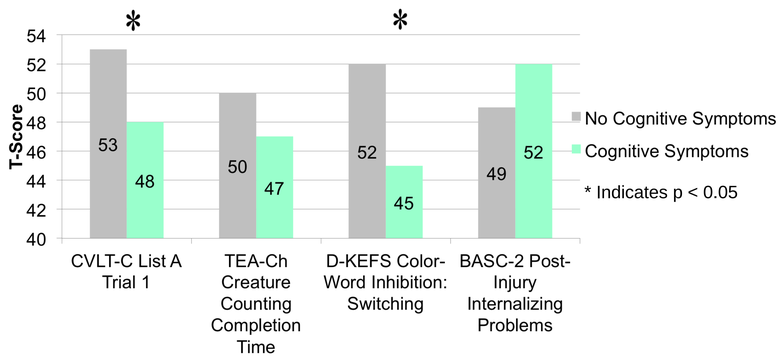
<u>Physical Symptoms and Neuropsychological Testing</u>

- No significant differences in BASC-2, CVLT-C, TEA-Ch, or D-KEFS were found between children who reported physical symptoms after injury or at the time of the evaluation compared to those who did not endorse physical symptoms.

<u>Cognitive Symptoms and Neuropsychological Testing</u>

- Children with reported cognitive symptoms ever and at evaluation demonstrated weaker performance on CVLT-C List A Trial 1, CVLT-C Total, and D-KEFS Color-Word Inhibition: Color Naming, Inhibition, and Switching compared to participants who did not report cognitive symptoms at that time (See Figure 1).

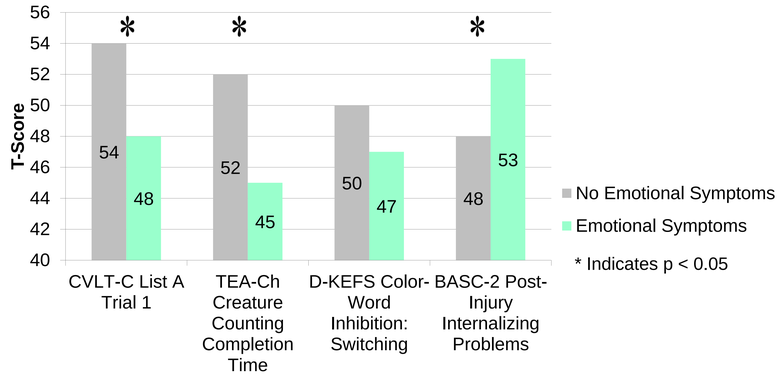
Figure 1: Presence of Cognitive Symptoms at Evaluation and Performance on Neuropsychological Testing



<u>Emotional Symptoms and Neuropsychological Testing</u>

- Children with reported emotional symptoms ever or at evaluation demonstrated weaker performance on CVLT-C Discriminability and TEA-Ch Creature Counting as well as BASC-2 Post-Injury Internalizing Problems compared to those who did not report emotional symptoms (See Figure 2).

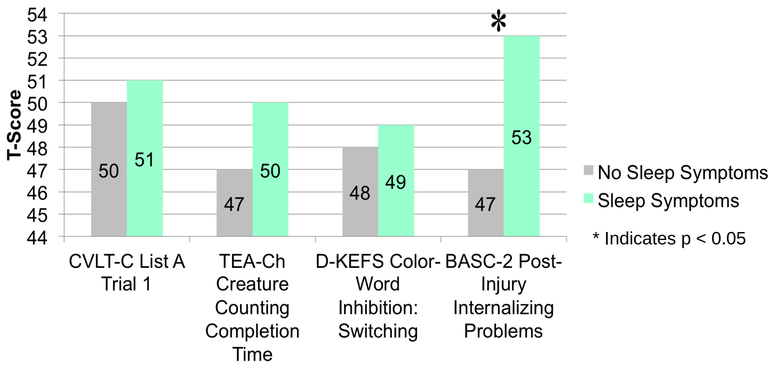
Figure 2: Presence of Emotional Symptoms at Evaluation and Neuropsychological Testing



<u>Sleep Symptoms and Neuropsychological Testing</u>

- Children with reported sleep symptoms ever and at evaluation demonstrated higher scores on the BASC-2 Internalizing Problems Composite compared to those without sleep symptoms. See Figure 3 for scores at evaluation.

Figure 3: Presence of Sleep Symptoms at Evaluation and Performance on Neuropsychological Testing



CONCLUSIONS

- Even though all patients had short hospitalizations, the majority of participants had physical, cognitive, emotional, and/or sleep symptoms after injury and many continued to have persisting symptoms at the time of evaluation.
- The presence of cognitive, emotional, and sleep symptoms was associated with worse neuropsychological functioning and behavior concerns.
- This study supports the need for more consistent neuropsychological follow-up after pediatric TBI, even for those who are discharged home after short acute care stays.
- Future research is needed to further delineate the risk factors associated with neuropsychological outcomes following TBI in children and adolescents with short acute care stays.