

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%

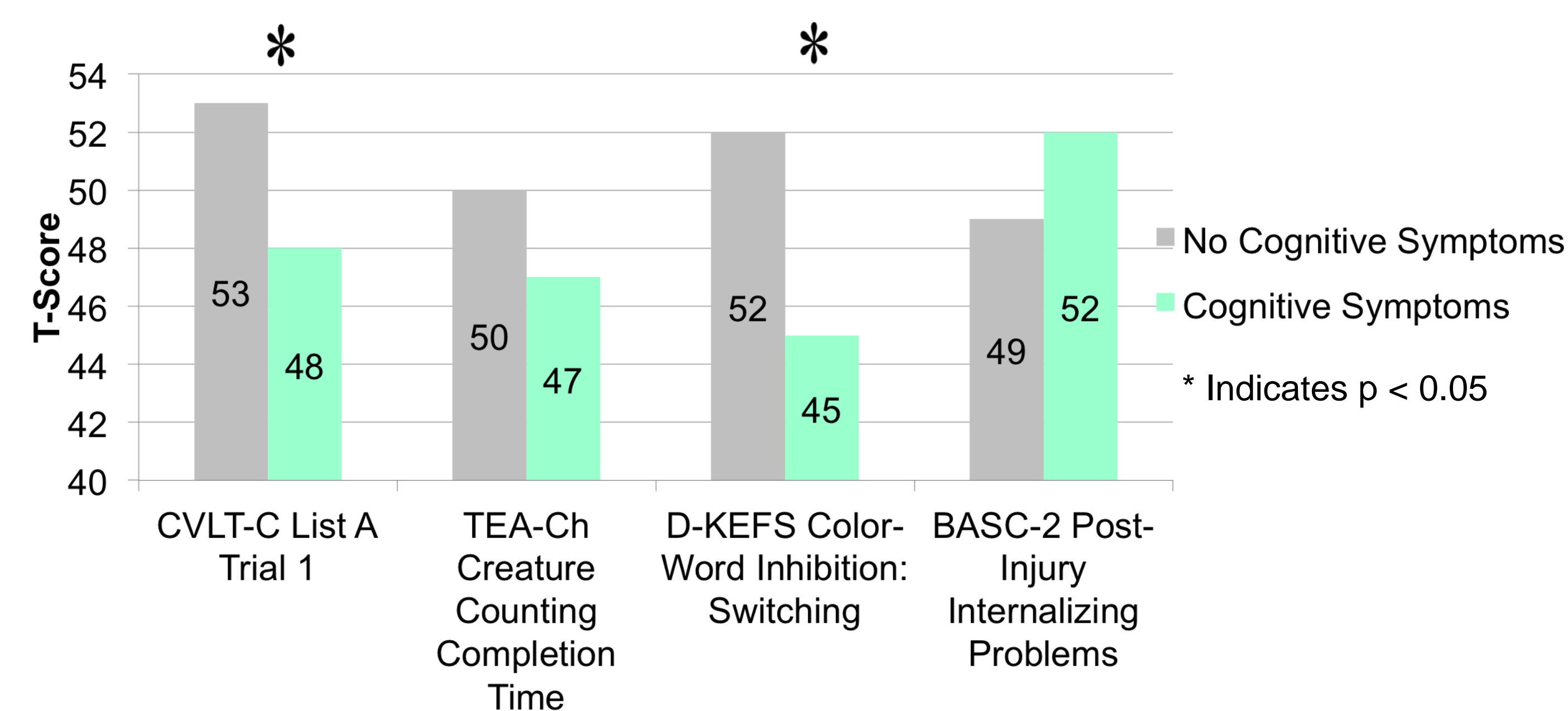
Physical Symptoms and Neuropsychological Testing

- 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.

Cognitive Symptoms and Neuropsychological Testing

- 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).

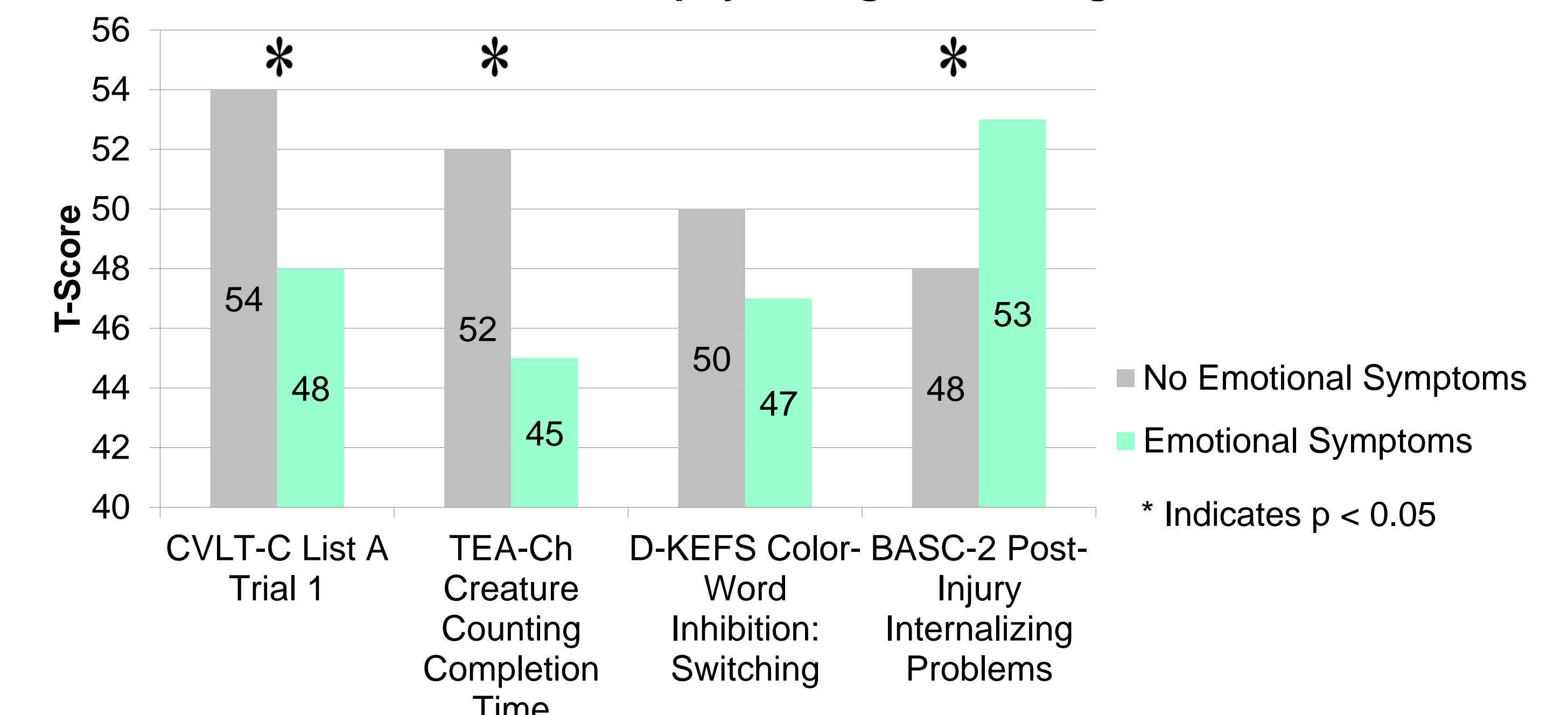
Figure 1: Presence of Cognitive Symptoms at Evaluation and Performance on Neuropsychological Testing



Emotional Symptoms and Neuropsychological Testing

- 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).

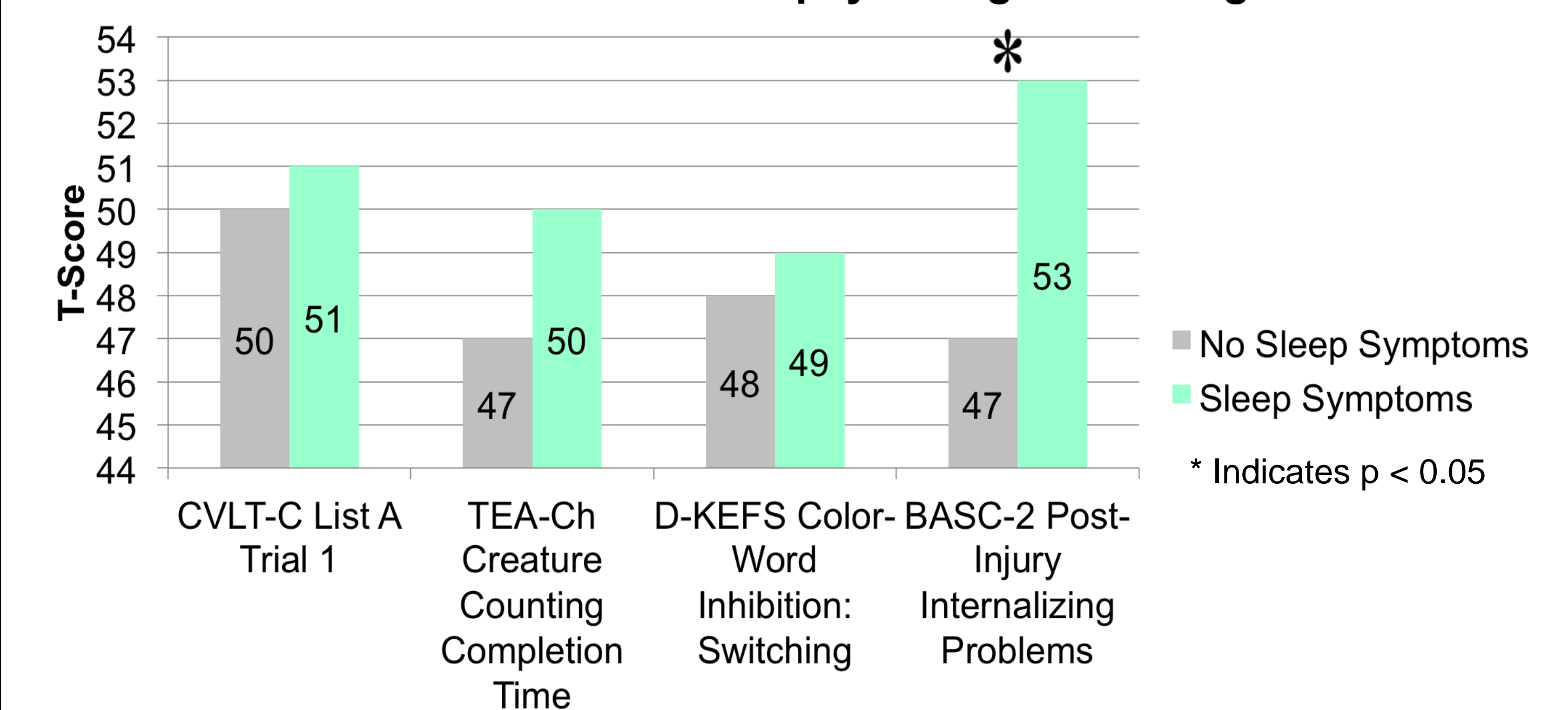
Figure 2: Presence of Emotional Symptoms at Evaluation and Neuropsychological Testing



Sleep Symptoms and Neuropsychological Testing

- 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.