

# Behavior 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
- Studies have demonstrated that children have significant unmet healthcare needs following TBI, particularly those with less severe TBIs
- Research suggests that cognitive /mental health needs are frequently unmet after pediatric TBI
- Children who are briefly hospitalized after TBI are often discharged without routine neuropsychological follow-up
- Studies have shown that executive function skills, most notably working memory, are negatively impacted by TBI
- Pre-injury mood and behavioral diagnoses have been associated with increased risk of psychiatric difficulties following TBI

## METHODS

- Information regarding Glasgow Coma Scale ratings (GCS), loss of consciousness (LOC), and neuroimaging findings obtained from review of available medical records
- Pre-injury diagnoses (LD, ADHD, mood, and behavioral diagnoses) obtained from parent report
- Behavior Rating Inventory of Executive Function (BRIEF) parent ratings used to assess pre- and post-injury executive functioning
- Behavior Assessment Scale for Children – 2<sup>nd</sup> Edition (BASC-2) parent ratings used to assess pre- and post-injury emotional/behavioral functioning

## Participants

- 100 children and adolescents requiring overnight hospitalization following injury to the head
- Mean age = 10.6 years
- 70% male
- Mean days post-injury = 37

## Medical Factors

- Inpatient days range 1-16, mode = 2
- 37 participants with available GCS ratings
  - Range 3-15
  - TBI Classification: 25 Mild, 1 Moderate, 11 Severe
- 63% experienced LOC
- 61% positive findings on neuroimaging

## Pre-Injury Diagnoses

- 14% learning disabilities
- 15% ADHD
- 31% behavioral problems
- 21% mood problems

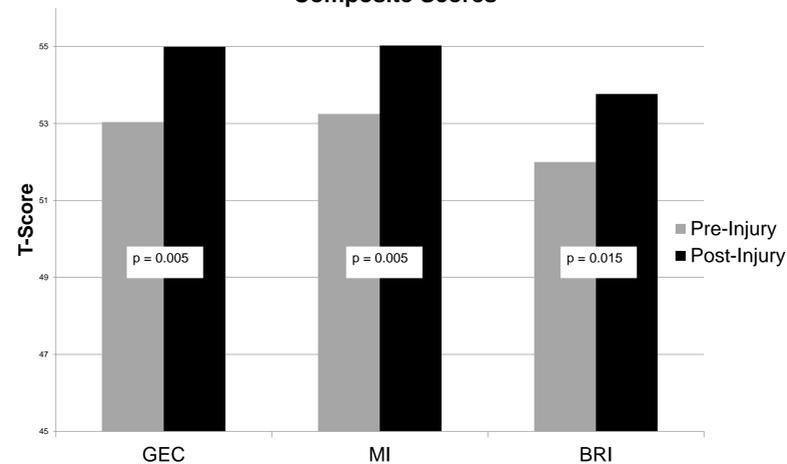
## RESULTS

- GCS, LOC, or imaging (CT or MRI) findings were not significantly associated with post-injury parent BRIEF or BASC-2 ratings

### BRIEF

- 28% of participants had elevated BRIEF scores post-injury
- Working Memory scale most commonly elevated (31%)
- Parent ratings suggested a significant increase in executive dysfunction from pre- to post- injury based on the BRIEF (See Figure 1)

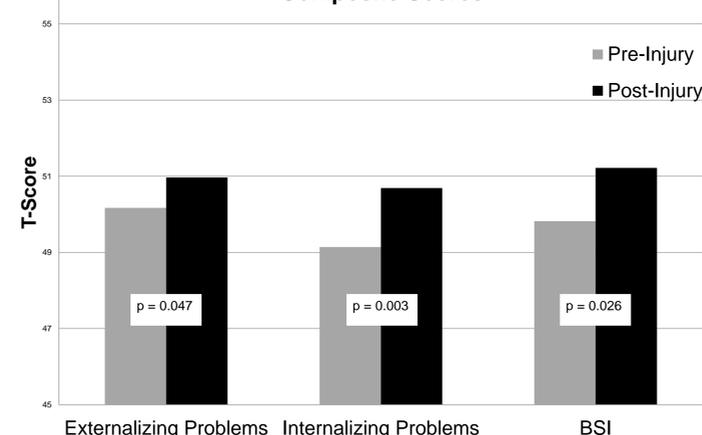
Figure 1: Pre- and Post- Injury Parent Rated BRIEF Composite Scores



### BASC-2

- Only 4% were rated as having clinically significant behavioral problems on the BASC-2 post-injury but parent ratings suggested a significant increase in symptoms from pre- to post- injury (See Figure 2)

Figure 2: Pre- and Post- Injury Parent Rated BASC-2 Composite Scores



- Pre-injury diagnoses were significantly associated with pre- and post-injury BRIEF and BASC-2 parent-reports (Tables 1 and 2)

Table 1. Pre-injury BRIEF and post-injury BRIEF by pre-injury diagnosis

	p-values		
	ADHD	LD	Behavioral
Pre-injury Global Executive Composite (GEC)	<0.001*	0.079	<0.001*
Pre-injury Metacognition Index (MI)	0.001*	0.090	<0.001*
Pre-injury Behavioral Regulation Index (BRI)	<0.001*	0.180	<0.001*
Post-injury GEC	<0.001*	0.055	<0.001*
Post-injury MI	0.02*	0.056	<0.001*
Post-injury BRI	0.001*	0.105	<0.001*

\* significant at p<0.05 level

Table 2. Pre-injury BASC-2 and post-injury BASC-2 by pre-injury diagnosis

	p-values		
	ADHD	LD	Behavioral
Pre-injury Externalizing Problems	0.001*	0.021*	<0.001*
Pre-injury Internalizing Problems	0.373	0.849	0.026*
Pre-injury BSI	0.001*	0.093	<0.001*
Post-injury Externalizing Problems	0.001*	0.013*	<0.001*
Post-injury Internalizing Problems	0.631	0.365	0.009*
Post-injury BSI	0.001*	0.019*	<0.001*

\* significant at p<0.05 level

## CONCLUSIONS

- 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.
- This research suggests that even children with short acute care stays have significant changes in emotional, behavioral, and executive functioning following TBI.
- Pre-injury factors are particularly important when considering outcome in this group of children.
- 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.