Depression Symptoms Predict Neurocognitive Functioning Following Pediatric Traumatic Brain Injury in the Acute Recovery Phase

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BACKGROUND & AIMS

- Pediatric Intensive Care Unit (PICU) survivors are at elevated risk for developing neurocognitive concerns.
- Worse outcomes are seen in those with lower premorbid abilities, more severe pediatric traumatic brain injury (pTBI), and higher post-injury depression symptoms.
- Limited research has focused on the acute recovery phase or used objective neuropsychological assessment measures.

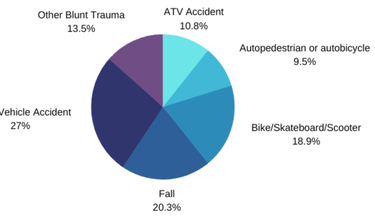
This study aims to:
Assess the impact of pTBI severity and post-injury depression symptoms on neurocognitive functioning in the acute recovery phase.

METHODS

Participants:
Seventy-four children who were treated in the PICU for pTBI

- Ages 8-19 years
- 46 male/28 female
- 53 White, 12 Unknown Race, 3 Multiracial, 2 Pacific Islander, 2 Asian, 1 Native American, 1 Black
- 36 received neurocritical care; 37 received monitoring only

Mechanism of Injury

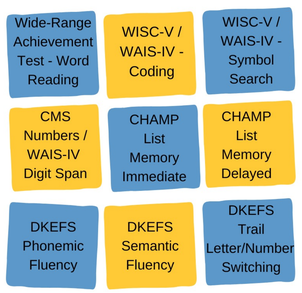


Variables	Mean	Std. Deviation	Minimum	Maximum
Age (in Years) at Admission	13.12	2.71	8.04	19.51
Inpatient Length of Stay (in Days)	3.92	4.70	0.24	32.56
GCS at Admission	13.36	3.12	3.00	15.00
ISS at Admission	14.03	10.44	1.00	50.00
PROMIS Depression t-score	49.19	12.16	36.20	82.20
Word Reading SS	101.49	15.03	74.00	145.00
Digit Span ss	8.55	2.88	3.00	16.00
CHAMP Lists Immediate ss	8.23	2.60	1.00	14.00
CHAMP Lists Delayed ss	8.08	3.01	2.00	14.00
DKEFS Number/Letter Switching ss	7.91	3.75	1.00	14.00
DKEFS Phonemic Fluency ss	8.43	2.87	2.00	15.00
DKEFS Semantic Fluency ss	9.95	3.31	2.00	17.00
Coding ss	8.03	3.00	1.00	17.00
Symbol Search ss	9.69	3.68	1.00	19.00

Procedures:
Demographic data and information about injury and intervention were extracted from the electronic medical record. Injury severity was indexed by the *Glasgow Coma Scale* and *Injury Severity Scale*.

Approximately 1-month following hospital discharge, as part of a multidisciplinary follow-up clinic, caregivers completed the *Pediatric Quality of Life Inventory (PedsQL)* and *PROMIS® parent Proxy Report Scales* and children participated in brief neuropsychological testing.

MEASURES



RESULTS

Given the high intercorrelations between aspects of executive function, principal components analysis (PCA) was conducted to create a cumulative neurocognitive index (NCI; *M* = -0.04, *SD* = 1.01; range = -2.49 to 2.13).

Principle Components Analysis

PCA LOADING	NCI COMPONENT
Digit Span	.61
List Memory Immediate	.68
List Memory Delayed	.71
Number-Letter Switching	.80
Phonemic Fluency	.73
Semantic Fluency	.80
Coding	.74
Symbol Search	.73
Eigenvalue	4.23
% Total variance	52.79%

- Simple linear regressions were used to test if injury severity (GCS; ISS) and clinically elevated Promise Depression scores predicted NCI, when controlling for reading ability.

Regression Coefficients for Predicting Neurocognitive Index

VARIABLE	B	BETA	T	P
Word Reading Score	.04	.59	6.35	<.001
GCS Severity Range	-.08	-.03	-.33	.74
PROMIS® Depression Severity Range	-.48	-.22	-2.22	.03

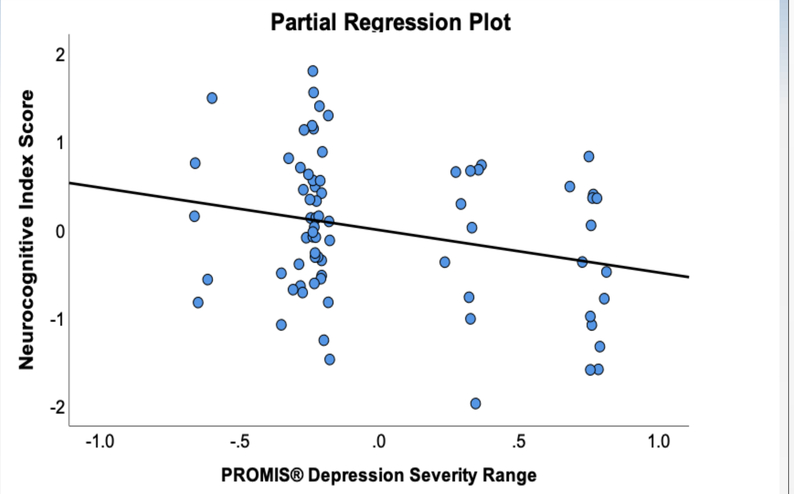
VARIABLE	B	BETA	T	P
Word Reading Score	.04	.61	6.51	<.001
ISS Severity	-.01	-.08	-.85	.39
PROMIS® Depression Severity Range	-.45	-.21	-2.17	.03

- Both regressions were significant [GCS as predictor: R^2=.40), F(df=3,70) =15.23, p<.001; ISS as predictor: R^2=.41), F(df=3,67) =15.54, p<.001].
- Elevated depression predicted NCI (p=.03) whereas greater pTBI severity was not predictive above the impact of premorbid factors.

Note, 11 of the 74 children had pre-existing psychiatric diagnoses. Of the 63 without such a history, 18 had moderate or severe depression ratings at follow-up appointment.

RESULTS

- Following pTBI, youth with higher range depression symptoms performed more poorly on neurocognitive tasks 1-month following PICU admission.



Conclusions & Future Directions

- Neurocognitive functioning in PICU survivors within the acute recovery phase may be more related to concurrent depression symptoms than injury severity markers when premorbid factors are considered.
- Additional research is needed to further explore the contribution of injury characteristics and depression symptomology.
- Multidisciplinary clinics, such as the Pediatric Critical Care Neurotrauma Recovery Program, provide an important service to address cognitive and psychosocial complexities seen in the acute recovery phase.

REFERENCES

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