Association between Paediatric Mild Traumatic Brain Injury and Two-Year Psychiatric Outcomes Largely Explained by Pre-Existing Mental Health Problems

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Introduction

Evidence that mild traumatic brain injury (mTBI) causes psychiatric problems in children has been mixed

Investigating this issue has been difficult due to the lack of representative longitudinal data on child mTBI and multiple psychiatric domains

Aims

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1) To examine the association between mTBI and psychiatric symptoms, diagnoses and service use:

i) At baseline *(aged 9-10, N=11,875)*

ii) Any new cases at two-year follow-up *(N=11,216)*

2) To compare these associations to participants with orthopaedic injury but without mTBI

3) To control for pre-injury levels of mental health using propensity-score matching

Methods

i) Dataset

ABCD longitudinal cohort study: 11,876 children recruited from 21 research sites across the United States

ii) Measures

Mild TBI
- Ohio State University TBI Identification method

Psychiatric symptoms
- Child Behaviour checklist (CBCL)

Psychiatric diagnoses
- Kiddie Schedule for Affective Disorder and Schizophrenia for DSM-5 (KSADS-5)

Psychiatric service use
- KSADS-5 background items questionnaire

iii) Analysis

- Mixed-effects models for baseline and two-year follow-up adjusted for:
  - Sex, age, ethnicity, annual household income, neighbourhood safety, parental mental health, family conflict, traumatic experiences
- Propensity-score matching at two-year follow-up:
  - Matched for baseline levels of the psychiatric outcome variable, biological sex, age, ethnicity, combined annual household income, perceived neighbourhood safety, family conflict and traumatic experiences

Results

1) Lifetime mTBI but not orthopaedic injury associated with psychiatric symptoms, disorders and service use

	Adjusted model Beta (95% CI)
CBCL Total problems	
mTBI	5.2 (3.80 – 6.60)
Ortho injury comparison	-0.52 (-1.30 – 0.26)
	Adjusted model OR (95% CI)
KSADS-5 Any anxiety disorder	
mTBI	1.61 (1.21 – 2.13)
Ortho injury comparison	0.97 (0.79 – 1.17)
KSADS-5 Any behavioural disorder	
mTBI	1.56 (1.16 – 2.11)
Ortho injury comparison	0.97 (0.79 – 1.17)
Psychotherapy	
mTBI	1.47 (1.02 – 2.11)
Ortho injury comparison	0.92 (0.71 – 1.18)
Medication for mental health	
mTBI	1.57 (1.08 – 2.27)
Ortho injury comparison	0.69 (0.51 – 0.94)
Any mental health service use	
mTBI	1.66 (1.33 – 2.08)
Ortho injury comparison	0.90 (0.78 – 1.05)

2) New mTBI but not orthopaedic injury associated with psychiatric symptoms, disorders and service use

	Adjusted model Beta (95% CI)
CBCL Total problems	
mTBI	3.30 (1.50 – 5.00)
Ortho injury comparison	0.80 (-1.41 – 2.00)
	Adjusted model OR (95% CI)
KSADS-5 Any anxiety disorder	
mTBI	2.08 (1.36 – 3.16)
Ortho injury comparison	1.02 (0.71 – 1.47)
KSADS-5 Any behavioural disorder	
mTBI	2.12 (1.32 – 3.42)
Ortho injury comparison	1.28 (0.86 – 1.90)
Psychotherapy	
mTBI	2.08 (1.26 – 3.42)
Ortho injury comparison	1.36 (0.91 – 2.04)
Medication for mental health	
mTBI	1.83 (1.09 – 3.05)
Ortho injury comparison	0.89 (0.56 – 1.42)
Any mental health service use	
mTBI	1.93 (1.39 – 2.69)
Ortho injury comparison	1.46 (1.14 – 1.86)

3) Controlling for pre-injury mental health eliminated associations between new mTBI and psychiatric outcomes

	PSM Model Beta (95% CI)
CBCL Total problems	
mTBI	2.80 (-0.17 – 5.70)
Ortho injury comparison	0.80 (-1.00 – 2.60)
	PSM model OR (95% CI)
KSADS-5 Any anxiety disorder	
mTBI	1.91 (1.00 – 3.79)
Ortho injury comparison	1.19 (0.71 – 1.99)
KSADS-5 Any behavioural disorder	
mTBI	1.06 (0.55 – 2.05)
Ortho injury comparison	1.41 (0.79 – 2.50)
Psychotherapy	
mTBI	2.08 (1.26 – 3.42)
Ortho injury comparison	1.36 (0.91 – 2.04)
Medication for mental health	
mTBI	1.83 (1.09 – 3.05)
Ortho injury comparison	0.89 (0.56 – 1.42)
Any mental health service use	
mTBI	1.93 (1.39 – 2.69)
Ortho injury comparison	1.46 (1.14 – 1.86)

Conclusion

Worse mental health and higher levels of psychiatric service use are associated with paediatric mTBI

However, these associations may be largely explained by pre-existing mental health problems

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