Traumatic Brain Injury and Crime

Dr Seena Fazel & Prof. Huw Williams
Moderate-Severe TBI (e.g. 30 mins + LoC)
- insult to the brain from an external mechanical force.
- E.g. blow to the head - “fast-stop” in a crash.
- frontal and temporal most common sites of injury
- diffuse injury across the brain

In MILD TBI – same mechanisms - but difference of degree (Bigler, 2008)

Rates of TBI (across all severities) in males across severities, are given as between 5% to 24%
TBI: consequences in children

Moderate to Severe TBI:

Problems in attention, memory, executive control, dis-inhibition, anger, etc.

(Anderson et al 2006; Max, 2001)

Mild TBI:

Repeated MTBI:

Difficulties considering alternative behaviours & controlling impulses

(Pontifex 2009)

EFFECTS MAY BE “DELAYED” IN DEVELOPING BRAINS
TBI in Young Offenders

Williams, Cordan, Mewse et al (2010)
Of 192 youth offenders (16 yrs)
- MTBI with LOC up to 10 minutes &/or moderate-severe TBI = 46%
- TBI = more convictions & Mental Health problems
- x3+ TBIs = more violence

Davies, Williams & Hinder 2012
“Dose response relationship” of TBI symptoms in young offenders

Williams, Mewse, Burgess et al (2010)
ADULT prisoners with TBI v non TBI enter prison 1st time at age 16 v. 21
What about TBI and risk of violence?
Previous work

- Identified only 6 studies
- In prisoners, WW2 or Vietnam veterans, hospital inpatients
- All studies show small increase in risk (50%)
- Need for generalizable studies with violence recorded after TBI diagnosis
Risk of Violent Crime in Individuals with Epilepsy and Traumatic Brain Injury: A 35-Year Swedish Population Study

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Abstract

Background: Epilepsy and traumatic brain injury are common neurological conditions, with general population prevalence estimates around 0.5% and 0.3%, respectively. Although both illnesses are associated with various adverse outcomes, and expert opinion has suggested increased criminality, links with violent behaviour remain uncertain.

Methods and Findings: We combined Swedish population registers from 1973 to 2009, and examined associations of epilepsy (n = 22,947) and traumatic brain injury (n = 22,914) with subsequent violent crime (defined as convictions for homicide, assault, robbery, arson, any sexual offense, or illegal threats or intimidation). Each case was age and gender matched with ten general population controls, and analysed using conditional logistic regression with adjustment for sociodemographic factors. In addition, we compared cases with unaffected siblings. Among the traumatic brain injury cases, 2,011 individuals (8.8%) committed violent crime after diagnosis, which, compared with population controls (n = 229,118), corresponded to a substantially increased risk (adjusted odds ratio [aOR] = 3.3, 95% CI: 3.1–3.5); this risk was attenuated when cases were compared with unaffected siblings (aOR = 2.0, 1.8–2.3). Among individuals with epilepsy, 973 (4.2%) committed a violent offense after diagnosis, corresponding to a significantly increased odds of violent crime compared with 224,006 population controls (aOR = 1.5, 1.4–1.7). However, this association disappeared when individuals with epilepsy were compared with their unaffected siblings (aOR = 1.1, 0.9–1.2). We found heterogeneity in violence risk by age of disease onset, severity, comorbidity with substance abuse, and clinical subgroups. Case ascertainment was restricted to patient registers.

Conclusions: In this longitudinal population-based study, we found that, after adjustment for familial confounding, epilepsy was not associated with increased risk of violent crime, questioning expert opinion that has suggested a causal relationship. In contrast, although there was some attenuation in risk estimates after adjustment for familial factors and substance abuse in individuals with traumatic brain injury, we found a significantly increased risk of violent crime. The implications of these findings will vary for clinical services, the criminal justice system, and patient charities.

Please see later in the article for the Editors’ Summary.


Academic Editor: Philippa J. Hey, University of Western Sydney, Australia

Received January 18, 2011; Accepted November 14, 2011; Published December 27, 2011

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Funding: Funded by the Swedish Research Council - Medicine, Swedish Council for Working Life and Social Research, and the National Prison and Probation Administration R&D. No funding bodies had any role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing Interests: The authors have declared that no competing interests exist.
## Association between TBI and violent crime after diagnosis

<table>
<thead>
<tr>
<th>Control group</th>
<th>No. of violent individuals (%)</th>
<th>Adjusted odds ratio\textsuperscript{a} (95%CI)</th>
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<tbody>
<tr>
<td></td>
<td>Individuals with traumatic brain injury</td>
<td>Comparison group</td>
</tr>
<tr>
<td>Unaffected general population controls</td>
<td>2,011 (8.8)</td>
<td>6,837 (3.0)</td>
</tr>
<tr>
<td>Unaffected full siblings</td>
<td>992 (8.6)</td>
<td>832 (4.2)</td>
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Post TBI: Absolute risk of violent crime is high and relative risk also increased moderately.
Policy and practice implications

- Neuro-rehabilitation for childhood TBI may assist in crime prevention
  - Utilize and develop evidence-based interventions for high risk children

- Improve detection and management of TBI in justice system
  - e.g. at court proceedings, sentencing and in forensic rehabilitation
  - Importance of screening for TBI in offenders

- Consider risk factors for violence in TBI persons, especially modifiable ones (e.g. alcohol or illegal drugs)
  - Forthcoming reviews:
    - “Traumatic Brain Injury and Crime” – for Barrow Cadbury Trust
    - “Neuro-developmental Disorders in Children and Young Adults in Custody” - for Office of Children’s Commissioner