Self-reported traumatic brain injury in male young offenders: A risk factor for re-offending, poor mental health and violence?

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Self-Reported Traumatic Brain Injury in Male Young Offenders:

A risk factor for re-offending, poor mental health and violence?

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Abstract

Background

Adolescence is a risk period for offending and for Traumatic Brain Injury (TBI). TBI is a risk factor for poor mental health and for offending. TBI has been largely neglected from guidance on managing mental health needs of young offenders.

Aims

We sought to determine the rate of self-reported TBI, of various severities, in a male, adolescent youth offending population. We also aimed to explore whether TBI was associated with number of convictions, violent offending, mental health problems and drug misuse.

Method

Young male offenders aged 11 to 19 years were recruited from a Young Offender Institute, a Youth Offending Team and a special needs school. A total of 197 participants were approached and 186 (94.4%) completed the study. They completed self-reports on TBI, crime history, mental health and drug use.

Results

TBI in Young Offenders:

TBI with a Loss of Consciousness (LOC) was reported by 46% of the sample. LOC consistent with Mild TBI was reported by 29.6% and 16.6% reported LOC consistent with Moderate-Severe TBI. Possible TBI was reported by a further 19.1%. Repeat injury was common – with 32% reporting more than one LOC. Frequency of self-reported TBI was associated with more convictions. Three or more self-reported TBIs were associated with greater violence in offences. Those with self-reported TBI were also at risk of greater mental health problems and of misuse of cannabis.

Conclusions

TBI may be associated with offending behaviour and worse mental health outcomes. Addressing TBI within adolescent offenders with neuro-rehabilitative input may be important for improving well-being and reducing re-offending.

Self-Reported Traumatic Brain Injury in Male Young Offenders:

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Introduction:

Traumatic Brain Injury (TBI) is the leading cause of disability in children and working age adults (Fleminger & Ponsford, 2005). Adolescence is a particular risk period for injury (Yates, Williams, Harris, Round & Jenkins, 2006). Adolescence is also a risk period for offending behaviour (Forrest, Tambor, Riley, Ensminger & Starfield, 2000; Mobbs, Lau, Jones & Frith, 2008). There is much concern over increased levels of incarceration across many countries (Prison Population Statistics, 2009). Currently, in the developed world, prison populations range from a high of 760 per 100,000 in the USA (highest), 151 per 100,000 in UK (above, but close to, the European Union average), through to 44 per 100,000 in Iceland (lowest) (Prison Population Statistics, 2009). Of the 85,000 prisoners in the UK over 2800 are aged between 10-17 years – classed as "young offenders" (Prison Population Statistics, 2009). Repeated calls have been made for better management of mental and physical health needs of prison populations and for reductions in prison populations (Health Care for Prisoners and Young Offenders, 2009). Despite this, a potential risk factor for poor mental health and, potentially, re—offending, TBI, has been largely neglected (Report from Centre for Disease Control Traumatic Brain Injury in Prisons and Jails – 2009).

Moderate to Severe TBI (such as defined by loss of consciousness of ten minutes to six hours or more) is typically associated with neuropsychological deficits, behavioural problems and poor

social outcomes (Stambrook, Moore, Peters, Deviaene, & Hawryluk, 1990). Mild TBI (less than 10 minutes LOC) is not usually associated with such persisting problems, however, when these injuries are "complicated", or cumulative, there can be neuropsychological sequelae, particularly involving attention and executive systems (Williams, Potter & Ryland, in press). Moreover, it is likely that neuropsychological sequelae (problems with attention, memory and executive functions) would limit their capacity to fully engage in forensic rehabilitation to enable behaviour change. Importantly, such issues may not be fully appreciated within justice systems charged with enabling behaviour change. Indeed, it is interesting to note that persistent offenders are described as impulsive and lacking affective empathy (Colantonio, Stemenova, Abramowitz & Clarke, 2007; Jolliffe & Farrington, 2003) - common consequences of TBI (Tonks, Slater, Frampton, Wall, Yates & Williams, 2009).

In males the rates of TBI across all severities are given as between 5% to 24% (McGuire, Burright, Williams & Donovick, 1998). TBI prevalence rates in adult prison populations vary considerably - from 25% to 87% (Schofield , Hollis, Smith, Lee, & Kelso, 2006; Slaughter, Fann, Ehde 2003; Morrell, Merbitz, Jain 1998). A study comparing rates of TBI in non-offending and offending youths showed that offenders had a higher level of TBI (50% versus 40%) and reported incidents indicating greater biomechanical forces - such as fights and road accidents versus sports injury (Huxx, Bong, Skinner, Belau, & Sanger, 1998). They also had higher levels of immediate symptoms, such as headaches, dizziness and losses of consciousness.

Although TBI may be elevated in offender groups, causative links between TBI and anti-social behaviour are equivocal. Many variables co-influence the risk of each. Those who are at risk of

crime and of TBI may well be risk-taking individuals of younger age and male gender (Turkstra, Jones, & Toler, 2003). Furthermore, TBI often occurs in the context of mental health problems and drug and alcohol misuse (Yates et al., 2006). However, it is worth noting that there is an emerging evidence base suggesting a link between childhood TBI and crime. A population based cohort study in Finland, involving more than 12,000 people, showed how TBI during childhood or adolescence was associated with a fourfold increased risk of developing later mental disorder with coexisting offending in adulthood in men (Timonen, Miettunen, Hakko, Zitting, Veijola, von Wendt, & Rasanen, 2002). Offending tended to occur following a TBI rather than pre-injury. Leon-Carrion and Ramos (2003) showed how a history of un-treated TBI in childhood or adolescence was associated with sentencing for violent offending in adults. The role of childhood TBI as a "keystone" condition around which other factors coalesce has emerged. For example, Perron and Howard (2008) examined the period prevalence and correlates of TBI – with a LOC of 20 minutes or more - in 720 youth offenders. Of their participants, 18.3% reported such a head injury. Male gender, co-morbid psychiatric diagnosis, earlier onset of criminal behaviour and substance use were associated with TBI.

Previous studies, such as Perron and Howard (2008), identified cases where there was "significant" head injury, but did not document mild TBI, nor the frequency of injuries. Repeat injury – even Mild TBI - may be common, and may lead to increased likelihood of neuro-cognitive inefficiency (see Williams, Potter & Ryland, in press). In this study we therefore aimed to establish the rate and frequency of self-reported TBI, of all severities, and their causes, in a representative, male, adolescent youth offending population. We also aimed to explore whether

self-reported TBI was associated with increased number of convictions, violent offending, mental health problems and drug misuse.

Method:

Participants:

In the UK youths who offend may be sentenced into custody if over age of 15, and if younger, can be placed in a secure environment (such as secure children's homes). They may also receive services from Youth Offending Teams (YOTs) who design community oriented programmes of activities to reduce potential for re-offending. These systems are broadly similar to juvenile detention systems, and related placements available in, for example, the USA. Participants were 186 young male offenders ranging from 11 to 19 years of age (M = 16.67, SD = 1.01 years). All had been given at least one police conviction (mean number of convictions 6.95, SD 4.56, ranging from 1 to 20, median 6, 186). Of these, 155 (mean age = 16.81, SD = .62 years; 83%) participants were recruited from a Young Offender Institute (which serves children from 15-18 and – in some cases - young adults up to 21), 25 (mean age = 16.6, SD = 1.23 years; 13.4%) from a city-based Youth Offending Team, and 6 (mean age = 13.33, SD = 2.07; 3.3%) from a special needs school based within the same city. A total of 197 participants were approached, 3 declined to take part, giving a response rate of 98.5%. A subsequent 8 persons met the study's exclusion criteria, resulting in a final sample of 186 (94.4% of the population approached).

Procedure:

Participants were approached individually by a researcher to consider taking part in the study. Those in custody were approached whilst in prison and asked if they "would be interested in spending some minutes answering a wide range of questions about their lives". Those attending the Youth Offending Team service as part of their licence were also approached directly at that service. Participants from the school were recruited via their Head of School, who, after identifying potential students, sought parental permission to obtain consent (for those under the age of 16 years). After participants had provided informed consent for participation – and where parental consent was also provided as appropriate – each was taken through a questionnaire individually with the researcher. Participants were provided with incentives. For participating, they were given £4, and entered into a lottery for winning a small digital music player. Ethical approval for the study was provided by the University of Exeter Ethics Committee. To ensure that participants did not provide infomation that may be perceived as influencing their treatment, it was explicitly stated that information provided would not be used by the prison authorities. Exclusion criteria included: severe mental health disorder (e.g. psychosis, depression with suicidal ideation); severe intellectual disability (those with specific learning difficulty, e.g. Attention Deficit and Hyperactivity Disorder (ADHD) were not excluded); any medical health condition that may affect cognitive functioning e.g. stroke, epilepsy and diabetes.

Measures

Severity and Frequency of Self-reported TBI

Severity of self-reported TBI was measured by asking the participant "Have you ever had a blow to the head causing you to be knocked out, and/or dazed and confused, for a period of time?" Participants were then asked to estimate the length of time they experienced a loss of consciousness (LOC), (Mild = LOC < 10 minutes, Moderate = LOC 10 minutes – 6 hours,

Severe = LOC for 6 hours plus). They were also asked: "How many times have you been knocked out and/or dazed and confused?" They were also asked what the causes of their injuries were, and their age at their "worst" injury.

Convictions

Participants were asked to specify the frequency of convictions for the following offences: burglary; shoplifting/theft/robbery; violent offences; joyriding; fraud/deception; drug offences; sexual offences. Participants placed a score of (0 = None, 1 = Once, 2 = Twice, 3 = Three times, or 4 = More than three times) for each. A Index for Violence Offending (IVO) was created by combining the sum of their self-rating score of the number of times convicted for violent offences (as above) with their self-rating score for severity of their most severe episode of violence for which they were convicted (0: none; 1: assault without causing injury; 2: minor injury; 3: serious injury; 4: severe injury; 5: murder; 6: multiple murder). We note that it was not possible to verify such accounts by accessing criminal records as this may have identified the participants, and their accounts, to custody staff.

General Health Questionnaire (GHQ-12)

The GHQ-12 consists of 12 items to assess mental health status over the past four weeks using a four-point scale (0-3). Items can be summed to provide a score ranging from 0 to 36. Higher scores indicate increased likelihood of psychiatric disorder, psychological distress, anxiety, and decreased social functioning (Golderberg & Williams, 1988).

TBI in Young Offenders:

Frequency and Poly drug use

Participants were asked whether, and how often, they took drugs prior to prison. They were asked to describe usage of: heroin, drugs prescribed for someone else, cocaine, crack cocaine, amphetamine, ecstasy and cannabis (adapted version of the Maudsley Addiction Profile; Marsden, Stewart, Best, Farrell, Lehmann, Edwards, & Strang, 1998). Participants rated the frequency of use of each drug (everyday = 5, most days = 4, weekends = 3, once per month = 2, once per year = 1, and never = 0). The frequency ratings for the 7 drugs were summed to provide a drug frequency score (minimum score of 0 and maximum 35). Participants were also asked to rate their alcohol usage by noting frequency of usage of alcohol from none through to everyday use.

Results:

Rate of Self-reported TBI: Of the 186 respondents 121 (65.1%) reported some form of TBI. Of these 19.1% may be classed as "possible TBI" as there was no reported LOC. Of the overall sample 46% reported a TBI with a LOC - 29.6% MTBI with a LOC (N= 55) and 16.6% a Moderate-Severe TBI (N= 31). Of the overall sample 32% self-reported repeat injury involving LOC (N = 60) (see Table 1 for level of repeat injury across severity of TBI). In the group with Mild TBI - with LOC – 72.7% (N= 40) sustained 2 or more injuries. In the group of those reporting moderate-severe TBIs 64% reported repeat injury (N=20).

As can be seen in Table 2, the main category of injury was violence (57.6%). Falls "on drugs" was the second most common cause. Of the total reported head injuries, 94 (77.69% of N = 121) participants described the origins of their injuries as being directly related to offending.

Self-reported TBI and conviction rates.

Participants who self-reported TBI had an average of 2 more convictions (M = 7.52, sd 4.5) compared with those that did not report having had TBIs (M = 5.89 sd 4.4). ANCOVA was carried out -with age entered as a covariate - to control for any possible effect of group differences in terms of age. ANCOVA indicated that the difference in number of convictions observed in comparing self-reported TBI and no-reported TBI respondents remained significant when controlling for current age [F (1, 186) = 5.436, p = .021].

We wanted to explore the relationship between the number of self-reported TBIs and severity of violence in offending. ANOVAS indicated that there was a significant overall effect [F (5, 180) = 3.364, p = .006]. Examination of means indicated that there was an increase in the IVO score with presence of 3 or more self-reported TBIs (see Figure 1). In order to explore the observed trend between violence and frequency of self-reported TBI further, post-hoc contrast analyses were conducted to compare those with 2 TBIs or less versus those with 3 TBI or more. The observed IVO score, after 3 self-reported TBIs or more, was significant [F (1, 180) = 12.268, p = .001]. This would strongly indicate that the overall effect was best understood in terms of the IVO score reported by those with 3 or more self-reported TBIs.

Mental health

We examined for differences in mental health symptoms in those with and without self-reported TBI. The self-reported TBI group reported higher levels of mental health symptoms (non-TBI M: 9.7 (sd 5.1), TBI M: 11.8 (sd 7.02) [F (1,185)=4.69, p= 0.032]).

Drug and Alcohol use and TBI

We examined for differences in the frequency of alcohol and drug use in those with and without self-reported TBI. There was no difference in alcohol use. There was a significant difference in drug use between the groups (non-TBI M: 5.8, (sd 4.2), TBI M: 8, (sd 5.3) [F (1,84)=8.577, p= 0.004]). This indicates more frequent drug misuse in the self-reported TBI group. We explored for group differences for use of each drug. There was no difference in frequency of usage between the 2 groups except for cannabis. Mann Whitney U test showed that TBI participants used cannabis significantly more frequently than their non-injured counterparts (U= 3318, z=-1.99, p= .047).

Discussion:

The lifetime prevalence rate, by an average age of sixteen, of self-reported TBI of various severities was 65%. Of these 19.1% may be classed as "possible TBI". For a TBI with a LOC the rate was 46%; 29.6% had MTBI with a LOC (N= 55) and 16.6% a Moderate-Severe TBI (N= 31). Repeat injury was very common. Greater frequency of self-reported TBI was associated with greater number of convictions. Three or more self-reported TBIs were associated with more violence in offences. Those with self-reported TBI also reported greater mental health problems and misuse of cannabis.

The rate of self-reported TBI is therefore towards the higher end of rates found in other prison populations for TBIs of all severities. Indeed, our data supports and extends that found by Perron and Howard (2008). In this study the rate of moderate to severe TBI (16.6%) is very close to

their reported level of "significant" head injury (at 18.3%). Furthermore, we have also documented levels of MTBI, and repeat injury, consistent with data from studies with adult prisoners (see Williams, Mewse, Tonks, Mills, Burgess, Cordan (in press)). TBI therefore appears to be a significant chronic health condition in adolescent male offenders. The rate is higher than that reported for non-offender populations. Of particular concern, there is evidence of sufficient "dosage" of injury that may be associated with neuropsychological deficits. There were many moderate to severe injuries and a high level of multiple MTBIs. Importantly, high velocity mechanisms, such as violence, were common.

Offenders with TBI may therefore have neurogenic causes for problems in behaviour. They may have neuropsychological dysfunction, for example, in executive function and attention, that may be linked to irritability and disinhibited behaviour. Our findings related to repeat offending suggest that neuro-cognitive factors may be a possible factor in limiting their ability to change behaviour within custodial systems. Improved management of offenders with TBI within the justice system may reduce the risk of future offending. It is therefore important to consider how current practice within custodial systems might be enhanced to account for neuropsychological variables in behavioural management for offenders.

There are methodological limitations to this study. There was no control group for comparison for rate of injury. We relied on retrospective self report, and there was no corroborative information. Furthermore, it not possible to corroborate with prison services whether crimes reported were those which the offenders were incarcerated. It was not possible to address whether there were significant effects of background issues, such as family functioning and/or

adverse early history, on current behaviour. We did not have direct measures of neuropsychological functioning, therefore we cannot know whether there is a link between reported TBI and actual neuro-cognitive dysfunction. Furthermore, even if there were dysfunction, some form of reverse causality may be in effect in regard of any such issue. For example, those with such conditions as Attention Deficit and Hyperactivity Disorder (ADHD) – which is a risk factor for TBI (Keenan, Hall, & Marshall, 2008) – may have difficulty with behavioural control prior to TBI. ADHD has been shown to be elevated in young offenders compared to non-offenders (Fazel, Doll, & Långström, 2008). Critically, it is not possible to know whether the TBI in earlier life was consequential in terms of increasing risk of offending, or whether it served as a "marker" of various contextual factors associated with crime. Future studies that addressed these issues would be warranted – particularly using prospective, longitudinal designs.

Clearly, whether TBI is causative factor, or a marker for other issues, it would be important to develop systems for enhanced screening for TBI, and of possible neuro-cognitive problems, in young offenders. Assessments may include screening instruments involving key questions as to whether there is a TBI history through to more detailed assessments where indicated (see Turkstra et al., 2003). Assessments would need to be designed to take account of: history and frequency of TBIs; other forms of Acquired Brain Injury; corroborative information; pre-morbid functions (possible intellectual disabilities and or learning difficulties); family issues and socio-economic factors. Specific testing, where indicated, of neuropsychological functions would be important. For example, for dysexecutive syndrome, insight and social emotional processing. Such assessments could be explored in relation to crime type, and whether crime profiles

indicate any particular difficulty in behavioural control (e.g. impulsive behaviour). From such assessments it may be possible to provide guidance for enhanced rehabilitation, such as for anger management.

In our study we found poorer mental health and greater use of cannabis in those with self-reported TBI. Co-morbidity would reduce capacity to engage in forensic rehabilitation. Means for addressing co-morbidity, such as integrated treatment approaches, would be indicated (Chandler, Fletcher, & Volkow, 2009).

Our findings suggest that early recognition and intervention when there is a TBI in childhood could be a measure of crime prevention. It should be noted, though, that those at most risk of injury could be stuck in a "Catch 22" position – lack of immediate support to access rehabilitative support to enable positive behaviour change. The delivery of services to such groups would therefore require close cooperation between health, social and educational systems. Importantly, adolescence is a critical window of opportunity that may be targeted for diverting young offenders at risk of injury and of further offending into non-offending lifestyles.

Clearly TBI is a major, chronic, health condition within the young offender population. This study highlights the need for a focus on adolescence as a key period for injury and entry into custodial systems. With better integration of neuro-psychological assessments and rehabilitative approaches into planning of rehabilitation of young offenders there may be better outcomes for them, and for society.

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Table 1. Injury Type and Frequency across all severities

Number of reported TBIs	Mild HI (No LOC)	Mild HI LOC >10 minutes	Moderate HI LOC (10 minutes to 6 hours)	Severe HI LOC (6 hours +)
One	17	15	10	1
Two	5	11	4	
Three or more	13	29	15	1
TOTAL	**35**	**55**	**29**	**2**
% of TBI Sample	29%	45%	24%	2%

Table 2: Causes of TBI

Source of Injury	Number of participants	% of total sample	% of HI sample
Joyriding	9	4.8	7.44
Falls on drugs	12	6.4	9.92
Falls sober	3	1.6	2.48
Sports injuries	3	1.6	2.48
Fights	70	37.2	57.85
Other crimes	3	1.6	2.48
Other – non-crime related	21	11.2	17.36
Total	121	65.05%	100%

Figure 1: Increase in the Index of violence Offending (IVO) score with presence of 3 or more TBIs