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Traumatic brain injury in a forensic intellectual disability population

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ABSTRACT

Traumatic brain injury (TBI) screening in forensic populations has been recommended, due to a high prevalence, links to specific offence profiles and poorer outcomes, such as higher rates of psychiatric disturbance, longer stays in prison, and reoffending. Research focusing on TBI among offenders with intellectual disability (ID) is lacking. This study therefore describes the implementation of TBI screening using the Brain Injury Screening Index (BISI©), TBI prevalence and correlates in a forensic ID service. TBI appeared under recorded in case notes, with considerably more patients self-reporting TBI. Reported causes of TBI differed somewhat to the general population, including childhood physical abuse, self-harming behaviour, and assault. Approximately one-third of injuries did not receive any treatment. Though further adaptations may be required on current screening measures for TBI in offenders with ID, screening can provide valuable information, contributing positively to individual patient therapeutic and risk formulations.

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Learning disability; traumatic brain injury; head injury; secure; forensic mental health

Introduction

Traumatic brain injury (TBI) is injury to the brain caused by a trauma to the head (Headway, 2013). This can result from a direct blow, penetration of the skull, or a force that causes the brain to move within the skull (National Center for Disease Control and Prevention, 2015). In the general population, the most common causes of TBI are falls (40%), road traffic accidents (20%), being struck by or against an object (19%), and assaults (11%) (National Center for Disease Control and Prevention, 2015). Hughes et al. (2015) note that the severity of TBI is most commonly classified by whether loss of consciousness (LOC) is experienced, and duration of the LOC. Severity is also graded by the duration of post-traumatic amnesia (the length of time after an injury that a person is alert but unable to take on new information). Headway (2013) note that across the UK, an approximately 1 million people attend, and around 135,000 people are admitted to hospital in the UK following head injury annually, although many injuries go unreported. Furthermore, there are an estimated 500,000 people living with long-term disabilities as a result of TBI, approximately 0.8% of the UK general population.

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Studies have highlighted an association between TBI and criminal behaviour, and a high prevalence of TBI in forensic populations (Colantonio, Stamenova, Abramowitz, Clarke, & Christensen, 2007). Pitman, Haddlesey, and Fortescue (n.d.) investigated the prevalence and severity of TBI among 613 male prisoners, using a self-report tool, the Brain Injury Screening Index (BISI©; The Disabilities Trust Foundation, n.d.). Of those screened, 289 (47%) reported a history of TBI. Williams et al. (2010) interviewed 186 adult offenders, and asked questions about well-known indicators of TBI, finding that 65.1% reported some form of TBI. Of these, 19.1% could be classed as 'possible TBI' as there was no reported LOC, 46% reported a mild TBI with LOC, 29.6% mild TBI with LOC, and 16.6% moderate to severe TBI. Schofield et al. (2006) reported that of 200 Australian prisoners, 82% had a history of at least one TBI of any severity, with 65% experiencing LOC. Multiple past TBIs were common. Treatment was more likely among those TBIs with a LOC compared with no LOC (66% vs. 39%). Hawley and Maden (2003) extensively searched clinical case notes for any documented brain injury in a sample of 113 forensic mental health inpatients being discharged to community settings, reporting evidence of head injury in 47 patients (41.6%). Of these, 27 (57.4%) were known to have lost consciousness (often of unspecified duration) and 13 (27.7%) had required hospital admission. However, due to poor-quality records, the authors felt this likely to be an underestimate.

So why is TBI common within forensic populations? Schofield et al. (2006) note that prison itself is a risk factor for TBI, due to the high risk of interpersonal violence, self-harm, suicide attempts, and unintentional injury. However, in the majority of cases, the date of the head injury preceded the first encounter with the law (Sarapata, Hermann, Johnson, & Aycock, 1998). Chan, Hudson, and Parmenter (2004) suggest that people with drug and alcohol abuse (common within forensic populations) were most likely to sustain violent injuries. In a one year longitudinal study of 351 individuals with TBI, Bogner, Corrigan, Mysiw, Clinchot, and Fugate (2001) found that almost 80% of persons with violence-related TBI causes had a history of substance abuse.

Furthermore, people with TBI appear to be at increased risk of committing crimes. TBI frequently results in significant long-term cognitive, behavioural, and social changes in the person affected (Colantonio et al., 2007), including aggression, agitation, and inappropriate social and sexual behaviour (Fleminger, 2008). A multi-centre study of 563 patients with TBI reported that 48% had behavioural problems including anger management, irritability, and aggression (Hawley, Stilwell, Stilwell, & Davies, 1998). In some patients, problems with aggression continue for many years (Fleminger, 2008), with Brooks, Campsie, Symington, Beattie, and McKinlay (1986) finding that patients described as irritable and bad tempered at one year post injury remained so at five years. In addition, aggression and impulsive behaviours have been demonstrated to increase with time, with Hall et al. (1994) reporting significant increases in aggressiveness and threats of violence amongst brain injured patients between six-month and two-year follow-ups.

Studies from various forensic settings and populations have reported specific profiles and poorer outcomes among those with a TBI history. Williams et al. (2010) found their TBI group were younger at entry into custodial systems, spent longer lengths of time in prison, and had higher rates of reoffending. Slaughter, Fann, and Ehde (2003) noted that those who had experienced TBI in the previous year had worse anger and higher psychiatric disturbance. Hawley and Maden (2003) compared patients with and without brain injury on diagnosis, forensic history, education/employment, and risk assessment. The number of previous convictions, violent index offences, threats/attempts to murder, restriction orders, and criminal sections were more common in the brain injury group, while sexual offences were less common. Twice as many head injured patients were rated by clinicians as difficult to discharge due to their level of risk, with other discharge difficulties being poor anger control, behavioural problems, lack of insight, risk of reoffending, and non-compliance with medication or treatment.

Due to the implications of TBI on forensic treatment outcomes, Williams et al. (2010) have recommended that forensic services should be routinely screening for TBI on admission. The following screening questions were suggested by Colantonio et al. (2007); a description of the injury, the date of (or age at) injury, the length of unconsciousness, and identifying hospitalization and length of hospitalization. This screening can direct further neuropsychological assessment to identify the effect of the brain injury upon cognitive, social, and behavioural functioning. Lezak, Howieson, and Loring (2012) highlighted six principal reasons why neuropsychological assessments should be undertaken: diagnosis, patient care, treatment planning, and remediation; treatment evaluation, research, and forensic neuropsychology evaluation. Despite these recommendations, screening has not yet become routine clinical practice within forensic settings. Hawley and Maden (2003) reported numerous challenges in obtaining good quality information on brain injury history, with previous medical history usually being brief, or in a minority of cases, completely absent. The authors felt this indicated that head injury was not widely regarded as relevant to the patient's current psychiatric care, particularly if the injury was sustained several years earlier.

There is little published literature on the prevalence or treatment of TBI among forensic intellectual disability (ID) populations, or indeed, any studies focusing on people with ID. Patients treated within such services typically have extensive histories of offending behaviour, multiple diagnoses (including major mental illness, personality disorders, autism spectrum disorders, ADHD, substance misuse), and significantly disadvantaged psychosocial backgrounds (Alexander et al., 2010; Alexander et al., 2011; Plant, McDermott, Chester, & Alexander, 2011). Studies highlight an increased risk of physical abuse among ID populations (Alexander et al., 2011), elevated rates of falls (Finlayson, Morrison, Jackson, Mantry, & Cooper, 2010; Hsieh, Rimmer, & Heller, 2012), and falls caused by epilepsy (Chiba et al., 2009). It is therefore reasonable to hypothesise that TBI rates may be higher in this group compared to general or forensic populations.

However, since below average cognitive functioning is part of the diagnostic criteria for an ID (World Health Organisation, 1992), there may be less of an inclination to look for a further TBI in patient clinical histories. This is problematic, because the factors that lead to poorer outcomes for those with TBI in general forensic populations are likely to be equally applicable in forensic ID. This paper therefore describes the introduction of screening for TBI into the routine diagnostic and treatment process of an inpatient forensic ID service in England; and examines the TBI prevalence, correlates and implications on treatment in this population.

Method

Participants/setting

The study took place in a 95-bed inpatient ID forensic service, with medium secure, low secure, and rehabilitation wards, that is, category 1, 4, and 5 beds in the classification used by the Royal College of Psychiatrists' Faculty of Psychiatry of Intellectual Disability (2013) and the Count me in Census (Health and Social Care Information Centre, 2015). Eighty patients were included in the study; 34 women and 46 men. Of this group, 66 agreed to be interviewed using the screening tool. Wechsler Adult Intelligence Scale full-scale intelligence quotient ratings (Wechsler, 2008) were available for 64 participants. The average group IQ was 62, with a range of 43–94 (SD 9.9). There were seven patients whose IQ scores were above 70, widely considered as the cut-off point for ID in ICD-10 (World Health Organisation, 1992) and DSM-5 (American Psychiatric Association, 2013). ID services have a long history of treating patients who, while falling outside of the strict IQ cut-off of 70, are still considered to have social and adaptive deficits (Alexander, Piachaud, & Singh, 2001; Alexander, Crouch, Halstead, & Piachaud, 2006; Wheeler et al., 2009). The measurements of IQ alone fail to capture individual differences in cognitive dysfunction (Bertelli et al., 2014). While there can be disagreement between services as to who should have responsibility for this group (Hassiotis et al., 2008), the adapted treatment they need is considerably similar to those with lower IQs and hence it is appropriate for them to be seen by professionals within a developmental disability team.

Measures

BISI© (The Disabilities Trust Foundation, n.d.)

The BISI is a self-report screening tool which measures a number of widely recognised indicators of TBI. The tool follows recommendations on classifying the severity of TBI, by whether LOC is experienced, and duration of the LOC (Hughes et al. 2015), using the following categories:

- Mild = no LOC or LOC < 10 minutes
- Moderate = LOC between 10 minutes and 6 hours
- Severe = LOC > 6 hours

Patients were also asked for further information about the circumstances/cause of the TBI, as the BISI© does not specifically prompt for this information. A number of screening tools were reviewed, and the BISI© was selected as it has been used in previously reported studies with similar populations, thus facilitating comparison (e.g. Pitman et al., n.d.; Williams et al., 2010).

Procedure

In light of the recommendation that TBI screening should be introduced in all forensic units (Williams et al., 2010), the service in which the study was conducted began screening as part of routine clinical practice in November 2013. Patient case notes were searched for any record of TBI using a standardised data collection form. If a record of TBI was found (or any other form of brain injury), this was recorded within the patient's clinical diagnoses. The quality of the record was evaluated according to the standards suggested by Colantonio et al. (2007). All patients were offered screening using the BISI© (The Disabilities Trust Foundation).

If a patient self-reported a TBI, or had a record of TBI within their case notes, they were included within the TBI group. As 44 people self-reported a TBI during the BISI interviews, and one patient who did not consent to the BISI interview had a recorded TBI, the TBI group equated to 45. Patients with TBI group ($n = 45$) were compared to those without (non-TBI group, $n = 35$) on the sociodemographic, clinical, forensic, quality of life, and treatment outcome variables described in Table 1.

Analysis

Between group analyses were performed on the variables described in Table 1. Data were analysed using SPSS – Version 20. Due to assumptions for parametric analysis not being met, non-parametric tests were used. Fishers exact tests were used for comparison of categorical variables and Mann–Whitney U test for comparison of means. Due to these multiple comparisons, the p values from the pairwise comparisons were given a Bonferroni adjustment. For this, the approach used was to adjust the p values upwards and to interpret them as usual (i.e. $p < .05$) for significance.

Table 1. Clinical, forensic, and treatment outcome variables examined.

Clinical	
Gender	
Psychiatric diagnoses	Diagnoses are those recorded by a Consultant Psychiatrist using ICD-10 (World Health Organisation, 1992), and encompass psychosis, bipolar disorders, depressive disorders, harmful use/dependence on substances, personality disorder, autism spectrum disorder, ADHD, and epilepsy.
Self-harm	Recorded from case-history as present or absent .
Abuse	Evidence of either a child protection or protection of a vulnerable adult response by social services had to be present before the experience of abuse was recorded as present or absent. This approach is similar to that adopted by Flynn, Matthews, and Hollins (2002).
IQ	Taken from file using either Wechsler Adult Intelligence Scale Third Edition (WAIS-III, Wechsler, 1997) or Wechsler Adult Intelligence Fourth Edition (WAIS-IV, Wechsler, 2008).
Health-related quality of life	Measured using the EQ5D VAS scale (Euroqol Group, 2013). The EQ5D is a widely used measure of health-related quality of life. The ED-5Q VAS provides a single index value of an individuals' perceived health status on a scale numbered from 0 to 100, with 0 being the worst health they can imagine, and 100 the best health they can imagine. This figure is then converted so that a value of 1 represents the individuals 'Best imaginable health state' and 0 the 'Worst imaginable health state'.
Forensic	
Criminal detention	Sections 35–38, 47 and 48 of the Mental Health Act, where the detention order is made either by a court or by the Ministry of Justice were designated as 'criminal sections'.
Past convictions	Three categories of past convictions were recorded as either present or absent; violent (involving interpersonal violence), sexual and arson.
Past history of aggression	Recorded as present or absent on five parameters: verbal aggression, aggression to people, aggression to property, sexual aggression, and history of fire setting.
Treatment outcomes	
Institutional aggression	Use of seclusion, physical intervention and intensive observation periods were used as proxy measures for institutional aggression. The total number of each intervention was divided by the total number of months of inpatient stay for each patient, and an average monthly intervention figure was generated.
Length of stay	Mean calculated in days.

Ethics

The study utilised routinely collected data from the admissions diagnostic assessment process. In accordance with NHS guidance on research, audit and service evaluation (NHS Health Research Authority, 2013), the project fulfilled criteria for service evaluation and hence did not require approval from a NHS Research Ethics Committee. The project was granted approval after a review through the service provider's internal ethics process.

Results

Prevalence: case notes vs. BISI©

Ten patients (13%) had a TBI documented within their clinical case notes. Seven patients (9%) had other forms of brain injury documented, including temporary loss of oxygen during birth, temporal lobe epilepsy due to encephalopathy, overdoses of prescribed medication, postnatal asphyxia, and suspected stroke.

The quality of these case note records was evaluated according to the standards suggested by Colantonio et al. (2007). Records were poor, often failing to report key information, such as the date of, or patients age at injury (present in only five reports), the patients length of unconsciousness (two reports), and any treatment or hospitalisation received (six reports).

Of the 66 interviewed using the BISI, 44 (67%) reported experiencing at least one TBI, and 25 (33%) experiencing more than one. Nineteen patients reported experiencing a singular TBI, three patients reported two TBI's, eight patients reported three TBI's, five patients reported four TBI's, and nine patients experiencing over five. In total, 114 TBIs were reported.

Causes of TBI

Table 2 describes the causes of TBI which were obtained from patients' case notes and the BISI interviews. These incidents occurred over patients' lifetimes, and are not limited to incidents within patients' present inpatient admission. A number of patients reported accidents; mostly falls, or car/motorcycle accidents. One patient reported being dropped from a third floor window as a baby.

Many patients reported self-harming or suicidal behaviour, such as attempting to jump from a moving car, walking into traffic, and jumping from heights. Head-banging as a form of self-harm was also reported, and further to this, was documented within the case histories of 16 patients (20%), 'he self-harmed by banging his head' and 'knocked head into a

Table 2. Self-reported causes of TBI.

Causes	Injuries *n*
Accidents and falls	28
Self-harm/suicidal	18
Childhood physical abuse	15
Assaults	12
Physical intervention	6
Physical health	2
Not stated	33

prison cell door'. A number had severe and prominent facial scarring as a result. Physical abuse during childhood was a commonly reported/recorded cause. These patients appeared vulnerable to multiple TBIs. A proportion of patients reported experiencing assault either in community settings, such as nightclubs or the street; or within inpatient settings. Some patients reported hitting their head during physical intervention. The physical health causes related to collapsing and an epileptic seizure.

Severity

Severity of the 114 TBIs self-reported was classified using the BISI, and the majority of injuries were mild (72%), with 60% resulting in no LOC, and 12% a LOC of less than ten minutes; while 7% were moderate, and 2% severe. Only one of the 10 moderate or severe injuries was recorded in the case notes. One fifth of injuries (19%) could not be classified as the patient could not remember details about their LOC.

Treatment

The most common mode of treatment received for each injury as classified by the BISI© was to visit hospital (36%), see a paramedic at the accident scene (18%), or visit the GP (7%). Some received medical treatment within their inpatient service. However, 27% did not seek any treatment, and 8% did not know what treatment they received. Some injuries received more than one treatment, for example, were treated by a paramedic at the accident scene, and then taken to hospital.

Self-report data reliability

A number of issues with the patient self-reporting of TBI arose during the interviews using the BISI©. Although all patients who had a documented TBI also self-reported a TBI during their interview, this was not always the same as the documented incident. Some patients struggled to recall incidents, or remember key information, such as whether they lost consciousness, the duration of unconsciousness, or the treatment they received. Patients appeared to underestimate their experience of TBI. For example, if asked the first question, whether they have ever suffered a serious blow to their head, patients would often say that no, they had not. However, if asked whether they had ever been hit, they would reply yes, and outline the number of times, with significant detail. Some patients struggled with the term '[un]conscious', and phrasing 'blow to the head' and these required further explanation. One patient reported that being in a coma for 24 hours on five occasions. On further questioning, it became clear they were referring to epileptic seizures.

Between group comparisons

Table 3 displays the between group comparisons on the clinical, forensic, and treatment outcome variables described in Table 1. Fisher's exact tests were used for comparison of categorical variables and Mann–Whitney *U* test for comparison of means. There were no significant differences between the two groups, although both autism spectrum disorder and ADHD appeared at double the rate within the TBI group, rates of physical intervention

Table 3. Between group comparisons: clinical, forensic, and treatment outcome variables.

	Variable	TBI group *n* (%)	Non-TBI group *n* (%)	Statistical test
Clinical	Male gender[a]	24 (53.3)	22 (62.9)	n.s.
	Psychiatric diagnoses[a]*:*			
	Psychosis	11 (24.4)	9 (25.7)	n.s.
	Bipolar disorders	3 (6.7)	0 (0)	n.s.
	Depressive disorders	6 (13.3)	3 (8.6)	n.s.
	Harmful use/dependence on substances	25 (55.6)	16 (45.7)	n.s.
	Personality disorder	27 (60)	17 (48.6)	n.s.
	Autism spectrum disorder	19 (42.2)	8 (22.9)	n.s.
	ADHD	10 (22.2)	4 (11.4)	n.s.
	Epilepsy	6 (13.3)	4 (11.4)	n.s.
	Self-harm[a]	33 (73)	24 (68.6)	n.s.
	Abuse[a]*:*			
	Physical	11 (24.4)	9 (25.7)	n.s.
	Sexual	8 (17.8)	8 (22.9)	n.s.
	Health-related quality of life[b]	0.81	0.78	n.s.
	IQ mean and (range)[b]	62 (47–94)	62.6 (43–88)	n.s.
Forensic[a]	*Criminal detention*	33 (73.3)	18 (51.4)	n.s.
	Past convictions:			
	Violent	19 (42.2)	16 (45.7)	n.s.
	Sexual	11 (24.4)	7 (20)	n.s.
	Arson	10 (22.2)	5 (14.3)	n.s.
	Past history of aggression:			
	Verbal aggression	39 (86.7)	33 (94.3)	n.s.
	Aggression towards people	40 (88.9)	34 (97)	n.s.
	Aggression towards property	34 (75.6)	28 (80)	n.s.
	History of sexual aggression	24 (53.3)	21 (60)	n.s.
	History of fire setting	24 (53.3)	11 (31)	n.s.
Treatment outcomes[b]	*Institutional aggression:*			
	Physical intervention	1.5	0.8	n.s.
	Seclusion	0.2	0.3	n.s.
	Observation	0.7	0.4	n.s.
	Length of stay	1651	1533.2	n.s.

[a]Fishers exact tests.
[b]Mann–Whitney *U* test.

were higher, a greater proportion of the TBI group were subject to a criminal section, and histories of fire setting were higher among the TBI group.

Discussion

This study investigated TBI in an inpatient forensic ID population. In terms of prevalence, 67% of patients self-reported experiencing at least one TBI during their lifetime, with 33% experiencing multiple injuries. This is slightly higher than UK prison studies with similar methodology, at 47% (Pitman et al., n.d.) and 60% (Williams et al., 2010). ID may therefore be an additional risk factor for TBI. The vast majority of the TBIs were mild, with no LOC, or a LOC of less than ten minutes. Despite this, many patients reported multiple, mild TBIs and evidence suggests that the effects of recurrent TBI can be cumulative, and associated with poorer clinical outcomes (Salcido & Costich, 1992), particularly impacting the attention and executive systems (Williams, Potter, & Ryland, 2010). A number of injuries were classified as moderate or severe, and only one of these injuries was recorded in the case notes.

Prior to the introduction of the routine screening, TBI appeared under-recognised. If taken from case notes, prevalence of TBI was 13%. Similarly, if TBI was recorded within the case notes, it was often buried within lesser accessed historical reports, rather than forming part of the patients currently recorded diagnoses and formulation. This finding supports the findings of Hawley and Maden (2003), who highlighted widespread under-reporting and poor quality of TBI records within clinical case notes and prevailing views that head injury was not widely regarded as relevant to the patient's current psychiatric care, particularly if the injury was sustained several years earlier. This highlights a need for increased awareness of TBI in forensic populations and practice improvements in this area.

Analysing the causes of TBI can indicate opportunities for intervention and avoidance of TBI, and areas for further consideration and research. The causes of TBI in this population were broadly similar to the causes documented in general populations (National Center for Disease Control and Prevention, 2015); however, there were some notable exceptions. Many patients reported that accidents, especially falls caused their TBI. Finlayson et al. (2010) reported a high prevalence of falls among those with intellectual disabilities of all age groups, and a lack of investment in fall reduction interventions. Flood et al. (2014) described an interdisciplinary falls group for older people with intellectual disabilities, which incorporated exercise, occupational therapy (e.g. grab rails, floor mats), physiotherapy, and pharmacology (e.g. calcium, vitamin D, and osteoporosis medication), an approach which led to a 75% reduction in the number of falls. Interventions such as this could also have utility in preventing TBI.

Self-harm and suicidal behaviour was another large cause of TBI, particularly 'head-banging' behaviour, exhibited by 20% of patients in this sample. Kahng, Iwata, and Lewin (2002) suggest head-banging is one of the most common presentations of self-harm, particularly in ID populations, yet there is surprisingly little research in this area. Future research is therefore required, which should focus on the function of head-banging behaviour for the individual, the safest short-term management approaches, and the longer term impact of this behaviour on individuals' cognitive and behavioural functioning.

Previous studies have highlighted the high prevalence of childhood physical abuse in forensic ID populations (O'Brien et al., 2010). Childhood physical abuse appeared to be a common cause of TBI, and victims appeared most likely to have experienced multiple TBIs. Indeed, this childhood physical abuse could be the direct cause of the ID. Becerra-García (2014) studied the impact of childhood abuse on adulthood executive functioning in offenders, finding that offenders who suffered physical abuse had significantly poorer processing speed and cognitive flexibility. The author speculated that head injuries caused by the abuse could partially explain these findings. This suggests a need for screening and treatment of TBI in victims of childhood abuse. A number of patients reported that physical intervention had caused them to hit their head, which is a cause of concern. Reducing the use of restrictive interventions is a widespread aim of providers of mental health and ID services (Kitchen, Thomas, & Chester, 2014). The finding that epileptic fits caused falls and subsequent head injuries is not an isolated one (McGrother et al., 2006; Chiba et al., 2009), and specialist helmets are one way in which this can be managed (Epilepsy Foundation, 2014).

The approach to seeking treatment could be described as erratic, with just under a third of injuries receiving no treatment at the time of the injury. This is concerning, as patients are not accessing the full range of assessments, monitoring and treatments outlined in the

NICE (2014) head injury guideline, which emphasises the importance of early intervention at the accident and emergency department. A number of risk factors are evaluated in order to assess the need for a CT scan, and urgency of this need. If a CT scan is not indicated following this process, or the CT scan is normal and the patient has returned to a Glasgow Coma Scale score equal to 15, the clinician may conclude that the risk of clinically important brain injury to the patient is low, and consider transfer to the community. It is recommended that patients who have undergone imaging of the head and/or been admitted to hospital and who experience persisting problems have opportunity available for an outpatient appointment with a professional trained in assessment and management of sequelae of brain injury.

There were some practical issues with the BISI© in this population. At present, the tool does not wholly follow the guidelines for recording TBI according to Colantonio et al. (2007), as it does not prompt the administrator to record the circumstances of the TBI, or the date of each incident, which is problematic for future investigation and management. It was also felt that in this population, the item pertaining to memory, concentration or speech picked up issues related to the ID, rather than TBI. Some of the patients interviewed struggled with the term '[un]conscious', and phrasing 'blow to the head', requiring further explanation. Other studies have highlighted that the words used to elicit self-report of TBI (e.g., 'head injury', 'TBI', 'concussion', 'knocked out', 'LOC') are interpreted differently by respondents, which can affect recall of an injury (National Center for Injury Prevention and Control, 2003; Ferguson, Pickelsimer, Corrigan, Bogner, & Wald, 2012).

Further, there were issues with the reliability of patients' self-report. Although all patients who had a documented TBI also self-reported a TBI during their BISI© interview, this was not always the same as the documented incident. Some patients struggled to recall incidents, or remember key information, such as whether they lost consciousness, the duration of unconsciousness, or the treatment they received. Patients often did not always consider their experiences as TBI. It is therefore possible that TBI was underestimated in this study. However, most patients did respond to other prompts, such as whether they had ever been hit. These prompts may need to be more formally incorporated into future screening tools in order to ensure standardisation across assessments. A considerable number of patients could not remember the length of their LOC, and so the severity of their TBI could not be classified. Therefore, relying on data from a self-report screening tool may not adequately capture reliable information in all members of this population. This indicates a need for an ID specific screening tool, and that neuropsychological and neuroimaging investigations are carried out if there are any suspicions of TBI.

No significant differences were found between the TBI group and the non-TBI group. This was somewhat surprising, as previous studies have found clear profiles and differences within their respective samples, such as higher rates of anger and psychiatric disturbance (Slaughter et al., 2003), younger age at entry into custodial systems, longer lengths of time in prison, and higher rates of reoffending (Williams et al., 2010). Conversely, many of the differences between groups highlighted by Hawley and Maden (2003) were also statistically insignificant, such as the poorer outcomes among those with a head injury. That is not to say the variables examined are not of clinical relevance to individual patients and their treating team.

There are a number of possible explanations for this. One is that the population in the present study already has significant cognitive deficits associated with their ID. Therefore, it may be that these cognitive deficits, regardless of whether caused by ID, TBI, or a combination of both, are a risk factor for offending behaviour. An alternative explanation is that there are differences between the two groups; but these were not picked up due to methodological issues, such as a lack of statistical power. A further difficulty is that it is possible that participants in the non-TBI group had TBIs. To be placed within this group, patients had to have no record of TBI within their case notes, and self-report that they had not sustained a TBI. As highlighted earlier, TBIs are often not recorded within case notes (Colantonio et al., 2007); and patients did appear to under report or not define their experiences as TBI.

All of this raises the question 'is screening for TBI of any clinical utility within the forensic ID population?'. This group experience cognitive deficits by definition, the between groups analysis revealed no significant differences and there were reliability issues in self-reporting among some participants. These factors would militate any such routine screening. However, there are a number of benefits in terms of patient care. The introduction of the screening process has prompted increased awareness and training among staff and patients regarding TBI. The screening interviews provide a framework for guiding the TBI assessment, and fit well within the structure of a comprehensive diagnostic process. Interviews take approximately 10 minutes to complete per patient, and reveal qualitative information about the patients' clinical histories, through discussion of the circumstances of their TBIs. Raising awareness of TBI also assisted direct care staff in understanding patients' presentation and needs, as well as aiding the assessment and treatment process.

This study highlights a large proportion of offenders with intellectual disabilities who have under-recognised histories of TBI. Prospective, multi-centre studies are required to further evaluate the impact of TBI on patients' clinical and forensic presentations, and treatment outcomes. The lack of research on TBI among individuals with intellectual disabilities is a concern. This is despite the potentially increased risk for TBI, and the likelihood of equally or more negative impacts of TBI on individuals who already experience cognitive difficulties. It may be that TBI research has excluded individuals with ID from research due to their perceived vulnerabilities and reduced capacity to consent. It is therefore recommended that future research focus on the prevalence and impact of TBI among individuals with pre-existing ID.

Disclosure statement

No potential conflict of interest was reported by the authors.

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