Acquired Brain Injury Justice Network

Acquired Brain Injury and the Criminal Justice System

Review of the Evidence

January 2025

Acquired Brain Injury Justice Network

UKABIF The United Kingdom Acquired Brain Injury Forum

About the ABI Justice Network

The Acquired Brain Injury Justice Network was established in January 2011 and was previously called the Criminal Justice Acquired Brain Injury Interest Group (CJABIIG). It is a consortium of representative groups spanning public, private and third sector organisations with the objective of raising the awareness of the significant number of people in the criminal justice system with Acquired Brain Injury (ABI). The Network is currently chaired by Professor Nathan Hughes and Andy MacDonald MP. It is a collaborative group, driving forward the issue of ABI across the Criminal Justice System, with the Government, and in Parliament.

The secretariat is provided by UKABIF who organise regular meetings, lead responses to consultations, organise research bids and carry out research, produce events and task and finish groups. Members update others on the status of their work, joint initiatives and responses are organised and key individuals and organisations in the Criminal Justice System are invited for discussion. You can contact us by emailing ABIJustice@ukabif.org.uk and follow us on X - @ABIJustice.

Glossary

Axon	Axons are long, slender projections of the nerve cells, or neurons, that make up the brain. They are responsible for transmitting messages from the cell body to other neurons.
Acquired Brain Injury (ABI)	An ABI is any injury to the brain acquired after birth. This could be due to infection, disease, oxygen deprivation (e.g. through strangulation or stroke), or a traumatic injury.
Neurodisability	An umbrella term, describing a collection of congenital and acquired conditions affecting the brain and nervous system. These conditions include, but are not limited to, Traumatic Brain Injury (TBI), Attention-Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), Developmental Language Disorder (DLD), Developmental Communication Disorder (DCD), Foetal Alcohol Spectrum Disorders (FASD), and Learning Disabilities (LD).
Neuron	A neuron, also known as a nerve cell, is a fundamental cell in the brain that sends electrical and chemical signals via axons. Neurons are responsible for receiving sensory input, sending motor commands to muscles, and transforming and relaying electrical signals.
Traumatic Brain Injury (TBI)	An injury caused by a penetrating or blunt blow to the head, which directly injures the brain, or causes the brain to move around inside the skull.

Acquired Brain Injury

Acquired Brain Injury (ABI) is a leading global cause of death and disability (1). ABI has been described as a 'silent epidemic', as despite its pervasive societal impact, it is a relatively poorly identified and understood condition (2). The term ABI describes any injury to the brain acquired after birth. This could be due to infection, disease, oxygen deprivation (e.g. through strangulation or stroke), or a traumatic injury. Traumatic brain injuries (TBIs) describe penetrating or blunt blows to the head, which cause the brain to move around inside the skull. This can lead to the shearing of nerve fibres (axons) within the brain, as well as lacerations (cuts), contusions (bruising), and haemorrhaging (bleeding). Common causes of traumatic brain injuries include violence, road traffic accidents, sporting accidents, and falls (3).

ABI is a spectrum condition. The impact can range from very mild concussive symptoms which resolve within days, to profound disability. TBIs are generally categorised into 'Mild' 'Moderate' or 'Severe'. This is generally assessed based on the length of time the individual is unconscious, any imaging findings from diagnostic scans, and any symptoms. 'Concussion' is a term often used interchangeably with 'Mild TBI'. Additionally, there is evidence that multiple mild brain injuries, particularly when acquired in quick succession, can compound and have similar consequences to moderate or severe injuries over time (4, 5). The ongoing symptoms of brain injury vary according to the location of injury, as well as the severity of the injury. Generally, however, acquired brain injury tends to result in problems with memory, attention, concentration, and planning, as well as problems related to emotional regulation (for example impulsivity, and being unable to judge and respond to social cues appropriately) (3). Where brain injuries are not recognised or managed appropriately, these symptoms can place individuals at higher risk of criminalisation (3).

Figure 1 indicates some of the symptoms attributed to injury to each of the four lobes of the brain, as well as injury to the cerebellum and brainstem. Most frequently, frontal injuries (impact to the front of the head e.g. from a car crash) lead to damage to the frontal lobes, with contra-coup injury to the occipital lobe and cerebellum where the brain rebounds backwards in the skull, whilst rotational injuries (e.g. from a punch to the side of the head) lead to damage to the temporal lobe, as the axons are rotated and damaged. However, as the brain moves and swells, there can be diffuse and widespread injury.

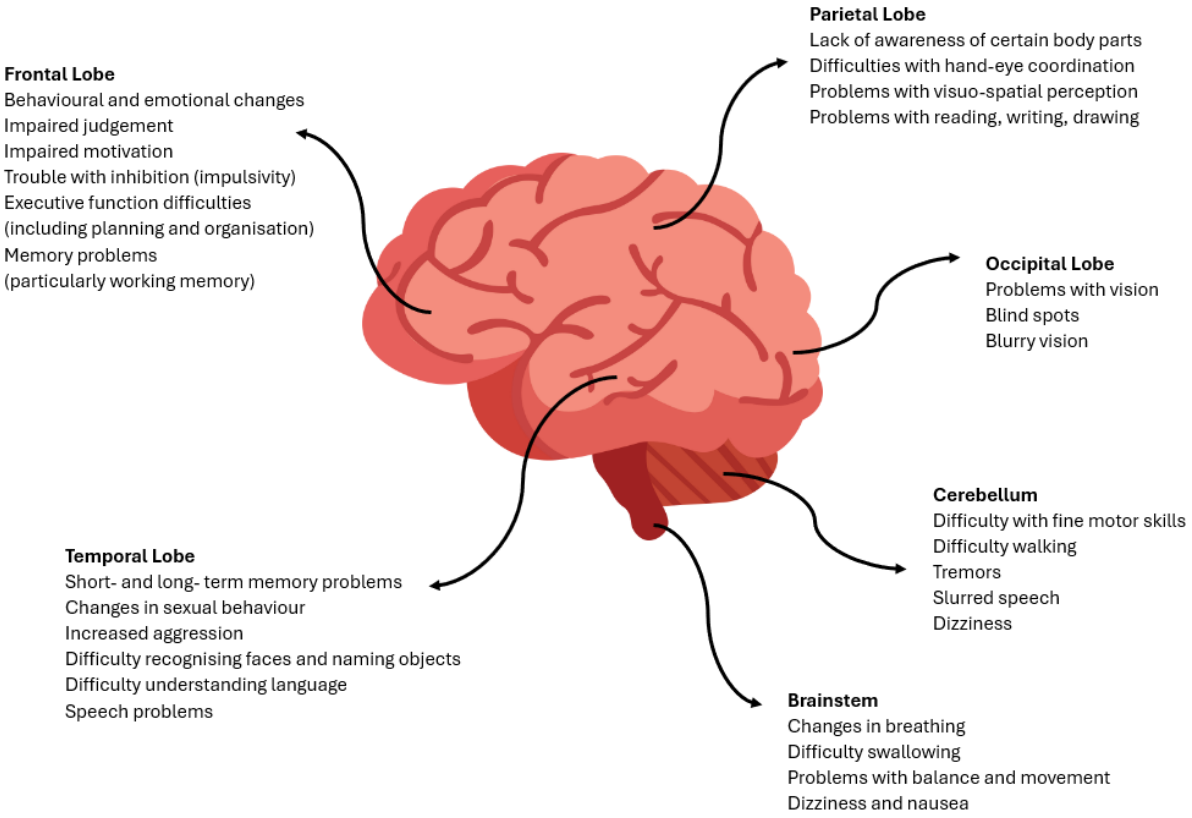

Figure 1: Symptoms associated with damage to particular areas of the brain

Prevalence in the Criminal Justice System

Estimates of the prevalence of brain injury in the justice system are difficult to make, due to the widespread under-identification of the condition, and the variety in assessment techniques (e.g. some studies use clinical interview, whereas other studies use self-report assessments). Practical difficulties in accessing justice-involved populations additionally mean that sample sizes are often small, or un-representative of the population more broadly. However, there have been two relatively recent meta-analyses attempting to estimate prevalence in the adult prison population.

Adults. Meta-analyses aim to compile prevalence estimates across all existing studies in a particular field, making their pooled prevalence estimates more powerful and robust than estimates provided by a single study. Shiroma and colleagues (6) conducted a meta-analysis in 2010 of 20 studies, which examined the prevalence of brain injury in incarcerated adults. Shiroma and colleagues estimated prevalence to be 60%, but this dropped to 50% when criteria were refined to include only those who had experienced a loss of consciousness

because of their head injury. More recently, a 2023 meta-analysis combined results from 64 studies, totalling 52,540 participants. They estimated the overall prevalence of any brain injury for adults in contact with the criminal justice system to be 46%, and the prevalence of moderate to severe brain injury (likely to lead to lasting disability) to be 32% (7). The authors of both meta-analyses commented on the poor methodological quality of the reviewed studies.

Children. Amongst children in custodial settings, estimates for the prevalence of ABI range significantly. In 2015, Hughes and colleagues published a systematic review of ten studies examining the prevalence of traumatic brain injury in children in custodial settings (8). The included studies estimated a prevalence rate of between 17% and 72%. A more recent study published in 2021 found a prevalence rate of 74% for any head injury, and 46% for a brain injury leading to loss of consciousness (9). Another 2020 study found 87% of children in prison had any head injury, with 31% reporting six or more injuries (10). These studies all examine TBI, but the evidence about ABI is much scarcer and more research is needed.

Gender differences in prevalence. Fewer studies have examined brain injury prevalence amongst women in the criminal justice system. However, a 2019 systematic review by and Ginley and McMillan (11) found that estimates of prevalence amongst female prisoners ranged from 19% to 95%, and varied significantly depending on the method of measurement. For example, hospital record searches lead to lower prevalence estimates than self-report methods. Further research into this population is needed, as the studies identified were of generally poor methodological quality (for example using small, unrepresentative samples, or short self-report screening tools). This review also looked only at TBI; as above, there is a need for more studies of ABI in this space. In the charity sector, Brainkind (formerly the Disabilities Trust) conducted a research project at HMP Drake Hall (12). They found that 64% of women reported a history indicative of likely brain injury, and that 62% of women had experienced a brain injury as a result of domestic abuse – a connection we discuss in more detail below.

Whilst these estimates vary substantially, and there are significant methodological challenges with many of the studies included in these reviews, it is clear that even the most conservative prevalence estimates are substantially higher than estimates of prevalence in the general population – which is approximately 12% (13).

Comorbidity. There is also evidence that ABI is often co-morbid (co-occurring) with other conditions that fall under the umbrella of neurodisability. For example, an observational study from the UK found that prisoners with ADHD were nearly twice as likely to have an ABI than those without, and that those with both ADHD and ABI had significantly lower health-related quality of life than those with just ABI (14). In a forensic Intellectual Disability population, 67% of people reported an ABI, with 33% having experienced multiple injuries – indicating a higher prevalence than estimates in the general prison population (15). These rates were chronically under-reported in medical records, which indicated a prevalence of 13%, and any indication of ABI was often in historical reports rather than informing the individuals current formulation.

Longitudinal Research

Cross-sectional prevalence studies can give us insight into a 'snapshot' of prevalence at any one time, however in order to establish any indication of cause and effect, longitudinal studies are needed (which measure effects over time). Robust longitudinal studies in larger samples have found increased odds of incarceration following brain injury. For example, Fazel and colleagues found that 9% of people in Sweden with a brain injury were convicted of violent crimes following their injury, compared to 3% of the general population (matched by important characteristics including age and gender) who have no brain injury (16). This meant that having a brain injury was associated with 3.3 times higher odds of a violent conviction. Amongst adolescents in psychiatric care in Finland, those who had a brain injury were at increased risk of being criminalised (having a brain injury multiplied odds of criminalisation by 6.8) compared to those in psychiatric care with no brain injury (17). A population-based study of 1.4 million young adults including both men and women aged 18-28 in Ontario, Canada, found that those with a brain injury were 2.5 times more likely to be incarcerated than those without (18).

It is important to note the presence of other psychological or social vulnerability factors in each of these longitudinal studies, contributing to an understanding of brain injury as a compounding factor in those who might be already vulnerable to justice system contact, rather than a complete cause of criminal behaviour in and of itself. Impairments associated with brain injury (such as impulsivity, irritability, and difficulties with social interactions) can lead to behaviours which are criminalised, particularly where these symptoms are poorly understood by others. However, there are often more complex webs of vulnerability for

people who end up in contact with the justice system, as brain injury occurs within a constellation of psychosocial adversity, and multi-system failure to identify and meet needs. For example, brain injury can compound existing issues and create barriers to rehabilitation, for example through difficulties with engaging with traditional education and employment opportunities.

In a 2018 review, Williams and colleagues explored why brain injury is linked to earlier and more violent offences (3). They identified that some risk factors co-occur for both brain injury and incarceration – for example, poverty, being male, and being disposed to risk-taking behaviour. This association could occur by coincidence, but evidence suggests that brain injury in groups who are already vulnerable to justice system contact could impact on social support networks, as well as increase the likelihood of inappropriate responses to social situations, creating a 'double hazard' for criminalisation (19). Brain injury can also impact an individual's ability to succeed in traditional or mainstream education and employment settings without adaptations (20). Individuals with brain injury in the criminal justice system are more likely than other prisoners to also live in socio-economic deprivation (21). Paediatric brain injury can increase vulnerability to substance use problems in later life, and an eroded capacity for self-regulation and socialisation can lead to vulnerability to exploitation by organised crime groups (3, 22). So, brain injury in the context of existing adversity, can compound problems and increase the risk of being criminalised.

Consequences of Brain Injury in the Criminal Justice System

In 2019, the United Nations Committee on the Rights of the Child (UNCRC) issued general comment number 24 on children's rights in the criminal justice system (23). Paragraph 28 of this comment states that 'children with developmental delays or neurodevelopmental disorders or disabilities… should not be in the child justice system at all, even if they have reached the minimum age of criminal responsibility'. The UN Convention on the Rights of Persons with Disabilities (UNCRPD) reinforces and compliments the UNCRC, and focuses on eliminating barriers that are created through inadequate accommodations for disability in systems including the criminal justice system (24, 25). The UNCRPD recognises disability 'results from the interaction between persons with impairments, and attitudinal and environmental barriers that hinder their full and effective participation in society on an equal basis with others'.

The consistent over-representation of people with ABI in the criminal justice system highlights systemic failures to provide adequate support for those with neurodisabilities. These shortcomings are evident not only within the criminal justice system itself but also in key areas such as education, employment, healthcare, and social care that precede justice involvement (26, 27, 28). As discussed by Hughes and colleagues, those with ABI and other neurodevelopmental disabilities face several barriers to realising their rights on an equal basis with their peers (24). These barriers include a lack of awareness amongst criminal justice professionals about how to identify and support children with ABI, as well as procedural barriers which are created through complex, rigid, and punitive criminal justice processes.

It is therefore necessary to identify and dismantle the barriers (both attitudinal, and environmental) which prevent people with ABI from having their rights realised in criminal justice contexts, and result in unequal treatment and outcomes (24). Evidence on disproportionately poor outcomes for individuals with ABI is summarised below.

Criminal Justice Proceedings. Criminal justice proceedings are difficult to navigate for people with brain injury, and there is substantial evidence that the presence of a neurodisability (such as a brain injury) can impede someone's ability to actively engage in police and court proceedings, and can impact compliance with probation requirements (such as understanding, remembering, and keeping to post-release license conditions) (29). The terminology used in legal processes can be alien, and processes can be opaque and confusing, leading to an inability to meaningfully participate (30).

In addition, ABI appears to increase risk of disciplinary sanctions (punishments for actions that break prison rules) inside prison. A 2020 Canadian study found evidence that ABI was associated with harsher disciplinary sanctions in prison (31). They found that one-third of adults with an ABI had a serious disciplinary charge, and that the risk of incurring such a charge was 39% higher for people with a history of ABI compared to those with no ABI. This mirrors a 2010 study which found that in-prison behavioural sanctions were significantly increased in males with ABI compared to those with no ABI, for both violent and non-violent infractions. They also found that females with ABI in prison had more disciplinary sanctions for violent behaviour than those with no infractions (32). These are both longitudinal studies utilising large population datasets, so the results are likely to be robust. These findings are indicative of the fact that prison environments are difficult to adjust to for people with ABI,

and the increased likelihood of receiving punitive sanctions indicates that appropriate adaptations are not being made to help people cope with prison life.

There is also evidence that people with ABI have poorer outcomes on probation, with lower rates of successful completion of probation, and higher rates of re-offending compared to probationers without ABI (33). As discussed by O'Rourke and colleagues, this could be related to a lack of identification of ABI, and therefore associated needs not being met, as well as misconceptions about ABI amongst probation staff (34).

Mental Health. There is substantial evidence that ABI is associated with mental health difficulties in prison populations, including depression and psychosis (35, 36). A 2015 systematic review of the existing literature by O'Rourke and colleagues examined co-occurring problems with brain injury amongst prisoners (37). They concluded that ABI presents alongside a complex array of impairments and difficulties, again highlighting how ABI is situated within a constellation of additional needs. Additionally, a 2024 review by Bickle and colleagues found that TBI in criminal justice systems is associated with poorer mental health (21). A study from Indiana State found that prisoners who had an ABI were twice as likely to also have a psychiatric disorder compared to prisoners with no ABI (22.2% of prisoners with ABI had a psychiatric disorder, compared to 9.9% in prisoners with no ABI – a statistically significant difference) (38). Amongst children in prison in Australia, those with ABI are significantly more likely to have a mental health problem, to have experienced psychological distress, and to have been victimised through bullying (39). Having experienced more than two ABIs meant that children were at a higher risk of having mental health problems. There is also evidence that women in prison with ABI are at higher risk of having associated physical and mental health problems, and higher levels of post-traumatic stress disorder (6). This is likely related to the high prevalence of domestic abuse leading to injury for women in prison, increasing the associated risk of post-traumatic stress. Collectively, this indicates that people with ABI should be prioritised for screening and intervention for mental health difficulties.

Suicide and Self-harm. Compelling evidence from national cohort studies (which follow the lives of a whole population over time to assess the relationship between an exposure and outcomes across the life course) indicate there is an association between TBI and later risk of suicidal thoughts and behaviours in the general population (40). There is also some emerging evidence that ABI is linked to suicidality in adult male prisoners, but this has

not yet been fully explored (41). Additionally, a study of 93 male children in custody aged 15-18 found an association between self-reported brain injury, self-harm, and suicidality (42). This relationship has not yet been explored in female prisoners to our knowledge, however this should be a research priority of future studies as there is evidence to suggest women in prison are particularly vulnerable to mental health difficulties (11), and suicide and self-harm rates are higher for women in prison than men (43, 44). If it is the case that ABI predisposes to suicidality in prisons, there are important implications for strategy relating to prison safety. 32% of prison suicides occur within the first 7 days in prison (45). It could therefore be pertinent to identify brain injury with some urgency in induction mental health assessments (46).

Substance Use. Several studies find associations between ABI and problematic substance use, although some studies find no such association (36, 47). In 2014, Fishbein and colleagues found that having an ABI was associated with greater severity and earlier onset of drug use amongst a prison population, and that earlier drug use predicted greater likelihood of aggressive behaviour (48). Schofield and colleagues found that prisoners who used illicit drugs on a daily basis were 2.5-times more likely to report an ABI (35). Walker and colleagues found that ABI was associated with both the type, and the frequency of substance use in the year before coming to prison (49). An older (1998) New Zealand based study also found very high rates of substance use amongst prisoners with ABI (50). Amongst young people in custody in Australia, those with an ABI were at significantly higher risk of problematic substance use, more so for those who had experienced multiple ABIs (39).

Links to Domestic Abuse

As previously discussed, prevalence estimates of ABI amongst women in prison indicate that domestic abuse is the most common cause in this cohort. The context of domestic abuse is one where injuries often go unrecognised and untreated, as, excepting the most severe injuries, victims are less likely to present at hospital for examination or treatment. Injuries are also likely to accumulate over multiple incidents (51). Non-fatal strangulation, resulting in anoxic or hypoxic injuries (i.e. total or partial oxygen deprivation to the brain), is a particularly prevalent and insidious mechanism of brain injury for victims of domestic abuse (52).

Scientific literature is increasingly recognising domestic abuse as a cause of brain injury, particularly amongst women in prison (37, 53). As mentioned above, research by

Brainkind (formerly the Disabilities Trust) found that 64% of women in HMP Drake Hall reported a history indicative of likely brain injury, and that 62% of women had experienced a brain injury as a result of domestic abuse[1]. These women are often also navigating the psychological trauma of abuse alongside disability resulting from significant head injury, and it is important to account for this in the development of interventions and criminal justice policy, as discussed by McMillan in 2021 (54). However, more research is needed to explore the intersectionality of brain injury, abuse, and incarceration, and particularly the consequences of this intersectionality now that prevalence has been largely established.

There is an additional dearth of research into brain injury in the perpetrators of violence. It has been established that brain injury can be both a result of domestic violence, or a predisposing factor which could contribute to the perpetration of violence in the family home (55). A recent review of 32 studies in the general population identified that prevalence of brain injury amongst perpetrators of intimate-partner violence ranged from 5% to 75% (56). The variation in these estimates of prevalence arises from the variation in the assessment of, and definition of, ABI amongst the samples. The study which found a prevalence of 5% used clinical interview corroborated by medical records, which is likely an underestimate of true prevalence due to under-reporting of brain injury in medical records. Where studies used only clinical interviews or self-report measures, estimates of brain injury prevalence were consistently higher. Several included studies had notably small sample sizes, indicating a need for more research in this area to provide robust prevalence estimates.

An additional consideration must also be given in the context of domestic abuse to data sharing, and whether a screening result is put on record, particularly for women with a suspected brain injury who have survived domestic abuse. These women are often disadvantaged in legal settings, particularly family courts, where the presence of an ABI could be inappropriately used as evidence against a mother's capacity to parent (57).

Conclusions

There is substantial evidence that people with ABI are significantly over-represented in both the adult and youth criminal justice systems. Despite methodological difficulties with studies estimating prevalence, there is a consistent picture indicating that people with ABI are criminalised disproportionately. This is supported by longitudinal research which finds that ABI often compounds existing problems for people living in contexts of adversity, for example by making it challenging to engage with traditional education or employment

settings without adaptations. However, despite this, ABI is frequently under-identified and as a result people do not have their needs met in criminal justice settings. Attitudinal and environmental barriers can result in people with ABI not having their rights realised in criminal justice contexts on an equal basis with their peers. Having an ABI can compound difficulties for people in prison and on probation, and there is emerging evidence that they may be more vulnerable to serious mental health difficulties whilst in prison, including suicidality and problematic substance use. Domestic abuse is a leading cause of ABI for women in prison, who also have very high rates of post-traumatic stress disorder. More research is needed in larger cohorts to identify the specific consequences of ABI for this very vulnerable group.

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