Brain Injury
Linkworker Service

Evaluation Report

South Wales 2022 – 2024

Brainkind

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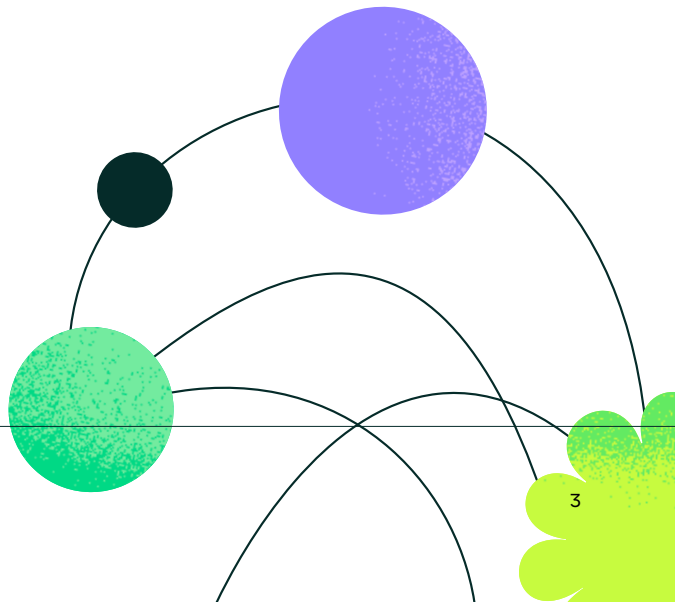
Background

The prevalence of brain injury (BI) for people in the Criminal Justice System (CJS) has been found to be consistently higher than in the general population (Kent & Williams, 2021).

Prevalence rates for men in custody are around 46% (Durand et al., 2017), compared to estimates between 2-8.5% in the general population (CDC, 2016; cited in Gorgens et al., 2021). Epidemiological studies consistently report that brain injury disproportionately occurs in males during late adolescence and young adulthood (Frost et al., 2013), with men aged between 14 and 25 four times more likely to sustain a brain injury compared to their female counterparts of the same age (Bruns & Hauser, 2003).

The consequences of BI are wide ranging and can have a profound effect on an individual's ability to function day to day (Haarbauer-Krupa et al., 2021). The physical disabilities associated with brain injury (e.g. changes in vision, headaches, mobility), are widely reported in the literature (Andelic et al., 2010). However, for many, the most difficult consequences relate to cognitive (e.g. memory impairments), emotional (e.g. mood disorders) or behavioural changes (e.g. aggression; Williams et al., 2010). These changes are often overlooked or misattributed (e.g., to rudeness or defiance) and as a result, brain injury is often referred to as a 'hidden disability'.



The impact of brain injury on life in the criminal justice system (CJS)

It is important to consider the impact that living with a brain injury can have for those in prison and on probation. Problems with memory, poor emotional regulation, impulsivity and disinhibition can have a significant impact on everyday life, making new or unfamiliar environments difficult to navigate (Ponsford, Sloan, & Snow, 2013). Given this context it is not difficult to see how those with brain injury might struggle to adapt to life in the CJS.

The cognitive consequences of brain injury vary in nature and severity in relation to the location and type of injury (Ponsford, 2013). Research demonstrates that BI sustained by individuals in the CJS frequently involves damage to the frontal and temporal lobes (Kent & Williams, 2021; Sapolsky, 2004). Damage to the frontal lobe can cause impairment of executive functioning, including decision-making, planning behaviours, inhibitory control and mental flexibility (Rabinowitz & Levin, 2014); while damage to the temporal lobes is often associated with memory and may affect the primary visual pathways leading to visual functioning impairments (Rauchman et al., 2022).

It has been observed that cognitive impairments associated with BI may adversely affect individuals' abilities to engage with the CJS (Slaughter, Fann & Ehde, 2003). Impairments may, for example, result in difficulties in meeting the demands of education, work, and daily living, both whilst in prison and post-release (Nagele et al., 2018). Those with memory or attentional difficulties may forget instructions from prison officers, causing staff to perceive them as defiant or lazy (Schofield et al., 2006). They may forget to go to work, struggle to pay attention in education classes, or forget someone's name, leading to conflicts with peers or prison staff. These impairments can therefore affect their engagement with the prison regime and negatively influence their parole, where reports from prison and probation staff about engagement is often used to make decisions.

Challenging behaviours are argued to be one of the most debilitating impairments following a BI (Hendryckx et al., 2023). Research has estimated that over half of BI survivors will display behaviours that challenge within the first two years post-BI, as well as increased difficulties with apathy, anger management, antisocial behaviours, and self-monitoring skills (Hanks et al., 1999; Kelly et al., 2008).

Furthermore, BI within prison and probation populations has been repeatedly associated with earlier, more frequent, and more violent offending (Kent & Williams, 2021). In a review of the literature exploring TBI and criminality, Williams et al. (2018, p. 842) state that "neuropsychological dysfunction is linked to violence, infractions in prison, poorer treatment gains and reconviction". Kuin et. al. (2019) identified that individuals with BI in a Dutch male prison reported greater levels of aggression when compared to their peers without a BI.

McMillan et al. (2023) identified that young people with BI exhibited signs of poorer behavioural control compared to counterparts with no history of BI, with researchers suggesting that these individuals are therefore at a greater risk of re-offending. Such behavioural consequences may mean that people in prison and probation with BI have a greater propensity towards acting inappropriately in confrontational situations. Prison staff may attribute such behaviours merely as 'bad behaviour' as opposed to the result of poor behavioural regulation (Linden et al., 2020). Again, these scenarios could result in someone in prison receiving additional days to their sentence or have an impact on their chance of being granted parole.

BI can also have significant emotional and neuropsychiatric consequences (Albrecht et al., 2021), which can result in adverse effects on the recovery process and psychosocial outcomes (Jorge & Robinson, 2003). Even brain injuries classified as mild have been associated with changes in anxiety and low mood, suicidality, and the onset or deterioration of mental health conditions including post-traumatic stress disorder (PTSD) and depression (Howlett et al., 2022). Researchers argue that the personality changes, emotional distress and behavioural difficulties in those with BI are the result of complex interactions between neurological, psychological, behavioural and social factors (Gorgens et al., 2021). Previous research in CJS populations has highlighted a complex interaction between BI-related consequences (e.g. aggression and reduced inhibition) and neuropsychiatric conditions (e.g. anxiety, PTSD, bipolar disorder) and alcohol and substance dependence (Albrecht et al., 2020).

In summary, the cognitive, behavioural and emotional consequences of BI can be wide ranging and, without intervention and support, are likely to have a significant impact on the individual's journey through the CJS.

Pre-existing research on brain Injury interventions in prison populations

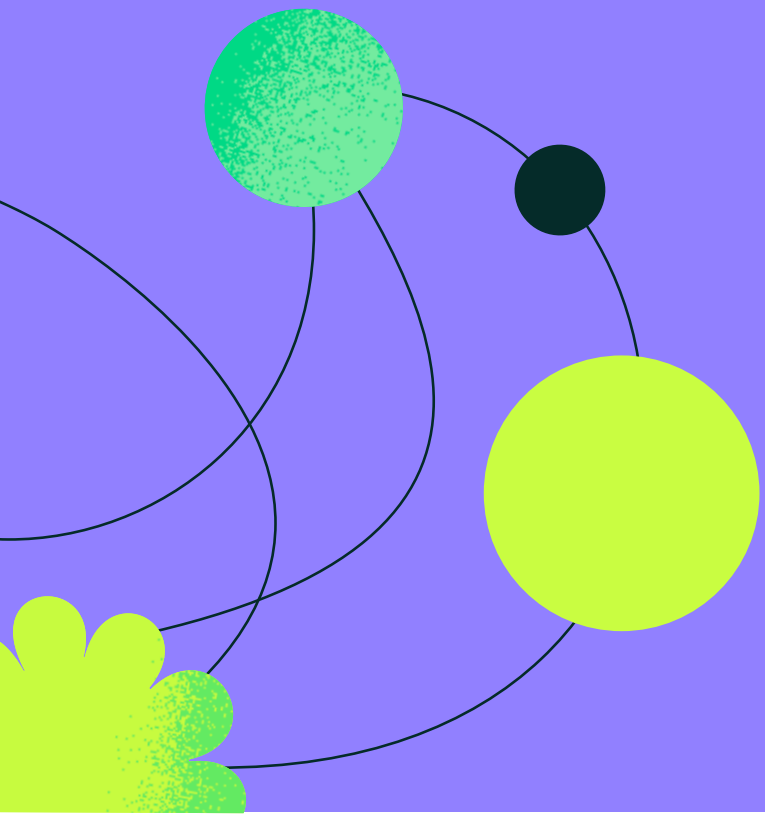
Despite the high prevalence of BI within the prison population, reports of interventions delivered within the CJS that target cognitive, behavioural and emotional consequences of BI are scarce. De Geus et al. (2021) conducted a systematic review of interventions for consequences of BI within a forensic setting, in which only four studies were identified. One of the studies (Nagele et al., 2018) described the implementation of an intervention which focused on psycho education, support to identify goals and release planning. Individuals were offered support after release with a focus on counselling, crisis management, learning and applying strategies. At two years post-intervention several positive outcomes were observed; 65% of individuals released were engaged in a form of productive activity, 50% had a full or part-time jobs, and only 17% were re-incarcerated. Ramos et al. (2018) described the Brain Injury Linkworker (BIL) Service and reported three case studies also suggesting positive outcomes after engagement with a specialist BI intervention, including 'no further criminal activity after three years', 'use of memory strategies to address dysexecutive problems' and 'challenging behaviour replaced by constructive behaviour'. Despite the reported positive outcomes of the studies included in the review, de Geus et al. (2021) highlighted the numerous shortcomings, including lack of control conditions, small sample sizes, use of self-report measures and lack of long-term outcome data. They state that it is difficult to draw an overall conclusion given that the setting, approach, and focus differed for each study, and there were also differences in how the presence of a BI was assessed.

More recently, Buchan and McMillan (2022) conducted a study in which people in prison received an hour-long psychoeducation session about BI. They found that knowledge on BI significantly increased post-intervention and highlight that this mode of delivery can be successfully conducted in a prison environment. They suggest that there may also be benefits to the provision of self-help material for those who do not want to attend individual sessions.

Aim

The aim of this study was to evaluate the Brain Injury Linkworker service (initially described by Ramos et al., 2018) in HMPPS Cardiff and HMPPS Swansea, on outcomes related to engagement in the prison regime, understanding of brain injury and the ability to use compensatory strategies.

The possible secondary benefits of the intervention on mental health were also evaluated.



Materials and Methods

BIL Service Delivery Model

This evaluation explores the delivery of the BIL service in HMPPS South Wales. It is delivered in prison and probation services by linkworkers (assistant psychologists) under the supervision of a Consultant Clinical Neuropsychologist and Clinical Psychologists. Referrals to the BIL service are screened using the Brain Injury Screening Index (BISI, see Measures section).

Individuals who screen positive for a history suggestive of brain injury (BI) are offered further assessment and treatment (Table 1).

Linkworkers work collaboratively with individuals to create tailored support plans targeting their reported difficulties and personal goals (e.g., securing prison employment). The role of the linkworker includes delivering education about brain injury, offering self-help resources such as “Tips and Tricks” leaflets, as well as referring to other services where appropriate. Specifically, interventions address a variety of cognitive or emotional difficulties (e.g. memory impairment, executive dysfunction, difficulties managing anger) and provide opportunities for practicing relevant strategies during the sessions.

The interventions provided follow the neurobehavioral therapy model of brain injury rehabilitation (Coetzer & Ramos, 2022).

Table 1

BIL Service Intervention (adapted from Ramos et al., 2018)

Phases	Activities
Phase 1	
Identifying a history and consequences of brain injury	• Administration of the Brain Injury Screening Index (BISI; Pitman, Haddlesey, Ramos, Oddy, & Fortescue, 2015) • Clinical interview • Administration of questionnaires relating to anxiety and low mood
Phase 2	
Intervention (The exact nature of the intervention is person-centred and tailored to individual needs.)	Individual • Setting of personal goals • Developing adaptive ways to cope with difficulties (psychoeducation, development and practice of compensatory strategies, therapy sessions) Environmental • Brain injury awareness training • Written behaviour support guidelines • Linking with specific services to provide support where needed.
Phase 3	
Follow-up after release	• Establishing a relationship with relevant agencies (e.g., employment, housing). • Assessment and intervention reports and letters to agencies, general practitioner as required.

In addition to individual sessions, linkworkers liaise with staff within the prison (e.g., healthcare, educational staff, and prison officers) and external agencies (e.g., housing, employment, and drug and alcohol services). They advocate for individuals by educating staff about the cognitive, behavioural, and emotional consequences of BI, aiming to increase understanding of how to accommodate these challenges. Regular training is also provided to HMPPS staff, offering practical guidance on how to adapt their practice to support individuals with BI.

For prison leavers, the service extends to planning for release sessions, where linkworkers work with probation officers to identify areas requiring support for successful reintegration. These sessions focus on helping individuals apply the compensatory strategies they have learnt in intervention sessions to a community setting.

Measures

Brain Injury Screening Index (BISI)

All individuals referred to the BIL service are assessed using the BISI (Ramos et al., 2020). The BISI is a validated screening tool that can be used within prison, probation, community and rehabilitation settings to help identify people with history suggestive of brain injury.

Intervention sessions and goals

The number of sessions attended is recorded, in addition to the nature of the work covered in the intervention sessions. At the end of the intervention, individuals are asked, in relation to each goal, whether the feel they have 'Not Achieved', 'Partially Achieved', 'Mostly Achieved', 'Achieved' or 'Exceeded' their goal.

Adjudications, incidents, assessment, care in custody, teamwork and prison regime

As part of the assessment, attempts were made to gather data relating to adjudications, incidents, Assessment, Care in Custody and Teamwork (ACCTs) and prison regime. These are often considered measures of how well adjusted a person is to prison life and whether they are engaging in prison interventions.

Incidents are a record of when an individual has engaged in a “negative behaviour” (e.g., rude or inappropriate behaviour towards staff). An adjudication refers to the more formal process where individuals must attend a hearing to discuss having broken prison rules and the associated offence. An ACCT refers to the process for people in prison who are identified as being at risk of suicide or self-harm. Ongoing assessment regarding risk is conducted as part of the process to ensure that the risk of suicide and self-harm is reduced. An ACCT remains open until staff agree the risk of suicide and self-harm has reduced enough for a person to cope without daily monitoring and support. Self-report information regarding these three measures was gathered pre and post intervention. Information was also gathered from electronic records where it was available.

The different regimes refer to the prison routine a person is on and determine the level of access that an individual can have outside of their cell, for meals, socialisation and employment. In England and Wales, there are three prison regimes - basic, standard and enhanced; each category having increased levels of incentives. The “basic” regime includes no access to a television, highly limited free time, a restricted range of employment opportunities as well as limited visits from family and friends. “Standard” provides entitlement to all benefits that are not accessible on the basic regime. “Enhanced” provides an opportunity to move to an enhanced wing, with more freedom in the prison, increased pay, phone allowance, and visits, as well as more ‘trusted’ job opportunities, such as kitchen server roles.

It is common for individuals to begin on a standard regime and work their way towards an enhanced status during their stay in custody. Regime status was recorded pre and post intervention.

Mental health

During the assessment, self-report information is gathered regarding mental health diagnosis and whether the person in prison has open referrals to other services (e.g., mental health or drug and alcohol services). Mood outcome measures are completed pre and post intervention using the Generalized Anxiety Disorder 7-item scale (GAD-7; Löwe et al., 2008) and the Patient Health Questionnaire-9 (PHQ-9, Kroenke et al., 2001). These tools were chosen because they are widely used in the UK National Health Service and can facilitate referrals to other services.

Perceived Change Questionnaire

The Perceived Change Questionnaire (PCQ Brainkind, in preparation 2025) asks individuals to rate, on a scale from 0 to 10, their understanding of brain injury, their confidence in explaining their difficulty to others, participation in prison activities, ability to control their behaviour and to keep out of trouble.

Results

Data collection was carried out in HMPPS Cardiff and HMPPS Swansea from 16th January 2022 to 31st March 2024. Demographic information was gathered (Table 2). The age of men referred to the service ranged between 19 – 86 years. The most prevalent ethnicity was white, and the majority of men reported having less than 10 years of education. At time of initial assessment, 214 men reported a mental health diagnosis, of which depression and anxiety were most the most prevalent.

Missing demographic data is due to people declining or being unable to give a response (e.g., ethnicity and education). Of the 342 men referred there was missing assessment data for only 8 men (2%). Five individuals were excluded from the outcome analysis for the GAD-7 and four individuals were excluded from the PHQ-9 analysis. Eight men were excluded from the regime analysis due to unknown regime status either pre or post intervention.

A total of 342 individuals were referred to the service. Seven (2%) declined assessment, and 14 (4%) did not attend their appointment. Conducting an assessment was not suitable for four (1%) because they had other health needs that needed to be addressed first. In summary, of the 342 men referred 90% completed the assessment. Of the 309 men that were assessed further intervention was deemed not suitable for 36 (12%). Reasons included screening negative on the BISI, the primary need being unrelated to their brain injury, for example, where a person's current mental health presentation would prevent them from engaging with the service.

Table 2

Demographic information of men referred to the BIL service (HMPPS South Wales)

Characteristic	Mean	SD
Age at referral	42	11.02
Ethnicity	**N**	**%**
Arab	4	1.17%
Asian	4	1.17%
British Asian	1	0.29%
Black	5	1.46%
Black Asian	5	1.46%
Black Caribbean	3	0.88%
Mixed	4	1.17%
White	282	84.46%
White Other	8	2.34%
Education		
< 10 years (no GCSEs)	197	57%
10-12 years (GCSEs)	93	27%
12 years + (A-level and above)	22	6%
Mental health (self-reported)		
Depression	176	51%
Anxiety	166	49%
Post Traumatic Stress Disorder	44	12%

Ninety-two men (34%) men were placed on the pathway for psycho education and signposting, 181 (66%) were placed on the pathway for a more intensive intervention (more than three sessions). Of the 273 men who following assessment were deemed appropriate for intervention, three did not give consent for their data to be used in this evaluation. Of those who consented to treatment and participation in the evaluation, 88 (33%) had a completed outcome data at the point of data collation. The remaining 67% either remained in treatment, had been released or transferred without an opportunity to complete outcome measures, or had disengaged from the service. This service evaluation took place at a time when an early release scheme was in place to reduce pressures on the prison population resulting in a higher-than-usual release rate.

Brain Injury Screening Index (BISI)

BISI data was complete for 304 men, of which 96% screened positive for a history suggestive of brain injury. The average number of blows to the head was 2.74 (*SD* = 1.6) and the average age at first reported head injury was 22.9 years (*SD* = 11.9, Range = 1-59 years). The majority of men sustained their BI through road traffic accidents (*n*=115; 38%), falls (*n*=109; 36%) and assaults (*n*=96; 32%). Two-hundred and sixty-one (86%) men reported a loss of consciousness. One-hundred and forty-four (47%) people reported a loss of consciousness of 30 minutes or longer, indicating moderate to severe brain injury according to Mayo criteria (Malec et al., 2007).

Reported difficulties

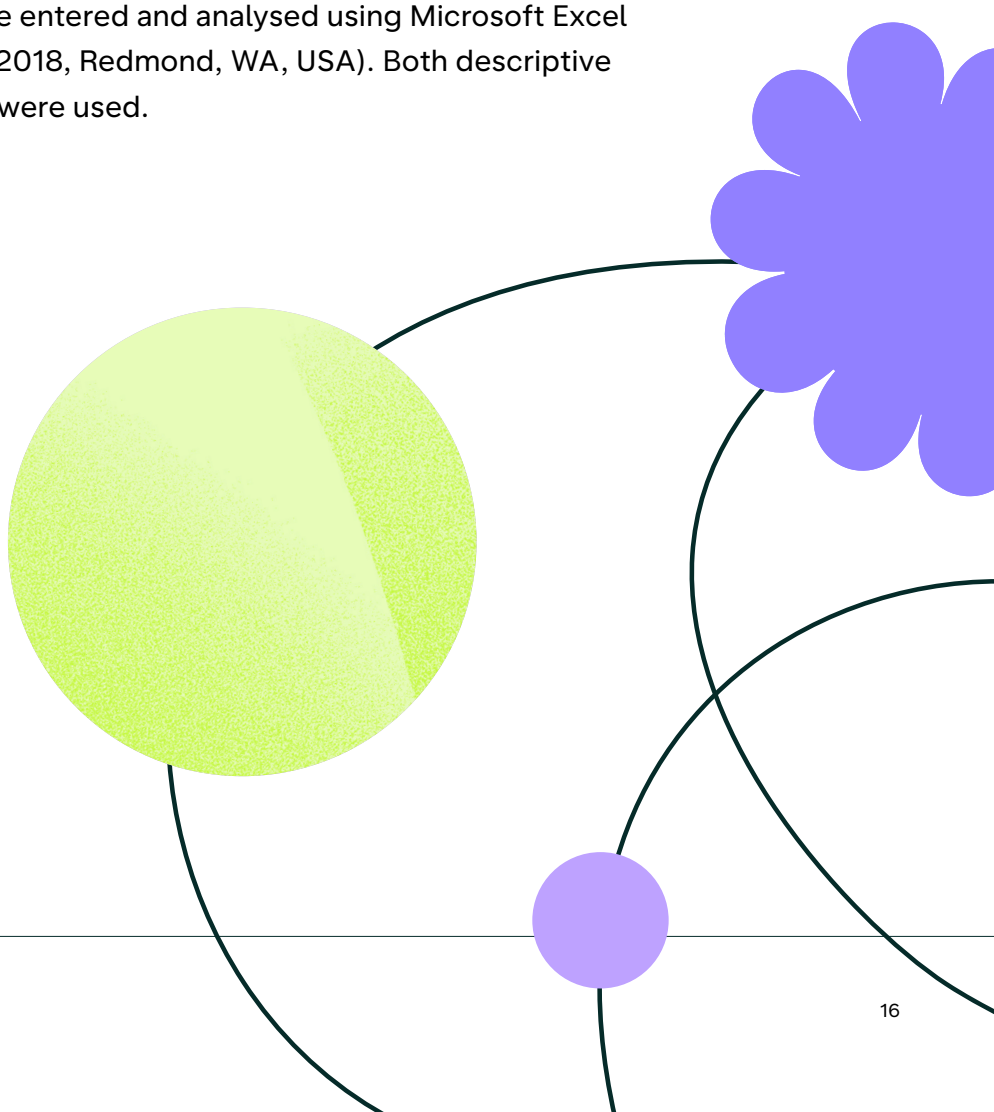
Eighty-five percent (*n*=257) of individuals reported difficulties with their memory, 58% (n=175) reported concentration difficulties, and 25% (*n*=76) reported problems with their speech. 76% (*n*=231) reported additional difficulties, including problems with regulating or managing emotions, anger, impulsivity, and sleep.

Ethics approval

Ethical approval for the service evaluation was sought from the National Research Committee of the Ministry of Justice; reference number 2021-252. All participants were provided with an information sheet and consented to their anonymized data being used in the service evaluation and write-up.

Analyses

The majority of data were entered and analysed using Microsoft Excel (Microsoft Corporation, 2018, Redmond, WA, USA). Both descriptive and inferential statistics were used.



Outcomes

Intervention sessions and goals

On average, individuals (who completed their intervention) received 5.47 (*Range* = 3-10) sessions. The majority of interventions included a psychoeducation component (81%, *n*=71), with a range of cognitive, emotional and behavioural issues being addressed. Most commonly interventions focussed on memory (82%, *n*=72), attention (40%, *n*=35) and managing frustration or anger (35%, *n*=31).

Sessions on adjustment to brain injury symptoms, liaison with professionals and pre-release planning were also recorded. In terms of their primary goal, at the end of intervention 67% (*n*=59) of individuals reported having achieved or exceeded their goal and 33% (*n*=29) reported mostly or partially having achieved their goal.

Adjudications, incidents, ACCTs, prison regime

The number of adjudications and incidents pre and post intervention was low. This was due to difficulty gathering reliable data on these areas. In terms of the prison regime, we had complete data from eighty of the eighty-eight participants who completed outcome measures following their intervention. None of the 80 participants were on the basic regime. Pre intervention most participants were on the standard regime (Figure 1, post intervention a significant number of participants had moved onto the enhanced regime (X^2 (1,2) = 5.98, p = .01; Figure 2).

Figure 1

Prison regime pre-intervention

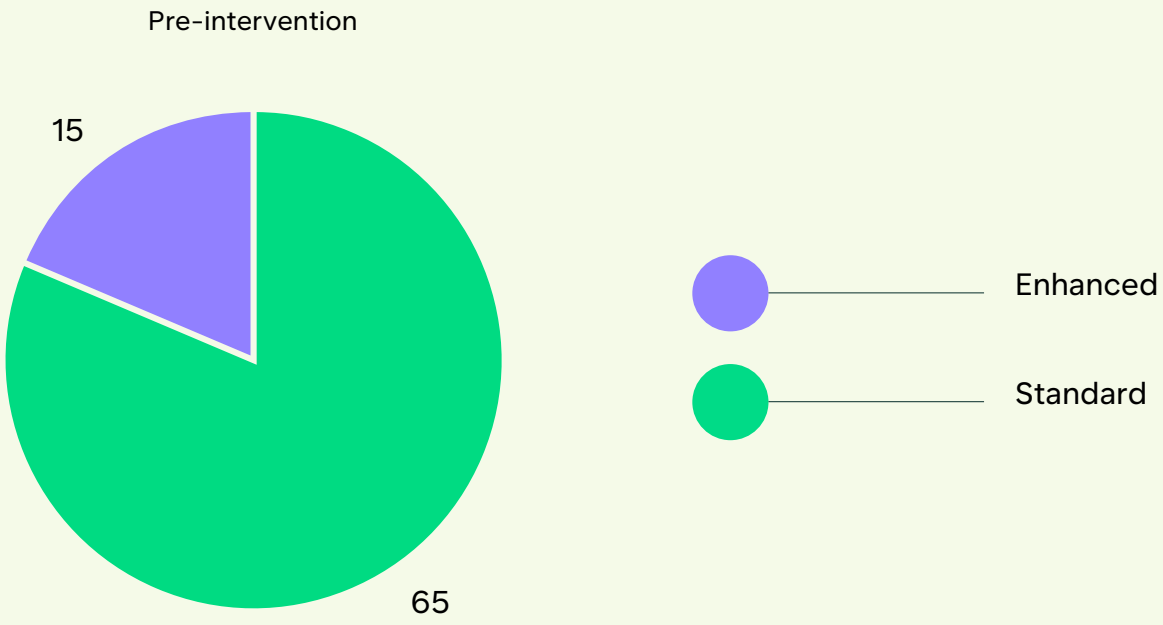
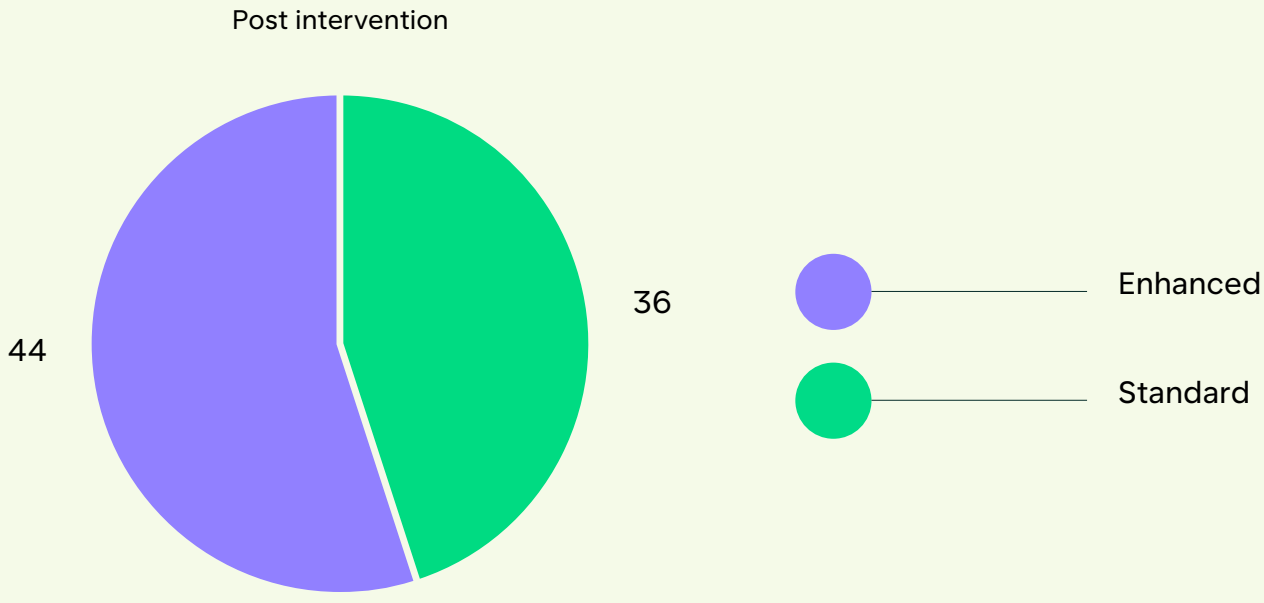


Figure 2

Prison regime post intervention

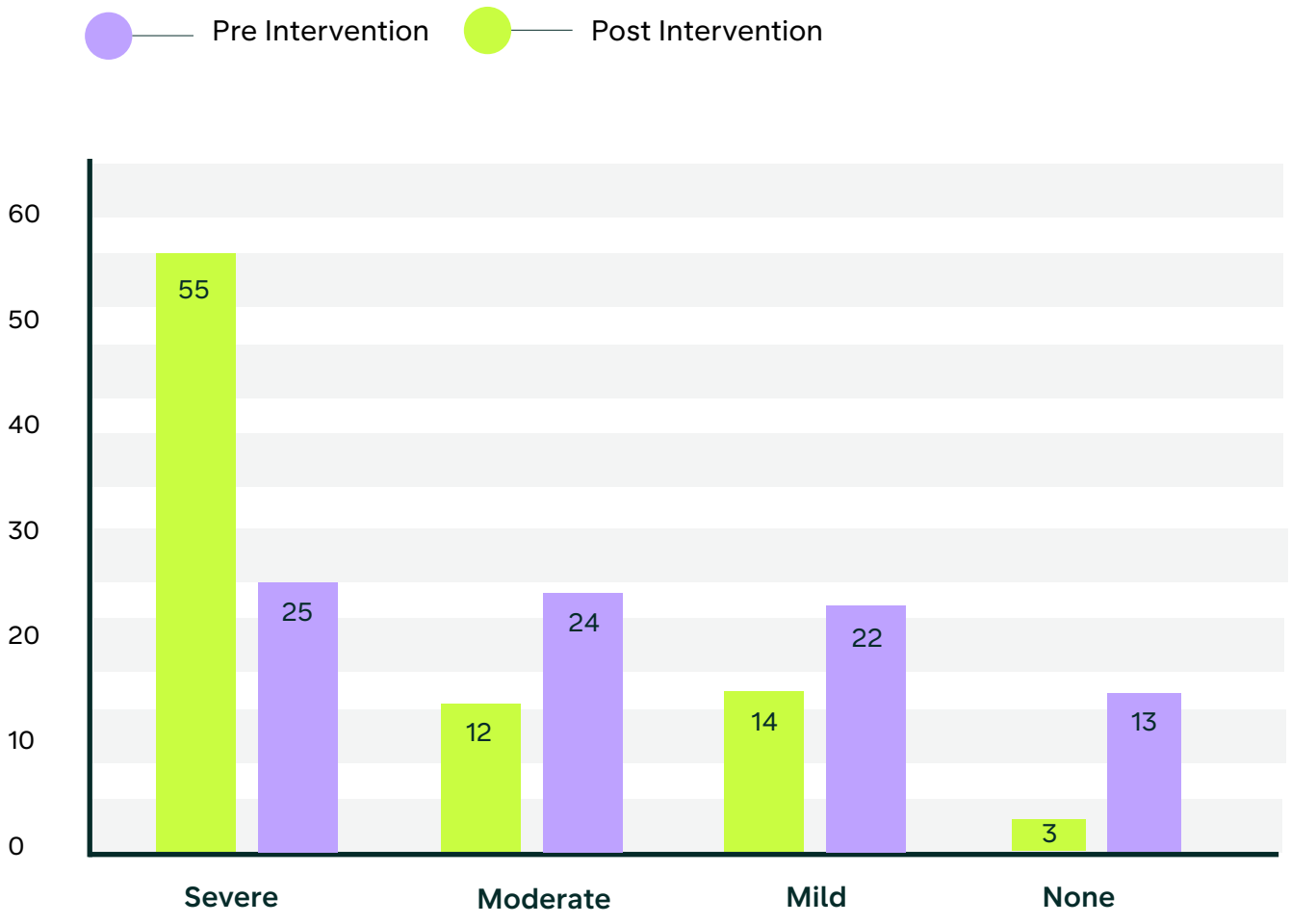


Mental Health

Anxiety was measured using the Generalised Anxiety Disorder assessment (GAD-7) and mood using the Patient Health Questionnaire (PHQ-9). There was a significant difference in the men's scores on the GAD-7 pre (M=15.14, SD=5.17) and post BIL intervention (M=11.55, SD=5.46); $t(83)$=1.99, p=.001. Results indicated a significant reduction in reported anxiety, with 70% of the sample classed as having no/minimal to moderate anxiety post intervention. **Figure 3** shows the number of men in each category pre and post intervention, there is a significant shift from the more severe to the milder categories of anxiety.

Figure 3

Number of participants GAD-7 classification **pre & post Intervention**

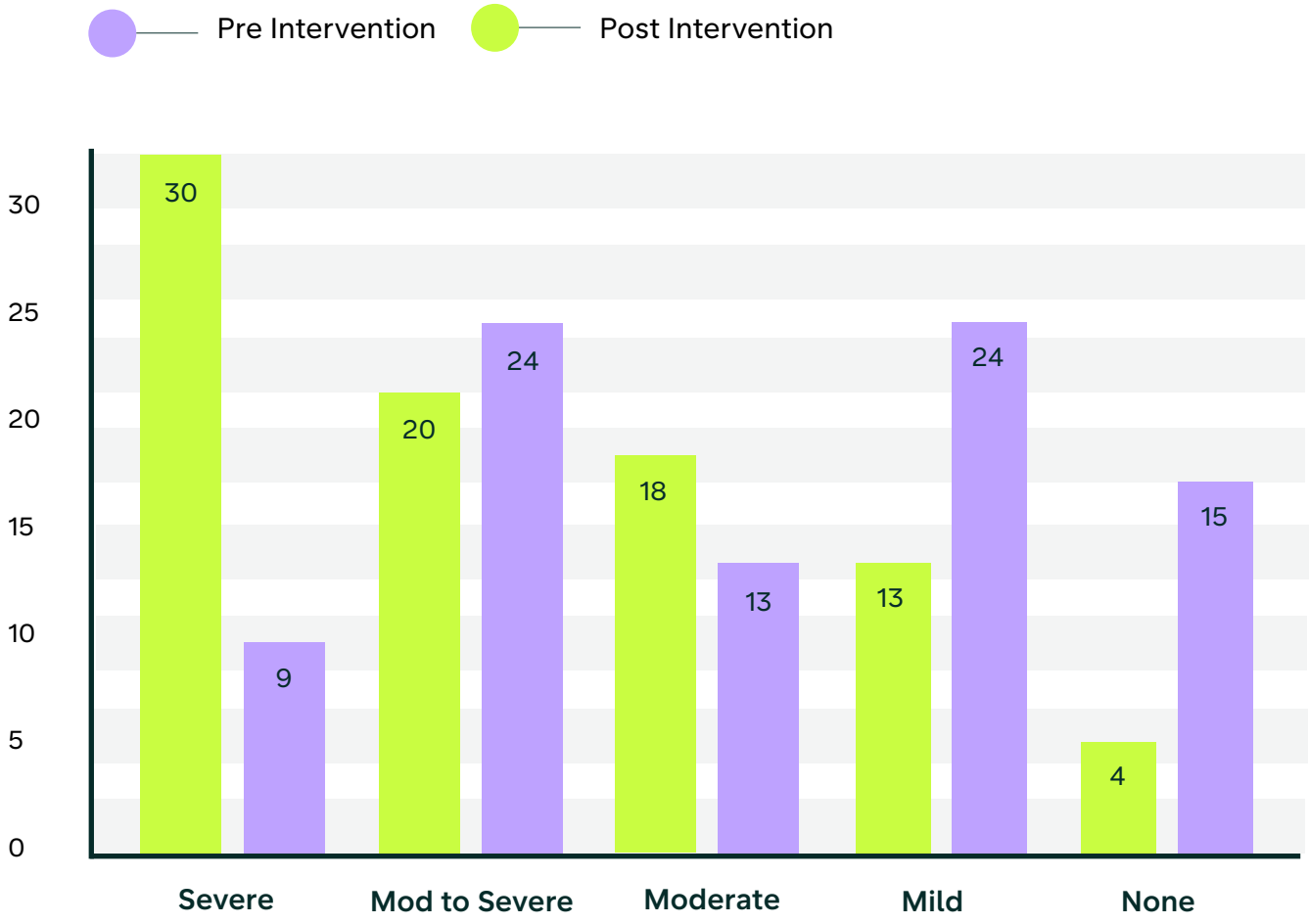


In terms of depression symptoms, a significant difference was also found in the men's total scores on the patient health questionnaire (PHQ-9) pre (M=16.47, SD=6.22) and post intervention (M=11.61, SD= 6.69); $t(84)$= 1.99, p = .001. This change was also reflected in the reduced number of men classed as having moderate to severe depression after the intervention.

Figure 4 illustrates the move from more severe categories of depression (pre intervention) to less severe categories (post intervention).

Figure 4

Number of participants PHQ-9 Classification **Pre & Post Intervention**



Perceived Change Questionnaire (PCQ)

A Wilcoxon signed rank test was conducted on data from the 83 participants who had completed pre and post treatment PCQ. On all items, participants demonstrated a statistically significant difference between pre and post treatment (Table 3). The largest observed differences in scores were for item one (understanding brain injury) and item two (explaining difficulties to others).

Table 3

Significance of difference between **pre and post intervention** responses on the PCQ

PCQ Statement	*Z*-Score	*df*	*p*-value
I understand what having a brain injury means and how it might affect me	-5.81	83	< .0001
I feel confident in explaining my difficulties to others	-5.63	83	< .0001
I feel able to participate in prison activities	-4.09	83	< .0001
I feel in control of my behaviour and how I respond to things	-5.12	83	< .0001
I feel able to keep myself from getting into trouble	-4.84	83	< .0001

Case Study

Background

Jim, a man in his 50s, was referred to the BIL service after reporting to prison staff that he had been diagnosed with a brain injury in the mid-2010s. His medical notes documented that he had experienced a bifrontal haemorrhage following an assault. Jim stated that after this incident, people told him his personality changed. He was able to identify that he “will just say it like it is”, more than he used to, and that this often led to conflict with family and friends.

Intervention

Jim was keen to learn about the brain and how it can be affected by a traumatic brain injury. His BIL sessions explored some of the common consequences of injury to the frontal networks of the brain. Jim began to think with about how his injury might have affected him, his personality and behaviour.

Jim was open to thinking about situations that he found challenging. He reported that he had been involved in a fight with a peer whilst in custody. When reflecting on this incident, Jim was able to recognise that he contributed to its escalation by the things he was saying.

When discussing the incident, and ways to reduce frustration and anger, it was identified that Jim might find it helpful to use a “mantra” to help remind himself to slow down and think about his words and actions. Jim had worked for most of his life with cars and came up with a mantra to ‘dip the clutch’. He felt that saying this to himself would help him remember to slow down when he was feeling triggered.

Deep-breathing exercises were practised in session and shorter versions developed that he could draw upon in the moment, when he noticed the early signs that he was becoming agitated.

Prior to his release, time was spent thinking about what situations on release might be challenging and what strategies Jim could use to navigate them. During this work, Jim was informed he would be released to live in Approved Premise (AP) in an area he was not familiar with. Initially Jim was very frustrated by this, but later when talking it through with the linkworker, he was able to identify that he had responded in confrontational way and had responded impulsively towards his probation officer. Jim was open to reflecting on how he might respond differently in the future. He was reminded of his mantra and subsequently gave permission for the linkworker to liaise with his probation officer and share the coping strategies that he found helpful.

Outcome

At the end of the BIL intervention Jim identified that he had a better understanding of brain injury and had a range of strategies that he could use to help him monitor and better manage his responses to things. He also reported a reduced symptoms of anxiety and low mood on discharge. A referral was sent to the brain injury linkworker based at the out of area AP, which meant that Jim could be seen as soon as he arrived. The new linkworker reported that he had settled in well, wanted to remain in the new area and was working with his probation officer to ensure that this was achieved.

> “Grateful for helping me understand myself, the service should be open to more prisons. 100% grateful.”

> “I’m grateful to have worked with [linkworker] and got better with some help and good advice”

Discussion

It is well established in the literature that the prevalence of brain injury for men in the CJS is far higher than the general population (Durand et al, 2017), despite this, there have been very few studies exploring the effectiveness of brain injury interventions in this context. It was in response to this need that over a decade ago Brainkind (formerly, The Disabilities Trust) developed the Brain Injury Linkworker service, with two key aims: to deliver evidence based neuropsychological interventions to people in the CJS and to explore the clinical effectiveness of the model.

Since its first description in the literature (Ramos et al., 2018) the BIL service has evolved from a pilot project to a Ministry of Justice (MOJ) commissioned service in Wales. The aim of this service evaluation was to explore the outcomes of the BIL service using the data collected from HMPPS Cardiff and HMPPS Swansea and consider future directions. This service evaluation has demonstrated that most people referred to the BIL service were assessed and offered intervention, thus demonstrating the very low risk of exclusion from the service and a strong commitment to offering specialist BI interventions to as many people as possible.

> “[Linkworker] has helped me a load and opened my eyes to thing I could have stopped”

The BISI data, consistent with previous studies (e.g., Pitman et al., 2015) revealed that the majority of the men had experienced multiple blows to the head and on average experienced their first head injury in early adulthood. Their head injuries were predominantly sustained via road traffic accidents, falls and assaults. In terms of severity of injury, 86% reported a loss of consciousness, with 47% reporting a loss of consciousness of thirty minutes or more, indicating moderate to severe brain injury, according to the Mayo criteria (Malec et al., 2007), and highlighting the need for specialist BI support within HMPPS. Also consistent with the literature (Kent & Williams, 2021), the men in this study reported experiencing a range of cognitive difficulties (e.g. poor memory, reduced concentration and impulsivity). It is known that if brain injury is not identified or understood, difficulties such as those reported here, risk being misattributed as defiant or disrespectful behaviours (Nagele et al., 2019). A strength of the BIL service is that linkworkers, are graduate psychologists with training in brain injury, who receive clinical supervision from Clinical Neuropsychologists. This enables them to accurately assess and identify the cognitive difficulties described above; a key factor in developing and implementing successful interventions. The integrated nature of the BIL service embedded in HMPPS systems, means that specialist knowledge can be shared with prison and probation staff, allowing them to adapt their practice to better support the person with BI.

The prevalence and range of cognitive difficulties experienced by the men in this study illustrates the need for specialist BI person-centred interventions. Linkworkers work collaboratively with the men to develop goals focused on their individual needs. Interventions which will allow them to develop strategies for managing their cognitive, behavioural and emotional difficulties are planned and delivered via 1:1 sessions. Compensatory strategies not only need to be taught but also practised in and outside of sessions to ensure that what has been learnt generalises beyond the BIL service. People with brain injury can often lack insight into their cognitive difficulties and struggle to know when to implement a strategy, working closely with prison and probation staff to ensure carry over is therefore a critical part of all interventions.

The efficacy of the BIL interventions is reflected in the high rate of reported goal achievement, with 67% of men rating themselves as having achieved or exceeded their goal and 33% as mostly or partially having achieved their goal. These findings support the ongoing use and expansion of individualised, goal-oriented service models to improve functional outcomes for individuals with BI and are in line with previous research (McMillan et al., 2023; Ramos et al., 2018). A limitation of the current service evaluation is that the goals were only rated by the by participant and not the linkworker.

Upon reflecting on this, all goals are now rated both by the person receiving the intervention and the linkworker. Whilst the linkworker is also not free from bias, it enables them to rate the individuals' goals if they are released or transferred from prison unexpectedly. It also allows comparison of the two ratings which may provide useful information to inform future service delivery.

It is documented that those with BI often take longer to adjust to life in custody, have higher rates of incidents and adjudications (Shiroma, et al., 2010) and are higher users of healthcare, but are less likely to complete the prison interventions (Piccolino & Solberg, 2014). Engagement with the prison regime is often seen as a measure of how adjusted to and engaged with prison life an individual is. The significant shift observed in this service evaluation from standard to enhanced regime post intervention reflects improved behaviour and engagement in prison activities, suggesting a potential positive influence of the BIL service on compliance and prison rehabilitation outcomes.

Reflecting on our work with the men, an observation is that they are often highly motivated to work towards moving on to the enhanced regime. During goal setting the linkworker will therefore support the person to develop goals focussed on things that will take the men closer to achieving this.

Neuropsychiatric and emotional difficulties are a common consequence of brain injury (Albrecht et al., 2020). The high rate of anxiety and depression symptoms reported prior to intervention reinforces the need for approaches that address not only the cognitive, but also the emotional and behavioural impact of BI. The statistically significant reduction in anxiety and depression symptoms (as measured by the GAD-7 and PHQ-9) suggests that there is an indirect, positive impact of the BIL intervention on participants' mood.

Many of the men seen by the BIL service reported that they did not seek medical advice at the time of their injury. Those who did often discharged themselves early or failed to attend follow up appointments. For many men, the BIL sessions are first opportunity to fully explore their difficulties and understand BI. It can be hypothesised that this improved understanding of their difficulties, together with support to help them engage with prison life, contributes to the improvement in anxiety and mood. Further research is needed to fully understand the relationship between the BIL intervention and this observed improvement in anxiety and depression symptoms.

Patient reported outcome measures are essential to understanding the outcomes of clinical interventions (Fleischmann and Vaughan, 2018) and yet the views of individuals receiving treatments in the CJS are rarely sought. A unique aspect of this service evaluation was therefore gaining feedback from the men about their views of the service and the impact it has had on them in relation to five key domains (i.e., understanding brain injury, ability to explain one's own difficulties to others, manage one's own behaviour, engage in prison activities and keep oneself out of trouble). The men reported significant improvements across all domains, indicating that the BIL service interventions is having an impact on the areas it aims to address. As the PCQ is a self-report measure (which the men complete with their linkworker present) the possibility of bias relating to social desirability and individuals wishing to present themselves in a positive light must be considered.

The findings from the PCQ are, however, consistent with other more independent data (e.g., regime change). Furthermore, it is interesting that the largest improvements on the PCQ were in relation to improved understanding of brain injury and ability to describe one's own difficulties to others; two key areas that the BIL intervention focuses on.

Whilst there are many strengths to this study the limitations of this service evaluation must also be acknowledged. A clear area for future learning has been that it has been challenging to fully analyse and understand our attrition rates. The data collected at the time of this service evaluation did not allow for a full exploration of the reasons for people not attending appointments (e.g., it was not always possible to establish if they chose not to attend or had been transferred or released). In response to this, our data collection process has now been changed to capture more detailed information to allow for fuller analysis.

A challenge for any clinical service is gaining complete outcome data for analysis. The BIL faces multiple challenges; men referred to the service frequently have complex mental health issues, or dependence on substances, such that they have to disengage with the BIL service whilst they prioritise other interventions. Additionally, there is the issue of people being released or transferred with little warning. This latter issue was particularly challenging during this service evaluation as the prison system was under considerable strain and an early release programme was in place. Consequently, at the time of analysis, only 33% of the men who went on to receive treatment had completed post intervention outcome measures.

It is also acknowledged that without a control group it is not possible to fully establish whether the outcomes described here are the result of the BIL intervention or have resulted from an alternative intervention being received at the same time.

Finally, the BIL interventions do not happen in isolation. Alongside the BIL assessments and interventions Brainkind delivers regular brain injury awareness training sessions to staff working across the CJS. Exploring whether the training delivered has an impact on individual outcomes (i.e., through staff being better equipped to support the person with a brain injury) was beyond the scope of this evaluation. However, future research focussed on the association or potential impact of this training on individual outcomes would contribute to a broader assessment of the BIL service.

Conclusions

Forty seven percent of the men referred to the BIL service reported experiencing a loss of consciousness of 30 minutes or more, indicating they have experienced moderate to severe brain injury (Malec, 2007)

Even those that have attended hospital in the immediate aftermath, have frequently not attended follow-up appointments or understood the seriousness of their injury. The BIL service is often the first opportunity to explore brain injury and what it means for them. The finding that the men reported having significantly improved their knowledge of brain injury and ability to explain their difficulties to others demonstrates the impact of the BIL intervention. Furthermore, the finding that a significant number of men have moved to the enhanced regime indicates that the BIL intervention also has a positive impact on improved compliance and engagement with the prison regime.

These encouraging findings emphasise the importance of continuous monitoring of outcomes to explore the efficacy of clinical intervention models, such as the BIL application of the neurobehavioral approach, and what components are most effective when delivered in prison and probations settings (e.g. person-centered, goal focused). Future research should explore the feasibility of controlled designs, comparisons of outcomes across different settings (prison, probation, approved premises) and over longer terms, gender differences and the equity of access to BIL services for minoritised ethnic groups.

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