Misconceptions about traumatic brain injury among probation services

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Abstract

Purpose: The prevalence of traumatic brain injury (TBI) among offender populations is significantly higher than among the general population. Despite this, no study has yet assessed the knowledge of members of the probation service surrounding traumatic brain injury (TBI). *Method:* Knowledge was assessed among members of the Probation Board for Northern Ireland (PBNI) using a cross-sectional online version of the Common Misconceptions about TBI (CM-TBI) questionnaire. Mean total misconception scores, along with scores on four subdomains (*recovery, sequelae, insight, and hidden injury*) were calculated. Analysis of variance was used to explore differences in misconceptions based on the collected demographic information. *Results:* The overall mean percentage of misconceptions for the group was 22.37%. The subdomain with the highest rate of misconceptions (38.21%) was *insight* into injury which covered misconceptions around offenders' self-awareness of injuries. Those who knew someone with a brain injury scored significantly higher in the CM-TBI total score ($F(1,63)= 6.639$, $p = .012$), the *recovery* subdomain ($F(1,63) = 10.080$, $p = .002$), and the *insight* subdomain ($F(1,63) = 5.834$, $p = .019$). Additionally, significant training deficits around TBI were observed among the probation service. *Conclusions:* This study is the first of its kind to examine the level of understanding around TBI within probation services. The findings reflect potential barriers to identification and rehabilitation of TBI for offenders coming into contact with the criminal justice system. A lack of identification coupled with misconceptions about TBI could lead to inaccurate court reporting with a subsequent impact on sentencing.

Key words: Traumatic brain injury, offenders, prisoners, probation services, misconceptions

Introduction

Traumatic brain injury (TBI) is regarded as one of the leading causes of death and disability worldwide (1). Rates of injury vary across countries with the United States reporting 823.7 per 100,000 (2), New Zealand reporting 790 per 100,000 (3), and Europe reporting 262 per 100,000 (4).

Within the UK, rates as high as 446.4 per 100,000 have been recorded (5) with almost double the number of men requiring a continuous hospital stay following TBI compared to women. Groups at particular risk include those aged <25 years and >75 years (4) with children <5 years at significantly higher risk (6). Injuries can be classified as mild, moderate, or severe, with the majority of injuries within the general population (71%-97.5%) falling into the mild range (4).

Paediatric brain injury is of particular worry given the vulnerability of the developing brain to insult (7). Children suffering from TBI can experience wide ranging cognitive and behavioural deficits, with more severe injuries linked to poorer outcomes and more persistent difficulties (8). Added to this is the risk of late-emerging deficits in social cognition as the child moves into adolescence (9). In a longitudinal study of 118 children, 78 of which had TBI's of varying severity and 40 of which had no past TBI, those with severe injuries displayed a disrupted recovery profile (9). As these children struggled to adapt to their cognitive and physical limitations over time, their failure to make age-appropriate gains may have contributed to their prolonged social difficulties. Among those most at risk of long term social dysfunction were children living in difficult family environments where poor mental health and family dysfunction was persistent (9). Recent research has attempted to draw a link between such post-injury deficits and subsequent antisocial and offending behaviour (10). Young people experiencing the long term effects of TBI may struggle not only with controlling their own behaviour, but understanding the behaviour and emotions of others (10). Poor social and communication skills may result in more externalising or aggressive behaviours, while difficulties with self-regulation and inhibition may place a young person at greater risk of committing acts of aggression against others. It has therefore been suggested that the altered life trajectory of adolescents with chronic deficits following TBI may lead to offending and subsequent involvement with the criminal justice system (10).

Convincing evidence for the link between TBI and offending has been provided by a number of longitudinal studies. A Finnish birth cohort study found a 4-fold increased risk of mental illness with coexisting offending, in adult males who had experienced a childhood TBI (11). Similarly, a Swedish population study showed that of those with a TBI, 8.8% had committed a violent crime, compared with 3% of controls (12). Two recent systematic reviews examining studies of both juvenile and adult prison populations, found significantly high rates of reported TBI. Hughes and colleagues (2015), reported rates of up to 72.1% among young offenders aged <21 years (13), while O'Rourke and colleagues (2016) found TBI prevalence rates as high as 88% among adult offenders (14). While past meta-analyses have placed the average rate of TBI with loss of consciousness (LOC) among the general population at 12% (15), the average rate among prisoners is significantly higher (51%) (16). Among prisoner populations, TBI is related to significantly more complex needs, with higher levels of co-occurring neurocognitive deficits, mental illness, and aggression observed among prisoners with TBI compared to those without (14).

While differences in injury measurement between studies makes it difficult to accurately ascertain TBI severity among offenders, studies have highlighted the prevalence of multiple injuries within this population (17–20). Work by Diamond and colleagues (2007) (20) emphasised the prevalence and compounding effect of multiple injuries in this group. The authors found that male and female offenders with multiple mild injuries had similar cognitive and behavioural profiles to those with more severe TBI. It is possible that many of these injuries remain invisible to healthcare teams, with Pitman and colleagues (2014) reporting that 31% of their sample of 139 male offenders reported having done "nothing" following their first TBI with LOC (21). In their discussion, the authors emphasise that mild injuries within this population may go un-noticed or untreated, suggesting that individuals may not recall, recognise, or appreciate the presence or consequences of past TBIs. The emergence of such research has shed light on what is now considered a major issue for the criminal justice system (22), and emphasises the importance of identifying potential points for early identification and intervention.

Probation services are among those most involved in the care, supervision, and assessment of offenders. As stated in a recent House of Commons report, the role of probation services has shifted from solely servicing offenders in the community to providing much broader supervision and support from the courtroom, to prison, to the community (23). The current role of probation services involves the provision of assessments and advice to the courts, the supervision of offenders both in prison and following release, and the management of offenders serving court orders such as community service, community supervision, or behaviour/substance abuse programmes (23). In the UK, probation personnel can be classified as probation officers or probation service officers. While probation service officers work solely with offenders serving community work sentences, probation officers are responsible for the management of individual offenders both in the community and in prison.

In the context of TBI among offenders, probation services are important for several reasons. As mentioned previously, they assist sentencers in deciding the most suitable method of dealing with an offender through the provision of pre-sentence reports (23). In addition to assessing the risk of re-offending, these pre-sentence reports involve examining possible programmes and support available for the offender in the community (24). This may offer an early opportunity to screen for possible TBI and incorporate the provision of rehabilitation into post-sentencing care. Of the 4,946 pre-sentence (PSR) and short pre-sentence reports (SPSR) completed by the Probation Board for Northern Ireland (PBNI) in 2015/16, 1,332 (28%) were for young offenders aged 18-24 years (25). Young adults aged 20-24 years also represent the highest proportion of people per 1000 of the population for which PSR and SPSR are compiled by the PBNI. As mentioned previously, this age group is among the most likely to receive a TBI, suggesting that probation services must routinely encounter a large proportion of clients who have sustained an injury. Additionally, probation services play a key role in running a range of interventions and programmes aimed at reducing the risk of re-offending, including both

violent and sexual offending (23). Given the overlap between TBI among offenders and increased aggression and violence (14), understanding the difficulties and challenges associated with such injuries e.g. memory and planning difficulties, diminished cognitive and learning ability, reduced empathy, can help to ensure that such programmes are tailored to the specific needs of offenders with TBI. It is therefore crucial that members of the PBNI can identify and understand the consequences of TBI, which significantly affect the individuals under their care.

Given the level of contact probation services have with offenders, and their influence on both sentencing and post-release care, it is vital to consider their level of understanding around TBI. Past studies examining beliefs about brain injury among the general public (26–29), family members of patients who sustained brain injuries (30), healthcare professionals (31), and educators (32) have all highlighted varying degrees of misconceptions. Misconceptions within these papers are described as misinformed opinions or beliefs relating to the physical, cognitive, and behavioural sequelae of TBI. Across many of these studies, misconceptions around unconsciousness, memory impairment, and recovery are particularly salient. Chapman and Hudson (2010) emphasised that among their sample of the British general public, there were significant misconceptions around unconsciousness, alongside an inaccurate understanding of the complexity of the recovery process (27). Likewise, Linden and colleagues (2013) showed that 74% of their sample of educational professionals did not know or incorrectly agreed with the statement that children who are knocked unconscious wake up quickly with no lasting effects (32). Several of these studies utilised an adapted version of the Gouvier and colleagues (1988) survey which employed a 25 item self-report questionnaire covering the domains of; use of seatbelts, effects of unconsciousness, amnesia, brain damage, and recovery (26). While Swift and colleagues (2001) utilised qualitative interviews to explore beliefs about brain injury (31), Springer and colleagues (1997) adapted the Gouvier questionnaire, including 16 additional items derived from clinical expertise (30). Swift and colleagues (2001) examined misconceptions concerning TBI among caregivers and healthcare professionals working with survivors of brain injury (31). Through their qualitative interviews, several themes emerged including; inaccuracies surrounding recovery time and the possible extent of recovery following injury, misconceptions around the diversity of difficulties resulting from brain injury, and misjudgements about the capabilities of individuals depending on whether their disability was visible or invisible. Springer and colleagues' (1997) adapted 40-item questionnaire assessed seven domains of knowledge among family members of patients with TBI; seatbelts/prevention, brain damage, brain injury sequelae, unconsciousness, amnesia, recovery, and rehabilitation (30). Among their sample of TBI patient family members, misconceptions were found in the domains of unconsciousness, amnesia, and recovery following brain injury, with over 80% of the sample believing that recovery from severe injury is possible if the person wants it enough. The response scale consisted of four options; true, probably true, probably false, and false. The overall mean percentage of misconceptions in their

sample was 23.1% when probably true and probably false responses were considered as true or false, and 48.8% when any response other than true or false was considered incorrect.

More recently, work by Yuhasz (2013) examined misconceptions about TBI within a prison healthcare setting (33). The study included health professionals working in correctional facilities throughout New Jersey in the USA and examined misconceptions surrounding the use of seatbelts, unconsciousness, amnesia, brain damage, and recovery. The mean percentage of overall misconceptions was 24%, with a range of 0% to 73%, and the subdomain of unconsciousness containing the highest percentage of misconceptions (39.1%). Overall, their sample endorsed fewer misconceptions than those of previous studies of the general population and held similar levels when compared to samples of college students, educators, and school psychologists. When they examined demographic factors that affected overall performance, men endorsed fewer misconceptions than women, those with doctoral levels of education performed better than those without, and those with either prior training in TBI or familiarity with someone with TBI also endorsed fewer misconceptions. The author highlighted the importance of working proactively to improve the successful reintegration of offenders into the community and emphasised the need for greater awareness about TBI within correctional healthcare settings.

It is evident that while TBI represents a significant issue among offenders, misconceptions surrounding the condition remain a significant issue for those involved in their care. As such, it is imperative that we assess the knowledge of those whose role is the supervision and support of offenders, and consider the implications this may have on access to appropriate rehabilitation services. The aim of this study was therefore to examine the prevalence of misconceptions surrounding TBI among members of the Probation Board for Northern Ireland (PBNI).

Methods

Participants and Design

A cross-sectional online survey design was used to collect information from probation services in Northern Ireland. Recruitment was conducted through the PBNI who contacted 184 probation officers, 38 probation service officers, 33 managers, 4 psychologists, and 1 intern (N=260) on behalf of the researchers. Managers, psychologists, and interns were included both to maximise the sample and to ensure that all personnel who have contact with offenders or influence in the decision making surrounding their sentencing were included. Demographic information included age, gender, educational qualification, length of employment in the PBNI, and levels of direct contact with young offenders. Additionally, knowledge and experience were measured at two levels- knowledge of someone with a brain injury or not, and experience of working with a person with a brain injury or

not. A final question asked whether participants had received previous training around brain injury and allowed for elaboration on the nature of training received. Section two comprised the Common Misconceptions about Traumatic Brain Injury questionnaire (CM-TBI) (30).

Materials

A modified version of the shortened 20-item CM-TBI (32) (Table 1) was used which assessed the level of knowledge of participants around TBI. The full questionnaire is a 40-item tool which asks participants to rate statements as either true or false in the domains of; seatbelts/prevention, brain damage, brain injury sequelae, unconsciousness, amnesia, recovery and rehabilitation (30). Though neither scale accounts for injury severity in the interpretation of correct answers, this was justified given the prevalence of moderate to severe injuries (19) alongside multiple mild injuries (20) among probation service clientele. This prevalence of unidentified multiple mild injuries also suggests that outcomes for offenders who present with a recent mild injury may still be comparable to that of more moderate to severe injuries. The shortened version, employed by Linden and colleagues (2013), utilised a 5-point Likert scale consisting of strongly agree (1), agree (2), don't know (3), disagree (4), and strongly disagree (5). While several variations of the scale have been employed across different studies, in line with the terminology used most commonly, this study utilised a 5-point Likert scale consisting of very true (1), true (2), neither true nor false (3), false (4), and very false (5). All true statements (n=9) are reverse scored giving participants a total score between 20 and 100. While previous versions dichotomised responses into either "true" or "false", the use of a Likert scale allowed for graded responses, such that participants indicating a statement as "neither true nor false" were not considered as fully endorsing a misconception. In addition, the 20-item psychometrically validated tool categorises questions into four subdomains; *recovery*, *sequelae*, *insight*, and *hidden injury*. The internal consistency of the questionnaire in the current study was checked using Cronbach's alpha. This 20-item version showed good internal consistency at 0.84. Cronbach's Alpha was also performed on the subscales, with both *recovery* (0.73) and *sequelae* (0.81) showing good internal consistency. I*nsight* (0.61) and *hidden injury* (0.55) showed more questionable internal consistency though this may be partly due to the low number of questions in both subscales (n=3).

Procedure

Data collection took place between the 1st and the 17th of December 2015. An email was circulated to staff currently working for the PBNI (N=260) containing information about the project and a link to the online survey. Survey data was collected using a third party online survey tool (Google Forms) to ensure ease of use for participants and prevent possible missing data. Participants were informed that involvement was voluntary and that completion of the survey constituted informed consent. A follow-up email was circulated two weeks later reminding participants about the study and offering an

opportunity to those who had not yet completed the survey to do so. A total of 65 participants took part, representing a response rate of 25%.

Ethical Approval

The study received full ethical approval from a university research ethics committee. Information provided to participants covered issues of anonymity and the right of withdrawal.

Data analysis

Survey responses were analysed using SPSS version 22.0. Descriptive statistics were used to generate demographic information, alongside information on individual CM-TBI questions. The online survey tool ensured greater accuracy of responses as anonymity was maintained for all participants and responders were prevented from submitting their form until all questions were answered. Analysis of variance (ANOVA) was used to compare gender, qualifications, knowledge of someone with TBI, experience working with someone with TBI, and training received on TBI, to the total and subdomain scores for each respondent.

Results

Sample Characteristics

Table 2 presents demographic information on respondents, the majority of whom were female (84.6%; n=55) probation officers (71%; n=46). Forty three percent (n=28) of staff had daily contact with offenders, 66% (n=43) knew someone with a brain injury, and despite 77% (n=50) having experience working with someone with a brain injury, only 7.7% (n=5) reported ever having received training on the condition. The mean age of the sample was 42 years (SD= 10.2) with the mean age of males (Mean: 49 years, range: 20-63 years) being significantly higher than that of females (Mean: 42 years, range: 22-60 years) ($t(63)=2.11$, $P=.038$). No other significant differences between genders were observed. Almost half the sample (47.7%) had worked with the PBNI for over 10 years and a large proportion of the sample were highly educated, with 49% holding a university degree and 40% holding a master's level qualification. Job titles included Probation Officer (70.8%, n=46), Probation Service Officer (10.8%, n=7), Psychologist (7.7%, n=5), Manager (9.2%, n=6), and Other (1.5%, n=1) which represented an intern.

Knowledge of TBI

Respondents were given a total score along with scores in each subdomain (recovery, sequelae, insight, and hidden injury). Reverse scoring for all true items meant that higher scores in all domains reflected fewer misconceptions. Overall scores ranged from 68 (40% incorrect) to 96 (5% incorrect)

with the mean total score for the sample being 82.11 (22.37% incorrect). When responses were dichotomised (if the statement was true, then either very true or true were considered correct) for the review of individual statements, no statement was answered correctly by all participants (see table 1), although the statements "A head injury can cause brain damage even if the individual is not knocked unconscious", "Problems with speech, coordination, and walking can be caused by brain damage", and "It is common for people to experience changes in behaviour after a brain injury" were correctly answered by over 95% of respondents. Seven of the statements (2, 3, 7, 8, 9, 16, 19) were incorrectly answered by over 30% of the sample, with 73.8% of the sample responding incorrectly to the statement "People who have survived a brain injury usually show a good understanding of their problems because they experience them every day". The subdomain *insight* had the highest mean percentage of misconceptions (38.21%), followed by *sequelae* (26.53%), *recovery* (23.41%), and *hidden injury* (20.64%).

One-way ANOVAs were conducted to explore differences between gender, qualifications, knowing someone with brain injury, working with someone with brain injury, and receiving training around brain injury on both total and subdomain scores. Of these, there was a statistically significant difference between those who knew someone with brain injury and those who did not on the CM-TBI total score ($F(1,63)= 6.639$, $p = .012$, $\eta p^2 = .095$), *recovery* subdomain ($F(1,63)=10.080$, $p =.002$, $\eta p^2 = .138$), and *insight* subdomain ($F(1,63)= 5.834$, $p = .019$, $\eta p^2 = .001$). Participants who knew someone with a brain injury had, on average, a total score which was 4 points higher (M= 83.72, SD= 6.867) than those who reported not knowing anyone with brain injury (M=78.95, SD= 7.422).

There was also a statistically significant difference between males and females on the subdomains of *insight* ($F(1,63)= 6.534$, $p = 0.013$, $\eta p^2 = .094$) and *hidden injury* ($F(1,63)=4.301$, $p = 0.042$, $\eta p^2 = .064$). In the domain of *insight* the mean score was higher for women (M=10.64, SD= 1.68) than men (M=9.2, SD= 1.32), while in the *hidden injury* domain, men (M=13.4, SD= 1.17) outperformed women (M= 12.36, SD= 1.5). There were no statistically significant differences between levels of qualification, experience working with someone with a brain injury, or receiving training around brain injury, on total or subdomain scores of the CM-TBI.

Insert Table 1 here

Insert Table 2 here

Discussion

The aim of this study was to examine the misconceptions surrounding TBI among probation services. The impact of the following factors on misconceptions about TBI was also examined; gender, qualifications, knowledge of someone with TBI, experience working with someone with TBI, and past TBI training. Of the 65 respondents, only five had previously received training around TBI despite 76.9% reporting having experienced working with someone with a TBI. The overall mean percentage of misconceptions was 22.37%, representing a greater level of knowledge about TBI among the PBNI compared to available studies of the general public (26,27). However, this was comparable to the levels reported by Yuhasz who found a mean misconception rate of 24% among a sample of 155 correctional healthcare professionals (33). The author employed a 33-item online survey, with items taken from the original Gouvier and colleagues (1988) questionnaire, covering the domains of "use of seatbelts", "unconsciousness", "amnesia", "brain damage", and "recovery". Though significant differences in mean scores were not found for education level, their sample was divided into doctorate (54.1%) and non-doctorate (45.9%) qualifications. Our sample primarily held a university degree (49.2%) and masters level (40%) qualifications with only one participant holding a doctorate. Our sample held slightly fewer misconceptions overall, though Yuhasz also found statistically significant differences between those who had received training around TBI and those who had not. Again, while 38.1% of their sample had receiving professional TBI training, only 7.7% of our participants had reported accessing external training for brain injury. In line with the findings of both Yuhasz and Linden and colleagues (32,33), there was a statistically significant difference in misconceptions between those who knew someone with a brain injury and those who did not (Mean: 20.35% vs 26.31%). It should be noted that two thirds of our sample (66.2%) reported knowing someone with a brain injury, which is slightly higher than the rate reported by Yuhasz (61.9%), and 76.9% reported having worked with someone with a brain injury. It is possible that this high rate contributed to the low overall percentage of misconceptions and that those who know or are close to someone with a brain injury may be more aware of the condition.

The subdomain with the highest rate of misconceptions was *insight* with a mean percentage of 38.21%. The three statements in this subdomain addressed beliefs about self-awareness of deficits following TBI. It is common for individuals with TBI to show a lack of understanding of the extent and severity of their impairments (34–36). Despite this, 73.8% of the sample incorrectly endorsed the statement "People who have survived a brain injury usually show a good understanding of their problems because they experience them every day". This supports the findings of Linden and colleagues (32) who showed that 61.4% of their sample of educational professionals also incorrectly

responded to this statement. Likewise, while 40% of our sample responded incorrectly to the statement "Asking people who were brain injured about their progress is the most accurate, informative way to find out how they have progressed", 44.6% of participants in the Linden and colleagues study (32) reported not knowing, incorrectly agreed, or strongly agreed with this statement. The misconceptions shown in the current study suggest a possible over-reliance on the ability of an offender to report their difficulties when dealing with probation services. Given that many offenders may have no awareness of their brain injury (21), the belief that they will have an understanding of their deficits highlights the potential for many behaviours and symptoms of TBI to be misidentified. Additionally, offenders may lack the ability to associate their current difficulties with past injuries. This may further perpetuate the belief that traits such as increased aggression, a lack of empathy, or difficulty in adhering to programmes, such as those mandated by the court, are simply the fault of the offender. A possible reason for the prevalence of misconceptions in the domain of *insight* may relate to the high number of participants who reported knowing someone with a TBI. A family member, relative, or colleague with a diagnosed and treated TBI may have a better understanding of their difficulties than an offender who may have never been examined for head injury. There may be a tendency to over-rely on anecdotal knowledge of TBI, possibly resulting in the misattribution of behaviours and traits expressed by offenders with undiagnosed past injuries. Work by Chapman and Hudson examining misconceptions among the British public asked respondents to comment on where they had learned about brain injury (27). Of the 301 participants who responded to this question, 38% stated it was from the media (e.g. television, newspapers), and 17.3% stated it was from personal experience. Only 6.6% of the sample had learned about it as part of their profession, with the authors commenting that their sample on a whole had a markedly higher rate of misconceptions than other groups. While personal experience of brain injury may help in both empathising with and understanding individuals with TBI, such experience should not be relied upon as the sole source of knowledge on the issue.

Also of importance is the finding that 92.3% of those surveyed reported having no formal training around brain injury. Of those who reported previous training, two indicated that this was incorporated into their university degree, one reported receiving training from a charity organisation, two were unsure where they had received training, and one had attended training out of personal interest. It is estimated that upwards of 60% of offenders have a TBI (37), meaning that a significant proportion of the clients dealt with by the PBNI may have cognitive, social, and behavioural problems resulting from past injuries. The discrepancy between those who reported knowing or working with someone with a brain injury, and those who accessed training, further reinforces the possibility that many beliefs are based upon personal experiences. Additionally, despite 76.9% of participants indicating they had worked with individuals with brain injury, this had no significant impact on misconception scores when compared to those who had not. This suggests that such experience is not an adequate

substitute for formal staff training and information around TBI, which may help ensure that offenders with hidden injuries are identified and referred to the appropriate services. This sentiment has been echoed both in the "Children and young people with neuro-disabilities in the criminal justice system" position paper by the British Psychological Society (22), and the "Brain Injury and Offending report" by the National Prisoner Healthcare Network (NPHN) advisory board in Scotland (38). Both documents re-iterate that without proper awareness and training, the needs of offenders with brain injury can remain unmet for many years.

Limitations

Our study was not without limitations. Firstly, of the 260 members of the probation service invited to participate, only 65 completed the survey, indicating a response rate of 25%. This is lower than we would have liked and may impact on the generalisability of our findings. Additionally, the majority of respondents were female (84.6%) which limits the conclusions drawn from analysis of gender differences. Although this reflects the reported gender split within the PBNI (70.6% Female, 29.4% Male), the attitudes and beliefs women hold about individuals with TBI have been shown to be less prejudicial than men (39) which may have affected results. It should be noted that the multiple use of statistical tests inflates the possibility of a type I error. This may further affect the generalisability of our results. The lack of well-established measures examining misconceptions around TBI was also an issue. The CM-TBI showed strong internal consistency for items on both the recovery and sequelae subscales but reliability was weaker for items on the insight and hidden injury subscales. Alongside this, it was unclear whether participants who responded "neither true nor false" to items were indicating a lack of knowledge, issues with the item, or indicating that more information was needed. The percentage of participants who knew someone with a brain injury or had worked with someone with a brain injury were equally high. It is possible that those who knew someone with a TBI were more interested in learning about such injuries and were thus more likely to take part. This means that while knowledge was high in our sample, possibly due to personal interest, the lack of response from the majority of the PBNI may indicate a lack of recognition for both the scale and importance of TBI among offenders. Nonetheless, despite these limitations the results highlighted areas of prevalent misconceptions and emphasised the need to address the training deficit within probation services.

Conclusions and clinical implications

Clear gaps in knowledge were evident among members of the probation service with regards to brain injury. Although the sample performed better than the general public, the domains in which we observed the highest rates of misconceptions suggest an over-reliance on offenders' self-awareness of their injuries. The implications of which may pose significant barriers to rehabilitation for offenders. Upon first meeting with probation services, offenders undergo an initial interview and assessment process which can affect both sentencing and their referral to necessary health and psychological

services. As no formal assessment of past brain injury is included in this screening, probation staff are reliant on the self-report of offenders. Given that many offenders may not realise the severity of past injuries, or understand the extent to which such injuries are affecting their cognition and behaviour (21), it is likely that many TBIs are not identified at this stage. Given the challenging nature of this group, there is need for clear and tailored information on identifying TBI, understanding the outcomes and challenges associated with such injuries, and the procedure for accessing the correct services and pathways of care for such individuals. Alongside this, when considering programmes of support and re-integration into the community, probations officers should be fully informed of the possible impact past TBIs may have on an offenders' ability to access and engage. Gaps in understanding and awareness may result in probation services failing to link problems with memory, concentration, and behaviour in their clients to possible past injuries. Given the high degree of control and influence probation services have on the lives of offenders, the findings of this study highlight significant barriers to informed sentencing and rehabilitation. With adequate training and access to effective screening tools, probation services have the unique opportunity to identify and refer offenders to the appropriate services, ensuring their needs are met early on in the criminal justice process.

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Declaration of interest

The authors report no conflicts of interest.

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Table 1. Response frequency and percentage for each item on the CM-TBI.

	True/False (subdomain)	Very True n (%)	True n (%)	Neither True nor False n (%)	False n (%)	Very False n (%)
1. A head injury can cause brain damage even if the individual is not knocked unconscious	T (HI)	29 (44.6%)	35 (53.8%)	1 (1.5%)	-	-
2. Whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head	T (HI)	8 (12.3%)	33 (50.8%)	13 (20%)	11 (16.9%)	-
3. It is common for people with brain injuries to be easily angered	T (S)	11 (16.9%)	29 (44.6%)	22 (33.8%)	3 (4.6%)	-
4. It is common for a person's personality to change after a brain injury	T (S)	23 (35.4%)	38 (58.5%)	3 (4.6%)	1 (1.5%)	-
5. Problems with speech, coordination, and walking can be caused by brain damage	T (HI)	34 (52.3%)	30 (46.2%)	1 (1.5%)	-	-
6. Problems with irritability and difficulties controlling anger are common in people who had a brain injury	T (S)	18 (27.7%)	30 (46.2%)	16 (24.6%)	1 (1.5%)	-
7. Most people with brain damage are not fully aware of its effect on their behaviour	T (S)	11 (16.9%)	22 (33.8%)	21 (32.3%)	11 (16.9%)	-
8. People who have survived a brain injury usually show a good understanding of their problems because they experience them every day	F (I)	1 (1.5%)	14 (21.5%)	33 (50.8%)	16 (24.6%)	1 (1.5%)
9. Brain injuries often cause a person to feel depressed, sad, and hopeless	T (S)	10 (15.4%)	31 (47.7%)	24 (36.9%)	-	-
10. It is common for people to experience changes in behaviour after a brain injury	T (S)	23 (35.4%)	40 (61.5%)	2 (3.1%)	-	-
11. Sometimes a second blow to the head can help a person remember things that were forgotten	F (R)	-	2 (3.1%)	16 (24.6%)	33 (50.8%)	14 (21.5%)
12. Recovery from a brain injury usually is complete in about five months	F (R)	-	1 (1.5%)	13 (20%)	30 (46.2%)	21 (32.3%)
13. Once a person is able to walk again, his/her brain is almost fully recovered	F (R)	-	-	11 (16.9%)	24 (36.9%)	30 (46.2%)
14. Once a person with a brain injury realises their degree of impairment they will always be aware of this	F (I)	-	3 (4.6%)	14 (21.5%)	41 (63.1%)	7 (10.8%)
15. A person who has a brain injury will be "just like new" in several months	F (R)	-	-	4 (6.2%)	27 (41.5%)	34 (52.3%)
16. Asking people who were brain injured about their progress is the most accurate, informative way to find out how they have progressed	F (I)	-	7 (10.8%)	19 (29.2%)	33 (50.8%)	6 (9.2%)
17. It is good advice to remain completely inactive during recovery from a brain injury	F (R)	-	-	8 (12.3%)	38 (58.5%)	19 (29.2%)
18. Once a person recovering from a brain injury feels "back to normal," the recovery process is complete	F (R)	-	-	6 (9.2%)	43 (66.2%)	16 (24.6%)
19. How quickly a person recovers depends mainly on how hard they work at recovering	F (R)	-	3 (4.6%)	20 (30.8%)	35 (53.8%)	7 (10.8%)
20. The primary goal of brain injury rehabilitation is to increase physical abilities such as walking	F (R)	1 (1.5%)	3 (4.6%)	13 (20%)	44 (67.7%)	4 (6.2%)

(HI)- Hidden Injury, (S)- Sequelae, (I)- Insight, (R)- Recovery

Table 2. Respondent characteristics

		n (%)
Gender		
	Male	10 (15.4%)
	Female	55 (84.6%)
Experience in the probation service (years)		
	<5	15 (23.1%)
	5-10	19 (29.2%)
	11-15	17 (26.2%)
	16-20	3 (4.6%)
	>20	11 (16.9%)
Qualifications		
	Certificate/Diploma	4 (6.2%)
	A-level or equivalent*	2 (3.1%)
	University Degree	32 (49.2%)
	University Masters	26 (40%)
	University Doctorate	1 (1.5%)
Job Title		
	Probation Officer	46 (70.8%)
	Probation Service Officer	7 (10.8%)
	Psychologist	5 (7.7%)
	Manager	6 (9.2%)
	Other	1 (1.5%)
Contact with offenders		
	None	18 (27.7%)
	Daily	28 (43.1%)
	Once a week	1 (15.4%)
	Once a fortnight	4 (6.2%)
	Once a month	5 (7.7%)
Knowledge of brain injury		
	Yes	43 (66.2%)
	No	22 (33.8%)
Experience of brain injury		
	Yes	50 (76.9%)
	No	15 (23.1%)
Brain injury training		
	Yes	5 (7.7%)
	No	60 (92.3%)

*A-Level or Advanced level is a school qualification offered in the United Kingdom to students aged between 16-18 years