arbias LA TROBE UNIVERSITY

# ACQUIRED BRAIN INJURY SCREENING, IDENTIFICATION & VALIDATION IN THE VICTORIAN CORRECTIONAL SYSTEM.

**Acquired Brain Injury.**
Screening, Identification & Validation
in the Victorian Correctional System.

Project brought to you by arbias Ltd
in partnership with La Trobe University.

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This project was carried out with the approval of:

- La Trobe University Human Ethics Committee (Approval: 08-030)
- Department of Justice Human Research Ethics Committee
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## EXECUTIVE SUMMARY

*arbias* Ltd in conjunction with Latrobe University were contracted by Corrections Victoria to undertake the project titled "Acquired Brain Injury: Screening, Identification and Validation in the Victorian Correctional System. Ethics approval was granted by La Trobe University (Application No: 08-030) and the Department of Justice Human Research Ethics Committee (Approval: CF/07/6072).

There were two main aims of the study. The first aim was to test the efficiency and veracity of a three-stage process for screening and identification of prisoners entering the Victorian correctional system who may have an acquired brain injury (ABI). The second aim of the study was to provide indicative data on the prevalence of ABI within the Victorian correctional system. The study used a three-tiered approach of initial screening, clinical interview and neuropsychological assessment to provide an indication of the potential prevalence rate of prisoners with an ABI within the Victorian prison system, as well as the nature and aetiology of the brain injury.

Stage 1

In Stage 1, 110 adult male prisoners and 86 female prisoners consented to participate in the study. Participants were recruited from sentenced prisoners only. Sixty-four per cent of male prisoners endorsed at least one ABI risk factor, whilst 73% of female prisoners endorsed at least one ABI risk factor during screening for ABI.

The most commonly endorsed risk factors for male prisoners were drug use (61%), hypoxic brain injury (47% - overdose and suicide attempt), traumatic brain injury (TBI) (29%) and alcohol use (25%). The most commonly endorsed risk factors for female prisoners were drug use (62%), hypoxic brain injury (51% - overdose and suicide attempt), TBI (29%) and alcohol (15%). Comparing male and female prisoners, female prisoners were more likely to endorse drug use, whilst males were more likely to endorse alcohol use.

Stage 2

Stage Two of the studies involved clinical interviews being conducted by staff employed by *arbias* Ltd. 90 male prisoners and 53 female prisoners continued to the clinical interview stage. The clinical interview involved taking a comprehensive background history, as well as further information regarding ABI risk factors. The male and female prisoners differed from the general population on a number of demographic variables including education, employment, accommodation, mental health history, substance use and offending behaviour:

- they were less educated than the general population;
- they had less stable accommodation;
- they were more likely to be unemployed;

- at least one psychiatric diagnosis (either current or past) was endorsed by 63% of male prisoners and 79% of female prisoners with over 50% of both male and female prisoners over endorsing two or more psychiatric diagnoses. The most commonly reported diagnoses were depression (39% males and 62% females), anxiety (16% males and 25% females), PTSD (9% males and 17% females) and personality disorders (10% males and 15% females);
- They were found to have levels of substance use which were well above levels of substance use in the general population. This included both illicit (e.g. cannabis, amphetamines, etc) and prescribed (e.g. benzodiazepines) drugs.
- approximately 20% of prisoners in the current sample were prisoners who had been found guilty of an offence for the first time;
- approximately 25% of prisoners had served time in a Youth Training Centre;
- on average the number of previous prison terms served by prisoners was three, although over 20% of both male and female prisoners were serving their fifth or more prison term; and
- over 50% of male and female prisoners reported they were under the influence of alcohol or drugs at the time the offences were committed.

Stage 3

In Stage 3, 74 male prisoners and 42 female prisoners participated in a full neuropsychological assessment. The diagnosis of an ABI was based on independent evaluation of the evidence by two clinical neuropsychologists at *arbias* Ltd. This evidence included the profile of cognitive strengths and weaknesses on formal testing, behavioural observations during the assessment and consideration of background history including ABI risk factors. ABI was not diagnosed when the cognitive deficits could be wholly explained by factors such as medication side-effects, physical problems, emotional disturbance, the person's intellectual background, and limited history of education.

Males and females were found to have different neuropsychological profiles with significant differences found on tests of perceptual and spatial ability, complex vision memory and spatial working memory. As a result of the finding of different male and female profiles, it was decided to analyse the male and female data separately.

Male and female prisoners who were diagnosed as not having ABI performed overall in the average range in all neuropsychological tests and cognitive categories.

Overall, male and female prisoners with an ABI produced significantly different cognitive profiles.

Females tended to present with more impairments in spatial abilities, complex attention and working memory, whilst male

prisoners had more wide spread and generalised impairments in all areas, apart from basic processing speed and the basic perceptual abilities.

It is likely the females' cognitive profile is the result of substance use, in particular, benzodiazepine use. In contrast, the males' impairment profile more resembles that seen in alcohol related brain injury and traumatic brain injury.

Evaluation of the *arbias* Screening Tool for Identifying ABI

Formal analysis of the sensitivity of the screening tool with regard to identifying a potential ABI indicated that the screening tool was able to identify potential ABI. There were no false negatives in the female participants. By contrast, there was a false negative rate of almost one quarter in the male sample, indicating that some male prisoners were still being missed at the screening stage. It was noted that new learning and memory problems were the most significantly impaired cognitive skill in males (moderate to severe impairment), and this is likely to have made their history somewhat unreliable. Thus they tended to under-report risk factors on screening assessment. This highlights the importance of not relying solely on the screening, as well as the usefulness of clinical interview and formal neuropsychological assessment.

Conclusions

The current research has found that the prevalence of ABI in the Victorian Correctional System is high, with 42% of males and 33% of females found to have evidence of an ABI following formal neuropsychological assessment. This indicates that persons with an ABI are a significant proportion of both male and female prisoners and are a group that requires particular attention.

Unexpectedly, male and female prisoners produced different profiles of cognitive impairment. Females tended to present with more impairments in spatial abilities, complex attention and working memory, whilst male prisoners had more widespread and generalised impairments in all areas, apart from basic processing speed and basic perceptual abilities. It is likely the females' cognitive profile is the result of substance use, in particular, benzodiazepine use.

In contrast, the males' impairment profile more resembles that seen in alcohol related brain injury and traumatic brain injury. This means that males and females with an ABI will present with different cognitive and behavioural profiles and may require different management strategies.

Recommendations

- During their time in prison, persons with ABI should have access to treatment of possible medical (and other) conditions, as well as management of cognitive and behaviour problems.
- Given that the current project strongly indicates that the use of substances (alcohol and other drugs) is the main cause of brain injury, it is recommended that access to drug and alcohol treatment services (including counselling, medication, etc) should be readily available and encouraged.
- Prisoners should have access to therapy to assist with learning to manage their cognitive problems (such as learning compensatory strategies for memory).
- Prisoners identified as having moderate to severe cognitive problems may have difficulty learning new routines and adhering to rules (e.g. they may forget them) so it is recommended that they may receive extra support from staff, for example, reminders, repetition and writing things down for them.
- Any possible relationship between the presence of acquired brain injury, offending behaviour and returning to prison (multiple incarcerations) was not within the scope of the current project. However, this is extremely important information that should be investigated further.
- If a relationship does exist between the presence of an acquired brain injury, offending behaviour and re-incarceration, then implementation of appropriate supports and services for the ABI may result in a reduction in re-offending behaviour and a reduction in returning to prison.
- Not only would appropriate ABI supports and services have significant psycho-social implications for the prisoners, it would also potentially have a significant cost-saving benefit by keeping people in the community rather than in prison.
- It is recommended that areas requiring attention include accommodation and employment given that these were areas of concern raised during the interview stage (i.e., high levels of accommodation problems and lack of employment prior to incarceration).
- It is recommended that screening for possible ABI become a core part of the induction process for prisoners when entering prison. The screening tool should not be used as a substitute for a formal assessment and diagnosis, but should be used to identify prisoners who may have an ABI and thus require further investigation.

# DEPARTMENT OF JUSTICE REPORT

## ANALYSIS AND FINDINGS

**INTRODUCTION**

Acquired Brain Injury (ABI) is an injury to the brain which results in deterioration in cognitive, physical, emotional or independent functioning. ABI can occur as a result of trauma, hypoxia (lack of oxygen to the brain), infection, tumour, substance abuse, degenerative neurological diseases or stroke. The impairments to cognitive abilities may be either temporary or permanent and may cause partial or total disability or psychosocial maladjustment (Department of Human Services and Health, 1994).

The impact on a person's entire wellbeing is of particular significance when exploring the link between ABI and the criminal justice system / offending behaviour. The type and severity of the brain injury play a crucial role not only in rehabilitation, but also in one's insight and awareness of their deficits, which in turn impacts on their ability to understand the exact link between the brain injury and offending.

Limited Australian and international empirical data indicates that the prevalence of offenders with an ABI in the Victorian correctional system may be considerable, although the true statistic is unknown, particularly in female prisoners. As ABI has important implications for offender management and, in particular, the responsivity of offenders to forensic treatment, accurate identification of ABI can be crucial for both management and needs-based treatment intervention.

The need to diagnose ABI in offenders clearly outweighs any potential costs borne as a result of the diagnosis. Early diagnosis is the most cost-effective way of ensuring appropriate targeting of resources and service allocation to offenders. Screening offenders for ABI may prove to be the most cost effective way to commence the process of diagnosis amongst this population. There are multiple manifestations of ABI, attributable to the cause and severity of the injury (see section on Sequelae, p. 13). Co-morbidities such as mental illness and drug and alcohol use, and the risk of further brain injury, reinforce the need to effectively diagnose sooner rather than later.

**1.1 CONTEXT**

Internationally over 9.25 million people are held in penal institutions (Walmsley, 2006), yet there is little information relating to the prevalence rates of ABI within this population. Due to its impact on a range of cognitive, emotional and behavioural functions, ABI and its associated deficits would be

expected to increase a person's chances of encountering the criminal justice system, either as an offender, witness or victim. There is an abundance of evidence that non-biological factors, including psychological and social variables, are related to crime (Miller, 1999).

Brain damage by itself does not precipitate offending; it is the resulting psychological changes which, in turn, may predispose the person with ABI to offending (Miller, 1999). Persons suffering an ABI often experience cognitive, emotional and physical sequelae that can debilitate daily functioning following the injury (Ducharme, 2000). The location of the damage within the brain mediates the deficits (Miller, 1999).

The difficulty sometimes associated with a brain injury is that the person may not recognize the loss in their psychological functioning (Sarapata, Herrmann, Johnson & Aycock, 1998).

There are enormous benefits of identifying ABI amongst the prison population. Identification is an important step in appreciating the overall burden on the system, as well as defining the health care needs of prisoners who have an ABI (Schofield et al., 2006b). Individuals with ABI present unique challenges to the correctional system (Iverson, Franzen, Demarest & Hammond, 1993) yet little information exists relating to ABI among prisoners compared to information relating to other healthcare issues (Slaughter, Fann & Ehde, 2003).

According to the Australian Bureau of Statistics (ABS) (2008) there were 27,615 prisoners in Australian prisons at 30 June, 2008. This equated to 169 prisoners per 100,000 adult population. The gender breakdown of the 27, 615 prisoners is 93% male and 7% female. Victoria's prison population at the same time (n=4223) accounted for 15% of the total Australian prisoner population, with 94.4% being male and 52.1 % having previously served a term of imprisonment in an adult prison (ABS, 2008).

### 1.2 PREVALENCE

So the question that one should pose is: Is there an over-representation of people with an ABI in the criminal justice system? The link between ABI and contact with the criminal justice system presumably lies in the psychological changes induced by head injury (Miller, 1999).

According to Sarapata et al. (1998) there are a variety of reasons, including lowered cognitive skills, decreased appreciation of legal and illegal behaviour or increased aggression. Further to this is the interaction between alcohol and substances and the impact on a head injured individual (Kenny & Lennings, 2007) and the combination of head injury and environmental influences (Miller, 1999).

Internationally there have been a number of studies exploring the prevalence of ABI amongst prison populations, though most only consider Traumatic Brain Injury (TBI) as the cause of ABI, while overlooking other significant causes of ABI such as alcohol and substance use and hypoxic brain injury. Percentage rates of TBI in prisoners range from 33% - 100% across studies (Slaughter et al., 2003; Barnfield & Leatham, 1998; Bach-Y-Rita & Veno, 1974; Turkstra, Jones & Toler, 2003; Hawley & Maden, 2003; Butler & Milner, 2003; Schofield et al., 2006a; Lewis, Pincus, Feldman, Jackson & Bard, 1986; Schofield et al., 2006b; Sarapata et al., 1998). Kenny and Lennings (2007) reported head injury rates of 35% amongst juvenile detainees in which unconsciousness was involved.

These figures are alarming, particularly when TBI is under-reported by inmates and prisoners (Iverson et al., 1993). Turkstra et al. (2003) highlighted that those who suffer from mild brain injuries often do not report for medical treatment, resulting in a lowered reporting of brain injuries in hospital data, which ultimately results in lowered reporting of ABI in both the general population and the prison population.

Finding evidence of neuropsychological abnormalities in offenders does not necessarily mean that these abnormalities played any part in precipitating offending (Miller, 1999). Kreutzer, Martwitz, Harris and Witol (1995) explored the link between arrest rate pre/post ABI. From a sample of 327 adults with a history of TBI from an outpatient rehabilitation medical clinic, 14.6% were convicted of criminal activity pre-injury with this figure decreasing to 5% post-injury. In contrast Turkstra et al (2003) proposed that the link between brain injury and crime may reflect the cognitive and emotional impairments on behaviour as a direct result of the brain injury.

### 1.3 FEMALE RESEARCH

The majority of prisoner research, including research exploring ABI, focuses on male prisoners, with little research focusing solely on female offenders. Therefore little is known about ABI amongst these prisoners and what impact, if any, it may be contributing to the overall numbers of female prisoners. A contributor to this lack of research could be the minimisation of neuropsychological distress amongst female prisoners (Daoust, Loper, Magaletta & Diamond, 2006) as well as low female prisoner numbers in comparison to male prisoners. In fact, over a four year period from June 2004 to June 2008 there has been a 2.5% decrease in the female prisoner population in Victoria (Corrections Victoria, 2009).

Research exploring TBI amongst female prisoners has revealed that, of 113 prisoners interviewed, 42% reported at least one TBI with loss of consciousness (Brewer-Smyth, Burgess & Shults, 2004). Of significance was that 95% of all subjects had abnormal neurological histories predating the current

crime. The brain injuries reported in the study were minor in nature.

Little research exists on the relationship between aggression and neuropsychological deficits and neurobiological factors contributing to violent behaviour in female inmate populations (Daoust et al., 2006, Brewer-Smyth et al., 2004).

Whilst risk factors for ABI between males and females in the general population are comparable, the battered women syndrome is one risk factor unique to females. Clinicians are frequently unaware of the incidence of head injury sustained by women with a history of domestic violence (Jackson, Philp, Nuttrall & Diller, 2002). Battered women frequently demonstrate "neurological signs that appear to have been caused by repeated head injuries" (Walker, 1991, as cited in Jackson et al., 2002).

Women are generally less likely to offend than men and, according to Butler, Allnutt, Cain, Owens and Muller (2005) when women do offend they are more likely to be suffering from a mental illness. Given the high correlation between ABI and mental illness one could also insert ABI in this already complicated equation.

### 1.4 TBI

In correctional settings, more is known about the prevalence, characteristics or identification of TBI compared with other forms of ABI (Slaughter et al., 2003). Cognitive deficits not only impact on functioning in prison, but also have significant consequences upon release from prison (Barnfield & Leatham, 1998).

The accumulation of these individuals in the Criminal Justice System may reflect the inability of overstretched services elsewhere in the system to meet existing need (O'Neill, Delgary & McInerney 2008).

Epidemiology studies indicate that TBI is a risk factor for subsequent TBIs (Schofield et al., 2006b). Substance abuse is well recognised as causing cognitive impairment, as well as being a significant risk factor for incurring TBI (Kelly, Johnson, Knoller, Drubach & Winslow, 1997). Risk factors associated with TBI include low socio-economic status, alcohol abuse and low years of education (Barnfield & Leatham, 1998). Those who have used substances prior to their head injury fare worse in neuropsychological testing than those who have not used (Kelly et al., 1997). Substance misuse, particularly alcohol, is both a premorbid risk factor for TBI and a continuing problem for some post-injury (Parry-Jones, Vaughan & Miles-Cox, 2004). Those established factors closely related to the presence of a TBI are generally accepted as being commonly present amongst the offending population.

### 1.5 ABI & OFFENDING

While previous research reports have shown heightened rates of brain injury in the prison population, Miller (1999) states that brain injury should not be considered the sole cause of

offending, nor should it be concluded that all offenders are neurologically damaged in some way. This sentiment was echoed by Sarapata et al. (1998) who asserted that someone suffering from a head injury is not necessarily destined to become a criminal. Many people who suffer from an ABI, whether or not diagnosed, maintain a law abiding existence without ever coming to the attention of authorities.

Following an ABI, impairments in cognitive functioning can arise (in memory, attention, speed of information processing etc.) and there are often changes in personality (Miller, 1999). The diffuse pattern of injury following TBI can lead to a variety of disorders of behaviour, including behavioural excesses such as aggression, impulsivity, disinhibition and various behavioural deficits, including amotivation and adynamia. Compounding these difficulties are the often concomitant neuropsychological problems of diminished insight and impaired cognitive functioning (Manchester, Hodgkinson & Casey, 1997).

The head-injured individual may seem unresponsive to a judge and/or jury because such participants have greater difficulty understanding the proceedings than non-head-injured participants. This perception of the head-injured individual probably leads to incarceration more often than for non-head-injured individuals (Sarapata et al., 1998).

While the prevalence rates of ABI vary from study to study, the exact implications of ABI on the criminal justice system can be assumed, or have been detailed. Individuals with memory problems may require reminders to appear in court and/or more written instructions (Colantonio, Stemenova, Abramowitz & Clarke, 2007). Impaired cognition may also diminish appreciation of the legal consequences of one's behaviour (Kelly & Winkler, 2007).

Furthermore, certain brain pathologies may exacerbate pre-morbid personality tendencies toward violence, or may functionally disinhibit a previously nonviolent individual (Iverson et al., 1993, Kenny & Lennings, 2007).

Irritability and aggression suggest a link to violent offending (Miller, 1999), whilst other forms of offending could be linked to disinhibition and lack of foresight (Miller, 1999).

Several studies have explored the link between head injury and crime amongst young people. Kenny and Lennings (2007) proposed that no single factor can explain why young people become involved with violent crime, but the co-morbid presentation of head injuries, alcohol use and possibly cultural background might have an influence. Perinatal difficulties also appear to play a causal role in violent offending (Mednick, Brennan & Kandal, 1998) and might be a contributing factor in early offending behaviour. Timonen et al. (2002) found that TBI sustained in childhood or early adolescence was associated with higher risk of criminal

offending among mentally disordered males. Non-treated ABI and severity of the injury could correlate with the degree of violence in delinquent behaviour (Leon-Carron & Ramos, 2003).

Law-violating acts are common sequelae in the lives of children and adolescents who have TBI. (Luiselli, Arons, Marchese, Potoczny-Gray & Rossi, 2000). One could say that head injury 'cocks the trigger' to delinquent behaviour (Leon-Carron & Ramos, 2003). Identifying the frequency and types of offences committed by young persons who have TBI is an important step in designing effective interventions that reduce risk, protect the community at large and teach coping skills to overcome the probability of committing law violations (Luiselli et al., 2000).

Perinatal difficulties have also been documented as being higher in incarcerated delinquent female populations (Shanok and Lewis, 1981, as cited in Mednick et al., 1988). Self reporting of these difficulties is solely reliant on the offender's recollection not only of their early childhood, but also on the information being passed on by families. The difficulty in obtaining this information is made even greater by the fracturing of families as a result of offending and the stigma associated with incarceration.

Furthermore, neurological impairment itself may undermine the ability to accurately report symptoms of brain injury (Daoust et al., 2006). Those who suffer structural damage to the brain may have psychological changes and cognitive impairments that predispose them to offending. This is especially so for head injury and damage to the frontal and temporal lobes, and it might be expected that the strongest link would be with violent and sexual offending (Miller, 1999).

### 1.6 RESEARCH RELIABILITY

All but a few studies of TBI prevalence in offender populations have relied upon self-administered instruments that attempt to map recall of injuries and subsequent symptoms onto differing clinical definitions of TBI severity (Diamond, Harzke, Magaletta, Cummins & Frankowski, 2007). Instruments and resulting data have been limited in scope, and have not been sufficient to assess questions regarding the frequency and severity of head injury and subsequent psychological and behavioural difficulties, including criminal behaviour (Diamond et al., 2007).

Research should examine the associations of self-reports of head injuries with assessed neurocognitive functioning to determine the validity of self reported head injury as an indicator of neurocognitive problems (Walker, Hiller, Staton & Leukefeld, 2003), notwithstanding a high correlation between self-reported head injury and other problems such as lifetime health problems, mental health and drug use (Walker et al., 2003). Caution is required, as the provision of 'phoney' substance use histories and faking a head injury

(malingering) may provide an excuse to the offender for their crime (Sarapata et al., 1998). It has been suggested that inmates exaggerate their experience with substances, and that up to 10.5% falsely report using a particular drug (Barnfield & Leatham, 1998). In contrast, Darke (1998) reported that prisoners are often reliable respondents when it comes to self-report.

### 1.7 WHY INVESTIGATE / THE NEED TO IDENTIFY ABI

Understanding the 'burden' of ABI and its complications within this population is an important first step in appreciating its relevance to the issue of causality for possible judicial considerations at the time of sentencing, and to help define the health needs during the incarceration period (Schofield et al., 2006b).

Self-report items could be used to develop a screening measure to identify inmates who, because of neuropsychological impairment, could be predisposed to increased levels of aggression (Daoust et al., 2006). Understanding inmates' neuropsychological functioning could also lead to more efficient and appropriate interventions, which could be implemented early in their sentences (Daoust et al., 2006).

No individual test can measure all aspects of brain functioning; hence no single measure has yet been found that will universally differentiate brain-impaired from non-brain impaired individuals (Iverson et al., 1993). Indeed, it has been suggested that a set of head injury history questions could help treatment planning to identify individuals with high likelihood of cognitive problems (Walker, Staton & Leukefeld, 2001). Diagnosis is often complicated by high levels of reported alcohol and substance use (Barnfield & Leatham, 1998).

Historically, prisoners are not screened for neurological deficits and brain injury histories, nor are they screened for in substance abuse treatment programs (Walker et al., 2003). Screening may well enable the identification of prisoners who may be at risk of higher rates of behavioural issues from ABI (Daoust et al., 2006). Likewise, collection of medical information at point of entry is critical and important, as it provides an opportunity to intervene and initiate treatment (Butler et al., 2005). Since prisons are restricted areas, the health problems of inmates are not well recognised, and are greater than those in the general population (Kanato, 2008). Screening is particularly important for those with a history of substance use, especially in the context of client goals. The presence of ABI might have implications for approaches and treatment for substance users without treatment taking into account strengths and weaknesses (Walker et al., 2001).

One of the issues pertinent to the definitive identification of ABI is the cost and availability of neuropsychological assessments (see page 11). The goal of screening is not to diagnose;

rather, it is to identify signs of brain dysfunction and suggest a possible aetiology (Iverson et al., 1993).

If signs of significant or especially problematic neuropsychological impairment are found, a referral for comprehensive evaluation is warranted (Iverson et al., 1993).

When screening, there can be under-reporting of head injuries, as reliance on self-report of head-injuries is always problematic (Kenny & Lennings, 2007). Identifying hospitalisation and length of hospitalisation might be helpful in determining ABI severity (Colantonio et al., 2007). Therefore, any screening instrument that is based on self-report may need to be treated with some caution. There are also gender specific issues with screening, i.e., the lack of screening for mild traumatic brain injury from domestic violence amongst women, with a need to utilise direct questions exploring blows to the head and loss of consciousness when female victims of domestic violence present (Jackson et al., 2002).

It is axiomatic that the earlier screening can take place, the more effectively correctional regimes can be modified to take into account potential ABI. Screening for ABI at reception into a correctional system would add another layer to the current risk assessments already conducted, such as suicidality, mental illness, violence and substance use. This early identification could inform offender assignment and management, thereby advancing rehabilitation efforts during incarceration (Diamond et al., 2007) and offering an 'early' intervention in a high risk group (Schofield et al., 2006b). High numbers of individuals in a correctional setting engage in (ABI) risk behaviours and, as such, a substantial proportion may benefit from neuropsychological screen (Iverson et al., 1993).

However, many prisoners received into the correctional system are highly distressed (Butler et al., 2006) which could interfere with initial screening. Screening should include recent or significant, remote or past TBI (Schofield et al., 2006a), as well as ABI from other causes such as substance use and hypoxia, bearing in mind the current mental state of the prisoner being screened.

It is possible that a significant percentage of inmates with less obvious forms of brain damage might go undetected (Iverson et al., 1993). Head injury questions during assessment require very little time, and would add little cost compared to neuropsychological assessments (Walker et al., 2003). More intensive screening might lead to more appropriate dispositions and more effective interventions (Iverson et al., 1993). Information at screening can also be used in release planning, particularly where neuropsychological deficits may affect the interaction between inmate and worker (Iverson et al., 1993). Self-reported head injury may help in assessment and treatment planning in settings where neuropsychological

assessments are unavailable (Walker et al., 2003).

There are six main areas in which neuropsychological screening data may aid inmate disposition: inmate management, medical treatment, educational placement, work detail, psychotherapy and release planning (Iverson et al., 1993).

## 1.8 NEUROPSYCHOLOGICAL ASSESSMENT

Traditional neuropsychological practices fit uncomfortably within health care models that place a premium on cost and time-efficiency (Erlanger et al., 2002), and thus the cost of neurocognitive assessments makes it prohibitive for both private and public treatment settings. (Walker et al., 2001). Administration of a structured interview is time-consuming and requires a period of extensive training to achieve adequate levels of reproducibility (Kennedy et al., 2005).

Comprehensive neuropsychological evaluation is generally not feasible or available in most correctional settings due to the time (4 to 8 hours), cost and expertise required (Iverson et al., 1993). Due to the length of time of assessment, many people are unwilling to withstand the long hours of testing (Erlanger et al., 2002).

Traditionally, neuropsychological assessment has been identified as the best way to identify cognitive functioning problems (Spreen & Strauss, 1998).

The cost of assessments, however, means it is out of reach for many individuals in the community and criminal justice settings (Walker et al., 2003). Instead of this costly approach, a set of head injury screening questions used during assessment and treatment could help identify individuals with a higher likelihood of health problems, mental health symptoms and cognitive problems (Walker et al., 2003).

In the context of a forensic evaluation, the role of the neuropsychologist is to determine whether there are any neurocognitive, behavioural, or psychological problems that can be attributed to a specific injury. This is a particularly challenging task, because the underlying cause for poor outcomes in a minority of prisoners is likely multi-factorial (Lange, Iverson and Franzen, 2008). Therefore, if cognitive problems are identified in neuropsychological tests, it is difficult to know whether these problems (a) are related to the injury, (b) are related to other factors, such as pre-existing learning disabilities or pre- or post-injury mental health or substance abuse problems, or (c) represent normal variation in performance across a battery of neuropsychological tests (Lange et al., 2008).

It is the severity of the head injury and characteristics of the person that predate the injury which are important for neuropsychological outcome, and not the

circumstance of the injury itself (Machamer et al., 2003).

## 1.9 SEQUELAE

Various forms of brain impairment, especially those involving the frontal lobes, have been associated with impaired judgment (Iverson et al., 1993). Clinically significant frontal lobe dysfunction is associated with aggressive dyscontrol (Brower & Price, 2001), impulsivity (Turkstra et al., 2003), impairments in social behaviour (Blair & Cipolotti, 2000; Turkstra et al., 2003) and result in overreaction to provocative stimuli and decreased conflict resolution skills (Turkstra et al., 2003).

The changes commonly described include apathy, a failure to exercise foresight or to take account of the likely consequences of actions, a tendency to persist in courses of action that have ceased to be appropriate, irritability, grandiose and unrealistic ideas, and so on.

One concept used in describing frontal changes is "disinhibition" (Miller, 1999). It is these cognitive changes that often result in individuals breaking the law.

Aggressive behaviour is one of the most socially and vocationally disruptive consequences of neuropsychiatric disorders (Tateno, Jorge and Robinson, 2003). Tateno et al. (2003) also stated that aggressive behaviour was significantly associated with major depression, a history of drug and alcohol abuse and frontal lobe damage. Aggression is associated with poor social functioning (Tateno et al., 2003) and, apart from brain injury, other biological predictors for increased risk of aggression include temporal lobe dysfunction, history of pathologic intoxication, and encephalopathy (Boles & Miotto, 2003).

Poor anger control is a frequent behavioural problem resulting from an ABI (Iverson et al., 1993). Such things as disinhibition and lack of foresight might be linked to offending in general (Miller, 1999). Irritability and impulsivity, while not yet established, could be the mediating factor which links head injury and offending (Miller, 1999).

## 1.10 COMORBIDITY

With the high rates of substance use amongst the prison population Butler et al. (2006) have contended that there may be an overwhelming association between opioid/amphetamine use disorder and criminal behaviour resulting in imprisonment. Furthermore, offenders and victims of violent crime have alcohol and illicit drugs present (Boles & Miotto, 2008). Whilst not directly considering ABI, one study found that substance users, who are viewed as being difficult, or in denial in treatment settings, may have impaired working memory which impacts on their ability to absorb new information (Walker et al., 2001).

The chronic use of alcohol and illicit substances tends to result in measurable neuropsychological impairments (Barnfield & Leatham, 1998). There has been an enormous amount of research into the

cognitive deficits associated with alcohol and substance use and abuse, therefore only a summary will be provided.

Neuropsychological deficits have been associated with long-term abuse of alcohol (Parsons, 1998; Beatty, Katzung, Moreland & Nixon, 1994; Errico, Nixon, Parsons, & Tassy, 1990, Oscar-Berman, Shagrin, Evert & Epstein, 1997; Nicolas et al., 1997; Selby & Azrin, 1998), marijuana (Pope, Gruber & Yurgelun-Todd 1995; Pope & Yurgelun-Todd, 1996), cocaine (Beatty et al., 1994; Hoff et al., 1996; Paraherakis, Charney & Gill, 2001; Rosselli & Ardila, 1996), benzodiazepines (Barker, Greenwood, Jackson, & Crowe, 2004a, 2004b; Paraherakis et al., 2001), heroin/opioids (Davis, Liddiard & McMillan, 2002; Strang & Gurling, 1989) and inhalants (Stollery, 1996).

Prisoners often report high rates of lifetime harmful use or dependency on alcohol or drugs (Duffy, Linehan & Kennedy, 2006). It would be expected that these high rates of substance use exist given that drug use is a crime, and on its own, or coupled with property crime or violence, often leads to incarceration (Butler et al., 2006). The risk of cognitive damage amongst these prisoners with lifetime high risk alcohol and drug use is heightened. Consequently, drug abusers in the criminal justice system who appear apathetic may not lack motivation for treatment but may have cognitive impairments that limit response to traditional treatment approaches (Walker et al., 2003). Substance users who resist treatment may in fact have decreased cognitive functioning that impairs their ability to comprehend the therapy (Walker et al., 2001).

### 1.11 MENTAL ILLNESS

There have been several Australian studies exploring prisoner health and substance use (Butler et al., 2005; Butler et al., 2006; Schofield et al., 2006a). Mental illness was identified in over 30% of prisoners, substance use disorder in over 60% of prisoners and Post Traumatic Stress Disorder (PTSD) in over 25%. In addition, nearly 50% of prisoners were found to use drugs on a daily basis and 13% gave a history of suicide attempt (Schofield et al., 2006a).

Psychiatric disturbance following TBI is common in both the acute and chronic stages of recovery (Kennedy et al., 2005). Kennedy et al. (2005) reported an incidence of 26%-77% of major depression after TBI. This high incidence of depression, coupled with higher than community rates of ABI and substance use disorder of prisoners, highlight the complicated health issues associated with imprisonment.

### 1.12 INTERVENTIONS

It is not clear without testing/assessment which psychological changes are of significance following ABI. By establishing which of these psychological changes might be important in leading to offending, some progress might be made in designing interventions that could

reduce the impact of brain damage on offending (Miller, 1999).

Addressing behavioural and lifestyle issues following ABI requires interventions to be implemented at a time when the person is receptive to change (Machamer et al., 2003), and this window of opportunity could be during a period of incarceration. However, it is unlikely that prison is the best therapeutic environment for those suffering from a mental illness (Butler et al., 2006) or brain injury.

Specialised interventions are required for individuals with neurobehavioural impairment, as they present differently from individuals with other learning disabilities. Educational and vocational training for these individuals should capitalise on relative neuropsychological strengths and help them compensate for weaknesses (Iverson et al., 1993).

Greater access to mental health and neuro-rehabilitation services could potentially prevent or decrease trauma, crime and the subsequent overall costs to society (Brewer-Smyth et al., 2004). The human, societal and financial tolls are exorbitant when repeat offenders continue to face re-incarceration with short sentences (Brewer-Smyth et al., 2004). There are additional costs of crime such as judicial processes, insurance, counselling, victims' medical intervention and property damage, which add to the expenses of imprisonment (Kelly & Winkler, 2007).

Understanding the behavioural correlates of neuropsychological deficits is valuable in designing policies and interventions offered by prisons (Daoust et al., 2006).

The criminal justice system needs to distinguish between offenders who have committed criminal activity because of impaired neurological functioning and other offenders who have been socialised into a life of crime.

The typical non-head-injured offender is subjected to incarceration and criminal rehabilitation. It may be appropriate that the head-injured individual is incarcerated and needs criminal rehabilitation; however, subjecting these people to incarceration and criminal rehabilitation without first giving them cognitive rehabilitation is unjust and cruel (Sarapata et al., 1998).

The research aims to evaluate the efficacy and validity of a three stage screening process to identify prisoners with an ABI and to provide ABI prevalence data for prisoners.

The three stages utilised were:

- Stage 1: *arbias ABI Screening Tool* used to indicate the possible presence of ABI
- Stage 2: Corrections Victoria clinical interview used to verify risk factors and refer to neuropsychological assessment
- Stage 3: Full neuropsychological evaluation, providing an objective validation of the screening tool and clinical interview sensitivity and specificity for identifying ABI.

It is hypothesized that a risk-factor based checklist, combined with a follow-up clinical interview, represents an accurate initial screening for the presence of ABI and that a validated risk-factor based screening tool will allow an estimation of the prevalence of ABI amongst prisoners.

# METHOD

## STAGE ONE: SCREENING TOOL

### 2.1 Method

#### 2.1.1 Participants

One hundred and forty-six adult male prisoners who were received into the Melbourne Assessment Prison (MAP) for assessment and orientation between November 2007 and March 2008 were invited to participate in the study. Of these individuals, 110 male prisoners (75% of the group approached) consented to participate in the study. One hundred and forty-nine female prisoners who entered the Dame Phyllis Frost Centre (DPFC) between December 2007 and March 2009 were invited to participate in the study. Of these individuals, 86 female prisoners (58% of group approached) consented to participate.

Participants were recruited from sentenced prisoners only, with male prisoners needing to be sentenced to a minimum of six months and female prisoners a minimum sentence of four months.

Participants were excluded from the study if they had been registered as having an intellectual disability; if they required acute psychiatric treatment; or if they presented with a Culturally and Linguistically Diverse (CALD) background that would necessitate use of an interpreter.

#### 2.1.2 Materials and Procedures

Stage One of the research project involved participant recruitment and administration of The Acquired Brain Injury (ABI) Screening Tool (Attachment 2). Participants were recruited through the Sentence Management Unit (SMU) services at MAP and DPFC. Prior to commencement of the study, the Manager of Information, Education and Research Services at *arbias* Ltd. provided a training seminar to staff from SMU on Introduction to Acquired Brain Injury, and training on administration of the ABI Screening Tool.

Staff from SMU invited the prisoners during a Tier I Risk and Need Assessment to participate in the study, and provided them with written information about the study and informed consent (Refer to Attachments 1, and 4 to 10). The informed consent sheet covered participation in all three stages of the project. After written consent to participate in the study was obtained, staff members from SMU administered the ABI Screening Tool to participants on an individual basis.

The ABI Screening Tool was developed for Corrections Victoria by *arbias* Ltd and La Trobe University. The ABI Screening Tool screened for risk of acquired brain injury from a variety of causes. The Question Sheet that

accompanied the ABI Screening Tool (Attachment 2) listed questions to be asked by the administrator to elicit relevant information. Questions were organised under eight subheadings, which related to history of: Alcohol Use; Drug Use; Assaults; Motor Vehicle Accidents; Suicide Attempts; Stroke; Amateur/Professional Boxing; and Psychiatric conditions.

Questions about alcohol and substance use history related to the type, duration and frequency of use. For alcohol use, the amount consumed was also elicited.

Where there was a positive history of substance use, history of overdose and overdose-related resuscitation was elicited. Questions about Assaults, Motor Vehicle Accidents, Suicide Attempts and Amateur/Professional Boxing related to the number of times the person had experienced each of these events, the nature of injuries sustained, whether injuries were associated with loss of consciousness and the estimated duration of loss of consciousness, whether hospital admission was necessary and the length of the hospital stay. For amateur/professional boxing, further specific questions related to the duration of involvement in competition and the number of times the person had been knocked out. The Stroke ABI indicator was explored by asking whether the person had suffered a stroke. Finally, psychiatric history was elicited via questions about diagnosis of any psychiatric conditions and involvement with any treatment services.

The information gathered from these questions was used to determine whether the individual presented with risk of acquired brain injury from alcohol use, substance use, traumatic brain injury, hypoxia and/or stroke. Traumatic brain injury was screened for by motor vehicle accident, assault and boxing histories, whereas hypoxic brain injury was screened for by drug overdose and suicide attempt history.

Judgments about whether ABI risk indicators were endorsed were made via reference to pre-determined criteria (Attachment 2).

## STAGE TWO: CLINICAL INTERVIEW

### 2.2 Method

#### 2.2.1 Participants

For the male sample, participants were 109 prisoners recruited following completion of the ABI Screening Tool at Stage One of the research project (one prisoner who consented to participate was excluded due to incompletion of Stage 1). Of these 109 participants, 7 participants withdrew their consent to participate in the clinical interview and one participant could not be seen due to behavioural problems. A further 11 participants were released from prison on parole or, following successful appeal of conviction, before they could be seen for clinical interview. Therefore, a total of 90 male participants completed the Stage Two Clinical Interview.

For the male sample, the breakdown of participants interviewed at various prisons was as follows:

- 54 participants interviewed at MAP.
- 25 participants interviewed at Port Phillip Prison.
- 4 participants interviewed at Fulham Correctional Centre.
- 3 participants interviewed at Langi Kal Kal Prison.
- 2 participants interviewed at Ararat Prison.
- 2 participants interviewed at Loddon Prison.

For the female sample, participants were 86 prisoners recruited following completion of the ABI Screening Tool at Stage One of the research project.

Of these 86 participants, 23 participants withdrew their consent to participate in the clinical interview, two were deemed to require an interpreter and consequently excluded from the study, and one was diagnosed with an intellectual disability. A further four participants were released from prison on parole or, following successful appeal of conviction, prior to the interview being conducted. Therefore, a total of 56 female participants completed the Stage Two Clinical Interview. For female participants, 43 were interviewed at Dame Phyllis Frost Centre and 13 were interviewed at Tarrengower Prison.

#### 2.2.2 Procedures and Materials

Clinical interviews were conducted at prisons as soon as possible following Stage One of the research project. Interviews were conducted by *arbias* staff members with professional training and experience in acquired brain injury. Interviews were conducted on an individual basis at either box visits or contact visits. The average duration of clinical interview was one hour.

The clinical interview format used for the current study was based on the interview developed by Corrections Victoria and *arbias* Ltd. during the Pilot Project. Minor modifications to the pilot study interview were made by *arbias* researchers prior to commencement of the study. The interview followed a semi-structured format and elicited information covering the following areas: demographic information and personal history; medical history; psychiatric history; alcohol and substance use history; history of contact with treatment and community support services; early developmental and school history; occupational history; current physical functioning; and self-reported cognitive difficulties (see Attachment 3).

## STAGE THREE: NEUROPSYCHOLOGICAL ASSESSMENTS

### 2.3 Method

#### 2.3.1 Participants

Participants were male and female prisoners who had completed both Stage 1 (ABI Screening Tool) and Stage 2 (Clinical Interview) of the research project. Of the 90 male participants who completed both stages of the project, 5 withdrew consent at the time of the assessment, and 11 were released on parole before assessments could be conducted. A total of 74 male participants completed the Stage 3 neuropsychological assessments.

For the male sample, the breakdown of participants assessed at various prisons was as follows:

- 28 participants at Fulham Correctional Centre.
- 9 participants at Ararat Prison.
- 8 participants at Beechworth Prison.
- 7 participants at Port Phillip Prison.
- 7 participants at Loddon Prison.
- 7 participants at Dhurringile Prison.
- 3 participants at Marngoneet Correctional Centre.
- 2 participants at Langi Kal Kal Prison.
- 2 participants at Barwon Prison.
- 1 participant at MAP.

Of the 53 female participants who completed Stages 1 and 2 of the research, 9 withdrew consent at the time of the assessment and 1 was released on parole before the assessment could be conducted.

A total of 43 female participants completed the Stage 3 neuropsychological assessments. For female participants, 31 completed the neuropsychological assessment at DPFC and 12 were assessed at Tarrengower Prison.

#### 2.3.2 Materials and Procedures

A comprehensive neuropsychological test battery was used for standardised data collection and to provide samples of a broad range of behaviour and assessment of the major cognitive functions. The test battery included some of the most commonly used measures in clinical practice and research. The neuropsychological tests were selected on the basis of their extensive development, psychometric properties and good normative sample data. A description of the tests used is presented below.

***WAIS-III***

Intellectual assessment was undertaken with the Wechsler Adult Intelligence Scale - Third Edition (WAIS-III) (Wechsler, 1997a). This test is considered to be a valid and reliable measure of intelligence. The Wechsler intelligence tests are the most widely used intelligence assessments and are among the most widely used tests in neuropsychological assessments.

The development of the WAIS-III was based on the theory that intelligence is a global or

general ability that characterises an individual's behaviour as a whole. This global ability is an aggregate of different elements, skills or specific abilities. Because intelligence is multifaceted, it was considered that a measure of intelligence must reflect this multitude of skills. Assessment of more global or general levels of functioning could then be obtained from aggregating specific behavioural outcome measures.

Consequently, the WAIS-III consists of 14 individual subtests that measure different mental abilities. Age-adjusted scaled scores (i.e., standardised scores) on these individual subtests can be combined in two different ways to provide summary scores of more general levels of functioning. These include the traditional Intelligence Quotients (IQs) for the Verbal Scale and Performance Scale tests, which are then combined to obtain the Full Scale IQ. These summary scores reflect the view that intelligence is composed of two major types of skills — verbal and visual, performance-based — which together reflect an individual's overall intellectual ability.

The second set of summary scores is the WAIS-III Index Scores, which provide grouped scores based on more refined domains of cognitive functioning than the IQ scores. The WAIS-III provides four Index Scores: Verbal Comprehension Index (VCI; grouping of scores from the Similarities, Vocabulary and Information subtests); Perceptual Organizational Index (POI; summary of scores on the Picture Completion, Block Design and Matrix Reasoning subtests); Working Memory Index (WMI; subtests Digit Span, Arithmetic and Letter-Number-Sequencing); and the Processing Speed Index (PSI, subtests Digit-Symbol Coding and Symbol Search).

The WAIS-III was administered using standard administration procedures, with each subtest completed separately. Each subtest proceeded from very easy items to very difficult ones. Tasks on the WAIS-III include questions of general knowledge, traditional arithmetic problems, tests of expressive vocabulary and ability to form verbal concepts, attentional functioning during spoken activities, completion of pictures with missing elements, arrangements of blocks and pictures and time-limited pencil-and-paper activities. Three subtests were not administered because summary scores can be calculated without them (Comprehension, Object Assembly and Picture Arrangement).

The outcomes from administration of the WAIS-III were as follows:

(i) Age-adjusted scaled scores for performances on the individual subtests. Each subtest has a scaled score mean of 10 and a standard deviation of 3.

(ii) Summary scores for the four WAIS-III Indices (VCI, POI, WMI, PSI).

(iii) Prorated summary scores for the Verbal Intelligence Quotient (VIQ) and

Performance Intelligence Quotient (PIQ), from which the Full Scale Intelligence Quotient (FSIQ) was calculated.

Each Index Score and Intelligence Quotient has a mean of 100 and a standard deviation of 15.

***WMS-III***

Memory assessment was undertaken with the Wechsler Memory Scale – Third Edition (WMS-III) (Wechsler, 1997b). The WMS-III provides a reliable and comprehensive assessment of immediate, delayed and working memory. These specific memory functions are assessed in two modalities: auditory and visual.

Similar to the WAIS-III, the WMS-III consists of individual subtests that are presented separately. The test provides age-adjusted scaled scores for performances on individual tests, with a mean score of 10 and a standard deviation of 3. Summary scores are also derived based on combined performances across groups of tests, providing the WMS-III Index Scores, with a mean of 100 points and a standard deviation of 15.

Current psychological theories provide a conceptual framework for understanding different types of memory systems. Based on this framework, the WMS-III is primarily a measure of declarative episodic memory, in that the information presented is novel, presented within a specific context (i.e., the testing situation) and must be consciously stored and retrieved as specific bits of information. The WMS-III also assesses another memory system, working memory, which is involved in the active manipulation of information while it is stored in memory for brief periods.

The six primary subtests of the WMS-III test battery were used to assess these memory systems under different conditions. The four declarative episodic memory tests each consisted of two recall trials that assessed the amount of information that could be remembered: (i) immediately after presentation, and (ii) following delay of 25 - 35 minutes. Participants were given explicit instructions to remember the information after the Immediate Recall trials. Two of the tests involved remembering verbal, orally presented information: one involved remembering spoken story passages (Logical Memory subtest), and the other tested the ability to learn and remember novel word associations (Verbal Paired Associates subtest).

Two tests involved remembering visual information: recognition memory for faces (Faces subtest) and memory for pictures of family members undertaking various activities (Family Pictures subtest).

The final two subtests provided measures of working memory: a verbal test that involved reordering sequences of numbers and letters (Letter-Number Sequencing) and a visual test that involved remembering the spatial locations

of blocks presented sequentially on a three dimensional board (Spatial Span).

Age-adjusted scales scores for performances on individual WMS-III subtests were combined into the following eight summary Index Scores:

1. Auditory Immediate Index: memory for information immediately after it is orally presented.
2. Visual Immediate Index: memory for information immediately after it has been visually presented.
3. Immediate Memory Index: memory for both visual and auditory information after it has been presented.
4. Auditory Delayed Index: memory for orally presented information after a delay.
5. Visual Delayed Index: memory for visually presented information after a delay.
6. Auditory Recognition Delayed Index: recognition memory for auditory information after a delay.
7. General Memory Index: overall delayed memory capacity for auditory and visual information 25 -35 minutes after a delay.
8. Working Memory Index: capacity to remember and manipulate both visually and orally presented information in short-term memory storage.

***COWAT***

The ability to initiate and spontaneously generate spoken information on demand was tested using the Controlled Oral Word Association Test (Benton & Hamsher, 1989, as cited in Lezak, Howieson & Loring, 2004). Participants were asked to name as many words as possible beginning with a given letter within a 60 second time period. Three word generation trials were administered using the letters F, A and S. The test rules specified that the words could not be names of people or places, or the same word with different endings. The total number of words produced under these testing conditions was recorded.

The total score was converted to a *Z*-score, based on the normative data for age- and education-level published by Tombaugh, Rees and Kozak (1996, as cited in Spreen and Strauss, 1998).

***Trail Making Test***

*Trails A*

This test is a commonly used pencil-and-paper measure of speed of information processing, visual scanning, and visuo-motor functioning. The test required participants to connect, by making pencil lines, 25 encircled numbers randomly arranged on a piece of paper. Participants were instructed to connect the numbers in proper order, and to work as quickly as possible. The time taken to complete the activity was recorded in seconds.

*Trails B*

This test is a measure of speed of attentional shifting and sequencing, divided attention, and visuo-motor functioning. A total of 25 encircled items, consisting of numbers (1 to 13) and letters (A to L), were presented on a piece of paper. Participants were instructed to join the items by alternating between a number and a letter in order (1-A-2-B-3-C-etc.), and to work as quickly as possible. The time taken to complete the activity was recorded in seconds.

Time-based raw scores for Trails A and B were converted to *Z*-scores, based on age group normative data provided in the study by Tombaugh (2004).

***Stroop Colour and Word Test***

The Stroop Colour and Word Test (SCWT) is a measure of attentional control and response inhibition. The test version and normative data developed by Golden and Freshwater (2002) was used. This test consisted of three test pages: the Word Page, Colour Page, and the Colour-Word Page. Each page showed 100 items, organized in five columns of 20 items, printed on a white A4 sheet of paper. The Word Page consisted of the three words (*red*, *green* and *blue*) printed in black ink and ordered randomly down the columns.

The Colour Page consisted of the symbol XXXX, with each item printed in red, green, or blue ink. No colour followed itself or matched the corresponding order of items on the Word Page.

The Colour-Word Page consisted of the words from the Word Page (*red*, *green* and *blue*) printed in the coloured ink of the items from the Colour Page. None of the words matched the ink colour in which they were printed (e.g., the word *red* was printed in green ink, the word *blue* was printed in red ink).

For each page, participants were asked to start with the item in the top left column and to work down the columns as quickly as possible, until instructed to stop. A period of 45 seconds was allowed for each page. If participants completed all columns before the time period had expired, they were instructed to return to the first column and begin again.

For the Word Page, participants were asked to read aloud the printed words. For the Colour Page, participants were instructed to name aloud the colour of the items. For the Colour-Word Page, participants were asked to name the colour of the words and to ignore the word that was printed. Errors were corrected by the examiner. The number of items read or named correctly within the time period was recorded for each page. These three raw score outcomes were then converted into age- and education-adjusted *T*-Scores. The fourth outcome provided a *T*-Score for performance on the Colour-Word Page adjusted for speed of performances on the Word and Colour Pages.

***Rey Complex Figure Test (RCFT)***

The Rey-Osterrieth Complex Figure is a measure of visuo-spatial constructional ability and visual memory.

The test version and normative data published by Meyers and Meyers (1995) were used. The stimulus material for this test is a complex geometric design, printed in black ink on a white A4 sheet of paper. The test consists of four trials. First, in the Copy trial, the participant was instructed to copy the design as accurately as possible on a blank sheet of paper. The examiner noted the approach taken to copying the figure, which provided information on perceptual organisation of complex visual information, and planning and sequencing of responses.

Second, for the Immediate Recall Trial, three minutes after the Copy Trial and with prior warning, the participant was asked to draw as much of the figure as possible.

Third, for the Delayed Recall Trial, 30 minutes after the Copy Trial was administered the participant was again asked to draw the complex figure. Finally, for the Delayed Recognition Memory Trial, the participant viewed 12 shapes or designs that were elements of the complex design, along with 12 designs that were not component pieces of the larger complex design (distracters). The participant was asked to identify the elements that were part of the complex design.

A scoring system was used to measure the accuracy of the copy of the design, and of the drawings produced during the immediate - and delayed - recall trials (see Meyers & Meyers, 1995). For the Delayed Recognition Trial, the number of elements correctly identified and distracters incorrectly identified was recorded. The raw scores from all trials were converted into age-adjusted *T*-Scores and percentile ranks.

***Rey Auditory Verbal Learning Test***

The Rey Auditory Verbal Learning Test (RAVLT) is a commonly used clinical measure of verbal learning and memory (Spreen & Strauss, 1998; Sullivan & Bowden, 1997). It is widely recognized as a valid measure of memory (Rosenberg, Ryan, & Prifitera, 1984). The RAVLT measures different aspects of verbal memory functions, including verbal immediate memory and new learning, susceptibility to interference, short and long delayed verbal recall, and delayed verbal recognition memory.
The RAVLT involves spoken presentation of a list of 15 words (nouns), repeated over five learning trials. Immediately after presentation at each learning trial, the participant was instructed to recall as many words as possible in any order. The presentation order of the words remained fixed and instructions were repeated at each trial. The final recall trial was followed by an interference trial, which involved

spoken presentation of a new list of 15 words, with instruction to recall as many words from the new list as possible immediately after presentation.

Immediately after the interference trial, participants were required to recall the original word list without any further exposure to it. They were instructed to remember this list because they would be tested again later. After a period of 30 minutes, participants were asked to recall the original word list without further presentation of this list. Finally, for the delayed recognition test, participants were presented with a list of 30 words that consisted of the 15 words from the original list and 15 new words that served as distracter items. After presenting each word, participants indicated verbally (forced-choice 'yes' or 'no') whether it had belonged to the original word list.

Test outcomes were the number of words recalled at each of the five learning trials, the total number of words recalled across the trials, the number of words recalled after interference and a short delay, the number of words recalled after a long delay, and the number of words correctly recognized after a delay. These raw scores were converted to *Z*-scores, based on normative data for participant's age and education level provided in the Australian study by Senior and Douglas (1999).

***TOMM***

The Test of Memory Malingering (TOMM; Tombaugh, 1996) is an effort test. This measure consists of 50 pictorial line drawings of common objects presented for 3 seconds, each over the course of two learning trials. Following each learning trial, participants were administered a forced-choice test in which they were shown 50 pairs of drawings. For each pair, participants were required to identify the picture they had seen during the learning trial. Corrective feedback was given. An optional retention trial was administered in which only the forced-choice test was given following a brief delay. Outcomes collected from this test were whether participants fell above or below criteria indicative of adequate effort.

***DASS21***

The Depression Anxiety Stress Scales-21 (DASS-21) is a 21-item questionnaire with three 7-item subscales: Depression, Anxiety and Stress (Lovibond & Lovibond, 1995). The DASS-21 is derived from the DASS, which is a 42-item measure of the same three constructs. The questionnaire items are statements that relate to potential clinical symptoms.

Participants were instructed to rate themselves for each item based on their experiences over the past week. A 4-point rating scale was used (ratings ranged from 0='Did not apply to me at all', to 3='Applied to me very much, or most of the time'). Item responses were collated within the three subscales, and then converted to *Z*-scores based on normative age group data.

Neuropsychological assessments were completed by qualified psychologists from *arbias* Ltd. who had completed postgraduate training in clinical neuropsychology approved by The Australian Psychological Society. The assessments were conducted on an individual basis during contact visits at various prisons. The assessment was conducted in a single session of approximately three hours' duration.

The tests were administered in the following order: WMS-III immediate recall and working memory measures, WAIS-III subtests, WMS-III delayed recall measures, WAIS-III subtests, Trails A & B, RAVLT, Rey Complex Figure Test (Copy Trial), Stroop Test, Rey Complex Figure Test (Immediate Recall Trial), COWAT, RAVLT Delayed Recall and Recognition Tests, TOMM and DASS-21.

Neuropsychological assessment findings included the profile of cognitive strengths and weaknesses on formal testing, behavioural observations during the assessment and consideration of background history including ABI risk factors. All of this information was considered when presenting a clinical opinion regarding whether or not a participant presented with an acquired brain injury.

With regard to acquired brain injury diagnosis, different types of acquired brain injuries tend to be associated with different neuropsychological profiles.

In general, however, acquired brain injury tends to cause impairment in one or more of the following areas: problem-solving and reasoning; new learning and memory; attentional functions; and higher-level executive skills. Impairment in a particular cognitive skill was determined when performance fell below normal limits for age expectations, that is, greater than 1.5 standard deviations below the mean score for age, and when the impairment was demonstrated with consistency under different testing conditions. Furthermore, the pattern of cognitive strengths and deficits had to be consistent with an acquired brain injury.

Acquired brain injury was not diagnosed when the cognitive deficits could be wholly explained by factors such as medication side-effects, physical problems, emotional disturbance, the person's intellectual background, and limited history of education. Some individuals diagnosed with acquired brain injury presented with these issues; in these instances, the cognitive deficits had to be greater than expected after taking into account the contribution from these factors.

The ABI diagnoses were based on independent evaluation of the evidence by two clinical neuropsychologists at *arbias* Ltd.

## RESULTS

### 3.1 Stage One: ABI Screening Tool

For the male sample, the Screening Tool was incomplete for one participant, giving a total sample size of *n*=109. The female sample consisted of a total sample of *n*=86.

The number and type of ABI indicators endorsed were collated within individuals and then within the groups. The results of interest were the types of ABI indicators endorsed most frequently within the groups and the number of ABI risk factors endorsed across individuals within the groups. The number of participants who positively endorsed each ABI indicator was collated.

Table 1 presents the number and percentage of male and female participants who met criteria for each type of potential ABI risk factor. The cumulative percentage was inflated due to more than one ABI risk factor being endorsed by some participants.

***Table 1***
***Percentage of male and female participants who met criteria for ABI Risk Indicators***

| ABI Indicator Type | Males (n=109) | | Females (n=86) | |
|---|---|---|---|---|
| | N | Percentage | N | Percentage |
| Alcohol | 27 | 24.77 % | 13 | 15.12% |
| Drug | 45 | 41.28 % | 53 | 61.63% |
| Traumatic Brain Injury | | | | |
| - MVA | 11 | 10.09 % | 15 | 17.44% |
| - Assault | 17 | 15.59 % | 20 | 23.26% |
| - Boxing | 4 | 3.67 % | 1 | 1.16% |
| Hypoxic Brain Injury | | | | |
| - Overdose | 28 | 25.69 % | 40 | 46.51% |
| - Suicide Attempt | 23 | 21.10 % | 21 | 24.42% |
| Stroke | 1 | 0.92 % | 2 | 2.33% |

Table 1 shows that the ABI risk factor endorsed most frequently in the male group was drug use, followed by overdose with resuscitation, and then alcohol use. With regard to breakdown within ABI indicators, 32 males (29%) met criteria for the TBI risk factor. Of these individuals, assault emerged as the most common cause of head injury (53.1%), followed by motor vehicle accident (34.4%) and then head injury from boxing competitions (12.5%). Fifty-one male participants (46.8%) endorsed risk factors for hypoxic brain injury. With regard to type of hypoxic brain injury risk indicator, overdose with resuscitation (54.9%) was slightly more common than suicide attempt (45.1%).

The ABI risk factor endorsed most frequently in the female group was drug use (62%), followed by overdose requiring resuscitation (47%) and attempted suicide (24%). Overall 29% of female prisoners endorsed a risk factor for TBI and 51% endorsed a risk factor for hypoxic brain injury during screening.

Comparing the risk factors endorsed at Stage One - ABI Screening between male and female prisoners, female prisoners endorsed risk factors of drug use (62% vs. 41%), overdose involving resuscitation (47% vs. 26%) and assault (23% vs. 16%) more than male prisoners. However, males endorsed alcohol use (25% vs. 15%) as a greater risk factor for ABI than female prisoners.

The self-report on screening of drug overdose and attempted suicide involving resuscitation for both male and female prisoners are two risk factors that require special consideration. It should be noted that these risk factors may involve the same risk factor being double counted, i.e., an attempted suicide resulting in resuscitation with an intentional drug overdose.

Due to the low numbers of prisoners endorsing stroke as a risk factor for ABI it will be removed from any further results and analysis.

The number of ABI risk factors that an individual could endorse on the ABI Screening Tool ranged from 0 to 8.

Table 2 presents the breakdown of number of ABI indicators endorsed within the male and female groups.

***Table 2***
***Number of ABI Indicators endorsed by the male and female groups***

| Number of ABI Indicators | Males (n=109) | | Females (n=86) | |
|---|---|---|---|---|
| | N | Percentage | N | Percentage |
| 0 | 39 | 35.77 % | 23 | 26.74% |
| 1 | 26 | 23.85 % | 11 | 12.79% |
| 2 | 19 | 17.43 % | 23 | 26.74% |
| 3 | 15 | 13.76 % | 16 | 18.60% |
| 4 | 6 | 5.50 % | 7 | 8.14% |
| 5 | 2 | 1.83 % | 4 | 4.65% |
| 6 | 1 | 0.92 % | 2 | 2.33% |
| 7 | 1 | 0.92 % | 0 | 0% |
| 8 | 0 | 0.00 % | 0 | 0% |

Table 2 highlights that over one third of the male sample (36%) did not endorse any risk factors. Seventy individuals (64.32%) within the male sample endorsed at least one ABI risk factor. Of this subsample (n=70), 86% endorsed 1-3 risk factors for ABI.

For female prisoners, 73% endorsed at least one potential trigger during screening for ABI. Of all female prisoners who endorsed a risk factor for ABI during screening, 79% endorsed 1-3 risk factors in total.

The types of ABI risk factors endorsed were next examined. For those individuals who endorsed only one of key indicator, Table 3 presents the breakdown of ABI indicators.

***Table 3***
***Single trigger (ABI) item breakdown***

| Trigger | Male % (n = 26) | Female % (n = 11) |
|---|---|---|
| Alcohol | 30.77 % | 9.09% |
| Drug | 42.31 % | 45.45% |
| Traumatic Brain Injury | 7.69% | 45.45% |
| Hypoxic Brain Injury | | |
| - Overdose | 11.54 % | 0.00% |
| - Suicide Attempt | 7.69 % | 0.00% |

Table 3 shows that, for males who endorsed a single ABI risk factor, drug use was the most frequently reported indicator (42%), followed by alcohol use (31%).

Of significance is the near lack of endorsement of TBI as a single risk factor/trigger in male prisoners. When this is compared to female prisoners who reported TBI as a single trigger for ABI, in 45% of cases it highlights that when male prisoners endorse TBI as a risk factor for ABI it is usually in conjunction with another reported risk factor.

Drug use both for male and female prisoners was the highest endorsed single trigger item for ABI.

***Table 4***
***Two trigger (ABI) percentage breakdown***

| Triggers | Male % (n=19) | Female % (n= 23) |
|---|---|---|
| Alcohol & Drug | 5.26% | 13.04% |
| Drug & overdose with resuscitation | 36.84% | 65.22% |
| Overdose & TBI | 10.53% | 4.35% |
| Drug & stroke | 0.00% | 4.35% |
| Drug & attempted suicide | 15.79% | 8.7% |
| Drug & TBI | 5.26% | 4.35% |
| Alcohol & suicide | 15.79% | 0.00% |
| TBI (two triggers for TBI) | 5.26% | 0.00% |
| TBI & suicide | 5.26% | 0.00% |

Table 4 shows that, for the male sample, 19 individuals endorsed two ABI risk factors. The most common combinations within this subgroup were drug use and overdose with resuscitation (*n*=7, 37%), followed by alcohol use and suicide attempt and drug use and suicide attempt (16%).

It was noted that 63% (*n*=12) of this subgroup of the male sample endorsed drug use with another indicator, whereas a relatively smaller 21% (*n*=4) endorsed alcohol use with another indicator.

For the female sample, 23 individuals endorsed two ABI risk factors with the most common combination being drug use and overdose involving resuscitation (n=15, 65.22%), followed by alcohol use and drug use (n=3, 13.04%) and drug use and suicide attempt (8.70%).

Almost the entire subgroup of the female sample 95% (n=22) endorsed drug use with another indicator, whereas a smaller proportion (n=3, 13%) endorsed alcohol use with another indicator. TBI was endorsed in only 9% of female prisoners who endorsed two triggers during screening for ABI.

The combinations of types of ABI indicators for participants who endorsed three or more triggers varied greatly between genders.

Within the male sample, drug use was endorsed in 88% of cases where three or more indicators were endorsed (*n*=25). The next most common ABI indicator was drug overdose with resuscitation (64%), followed by alcohol use (60%), attempted suicide resulting in loss of consciousness (56%) and assault (52%). Once again, the majority of males who indicated multiple ABI indicators endorsed drug use and drug overdose (64%) in combination with at least one other trigger. The most common three-indicator combination was alcohol use, drug use and drug overdose, found in 32% of individuals.

The combinations of types of ABI indicators for the female sample who endorsed three or more risk factors varied considerably. In cases where three or more indicators for ABI were endorsed on screen, drug use was endorsed in 81% (n=13) of cases. The next most common ABI indicator was drug overdose requiring resuscitation (69%) and attempted suicide (56%). Similar to the males, the majority of females who indicated multiple ABI indicators endorsed drug use and drug overdose (56%) in combination with at least one other trigger item. The most common three-indicator combination was drug use, drug overdose and attempted suicide, found in 37.5% of individuals.

Summary

- Stage One was completed with 109 males and 86 females.
- For the male sample, 64% of the sample positively endorsed one or more indicators of potential ABI.
- For the male sample, 40% of the sample endorsed two or more ABI risk factors.
- For the total male sample, the ABI risk indicator endorsed most frequently was drug use, followed by events that could potentially lead to hypoxic brain injury (i.e., drug overdose with resuscitation, suicide attempt associated with loss of consciousness), and then alcohol use. A relatively smaller number of male participants endorsed potential ABI indicators associated with traumatic brain injury (29%); of these individuals, traumatic brain injury was more frequently reported in the context of assault injuries than motor vehicle accidents (MVA) or boxing injuries.
- For individuals within the male sample who endorsed two or more ABI risk indicators, the most common combination was drug use and drug overdose with resuscitation.
- For the female sample, 73% of the sample positively endorsed one or more indicators for potential ABI.
- Sixty per cent of female prisoners who endorsed an ABI risk factor also endorsed two or more potential ABI indicators.
- For the total female sample, the ABI risk factor most frequently endorsed was drug use (62%), followed by events that could lead to hypoxic brain injury (i.e., drug overdoses requiring resuscitation and attempted suicide with loss of consciousness). An indicator for TBI was endorsed by 42% of the female sample, with assault accounting for 57% of endorsed TBIs and 42% of MVAs.

## 3.2 Stage Two: Clinical Interview

### *3.2.1 Demographic information*

Tables 5 and 6 present the demographic data for the male and female samples who participated in Stage Two of the research project.

***Table 5***
***Age, education and prior prison sentence***

| Variable | Males (n=90) | | | Females (n=53) | | |
|---|---|---|---|---|---|---|
| | M | SD | Range | M | SD | Range |
| Age | 34.5 | 11.6 | 20-68 | 33 | 7.90 | 21-61 |
| Highest completed secondary schooling | 9.47 | 1.7 | 5-12 | 10.13 | 1.70 | 6-12 |
| Number of times in prison | 3.06 | 3.34 | 1-15 | 3.72 | 3.85 | 1-16 |

The average age of male prisoners who were interviewed as part of Stage 2 (Clinical Interview) was 34.5 (SD 11.6). According to the Statistical Profile of the Victorian Prison System 2003-04 to 2007-08 (Corrections Victoria, 2009), the mean age of male prisoners at 30 June 2008 was 37.5 with a median value of 36.8 (compared to a median of 30 in the current sample). The average male prisoner who completed Stage 2 had completed Year 9 at secondary school and had been imprisoned approximately three times (inclusive of the current sentence), with a median number of times in prison of two. In comparison, for 87.4% of male prisoners as at 30 June 2008 the highest level of education attained was only part of secondary school (Corrections Victoria, 2009). These education levels are significantly lower when compared with the Victorian population in which, according to the 2006 Census of Population and Housing (ABS, 2007), 44% of all Victorians had completed Year 12 or equivalent.

The average age of female prisoners at 30 June 2008 was 37.5 (median 36.8) (Corrections Victoria, 2009) compared to an average age of 33 (median 31) for females who completed Stage 2 of the research. Of these 53 females who completed Clinical Interviews (Stage 2), the average year completed at secondary school was Year 10, and they had previously been in prison four times inclusive of the current sentence (median value of 2). For all female prisoners in custody at 30 June, 2008, 76.5% had only partially completed secondary school (Corrections Victoria 2009).

***Table 6***
***Demographic information***

| | Males (n=90) | | Females (n=53) | |
|---|---|---|---|---|
| | N | Percentage | N | Percentage |
| Aboriginal/ Torres Strait Islander | 8 | 8.89% | 2 | 3.77% |
| Born in Australia | 74 | 82.22% | 40 | 75.47% |
| English First Language | 78 | 86.67% | 50 | 94.35% |
| English Primary Language | 89 | 98.89% | 51 | 96.23% |
| **Marital Status** | | | | |
| Single / Never Married | 33 | 36.67% | 28 | 52.83% |
| De Facto | 31 | 34.44% | 12 | 22.64% |
| Married | 15 | 16.67% | 5 | 9.43% |
| Separated | 3 | 3.33% | 2 | 3.77% |
| Divorced | 6 | 6.66% | 5 | 9.43% |
| Widowed | 2 | 2.22% | 1 | 1.89% |
| **Accommodation prior to incarceration** | | | | |
| Homeless | 7 | 7.78% | 4 | 7.55% |
| Caravan / Mobile Home | 3 | 3.33% | 0 | |
| Public rental | 10 | 11.11% | 16 | 17.78% |
| Private rental | 31 | 34.44% | 16 | 17.78% |
| Privately owned residence | 20 | 22.22% | 4 | 7.55% |
| Family of Origin (parents) | 18 | 20.00% | 7 | 13.21% |
| Rented room (Boarding house/hotel) | 0 | 0% | 2 | 3.77% |
| Crisis Accommodation | 1 | 1.11% | 1 | 1.79% |
| Drug Rehab/Detox Unit | 0 | 0% | 2 | 3.77% |
| Other | 0 | 0% | 1 | 1.79% |
| **Education** | | | | |
| History of learning difficulties | 21 | 23.33% | 8 | 15.19% |
| Suspended from school | 37 | 41.11% | 23 | 43.40% |
| Expelled from school | 26 | 28.89% | 11 | 20.75% |

| | Males (n=90) | | Females (n=53) | |
|---|---|---|---|---|
| | N | Percentage | N | Percentage |
| **Higher Education** | | | | |
| None | 41 | 45.56% | 28 | 52.83% |
| University | 5 | 5.56% | 2 | 3.77% |
| TAFE | 37 | 41.11% | 23 | 25.56% |
| Trade | 7 | 7.78% | 0 | 0.00% |

| | | | | |
|---|---|---|---|---|
| **Employment Status** | | | | |
| Unemployed | 38 | 42.22% | 29 | 54.72% |
| Part-time | 7 | 7.77% | 8 | 15.09% |
| Full-time casual/contract | 40 | 44.44% | 14 | 26.42% |
| Other | 5 | 5.56% | 2 | 3.77% |
| **Source of income** | | | | |
| Employment wages | 44 | 48.89% | 22 | 41.51% |
| Centrelink | | | | |
| - New Start | 30 | 33.33% | 15 | 28.30% |
| - DSP | 9 | 10% | 8 | 15.09% |
| - Other Centrelink | 3 | 3.33% | 8 | 15.09% |
| Other | 4 | 4.44% | 0 | 0.00% |

Approximately 6% of all prisoners (5.8% males, 6.3% females) in 2008 (Corrections Victoria, 2009) identified themselves as Indigenous, compared to 9% of males and 4% of female prisoners who completed a Clinical Interview (Stage Two). According to the 2006 Australian Census (ABS, 2007), 0.6% of Victoria's total population were estimated as Indigenous in comparison to 2.5% nationally.

Approximately 70% of Victorian residents were born in Australia (ABS, 2007). Of prisoners received into custody, 76% reported being born in Australia Correction Victoria (2009).

Of the male prisoners who completed Clinical Interview (stage 2) 82% reported being born in Australia compared to 75% of female prisoners.

Eighty-seven per cent of male prisoners endorsed English as their first language compared to 94% of female prisoners and, of these prisoners, 99% of males and 96% of female prisoners endorsed English as their primary spoken language. These figures were markedly higher compared to rates reported in the 2006 Census (ABS, 2007), in which 74% of Victorians (74% males, 75% females) endorsed English as their main language spoken at home. The figures relating to spoken language may be misrepresentative of the prison population, given that prisoners requiring interpreting services were excluded from the study.

According to the Correction Victoria (2009) 61% of male prisoners and 43% of female prisoners reported they were not married. This subcategory was the relationship status highest endorsed by prisoners, followed by de facto (14% males, 21% females) Correction Victoria (2009). In the current study, 30% of male prisoners who completed Stage 2 (Clinical Interview) stated they were single/never married, followed by 35% who stated they were in a de facto relationship. In comparison, 53% of female prisoners reported being single/never married and 22% reported

they were in a de facto relationship prior to entering prison. In comparison, 50% of Victorians state their relationship status as married (excluding de facto), with 33% citing being never married as their current relationship status (ABS, 2007).

Accommodation prior to the current prison term between both male and female prisoners resulted in some marked differences. Thirty-four per cent of male prisoners reported they were living in private rental prior to their current term of imprisonment compared with 18% of female prisoners. Male prisoners were also more likely to be still residing with their parents than female prisoners (20% vs. 13%), and even likelier to be residing in a privately owned residence (22% vs. 8%). However, female prisoners were more likely to be residing in a public rental property than male prisoners (18% vs. 11%).

Male prisoners had more reported learning difficulties than female prisoners (23 vs. 15%) and were more likely to be expelled from school (29 vs. 21%). When suspension from school was explored, there were no significant differences found between genders. The link between expulsion and level of schooling completed was not part of the data collection.

Female prisoners had an increased likelihood of not completing higher education than male prisoners (52% vs. 46%). According to Department of Justice figures (2009), 2.5% of male prisoners and 5% of female prisoners stated that their highest level of education was either tertiary/post-secondary or technical or trade. Of those prisoners who completed Clinical Interview (Stage 2), 55% of the current sample of male prisoners reported a post-schooling level of education; in comparison, female prisoners reported 47%. However, it should be noted that Technical and Further Education (TAFE) courses account for a high proportion of this figure. TAFE courses are offered throughout a number of Victorian prisons.

Given the high number of prisoners in the sample who have previously been imprisoned, the elevated figures may be as a direct result of previous periods of incarceration.

When reviewing employment status, 44% of male prisoners reported they were employed full time (40% casual contract, 60% permanent) compared to only 26% of female prisoners (all employed in permanent roles). Overall, 52% of male and 42% of female prisoners were employed prior to their current period of incarceration. Of those who listed their employment status as "other", these consisted of full time students, retirees and home duties/child care.

In comparison, 66% of male prisoners and 50% of female prisoners were listed as unemployed, with only 25% of males and 20% of females being employed upon reception to prison as at 30 June, 2008 (Corrections Victoria, 2008).

Statewide, 48% of males and 25% of females are employed in full time work (ABS, 2007). With 52% of male prisoners and 42% of female prisoners being employed, the reported source of income for prisoners prior to entering prison is reflective of this. Approximately 50% of male and 42% of female prisoners were in receipt of wages prior to entering prison. The majority of male prisoners and female prisoners who were not receiving wages were in receipt of Centrelink benefits (47% vs. 58%).

***Table 7***
***Medical History (self reported)***

| | Males (n=90) Percentage | Females (n=53) Percentage |
|---|---|---|
| Maternal Consumption of alcohol & drugs | 15.56% | 16.98% |
| Neurological | 55.55% | 50.94% |
| Cardiovascular | 17.77% | 13.21% |
| Respiratory | 17.77% | 32.07% |
| Gastrointestinal | 2.22% | 11.32% |
| Cancer | 3.33% | 9.43% |
| Arthritis | 8.89% | 11.32% |
| Kidney disorder | 3.33% | 13.21% |
| Hepatitis | 31.11% | 41.51% |

* 8 males & 6 females responded "Not sure"

Over 50% of male and female prisoners reported a medical history involving neurological complications. These neurologic complications comprised epilepsy; head injury; loss of consciousness for other reason; migraine; neurological illness; brain tumour; and neurodegenerative disorder.

More females than males (42% vs. 31%) reported being Hepatitis B or C positive. Overall female prisoners reported more diagnoses of medical conditions than males. Maternal drug and alcohol consumption was comparable across both genders, with approximately 16% of prisoners endorsing maternal drug and alcohol use.

***Table 8***
***Psychiatric history – number of diagnoses***

| | Males (n=90) Percentage | Females (n=53) Percentage |
|---|---|---|
| 1 diagnosis | 63.33% | 79.25% |
| 2 diagnoses | 34.44% | 47.17% |
| 3 diagnoses | 17.78% | 22.64% |
| 4+ diagnoses | 8.89% | 0.00% |

At least one psychiatric diagnosis (either current or past) was endorsed by 63% of male prisoners and 79% of female prisoners (Table 8). Whilst these self-reported histories of psychiatric diagnoses seem excessive, they are comparable to previous prison studies of New South Wales prisoners which reported screening rates of 43% and prevalence rates for psychiatric illness of 80% (Butler et al., 2005; Butler et al., 2006).

Of note was that for both male and female prisoners, over 50% endorsed more than two psychiatric diagnoses. When these diagnoses are coupled with the high reporting of ABI risk factors and high substance usage, a multi-disciplinary approach across a number of domains is required to avoid a return to prison.

The higher rates in females than males could be, in part, that when women offend they are more likely to be suffering from a mental illness (Butler et al., 2005).

***Table 9***
***Psychiatric history (self reported)***

| | Males (n=90) Percentage | Females (n=53) Percentage |
|---|---|---|
| Depression | 38.89% | 62.26% |
| Anxiety | 5.56% | 24.53% |
| PTSD 8.89% | 16.98% | |
| Breakdowns | 0% | 0% |
| Personality Disorder | 10% | 15.09% |
| Childhood Disorder | 4.44% | 5.66% |
| Self Harm/Suicide Attempts | 16.67% | 5.66% |
| Substance dependence | 13.33% | 5.66% |
| Learning disability/ID | 1.11% | 1.89% |
| Psychosis (primary) | 1.11% | 5.66% |
| Psychosis (secondary) | 10% | 3.77% |
| Other | 3.33% | 1.89% |
| None | 36.67% | 20.75% |

The overall percentage of prisoners with a previous psychiatric disorder ranges between studies due to diagnosed versus reported illnesses. Previous Australian studies have put this figure between 28% and 54% (Deloitte Consulting, 2003; Butler & Milner, 2003).

Whilst the current rates of 63% for males and 79% for females sit above these previous figures, it should be noted that while prisoners were asked if the diagnosis was made formally by a medical specialist, no medical records were sought in corroboration.

Depression and anxiety among male and female prisoners were the highest reported psychiatric illnesses in the current study and previous Australian studies (Deloitte Consulting, 2003; Butler and Milner, 2003). The observable difference was that female prisoners reported significantly higher levels of depression than males in the current sample, whilst males reported much higher rates of secondary psychosis (usually drug induced) than females.

A previous diagnosis of learning disability/ID was reported in less than 2% of male and female prisoners, which is comparable to the 3% found by the Victorian Prisoner Health Study (Deloitte Consulting, 2003).

***Table 10***
***Smoking percentages for male and female prisoners***

| | Males (n=90) | | | Females (n=53) | | |
|---|---|---|---|---|---|---|
| | Percentage | Ave | SD | Percentage | Ave | SD |
| Cigarette smoker | 75.56% | | | 86.79% | | |
| Number of years smoked | | 12.78 | 10.15 | | 14.98 | 8.71 |
| Amount smoked per day | | 13.15 | 10.06 | | 14.88 | 9.03 |

Table 10 shows that cigarette smoking was endorsed by 76% of male prisoners and 87% of female prisoners.

In contrast, the 2007 National Drug Strategy Household Survey (Australian Institute of Health and Welfare [AIHW], 2008) reported that 21% of males aged 14 and over, and 19% of females aged same were current smokers smoking daily, weekly or less than weekly. This compares with the 2001 New South Wales inmate Health Survey (Butler and Milner, 2003) which reported that 83% of women and 78% of men were current smokers.

The average number of cigarettes smoked per week by male prisoners in the current study was 92 compared to 102 (AIHW, 2008). Female prisoners smoked a greater number of cigarettes (104) per week than the general population who smoked 91 (AIHW, 2008).

***Table 11***
***Alcohol and drug use rates for male and female prisoners***

| | Males (n=90) | | Females (n=53) | |
|---|---|---|---|---|
| | N | Percentage | N | Percentage |
| Alcohol | 86 | 95.56% | 50 | 94.34% |
| Cannabis | 68 | 75.56% | 44 | 83.02% |
| Amphetamines | 47 | 52.22% | 37 | 69.82% |
| Cocaine | 19 | 21.11% | 20 | 37.74% |
| Hallucinogens | 16 | 17.77% | 12 | 22.64% |
| Ecstasy | 28 | 31.11% | 29 | 54.72% |
| Opiates | 36 | 40.00% | 34 | 64.15% |
| Inhalants | 10 | 11.11% | 10 | 18.87% |
| Benzodiazepines | 32 | 35.56% | 33 | 62.26% |

Table 11 shows that:

- The proportion of Australians aged 14 years and over in 2007 who had never had a full serve of alcohol was 10.1% (AIHW, 2008). For males this figure was 8.1% and for females 12.1%. In comparison, 4% of male prisoners and 6% of female prisoners who completed Clinical Interview (Stage Two) rated themselves as never having consumed alcohol.
- One in three Australians reported using cannabis in 2007 (AIHW, 2008). Of the population of prisoners who completed Stage Two, 76% of males and 83% of female prisoners reported using cannabis in their lifetime. The 2001 New South Wales Prisoner Health Survey (Butler & Milner, 2003) reported cannabis usage rates of 75% for male prisoners and 77% for female prisoners.
- Of Australians aged 14 years and over, 6.3% reported using meth/amphetamines in 2007 (AIHW, 2008). In comparison, 52% of male and 70% of female prisoners reported using amphetamines.
- Of Australians aged 14 years and older, 1.6% reported they had used heroin in 2007 (AIHW, 2008). In comparison, 40% of males and 64% of female prisoners reported using heroin/opiates.
- In 2007 8.9% of Australians aged 14 years and over reported using ecstasy. Of those prisoners completing Stage Two, 31% of male prisoner and 56% of female prisoners reported previous use of ecstasy.
- Eleven per cent of male prisoners and 19% of female prisoners reported previous use of inhalants. According to the AIHW (2008) 3.1% of Australians aged 14 and over reported using inhalants.
- In 2007, 5.9% of Australians aged 14 years or older had never used cocaine (AIHW, 2008). In the current study 21% of male prisoners and 38% of female prisoners reported using cocaine at least once in their lifetime.
- Benzodiazepine use was reported in 62% of female prisoners and 36% of male prisoners.

***Table 12***
***Alcohol consumption of males and females who completed Stage 2***

| | Males (n=86) | | | Females (n=50) | | |
|---|---|---|---|---|---|---|
| | Percentage | Ave | SD | Percentage | Ave | SD |
| Age first used alcohol | | 15.39 | 3.83 | | 15.58 | 3.68 |
| Age first used regularly | | 19.72 | 6.83 | | 20.29 | 10.32 |
| Regular use frequency | | | | | | |
| - Daily/most days | 44.19% | | | 34% | | |
| - Weekly | 27.91% | | | 8% | | |
| - 1-3 times/month | 9.3% | | | 4% | | |
| - Never | 17.44% | | | 54% | | |
| Regular alcohol use duration | | | | | | |
| - > 20 years | 9.3% | | | 2% | | |
| - 10-20 years | 13.95% | | | 10% | | |
| - 5-10 years | 13.95% | | | 4% | | |
| - 1-5 years | 37.21% | | | 24% | | |
| - < 1 year | 6.98% | | | 6% | | |
| - Never | 17.44% | | | 54% | | |

Note: one male prisoner did not record frequency of use

In 2007 males (10.8%) were twice as likely as females (5.5%) to consume alcohol daily (AIHW, 2008). This figure was markedly higher in the sub-group of prisoners who consumed alcohol. Forty-four per cent of male prisoners who consumed alcohol did so daily, with 34% of female prisoners doing similar (Table 12). Using the AUDIT Schofield et al. (2006) reported that 44% of prisoners had an alcohol problem.

Whilst the AUDIT was not used to assess alcohol problems amongst the current sample, the figures are remarkably similar. Weekly alcohol consumption rates were higher in the general population than that of the current prison population (AIHW, 2008). Alcohol use of 1-5 years was the timeframe most endorsed by both male and female prisoners. Of note was that 9% of male and 2% of female prisoners had been regular consumers of alcohol for greater than 20 years.

***Table 13***
***Cannabis use of males and females who completed Stage 2***

| | Males (n=68) | | | Females (n=44) | | |
|---|---|---|---|---|---|---|
| | % | Ave | SD | % | Ave | SD |
| Age first used cannabis | | 16 | 6.01 | | 15.08 | 3.23 |
| Age first used regularly | | 17.27 | 6.58 | | 15.95 | 3.68 |
| Regular use frequency | | | | | | |
| - Daily/most days | 66.18% | | | 70.45% | | |
| - Weekly | 7.35% | | | 9.09% | | |
| - 1-3 times/month | 7.35% | | | 4.55% | | |
| - Less than monthly | 2.94% | | | 0% | | |
| - Never | 14.71% | | | 15.09% | | |
| Regular cannabis use duration | | | | | | |
| - > 20 years | 5.88% | | | 9.09% | | |
| - 10-20 years | 19.12% | | | 29.55% | | |
| - 5-10 years | 22.06% | | | 22.73% | | |
| - 1-5 years | 30.88% | | | 15.91% | | |
| - < 1 year | 5.88% | | | 6.82% | | |
| - Never | 14.71% | | | 15.09% | | |

Note: one male prisoner did not record frequency of use

The high rate of cannabis use of prisoners versus the general population was also reflected in usage frequency. Approximately 70% of prisoners reported using cannabis daily/most days, with no observed differences in usage patterns between male and female prisoners (Table 13). Of note is that 15% of prisoners in the study reported using cannabis, but never being a "regular user".

Females tended to report a lengthier duration of use than male prisoners, with 30% of female prisoners reporting a lifetime use of cannabis between 10-20 years, compared to male prisoners who endorsed 1-5 years at a rate of 31% of interviewees.

Overall, approximately 50% of male prisoners endorsed using cannabis for longer than 5 years, with 61% of female prisoners endorsing use over the same time period.

***Table 14***
***Amphetamines use of males and females who completed Stage 2***

| | Males (n=47) | | | Females (n=37) | | |
|---|---|---|---|---|---|---|
| | Percentage | Ave | SD | Percentage | Ave | SD |
| Age first used amphetamines | | 19.27 | 5.52 | | 18.09 | 5.45 |
| Age 1st used regularly | | 20.08 | 5.40 | | 21.08 | 6.32 |
| Regular use frequency | | | | | | |
| - Daily/most days | 51.06% | | | 54.05% | | |
| - Weekly | 21.28% | | | 2.7% | | |
| - 1-3 times/month | 10.64% | | | 5.41% | | |
| - Less than monthly | 2.13% | | | 2.7% | | |
| - Never | 14.89% | | | 27.03% | | |
| Regular amphetamine use duration | | | | | | |
| - > 20 years | 2.12% | | | 8.11% | | |
| - 10-20 years | 6.38% | | | 13.51% | | |
| - 5-10 years | 17.02% | | | 10.81% | | |
| - 1-5 years | 36.17% | | | 21.62% | | |
| - < 1 year | 23.40% | | | 10.81% | | |
| - Never | 14.89% | | | 27.03% | | |

Note: 3 females not report usage freq and duration

Amphetamine usage patterns for male and female prisoners were similar in age of first use, age of first regular use and frequency, with half of amphetamine users using daily/most days for both genders (Table 14). The major difference was that over 20% of female users had done so for greater than 10 years, whereas nearly 60% of male prisoners had used for five years or less. The use of amphetamines by females in the current sample was slightly lower compared to previous studies (Butler & Milner, 2003).

***Table 15***
***Cocaine use of males and females who completed Stage 2***

| | Males (n=19) | | | Females (n=20) | | |
|---|---|---|---|---|---|---|
| | % | Ave | SD | % | Ave | SD |
| Age first used cocaine | | 22.58 | 7.8 | | 20.58 | 5.76 |
| Age 1st used regularly | | 22 | 8.61 | | 28 | 5.57 |
| Regular use frequency | | | | | | |
| - Daily/most days | 26.32% | | | 10% | | |
| - Weekly | 15.79% | | | 0% | | |
| - 1-3 times/month | 0% | | | 5% | | |
| - Less than monthly | 10.53% | | | 0% | | |
| - Never | 42.11% | | | 80% | | |
| Regular cocaine use duration | | | | | | |
| - 10-20 years | 10.53% | | | 0% | | |
| - 1-5 years | 31.58% | | | 10% | | |
| - < 1 year | 15.79% | | | 5% | | |
| - Never | 42.11% | | | 80% | | |

One female prisoner did not report usage and duration

Male prisoners reported using cocaine regularly at a much earlier age than female prisoners (22 years vs. 28 years) (Table 15). For those males interviewed, that data examined highlights a strong association with the age of first use and age of first regular use, indicating that once males in the current sample used cocaine they tended to do so on a regular basis after this.

Female prisoners who had used cocaine were nearly twice as likely as males to report that they never used regularly. Even so, over 30% of male prisoners who had used cocaine did so at a frequency of weekly or less. Reported use of cocaine was significantly less than the reported 35% for males and 55% for females in a previous prisoner health survey (Butler & Milner, 2003).

***Table 16***
***Hallucinogen use of males and females who completed Stage 2***

| | Males (n=16) | | | | Females (n=12) | | | |
|---|---|---|---|---|---|---|---|---|
| | N | % | Ave | SD | N | % | Ave | SD |
| Age first used hallucinogen | | | 18.33 | 3.44 | | | 17.13 | 3.18 |
| Age first used regularly | | | 16.67 | 4.13 | | | 17 | 2.65 |

A small number of both male and female prisoners reported a lifetime use of hallucinogens (Table 16). Of those who did report previous usage, approximately 60% of both male and female prisoners reported that their usage was not regular, with approximately 20% of regular users doing so for less than one year.

***Table 17***
***Inhalant use of males and females who completed Stage 2***

| | Males (n=10) | | | | Females (n=10) | | | |
|---|---|---|---|---|---|---|---|---|
| | N | % | Ave | SD | N | % | Ave | SD |
| Age first used inhalants | | | 15.63 | 4.90 | | | 14.44 | 1.13 |
| Age 1st used regularly | | | 16.33 | 5.57 | | | 14.25 | 1.26 |

Identified inhalant use among male and female prisoners was relatively small (Table 17). The concern is the early age of both first usage and regular usage, given the detrimental effects usage can have on a developing brain. Whilst 40% of inhalant users did not use regularly, it is concerning that 40% of male users reported using daily/most days. Of those prisoners who did use regularly, 30% reported that they used regularly for less than one year.

***Table 18***
***Ecstasy use of males and females who completed Stage 2***

| | Males (n=28) | | | Females (n=29) | | |
|---|---|---|---|---|---|---|
| | % | Ave | SD | % | Ave | SD |
| Age first used ecstasy | | 22.29 | 6.04 | | 21.12 | 6.49 |
| Age first used regularly | | 19.62 | 3.04 | | 22 | 3.67 |
| Regular use frequency | | | | | | |
| - Daily/most days | 7.14% | | | 6.89% | | |
| - Weekly | 25% | | | 3.45% | | |
| - 1-3 times/month | 10.71% | | | 6.89% | | |
| - Less than monthly | 6.67% | | | 0% | | |
| - Never | 53.57% | | | 82.76% | | |
| Regular opiate use duration | | | | | | |
| - 5-10 years | 7.14% | | | 3.45% | | |
| - 1-5 years | 25% | | | 6.89% | | |
| - < 1 year | 14.29% | | | 6.89% | | |
| - Never | 53.57% | | | 82.76% | | |

Butler and Milner (2003) reported that 27% of male prisoners and 29% of female prisoners had used ecstasy in their life. Over 50% of female prisoners who completed Clinical Interview (Stage Two) reported previous ecstasy use in the current sample (Table 18). The reported use of ecstasy is significantly higher than that reported by males (31%). Although females reported a higher rate of ecstasy use, males reported using regularly at an earlier age and using much more regularly than females, with 83% of females who started using ecstasy reported never using regularly.

***Table 19***
***Opiate use of males and females who completed Stage 2***

| | Males (n=36) | | | Females (n=34) | | |
|---|---|---|---|---|---|---|
| | % | Ave | SD | % | Ave | SD |
| Age first used opiates | | 18.15 | 5.28 | | 18.35 | 5.16 |
| Age first used regularly | | 19.19 | 4.95 | | 19.63 | 5.86 |
| Regular use frequency | | | | | | |
| - Daily/most days | 88.89% | | | 94.12% | | |
| - Other frequency | 5.56% | | | 0% | | |
| - Never | 5.56% | | | 5.88% | | |
| Regular opiate use duration | | | | | | |
| - > 20 years | 5.56% | | | 2.94% | | |
| - 10-20 years | 22.22% | | | 32.35% | | |
| - 5-10 years | 22.22% | | | 35.29% | | |
| - 1-5 years | 36.11% | | | 20.59% | | |
| - < 1 year | 8.33% | | | 2.94% | | |
| - Never | 5.56% | | | 8.82% | | |

Opiates were the fourth highest endorsed substance used by prisoners behind alcohol, cannabis and amphetamines. Butler and Milner (2003) recorded usage rates significantly higher in female prisoners than males.

This pattern was also reflected in the current sample, as was the lifetime usage rates by prisoners (Table 19). As expected, a high proportion of users did so daily/most days. The risk of opiate use and overdose is high, and this increases with length of time used. With a reported 50% of users doing so for longer than five years, the reported rates of overdose involving resuscitation of this subgroup could account for a high proportion of prisoners reporting overdose involving resuscitation.

***Table 20***
***Benzodiazepine use of males and females who completed Stage 2***

| | Males (n=32) | | | Females (n=33) | | |
|---|---|---|---|---|---|---|
| | Percentage | Ave | SD | Percentage | Ave | SD |
| Age first used benzodiazepines | | 21.77 | 5.65 | | 20.25 | 6.0 |
| Age 1st used regularly | | 22.2 | 5.93 | | 21.14 | 6.04 |
| Regular use frequency | | | | | | |
| - Daily/most days | 56.25% | | | 60.61% | | |
| - Other Frequency | 12.5% | | | 3.03% | | |
| - Never | 31.25% | | | 33.33% | | |
| Regular benzodiazepine use duration | | | | | | |
| - 10-20 years | 6.25% | | | 24.24% | | |
| - 5-10 years | 18.75% | | | 18.18% | | |
| - 1-5 years | 28.13% | | | 18.18% | | |
| - < 1 year | 12.5% | | | 3.03% | | |
| - Never | 31.25% | | | 33.33% | | |

Note: 1 male usage duration missing and 1 female missed freq & duration

Female prisoners reported using benzodiazepines at higher rates than male prisoners (Tables 11 & 20).

Other data between the genders was relatively comparable with ages of first use and age of first use being in the early 20s.

Approximately 30% of prisoners reported never using benzodiazepines regularly; however, if they did use regularly, they were more likely to do so on a near daily basis. Females reported much longer use than males, with 42% reporting 5 or more years of use, compared to 25% of male benzodiazepine users.

***Table 21***
***Percentage Breakdown of risk factors screen vs. interview for interviewed participants***

| | Males (n=90) | | Females (n=53) | |
|---|---|---|---|---|
| | Screening | Interview | Screening | Interview |
| Alcohol | 24.44 %(22) | 18.89%(17) | 20.75%(11) | 11.32%(6) |
| Substances | | | | |
| - Cannabis | 24.44 %(22) | 22.22%(20) | 32.08%(17) | 35.85%(19) |
| - Amphetamines | 10.00 %(9) | 7.78%(7) | 18.87%(10) | 13.21%(7) |
| - Cocaine | 1.11 %(1) | 0% | 0% | 0% |
| - Opiates | 20.00 %(18) | 14.44%(13) | 43.4%(23) | 41.51%(22) |
| - Benzodiazepines | 2.22 %(2) | 3.33%(3) | 13.21%(7) | 18.87%(10) |
| - Other | 1.11 %(1) | 1.11%(1) | 0% | 1.89%(1) |
| Drug overdose with resus | 26.67 %(24) | 21.11%(19) | 50.94%(27) | 47.17%(25 |
| Assault | 20.00 %(18) | 7.78%(7) | 20.75%(11) | 9.43%(5) |
| MVA | 11.11 %(10) | 12.22%(11) | 20.75(11) | 13.21%(7) |
| Attempted suicide | 17.78 %(16) | 13.33%(12) | 32.08%(17) | 24.53%(13) |
| Stroke | 1.11 %(1) | 1.11%(1) | 3.77%(2) | 1.89%(1) |
| Boxing | 2.22 %(2) | 1.11%(1) | 0% | 0% |

When the risk factors for ABI are compared between screening (Stage One) and Clinical Interview (Stage Two) there is no significant difference between the stages (refer to Table 21). Reporting of risk factors remained constant across both stages, with minor decreases across most risk factors between screen and interview. This over-screening at Stage One is to be expected and a design mechanism of the screening tool.

The sub-category in which there was a significant change was that involving loss of consciousness. This could be best explained by Clinical Interview having more time and expertise than screening to illicit more information in respect to overall levels of loss of consciousness. From these results, and without viewing Stage Three results, the comparison between Stages One and Two highlights the effectiveness of Stage One screening in identifying risk factors in prisoners with ABI. .

***Table 22***
***Self reported cognitive problems/concerns***

| | Males (n=90) Percentage | Females (n=53) Percentage |
|---|---|---|
| Thinking Speed | 13.33% | 26.42% |
| Concentration | 27.78% | 52.83% |
| Memory | 36.67% | 64.15% |
| Language | 4.44% | 1.89% |
| Problem Solving & Reasoning | 2.22% | 3.77% |
| Planning/Completing Activities | 6.66% | 3.77% |
| Decision Making | 5.55% | 3.77% |
| Affective Dysregulation | 11.11% | 0% |
| Personality change | 3.33% | 5.66% |

Participants were asked during their clinical interview whether they felt that they had any cognitive problems, and were given a list of potential problems. If an item was endorsed, further information was elicited to ascertain a potential cause and the length of time this had been an issue. As can be seen in Table 22, there was a vast difference in reporting of cognitive problems/concerns between male and female prisoners. Over 50% of female prisoners reported problems with memory and planning, with half this number reporting problems in the area of thinking speed. Over a quarter of male prisoners reported problems with concentration and memory.

While this is not a reliable indicator for ABI, as there could be a range of explanations for the problems, it could be of particular interest to those who are conducting programs within the prison environment.

The reported levels of problems with concentration and memory were significantly higher than the approximate 20% for both categories outlined by Butler and Milner (2003).

***Table 23***
***Admission to Hospital for potential ABI***

| | Males (n=90) Percentage | Females (n=53) Percentage |
|---|---|---|
| Never | 53.33% | 33.96% |
| TBI | 31.11% | 28.3% |
| Drug overdose with resuscitation | 15.56% | 20.75% |
| Attempted suicide | 3.33% | 24.53% |
| Other | 11.11% | 13.21% |

Deloitte Consulting (2003) reported rates of approximately 25% of prisoners who had been admitted to hospital or stayed overnight. The current study did not specifically explore overall rates of hospitalisation, but did explore hospitalisation against likelihood of ABI.

Approximately 50% of males and 65% of females reported being hospitalised from factors that could result in an ABI (Table 23). TBI from either assault or MVA was reported in approximately 30% of cases, with drug overdose requiring resuscitation being reported in nearly 20% of hospital admissions. The significant difference was that female prisoners were more likely than males to be admitted to hospital as a result of an attempted suicide. Hospital records were not sought during this stage of the research.

***Table 24***
***Imprisonment percentages***

| | Males (n=90) | | | Females (n=53) | | |
|---|---|---|---|---|---|---|
| | Percentage | Ave | SD | Percentage | Ave | SD |
| First time guilty of an offence | 21.11% | | | 20.75% | | |
| First prison term | 48.89% | | | 41.51% | | |
| Previous sentence to YTC | 26.67% | | | 22.64% | | |
| Number of times in Prison | | 3.07 | 3.34 | | 3.72 | 3.85 |
| - 1 | 48.89% | | | 41.51% | | |
| - 2 | 16.67% | | | 16.98% | | |
| - 3 | 8.89% | | | 5.66% | | |
| - 4 | 5.56% | | | 11.32% | | |
| - 5+ | 20% | | | 24.53% | | |
| Under influence of alcohol/drugs when committed offence | 71.11% | | | 50.94% | | |
| Sentence length | | | | | | |
| - 0-6 months | 24.44% | | | 41.51% | | |
| - 7-12 months | 33.33% | | | 18.87% | | |
| - 13-24 months | 23.33% | | | 24.53% | | |
| - 25-36 months | 5.56% | | | 9.43% | | |
| - 37-48 months | 4.44% | | | 5.66% | | |
| - 49-60 months | 3.33% | | | 0% | | |
| - 60+ months | 5.56% | | | 0% | | |
| Imprisonment in past 2 years | 31.11% | | | 43.4% | | |

Approximately 20% of prisoners in the current sample were prisoners who had been found guilty of an offence for the first time (note: not necessarily first time offenders) (Table 24).

Female prisoners reported higher rates of previous terms of imprisonment than males (58% vs. 51%). Corrections Victoria (2009) report that in 2008 52% of male prisoners and 47% of female prisoners had previously been sentenced to prison.

Overall, approximately 25% of prisoners had served time in a Youth Training Centre. Previous Australian research indicates that 41% of male prisoners and 26% of female prisoners (Butler and Milner, 2003) had served time in a Youth Training Centre.

On average, the number of previous prison terms served by prisoners was three. Remarkably, over 20% of both male and female prisoners were serving their fifth or more prison term. In contrast, The Victorian Prisoner Health Study (Deloitte Consulting, 2003) reported that 31% of prisoners had had 3 or more terms of imprisonment.

Over 50% of male and female prisoners reported they were under the influence of alcohol or drugs at the time the offences were committed. Previous research has reported this figure to be 60% (Butler and Milner, 2003).

Over 50% of both male and female prisoners were serving a sentence of less than 12 months. The length of sentence was markedly lower than that reported by Corrections Victoria (2009), in which 28% of males and 41% of females were serving a term of 12 months or less.

In the current sample female prisoners (43% vs. 31%) had higher rates of being in prison in the previous 2 years prior to their current term of imprisonment.

The rate of recidivism for prisoners released from custody in Victoria in 2002-03 was 35% (Holland, Pointon & Ross, 2007).

***Table 25***
***Most serious offence types via ASOC (2008)***

| | Males (n=90) Percentage | Females (n=53) Percentage |
|---|---|---|
| Homicide and Related | 0% | 0% |
| Acts intended to Cause injury | 15.56% | 3.77% |
| Sexual assault & related | 13.33% | 0% |
| Dangerous or negligent acts endangering persons | 2.22% | 3.77% |
| Abduction, Harassment and other offences against person | 0% | 0% |
| Robbery, Extortion and related offences | 3.33% | 16.98% |
| Unlawful entry with intent/burglary, break & enter | 8.89% | 5.66% |
| Theft and related Offences | 6.66% | 22.64% |
| Fraud, deception and related | 5.56% | 9.43% |
| Illicit Drug Offences | 7.78% | 20.75% |
| Prohibited and regulated weapons and explosive offences | 1.11% | 0% |
| Property damage and environmental pollution | 1.11% | 3.77% |
| Public order offences | 1.11% | 0% |
| Traffic and vehicle regulatory offences | 12.22% | 3.77% |
| Offences against justice procedures, government security and government operations | 14.44% | 9.43% |
| Miscellaneous offences | 0% | 0% |

Table 25 reports the offence types for which prisoners are currently sentenced, using most serious offence as the rating offence. Offences are categorised using the Australian Standard Offence Classification (ASOC) 2008 Second Edition (ABS, 2008).

Male prisoners reported being sentenced for violence-related offences more than females. The lower rates of female violence related offences could be due to the fact that female violence is perceived as less as a threat and less harmful than male violence (Barber et al., 1999; Harris, 1994; Harris & Knight-Bohnhoff, 1996).

Females reported being sentenced for crimes relating to theft, robbery and illicit drug offences more often than males. These three categories represent 60% of offence types for female prisoners in the current sample.

Male prisoners varied in terms of their most serious offence status. Approximately 30% of male prisoners were serving sentences related to sexual assault or related offences, or acts intended to cause injury. Comparisons

between previously published data sets are extremely difficult, due to different methods of recording the most serious offence. Previous research has used the Australian National Classification of Offences (ANCO).

## 3.3 Stage 3 – Neuropsychological Assessment

Please note that all participants were included in the analysis of the neuropsychological assessment results, as all participants achieved criterion on the TOMM.

As mentioned in the Method section, the diagnosis of an ABI was based on independent evaluation of the evidence by two clinical neuropsychologists at *arbias* Ltd. This evidence included the profile of cognitive strengths and weaknesses following formal testing, behavioural observations during the assessment and consideration of background history including ABI risk factors. All of this information was considered when presenting a clinical opinion regarding whether or not a participant presented with an acquired brain injury. Impairment in a particular cognitive skill was determined when performance fell below normal limits for age expectations, that is, greater than 1.5 standard deviations below the mean score for age, and when the impairment was demonstrated with consistency under different testing conditions. Furthermore, the pattern of cognitive strengths and deficits had to be consistent with an acquired brain injury.

Acquired brain injury was not diagnosed when the cognitive deficits could be wholly explained by factors such as medication side-effects, physical problems, emotional disturbance, the person's intellectual background, and limited history of education. Some individuals diagnosed with acquired brain injury presented with these issues; in these instances, the cognitive deficits had to be greater than expected after taking into account the contribution from these factors.

### *3.3.1 Gender, Age, Education and Mood*

Table 26 shows the age, education and DASS mood scores of male and female prisoners with and without an ABI.

A MANOVA found no significant effect of gender or ABI group on age, depression, anxiety or stress.

However, there was a significant effect of both gender and ABI group on education ($F=9.16$, $p<.01$; $F=4.71$, $p<.05$ respectively), although there was no interaction effect. Male prisoners with an ABI had significantly lower education than male prisoners without an ABI ($t=3.7$, $p<.01$) and female prisoners ($t=-2.1$, $p<.05$).

It was noted that males with and without an ABI and females without an ABI generally showed no significant or mild depression, anxiety and stress. Whilst females with an ABI showed mild anxiety, they reported moderate to severe levels of depression and anxiety, although these were not statistically significant.

***Table 26***
***Age, Education and DASS z-scores (Depression, Anxiety and Stress) by Gender (Male/Female) and ABI Group (ABI/No ABI)***

| | Males | | | | Females | | | |
|---|---|---|---|---|---|---|---|---|
| | No ABI (n=43) | | ABI (n=31) | | No AB (n=28) | | ABI (n=14) | |
| | M | (SD) | M | (SD) | M | (SD) | M | (SD) |
| Age | 37.1 | (13.6) | 34.4 | (11.0) | 32.9 | (8.7) | 34.3 | (7.5) |
| Education | 10.3 | (2.0) | 8.8 | (1.4)* | 10.6 | (1.6) | 10.1 | (2.1) |
| Depression | .57 | (1.3) | .94 | (1.4) | .90 | (1.4) | 1.49 | (1.7) |
| Anxiety | -1.42 | (10.8) | .94 | (1.8) | .95 | (1.9) | 1.81 | (2.4) |
| Stress | .044 | (1.0) | .63 | (1.1) | .65 | (1.2) | .79 | (1.1) |

*p<.01

### *3.3.2 Reported Cognitive and Behaviour/Emotional Problems*

Prior to commencing formal testing, all participants were asked whether they had noticed any problems with their thinking skills, including thinking speed, concentration, memory, language, problems solving, planning, reasoning and decision making, as well as any problems with mood dysregulation or personality change. Table 27 indicates that a high proportion of both male and female participants reported problems with their thinking speed, concentration and memory. Furthermore, a significantly higher proportion of females (twice as many) reported problems in these areas than did males. In contrast, a higher proportion of males reported problems with mood dysregulation or personality change, although this was a relatively minor problem.

***Table 27***
***Reported cognitive/behavioural problems for male and female prisoners***

| | Males (n=90) % | Females (n=53) % |
|---|---|---|
| Thinking speed | 13 | 26 *** |
| Concentration | 28 | 53 *** |
| Memory | 37 | 64 *** |
| Language | 4 | 2 |
| Problem solving, planning, reasoning | 9 | 8 |
| Decision making | 6 | 4 |
| Affective dysregulation/personality change | 14 | 6 ** |

**p<.01, ***p<.001

### 3.3.3 *Gender Difference on Neuropsychological Tests*

An initial MANOVA was conducted with gender and ABI group as the dependent variables and all the neuropsychological test results as the dependent variables. Findings showed a significant effect of gender (F=2.7, p<.001) and ABI Group (F=3.16, p<.001), but no interaction effect.

Table 28 shows the variables that were found to have significant differences between males and females. It is clear that females performed more poorly on tests of perceptual and spatial ability, complex visual memory and spatial working memory. Furthermore, they performed more poorly on two educationally based tasks (general knowledge and mental arithmetic), despite having better overall education.

This indicates a clear discrepancy between males and females on perceptually based tasks, which will be discussed in the Discussion section. On the basis of these results it was decided to analyse the neuropsychological test data for males and females separately.

***Table 28***
***Neuropsychological cognitive variables with significant gender differences***

| | Males (n=74) | | Females (n=42) | | |
|---|---|---|---|---|---|
| | M | (SD) | M | (SD) | |
| ***WAIS-III variables*** | | | | | |
| Block Design | 11.0 | (2.9) | 9.7 | (3.0) | * |
| Matrix Reasoning | 11.3 | (2.8) | 9.6 | (2.9) | ** |
| Picture Completion | 11.1 | (2.7) | 10.0 | (3.1) | * |
| Arithmetic | 9.8 | (3.0) | 7.6 | (2.8) | *** |
| Information | 9.0 | (2.3) | 7.7 | (2.3) | ** |
| POI | 106.5 | (13.8) | 98.4 | (15.0) | ** |
| WMI | 98.6 | (14.7) | 90.9 | (12.9) | ** |
| VIQ | 93.4 | (13.0) | 87.4 | (9.9) | ** |
| PIQ | 102.7 | (14.3) | 96.1 | (15.3) | * |
| FSIQ | 97.3 | (13.3) | 90.5 | (12.2) | ** |
| ***Other variables*** | | | | | |
| Spatial Span | 10.6 | (2.6) | 9.2 | (2.7) | ** |
| Rey Figure Immed | 43.9 | (15.3) | 36.3 | (12.9) | ** |
| Rey Figure Delay | 42.4 | (15.6) | 35.7 | (12.5) | * |

*p<.05, **p<.01, ***p<.001

*3.3.4 Neuropsychological Test Results for Male Prisoners*

Table 29 contains the neuropsychological test results for male prisoners with and without an ABI. Male prisoners without an ABI performed within the average range on all of the neuropsychological tests, indicating no areas of impairment or significant strengths and weaknesses. This is important information as it indicates that the majority of male prisoners have intact cognitive functions similar to the general population.

***Table 29***
***Neuropsychological test results for male prisoners with and without an ABI***

| | No ABI (n=43) Mean | (SD) | ABI (n=31) Mean | (SD) | |
|---|---|---|---|---|---|
| **WAIS III** | | | | | |
| ***Subtest scores (scaled scores)*** | | | | | |
| Vocabulary | 9.1 | (2.5) | 6.8 | (1.9) | *** |
| Similarities | 8.9 | (2.5) | 7.3 | (2.2) | ** |
| Information | 10.0 | (2.5) | 7.6 | (2.2) | *** |
| Picture Completion | 11.3 | (2.7) | 10.8 | (2.7) | |
| Block Design | 11.5 | (2.8) | 10.3 | (2.8) | |
| Matrix Reasoning | 12.2 | (2.4) | 9.9 | (2.9) | *** |
| Arithmetic | 10.8 | (3.1) | 8.4 | (2.3) | *** |
| Digit Span | 10.8 | (3.4) | 8.0 | (1.5) | *** |
| LNS | 11.2 | (2.6) | 8.2 | (1.8) | *** |
| Digit Symbol Coding | 9.4 | (2.7) | 7.0 | (1.9) | *** |
| Symbol Search | 11.7 | (2.3) | 7.0 | (2.9) | *** |
| ***IQ Scores (standard scores)*** | | | | | |
| VIQ | 99.1 | (12.6) | 85.1 | (8.2) | *** |
| PIQ | 107.3 | (14.2) | 95.9 | (11.7) | *** |
| FSIQ | 102.9 | (12.7) | 89.1 | (9.2) | *** |
| ***Index Scores (standard scores)*** | | | | | |
| VCI | 96.4 | (12.0) | 84.5 | (10.0) | *** |
| POI | 110.0 | (13.7) | 101.4 | (12.7) | ** |
| WMI | 104.9 | (15.2) | 89.2 | (7.0) | *** |
| PSI | 103.0 | (13.2) | 90.8 | (10.0) | *** |
| ***Subtest scores (scaled scores)*** | | | | | |
| Logical Memory I | 9.8 | (2.6) | 6.5 | (2.6) | *** |
| Logical Memory II | 10.4 | (2.4) | 7.4 | (2.5) | *** |
| Verbal Pairs I | 11.1 | (2.4) | 8.0 | (2.8) | *** |
| Verbal Pairs II | 11.3 | (2.3) | .1 | (3.0) | *** |
| Faces I | 9.9 | (2.6) | 7.9 | (1.8) | *** |
| Faces II | 10.2 | (2.4) | 8.4 | (2.5) | ** |
| Family Pictures I | 9.4 | (3.0) | 6.5 | (3.1) | *** |
| Family Pictures II | 9.2 | (2.9) | 6.4 | (3.1) | *** |
| Spatial Span | 11.5 | (2.2) | 9.4 | (2.6) | *** |

| | | | | | |
|---|---|---|---|---|---|
| ***Index Scores (standard scores)*** | | | | | |
| Auditory Immediate | 102.4 | (11.8) | 84.1 | (13.1) | *** |
| Visual Immediate | 97.6 | (13.5) | 82.3 | (13.3) | *** |
| Immediate Memory | 100.1 | (13.0) | 79.6 | (14.1) | *** |
| Auditory Delayed | 104.9 | (10.9) | 86.9 | (13.3) | *** |
| Visual Delayed | 98.1 | (11.5) | 83.6 | (15.7) | *** |
| Auditory Recognition | 102.1 | (13.4) | 88.7 | (14.3) | *** |
| General Memory | 102.0 | (11.9) | 83.1 | (13.2) | *** |
| **COWAT** | | | | | |
| Total Words (F, A & S) | 38.8 | (11.1) | 30.5 | (10.5) | ** |
| **TRAIL MAKING TEST (seconds)** | | | | | |
| Part A | 25.5 | (8.9) | 30.5 | (15.2) | |
| Part B | 62.5 | (20.6) | 94.9 | (41.5) | *** |
| **STROOP TEST (T scores)** | | | | | |
| Word | 49.6 | (12.4) | 43.7 | (12.4) | * |
| Colour | 50.1 | (11.7) | 43.8 | (8.7) | * |
| Coloured Word | 56.7 | (11.8) | 49.9 | (7.4) | ** |
| Predicted CW | 54.3 | (7.2) | 50.1 | (7.1) | * |
| **REY FIGURE (T scores)** | | | | | |
| Immediate Recall | 46.2 | (14.8) | 40.8 | (15.7) | |
| Delayed Recall | 44.1 | (16.3) | 40.0 | (14.6) | |
| Delayed Recognition | 48.0 | (10.3) | 46.0 | (12.0) | |
| **RAVLT (words)** | | | | | |
| Trial 1 | 6.3 | (1.5) | 4.6 | (1.5) | *** |
| Trial 2 | 9.8 | (2.1) | 7.3 | (1.5) | *** |
| Trial 3 | 11.6 | (2.0) | 8.8 | (2.3) | *** |
| Trial 4 | 13.0 | (1.7) | 10.3 | (2.5) | *** |
| Trial 5 | 13.4 | (1.7) | 10.9 | (2.3) | *** |
| TOTAL | 54.0 | (7.5) | 41.9 | (7.9) | *** |
| Immediate Recall | 11.9 | (2.5) | 8.5 | (3.0) | *** |
| Delayed Recall | 11.6 | (2.8) | 7.8 | (3.2) | *** |
| Delayed Recognition | 14.7 | (.7) | 13.5 | (1.7) | *** |

*p<.05, **p<.01, ***p<.001

However, male prisoners with an ABI demonstrated a wide range of cognitive impairments. If a conservative significance level of .01 is used (to account for multiple test comparisons and to make it more meaningful clinically), then male prisoners demonstrated lower performances in the areas of verbal intellectual and executive functions, complex processing speed, working memory, higher attention skills, new learning and memory. No significant differences were found in the areas of basic processing speed and basic perceptual abilities.

Whilst deficits in the areas of verbal intellectual and executive functions, complex processing speed, working memory, and higher attention skills would be considered 'mild' (approximately one standard deviation below the mean), impairments in the areas of new learning and memory would be considered 'moderate' to 'severe' (approximately two standard deviations below the mean).

It should also be noted that male prisoners with an ABI had a significantly lower education, which may account for some of the lower performances in the areas of verbal intellectual abilities.

### *3.3.5 Neuropsychological Test Results for Female Prisoners*

Table 30 contains the neuropsychological tests results for female prisoners with and without an ABI. Female prisoners without an ABI also performed within the average range on all of the neuropsychological tests, indicating no areas of impairment or significant strengths and weaknesses. This is important information, as it indicates that the majority of female prisoners have intact cognitive functions similar to the general population.

***Table 30***
***Neuropsychological Test Results for Female Prisoners With and Without an ABI***

| | No ABI | | ABI | | |
|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | |
| **WAIS III** | | | | | |
| ***Subtest scores (scaled scores)*** | | | | | |
| Vocabulary | 8.4 | (2.0) | 7.2 | (2.8) | |
| Similarities | 8.0 | (1.8) | 7.3 | (2.3) | |
| Information | 8.1 | (2.1) | 7.0 | (2.5) | |
| Picture Completion | 10.4 | (2.7) | 9.0 | (3.7) | |
| Block Design | 10.7 | (3.0) | 7.6 | (1.9) | *** |
| Matrix Reasoning | 10.7 | (2.9) | 7.5 | (1.8) | *** |
| Arithmetic | 8.4 | (2.7) | 5.8 | (2.0) | ** |
| Digit Span | 9.7 | (2.7) | 7.1 | (1.2) | *** |
| LNS | 10.0 | (2.7) | 7.4 | (2.3) | ** |
| Digit Symbol Coding | 9.5 | (2.3) | 7.1 | (2.6) | ** |
| Symbol Search | 11.6 | (2.1) | 8.5 | (2.9) | *** |
| ***IQ Scores (standard scores)*** | | | | | |
| VIQ | 90.6 | (8.7) | 81.5 | (8.7) | ** |
| PIQ | 101.3 | (14.5) | 85.4 | (10.1) | *** |
| FSIQ | 95.0 | (10.7) | 81.9 | (10.7) | *** |
| ***Index Scores (standard scores)*** | | | | | |
| VCI | 90.0 | (8.9) | 85.0 | (12.8) | |
| POI | 103.6 | (14.3) | 88.1 | (11.4) | *** |
| WMI | 95.9 | (11.9) | 80.7 | (8.8) | *** |
| PSI | 103.1 | (11.2) | 88.1 | (13.6) | *** |
| **WMS III** | | | | | |
| ***Subtest scores (scaled scores)*** | | | | | |
| Logical Memory I | 9.4 | (2.0) | 8.1 | (3.1) | |
| Logical Memory II | 9.8 | (1.9) | 8.7 | (3.9) | |
| Verbal Pairs I | 10.4 | (2.2) | 9.2 | (3.3) | |
| Verbal Pairs II | 11.2 | (1.8) | 10.1 | (3.1) | |
| Faces I | 9.5 | (2.2) | 9.1 | (2.5) | |
| Faces II | 10.1 | (2.5) | 8.9 | (2.0) | |
| Family Pictures I | 8.9 | (2.5) | 6.7 | (2.9) | * |
| Family Pictures II | 8.8 | (2.3) | 6.6 | (3.5) | * |
| Spatial Span | 10.1 | (1.9) | 7.3 | (3.0) | *** |

| | | | | | |
|---|---|---|---|---|---|
| ***Index Scores (standard scores)*** | | | | | |
| Auditory Immediate | 98.9 | (9.0) | 92.6 | (16.7) | |
| Visual Immediate | 95.3 | (9.7) | 86.9 | (13.2) | * |
| Immediate Memory | 96.1 | (9.2) | 87.6 | (16.6) | |
| Auditory Delayed | 102.3 | (7.3) | 96.3 | (18.9) | |
| Visual Delayed | 96.5 | (10.7) | 85.6 | (13.2) | ** |
| Auditory Recognition | 98.4 | (11.2) | 101.8 | (15.8) | |
| General memory | 98.6 | (8.9) | 92.4 | (16.9) | |
| **COWAT** | | | | | |
| Total Words (F, A & S) | 39.1 | (9.2) | 30.6 | (11.1) | * |
| **TRAIL MAKING TEST (seconds)** | | | | | |
| Part A | 25.6 | (8.6) | 30.2 | (10.9) | |
| Part B | 62.2 | (18.5) | 93.4 | (44.3) | ** |
| **STROOP TEST (T scores)** | | | | | |
| Word | 51.3 | (7.5) | 41.0 | (9.0) | *** |
| Colour | 49.6 | (9.1) | 39.3 | (10.1) | ** |
| Coloured Word | 54.5 | (8.4) | 46.0 | (9.8) | ** |
| Predicted CW | 52.2 | (7.8) | 48.6 | (6.1) | |
| **REY FIGURE (T scores)** | | | | | |
| Immediate Recall | 39.6 | (13.4) | 29.2 | (9.0) | * |
| Delayed Recall | 38.8 | (13.2) | 26.9 | (8.5) | * |
| Delayed Recognition | 46.0 | (12.3) | 41.0 | (6.3) | |
| **RAVLT (words)** | | | | | |
| Trial 1 | 6.0 | (1.2) | 5.2 | (1.5) | |
| Trial 2 | 9.2 | (1.6) | 7.6 | (1.7) | ** |
| Trial 3 | 11.8 | (2.0) | 9.6 | (2.2) | ** |
| Trial 4 | 13.1 | (1.7) | 10.9 | (2.7) | ** |
| Trial 5 | 13.1 | (1.9) | 11.2 | (2.6) | ** |
| TOTAL | 53.3 | (6.3) | 44.4 | (9.3) | *** |
| Immediate Recall | 10.9 | (2.1) | 8.7 | (3.7) | * |
| Delayed Recall | 20.6 | (2.6) | 7.8 | (3.1) | ** |
| Delayed Recognition | 14.4 | (1.0) | 12.7 | (3.0) | ** |

*p<.05, **p<.01, ***p<.001

Female prisoners with an ABI demonstrated a very different cognitive impairment profile from that of male prisoners with an ABI.

Again, if a conservative significance level of .01 is used (to account for multiple test comparisons and to make it more meaningful clinically), then females prisoners demonstrated significantly lower performances in the areas of perceptual intellectual and executive functions, complex processing speed, working memory (especially spatial), higher attention skills and more complex new learning and memory, (especially visual). No significant differences were found in the areas of verbal intellectual and executive skills, basic processing speed and basic new learning and memory.

It should be noted that the majority of areas of impairment would be considered 'mild' (approximately one standard deviation below the mean), apart from spatial working memory and some aspects of visual memory, which would be considered 'moderate' to 'severe' (approximately two standard deviations below the mean).

*3.3.6 Severity of ABI*

Table 31 shows the percentages of male and female prisoners identified as having a mild, moderate or severe ABI on formal neuropsychological assessment. It can be seen that only a small proportion of both male and female prisoners were rated as having a severe ABI (6% and 7% respectively), which is consistent with the prevalence of severe ABI in persons with an ABI (generally reported as around 5%). Over half of both female and male prisoners were rated as having a mild ABI (55% and 72% respectively), although females more likely to have a mild ABI than males. Whilst the prevalence of mild ABI in females was similar to ABI populations (generally reported as around 70-80%), males were more likely to have a moderate ABI than females (39% and 21% respectively).

***Table 31***
**Severity of ABI for Male and Female Prisoners**

| | Males (n=31) | Females (n=14) |
|---|---|---|
| Mild | 55% | 72% |
| Moderate | 39% | 21% |
| Severe | 6% | 7% |

*3.3.7 Evaluation of the arbias Screening Tool for Identifying ABI*

Table 32 shows the numbers of male and female prisoners identified as potentially having or not having an ABI at Stage One (screening) and the number of male and female prisoners assessed as having or not having an ABI at Stage Three (neuropsychological assessment). It can be seen that there was a significant drop in the proportion of prisoners who potentially had an ABI at Stage One to those who actually had an ABI on assessment (Males – 65% at screening down to 42% at assessment; Females - 81% at screening down to 33% at assessment).

This is not a surprising result, as the 'triggers' used in the screening tool for identifying a potential ABI were set below what is generally seen as the threshold at which an ABI may occur (such as males drinking 6 standard drinks per day for 8 years, whereas the threshold is generally seen as 8 standard drinks per day for 10 years). One of the attributes of a screening tool is that it is often 'over-inclusive', so that potential positive cases are not missed. This may result in a large number of 'false positive' screens. It is more concerning if there are a large number of 'false negative' cases which would indicate that the screen is not successfully identifying clients with a brain injury.

In this case the screen was part of a three-stage process of identifying potential brain injury with the aim being to identify prisoners who warranted further investigation.

The substantial drop in rate of female prisoners identified at screening as potentially having an ABI to those who did on assessment was of concern. One possible reason for that is that there were a large number of female prisoners who 'dropped out' of the study at Stage Two and Stage Three. It was noted that many of the female prisoners who 'dropped out' did screen 'positive' on the tool. Therefore, this might have led to a 'watering down' effect in terms of actual ABI numbers. As such, the final prevalence found on assessment may be lower than the actual rate.

***Table 32***
***Number of Male and Female Prisoners Identified as Potentially Having an ABI at Stage One (Screening) and Actually Having an ABI at Stage Three (Assessment)***

| | Males (n=74) | | Females (n=43) | |
|---|---|---|---|---|
| | No ABI | ABI | No AB | ABI |
| Screening | 26 | 48 | 8 | 35 |
| Assessment | 43 | 31 | 29 | 14 |

***Table 33***
***Number of Male and Female Prisoners Identified as Potentially Having an ABI at Stage One (Screening) and Stage Three (Assessment)***

| | Males (n=74) Screen | | Females (n=43) Screen | |
|---|---|---|---|---|
| | ABI | No ABI | ABI | No ABI |
| Assessment ABI | 26 | 48 | 8 | 35 |
| Assessment No ABI | 43 | 31 | 29 | 14 |
| | $X^2 = 5.82$ | $p<.05$ | $X^2 = 4.94$ | $p<.05$ |

Males – true positives – 52 %
Males – true negatives – 77%
Males - false positives – 48%
Males - false negatives – 23%

Females – true positives – 41 %
Females – true negatives – 100%
Females - false positives – 59%
Females - false negatives – 0%

Table 33 outlines the sensitivity and specificity analysis of the ability of the screening tool to predict whether a prisoner had an ABI or not. It is seen that the analyses for both male and female prisoners were statistically significant, indicating that the screening tool was useful in predicting whether a prisoner had an ABI or not. This was particularly so for the female prisoners where there were no false negatives, which meant that all prisoners with an ABI were identified by the screening tool.

This was less so for male prisoners where there was a 23% 'false negative' rate indicating that 1 in 4 male prisoners with an ABI was missed by the screen. The possible reasons for the differing sensitivity of the screening tool for males and females will be explored further in the Discussion section.

# DEPARTMENT OF JUSTICE REPORT
# DISCUSSION SECTION

As stated previously, there is limited Australian and international empirical data regarding the prevalence of acquired brain injury amongst prison populations. Furthermore, most published studies have only considered the prevalence of traumatic brain injury whilst overlooking other significant causes of acquired brain injury such as alcohol, substance use and hypoxic brain injury. Percentage rates of traumatic brain injury in published research range from estimates of 33% to 100% across a range of studies. There is currently no research data available on the prevalence of offenders with an acquired brain injury in the Victorian correctional system, despite the likelihood that the prevalence is high.

It is also noted that generally there is no systematic screening of prisoners for an acquired brain injury, despite the presence of an acquired brain injury having important implications for offender management and the responsivity of offenders to forensic treatment. Accurate identification of acquired brain injury can be crucial for both management and needs-based treatment intervention.

*arbias* Ltd., in conjunction with La Trobe University, conducted a project titled "Acquired Brain Injury Screening and Identification Pilot Project", which was completed in 2006.

The Pilot Project employed a three-tiered approach of initial screening, clinical interview and neuropsychological assessment to provide an indication of the potential prevalence rate of prisoners with an acquired brain injury within the Victorian prison system, as well as the nature and aetiology of the brain injury.

The three-tiered approach included an initial screen using the *arbias* Acquired Brain Injury Screening Tool; a clinical interview conducted on prisoners who positively endorsed at least one trigger item for an acquired brain injury on the Acquired Brain Injury Screening Tool; and a random sample of ten neuropsychological assessments. The results of the pilot project indicated that 72% of the male prisoners screened endorsed positively at least one of the key indicators of a possible acquired brain injury. At the clinical interview stage 82.5% of those interviewed were identified as possibly having an acquired brain injury and were subsequently referred to Stage Three. At the formal assessment stage, ten individuals were given full neuropsychological assessments, and all ten participants were considered to have sustained at least a mild acquired brain injury.

The Pilot Project concluded that there was strong evidence that the estimated prevalence of acquired brain injury from all etiologies in

the male prison population was very high. Drug and alcohol use were the most commonly endorsed positive indicator. However, it was noted that the sensitivity and specificity of the screening tool could not be assessed in full, as only people who identified positively as potentially having an acquired brain injury were referred from Stage One to Stage Two to Stage Three of the project.

Furthermore, only male prisoners were used as participants, and data also needed to be gathered on female prisoners. It was recommended that future research aim to assess the true and false negative rates of the screening process, as well as the true and false positive rates, by using participants who screened negatively as a control group.

The current project was an extension of the original Acquired Brain Injury Screening and Identification Pilot Project in that both female and male prisoners were recruited as participants, and all participants were given a full neuropsychological assessment (whether they screened positive or negative for a potential acquired brain injury). The aims of the study were to evaluate the efficacy and validity of a three-stage screening process to identify prisoners with an acquired brain injury and to provide acquired brain injury prevalence data for prisoners. The three-stage process included screening with the *arbias* Acquired Brain Injury Screening Tool; conducting a full clinical interview; and conducting a full neuropsychological evaluation.

Stage One - Screening Tool

In Stage One, prisoners were screened for positive indicators of a possible acquired brain injury. As outlined in the method section, the criterion for a positive indicator was set at slightly below what is reported in scientific literature as being indicative of a possible acquired brain injury (i.e., alcohol consumption of at least six standard drinks per day for greater than eight years).

One hundred and nine males and 86 females completed the screening tool. Males and females produced slightly different profiles of potential sources of brain injury. Females were much more likely than males to screen positive for drug use, hypoxic brain injury due to overdose and traumatic brain injury. In contrast, males were much more likely to identify alcohol as being a potential source of acquired brain injury. It is also noted that females were more likely to screen positive for at least one indicator of potential acquired brain injury than males (73.3% compared to 64.2%). Of those prisoners who identified one potential positive factor, use of drugs and traumatic brain injury were most commonly reported by females, whilst alcohol and drugs were most commonly reported by males. In terms of multiple factors, the use of drugs was the most prevalent positive screen for both males and females.

Overall, the initial screen indicated that potentially between two thirds and three

quarters of prisoners in the Victorian correctional system may have an acquired brain injury.

Stage Two - Clinical Interview

The Clinical Interview was conducted on participants whether or not they screened positive at the screening stage. Ninety males and 56 females participated in the clinical interview stage. The main aim of the interview was to obtain further information regarding the potential triggers of an acquired brain injury in order to clarify information regarding the potential triggers, in addition to obtaining further demographic and background information.

The clinical interviewing revealed important demographic data. The average level of highest completed secondary schooling was 9.5 years for males and 10.1 years for females. Data from the Department of Justice in 2009 indicated that 87.4% of male prisoners and 76.5% of female prisoners had only partially completed secondary school, whereas the Victorian 2006 census data indicated that 44% had completed Year 12 or equivalent. It was also noted that 29% of males and 21% of females had been expelled from school. Despite this, the presence of a learning difficulty was no different from that of the general population. Data also revealed a relatively high level of unstable accommodation. Twelve per cent of males and 13% of females were homeless, in crisis accommodation, in rehabilitation, or were living in a caravan. Interestingly, employment data indicated that approximately half of both female and male prisoners were unemployed prior to going into prison, but a large proportion of arrests were in full time work. Very few (8% of males and 15% of females) were in part-time work. This suggests that, prior to being sent to prison, the participants were either working full time or generally not working at all.

Participants also reported a very high level of at least one previous psychiatric diagnosis (63% of males and 79% of females). These are substantially above the rates reported in the general population. It was noted that the highest reported psychiatric diagnoses were depression, anxiety and post traumatic stress disorder, with females reporting being diagnosed at double the rate of males. Interestingly, only 13% of males and 6% of females reported being diagnosed with a substance dependence disorder.

A full drug and alcohol history was taken for both male and female prisoners. It indicated extremely high rates of substance use including alcohol, cannabis, amphetamines, cocaine, ecstasy, opiates and benzodiazepines, whilst also reporting the use of hallucinogens and inhalants at a lower rate. Women were much more likely to report substance use than males in all categories, apart from alcohol use, and particularly in the categories of ecstasy, opiates and benzodiazepine use. Drug use amongst

the prisoner participants was far and above that reported by the general population in all substance categories, except for alcohol. It was also noted that substance use generally started at a young age (15 or 16 for alcohol and cannabis, late teens and early twenties for other substances). It was also noted that the majority of participants who reported using a particular substance did so on a regular basis for an extended period of time.

A judgment of whether a person met the criteria for having an acquired brain injury during Stage Two was made on the basis of several factors assessed during the clinical interview, including background history and the person's clinical presentation (i.e., evidence of chronic impairment or behavioural difficulties and individual report).

On this basis, 54% of males had indicators of acquired brain injury, whilst 79% of females had indicators of acquired brain injury. When comparing the breakdown of risk factors from the screen to the risk factors identified in the interview, there was no significant change in risk factor rate in the areas of substance use, drug overdose or attempted suicides.

There was a significant decrease in participants identified as potentially having an alcohol related brain injury (males dropped from 24% to 19% and females dropped from 21% to 11%); from assault (males dropped from 20% to 8% and females dropped from 21% to 9%); and from motor vehicle accidents (females dropped from 21% to 13%). Therefore, the clinical interview was effective in reducing potential false positive prevalence rates from the screen. This is likely to be best explained by the clinical interviewer having more time and expertise to elicit relevant information in respect to substance use and head injury factors, when compared to the basic criteria as set out in the screening tool.

Participants were also asked during the clinical interview whether they felt that they had any cognitive problems. Whilst a significant number of male and female prisoners reported having problems with thinking speed, concentration and memory, females reported problems at approximately double the rate of males (13% of males vs. 26% of females for thinking speed; 28% of males vs. 53% of females for concentration; and 37% of males vs. 64% of females for memory).

Very few prisoners (male or female) reported problems suggestive of executive or frontal lobe impairment, such as problem solving, reasoning, planning and decision making. There was no difference between the percentage of male and female prisoners self-reporting cognitive problems and the percentage of prisoners identified as potentially having an acquired brain injury by the screening tool, or by interview.

New information was also gathered regarding the number of times a person had been sent to prison and the types of offences they had

committed. Both females and males averaged just over three prison sentences. For just under half the participants this was their first time in prison (both males and females), although only one in five male and female prisoners had been found guilty of an offence for the first time. It was noted that 20% of males and 25% of females had been in prison five or more times. The types of offences that males tended to commit were violence-related offences (such as acts intended to cause injury, sexual assault, traffic offences, etc.), whilst females were more likely to commit offences related to theft, robbery and illicit drugs. This is consistent with the types of offences committed by males and females in the Justice System, indicating that the current sample was a representative sample of the male and female prison populations.

Stage Three - Neuropsychological Assessment

Seventy-four males and 42 females continued to Stage Three, where they underwent a full neuropsychological assessment whether or not they had screened with any positive indicators for an acquired brain injury. Mood and effort on testing were also assessed and all participants passed tests of effort, indicating that valid profiles were produced. Participants were diagnosed as either having or not having an acquired brain injury by two clinical neuropsychologists on the basis of their profile of cognitive strengths and weaknesses in formal testing, behaviour observations during assessment and consideration of background history.

Cognitive skills were determined to be impaired if they fell greater than 1.5 standard deviations below the mean score for age and the impairment was demonstrated with consistency under different testing conditions. Acquired brain injury was not diagnosed when the cognitive deficits could be wholly explained by other factors such as medication side effects, physical problems, or emotional disturbance.

Males and females, with and without an acquired brain injury, were initially examined for age, education and mood differences. No differences were found on any of the groups for age, depression, anxiety or stress. However, an effect of education was found: males with an acquired brain injury had slightly lower education levels than males without an acquired brain injury and/or females.

The first set of analyses compared males and females across all neuropsychological test variables. Significant differences were found on tests of perceptual and spatial ability, complex vision memory and spatial working memory. This indicated a clear discrepancy between males and females on perceptually based tasks, despite similar performances in nearly all other areas of cognition.

This was an unexpected and interesting finding that could not be explained by age, education or mood symptoms. There are several possible explanations for this finding, including the presence of a pre-existing learning disorder, or perhaps a specific acquired brain injury profile. It is unlikely that this is evidence of a pre-existing learning disability, as the presence of learning disability was much less common in females than in males during the interview process.

Looking at potential acquired brain injury factors, the most likely explanation for the presence of the discrepancy between males and females is due to drug use, most likely due to benzodiazepine use. Difficulties with spatial abilities and working memory are reported in scientific literature with regard to long-term benzodiazepine use. As outlined previously, female prisoners tended to have a higher rate of substance use than males in nearly all categories (other than alcohol), but had particular high use of benzodiazepines (62%), opiates (64%) and amphetamines (69%). Visuo-spatial problems are not commonly reported amongst opiate and cocaine users, but are commonly reported amongst benzodiazepine users.

As a result of the finding of different male and female profiles, it was decided to analyse the male and female data separately. In terms of male neuropsychological results, it was found that males who were diagnosed as not having acquired brain injury performed overall in the average range in all neuropsychological tests and cognitive categories. In contrast, male prisoners who were identified as having an acquired brain injury demonstrated a wide range of cognitive impairments, particularly in the areas of complex processing speed, working memory, higher attention skills, new learning and memory and executive functions. They were found to be intact only in the areas of processing speed and basic perceptual abilities. Impairments in the areas of new learning and memory were considered minor to severe, whilst impairments in the areas of verbal executive functions, complex processing speed, working memory and higher attention skills were considered mild.

When considering the results for female prisoners, again it was noted that female prisoners without an acquired brain injury generally were performing in the average range on all neuropsychological tests and in all test categories. Female prisoners with an acquired brain injury demonstrated a very different cognitive impairment profile to male prisoners with an acquired brain injury. They demonstrated significantly lower performances in the areas of perceptual, intellectual and executive functions, complex processing speed, working memory, higher attention skills and more complex new learning and memory. No significant differences were found in the areas of verbal, intellectual and executive skills, basic processing speed and basic new learning and memory. Again, the majority of areas of impairment were considered to be mild, apart

from spatial working memory and some aspects of visual memory which were considered to be moderately to severely impaired.

In terms of the severity of ABI, only a small proportion of both male and female prisoners were rated as having a severe ABI (6% and 7% respectively), which is consistent with the prevalence of severe ABI in persons with an ABI (generally reported as around 5%). The prevalence of mild (72%) and moderate (21%) ABI in female prisoners was similar to ABI populations (mild ABI generally reported as around 70-80%). However, although more than half of male prisoners were rated as having a mild ABI (55%), this was lower than ABI populations. The prevalence of moderate ABI (39%) was higher.

Overall, male and female prisoners with an acquired brain injury produced significantly difference cognitive profiles. Females tended to present with more impairments in spatial abilities, complex attention and working memory, whilst male prisoners had more widespread and generalised impairments in all areas, apart from basic processing speed and the basic perceptual abilities. As outlined above, it is likely the females' cognitive profile is the result of substance use, in particular, benzodiazepine use. In contrast, the males' impairment profile more resembles that seen in alcohol related brain injury and traumatic brain injury. Both male and female prisoners had low levels of severe impairment, but female prisoners were more likely than male prisoners to have a mild ABI.

Evaluation of the *arbias* Screening Tool for Identifying ABI

It was noted above that the aim of screening tools is to be "over inclusive" at the screening stage so there is a very low false negative rate. The idea of the clinical interview and neuropsychological testing stages was to refine possible acquired brain injury factors and get an actual rate of prevalence, rather than estimated rate of prevalence. Whilst the prevalence of acquired brain injury fell somewhat for males from the screen to the assessment, it reduced drastically for females from the screen to the assessment. The reason for this is likely to be due to gaps in research information regarding thresholds of drug use (including length of use and amount used) for individual drug groups. Whilst the threshold of use for alcohol both in terms of amount used and length of time used is well known, it is much less clear for other drugs. Whilst part of the screening process required a person to have used for eight years or more, no restrictions were put on the amount of substance used, as this is not known. Therefore, it seems very likely that the high number of the females who screened as potentially positive to having an acquired brain injury due to substance use did not actually have one because they did not use enough per occasion. This cannot be verified, but intuitively appears to be the most likely reason

for the finding. Given the lack of knowledge generally about what are "safe levels" of illicit substance use, it makes it very difficult to refine the screening tool with regard to drug use. It does mean that while screening for alcohol, traumatic brain injury and hypoxic brain injury is relatively accurate in terms of the possibility of the presence of an acquired brain injury, there are considerable issues about accuracy regarding drug use.

Therefore, if a person screens positive for a potential acquired brain injury due to substance use, then this needs to be investigated more fully.

Formal analysis of the sensitivity of the screening tool with regard to identifying a potential acquired brain injury indicated that the screening tool was able to identify potential acquired brain injury at a significant level. There were no false negatives in the female participants, but there was a false negative rate of almost one quarter in the male sample, indicating that some male prisoners were still being missed at the screening stage. This is most likely due to prisoners having cognitive impairment and therefore being unaware, or unable to remember, parts of their background history which might result in a positive trigger. It was noted that new learning and memory problems were the most significantly impaired cognitive skill with males (moderate to severe impairment), and this is likely to have made their history somewhat unreliable. Despite this, the screening was able to identify people with an acquired brain injury at a statistically significant rate. However, it also outlines the importance of not relying solely on the screening, as well as the usefulness of clinical interview and formal neuropsychological assessment.

Methodological Considerations

The current project set out to address the methodological concerns raised during the Pilot Project, in that both male and female prisoners were investigated, and all prisoners were given a neuropsychological assessment, whether they screened positive or negative for having a potential brain injury. These previous concerns were addressed by the current project.

The main methodological concern for the current project was the drop-out rate by participants. The drop-out rate of male prisoners was mainly due to issues such as early release (before the neuropsychological assessment could be completed), although of the 90 male prisoners clinically interviewed, 74 went on to complete the neuropsychological assessment.

However, there was almost a 50% drop-out rate from the screening stage to the neuropsychological assessment stage for the female prisoners. This was largely due to female prisoners who decided to withdraw from the project at the time of neuropsychological assessment. The reasons for their decision to withdraw are not known. However, it was

noted that a significant proportion of female prisoners who withdrew had screened positive on the initial screening and therefore it is possible that the actual prevalence rate found on formal neuropsychological assessment is lower than the true prevalence rate within the female prisoner population.

Conclusions and Future Research

The current research has found that the prevalence of acquired brain injury in the Victorian Correctional System is high, with 42% of males and 33% of females found to have evidence of an acquired brain injury on formal neuropsychological assessment. This indicates that persons with an acquired brain injury are a significant proportion of both male and female prisoners and represent a group that requires particular attention. Unexpectedly, male and female prisoners produced different profiles of cognitive impairment.

Females tended to present with more impairments in spatial abilities, complex attention and working memory, whilst male prisoners had more widespread and generalised impairments in all areas, apart from basic processing speed and the basic perceptual abilities. It is likely the females' cognitive profile is the result of substance use, in particular, benzodiazepine use. In contrast, the males' impairment profile more resembles that seen in alcohol related brain injury and traumatic brain injury. This means that males and females with an acquired brain injury will present with different cognitive and behavioural profiles and may require different management strategies.

These findings clearly have significant implications, not only for offender management during their time in prison, but also the supports and needs of prisoners upon release.

In terms of management of offenders during their time in prison, consideration needs to be given to treatment for possible conditions, as well as management of cognitive and behaviour problems. Given that the current project strongly indicates that the use of substances (alcohol and other drugs) is the main cause of brain injury, it is recommended that access to drug and alcohol treatment services (including counselling, medication, etc) should be readily available and encouraged. It is also recommended that prisoners have access to therapy to assist with learning to manage their cognitive problems (such as learning compensatory strategies for memory). It is also noted that prisoners identified as having moderate to severe cognitive problems may have difficulty learning new routines and adhering to rules (e.g. they may forget them). It is therefore recommended that they receive extra support from staff such as reminders, repetition and writing things down for them.

In terms of support upon release, any possible relationship between the presence of acquired brain injury, offending behaviour and returning to prison (multiple incarcerations) was not

within the scope of the current project. However, this is extremely important information that should be investigated further. If a relationship does exist between the presence of an acquired brain injury, offending behaviour and re-incarceration, then implementing appropriate support structures and services for the acquired brain injury may result in a reduction in re-offending behaviour and a reduction in returning to prison. Not only would this have significant psycho-social implications for the prisoners, it would also potentially have a significant cost-saving benefit (i.e., keeping people in the community rather than in prison). Areas that may require attention include accommodation and employment, given that these were areas of concern raised during the interview stage (i.e., high levels of accommodation problems and lack of employment prior to incarceration).

Finally, the current study found that the *arbias* screening tool was an effective and efficient way of screening for a possible acquired brain injury as prisoners entered the prison system. It is recommended that screening for possible acquired brain injury become a core part of the induction process for individuals entering prison. The screening tool should not be used as a substitute for a formal assessment and diagnosis, but should be used to identify prisoners who may have an acquired brain injury and require further investigation.

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ATTACHMENT 1

CONSENT PROCEDURES

| Consent | Project Stage | Purpose of Consent | Provision of Information | Who |
|---|---|---|---|---|
| **1. Consent to Stages 1, 2 & 3** | **STAGE 1 – SCREENING** Administration of Screening Tool<br><br>**STAGE 2 – IDENTIFICATION** Administration of Clinical Interview<br><br>**STAGE 3 – DIAGNOSIS** Full Neuropsychological Assessment | Agreement to have the Screening Tool, and clinical interview administered<br><br>Agreement to undergo neuropsychological testing. Where the individual case indicates previous relevant medical intervention, consent to access to these records may occur. Separate written consent would be obtained | Written Information, accompanied with verbal explanation | Corrections Victoria Assessment Officers |
| *Prisoner Access to independent advice from Turning Point regarding all 3 stages of research and release of neuropsychological report to Corrections Victoria* | | | *Verbal advice via telephone consultation to the prisoner.* | *Turning Point* |
| **2. Consent to Release Information to Corrections Victoria** | Release of Information to Corrections Victoria re: Diagnosis of ABI | Agreement to release diagnostic advice of an acquired brain injury to Corrections Victoria, following **STAGE 3** | Written Information, accompanied with verbal explanation | ***arbias*** Ltd |

**ATTACHMENT 2**

# ACQUIRED BRAIN INJURY (ABI) SCREENING TOOL

arbias LA TROBE UNIVERSITY

**OFFENDER DETAILS**

Date : _____
Name:_____
CRN:_____ DOB:_____
Location:_____
Contact Person, position and phone number
_____
_____

**Key indicators / potential triggers for possible ABI**

Alcohol: Males:6 standard drinks / day for greater than 8 years
Females: 3 standard drinks / day greater than 8 years
Drug Use: greater than 8 years
Overdose resulting in resuscitation
Loss of Consciousness (LOC) (Total): greater than 30 mins
Hospitalisation: more than 1 day
Stroke – potential risk for ABI
KO'd- potential risk of ABI

**Instructions:**
If one of these key indicators / potential triggers are present, a tick should be placed and recorded in the appropriate box on the next page.

This tool is to be used as part of a 3 stage study to identify prisoners who may potentially have an Acquired Brain Injury(ABI).

**ATTACHMENT 2**

# ACQUIRED BRAIN INJURY (ABI) SCREENING TOOL

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**Meets key indicator/ Potential trigger**

1. Alcohol Use ☐ # of years used……daily/weekly/monthly use ……. Amount consumed ..... ☐

2. Drug Use ☐
   Type of Drug _____ # of years used ……daily/weekly use ……. overdose(s)…… ☐
   Type of Drug _____ # of years used ……daily/weekly use ……. overdose(s)…… ☐
   Type of Drug _____ # of years used ……daily/weekly use ……. overdose(s)…… ☐
   Type of Drug _____ # of years used ……daily/weekly use ……. overdose(s)…… ☐
   Type of Drug _____ # of years used ……daily/weekly use ……. overdose(s)…… ☐

3. Assaults ☐ LOC (mins/hrs) ……. Hospitalisation required (yes/ no) …… ☐

4. Motor Vehicle Accident(s) ☐ LOC (mins/hrs) …….
   Hospitalisation required (yes/no) …… ☐

5. Suicide Attempt(s) ☐ LOC (mins/hrs) ……☐

6. Stroke(s) ☐

7. Amateur/professional boxing ☐ # of years…LOC (mins/hrs) ..# of times KO'd … ☐

8. Psychiatric history ☐ diagnosis (if known) …….

This tool is to be used as part of a 3 stage study to identify prisoners who may potentially have an Acquired Brain Injury(ABI).

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# ATTACHMENT 3

## CLINICAL INTERVIEW - CORRECTIONS VICTORIA

## STAGE 2
## ACQUIRED BRAIN INJURY (ABI)
## IDENTIFICATION PROCESS

### Guide for Clinical Interview

**1. Purpose of Stage 2**

To establish a basis for referral for neuropsychological assessment.

**2. Background**

As part of the Tier 1 assessment, Stage 1 of the ABI Screening Process will have been completed. All prisoners who have completed the screening process (stage 1) are then referred for a clinical interview (Stage 2).

**3. Stage 2**

A clinical interview is conducted by a clinician to determine whether the prisoner may be possibly identified as having an Acquired Brain Injury (ABI). Attached is a guide for a clinical interview. Also attached is an outline of a Mental Status Examination which may assist in the formulation of the report.

It should be noted that the use of a Mental Status Examination as a means of determining the possible identification of ABI, may indicate Axis 1 disorders.

**4. Information from Stage 1 ABI Screening Tool**

The information collected at Stage 1 through the ABI screening tool, should be verified in the course of the clinical interview (Stage 2).

**5. Prisoner under the Influence of Drugs or Alcohol**

It should be determined that the prisoner is not under the influence of drugs or alcohol, or may still be affected by same, at the time of the clinical interview.

**6. Medical history/records**

Medical history/records are reliable and invaluable means verifying information or a diagnosis, and should be sought wherever possible. Access can be obtained through obtaining the consent of the prisoners and writing to the medical records unit of the hospital concerned.

**7. Outcome**

At the conclusion of Stage 2, a written report is to be produced by the clinician in which recommendations regarding identification of ABI are made, and the rationale for this identification (specific risk factors identified and confirmed).

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# Clinical Interview Guide

**Identifying information**

- Name
- Aliases
- Date of birth
- CRN

**Collateral Information**

- **Medical History /Reports**
- File information
- Case manager
- Previous reports
- Criminal history
- Offence summary
- Sentencing comments
- Custodial staff -
  Observation of custodial staff regarding issues such as response to changes in routine, memory

**Personal history**

***Infancy***

- Developmental milestones
- Family atmosphere
- Amount of contact with parents
  Early medical history –
  Illnesses/accidents/hospitalisation. If so what?
  If admitted to hospital, where and when?
  Car accident: "were there changes in yourself after the accident"?
  Loss of consciousness for greater than 1 hour?
- Abuse history
- Drug and alcohol consumption of mother (foetal alcohol syndrome?)

***Early and Middle Childhood***

- Adjustment to school –
  How many schools attended?
- Academic achievement –
  Strengths/repeated grades/remedial classes
- Hobbies/interests/activities
- Peer relationships –
  friendships/loner
- Relationships with parents/caregivers
- Medical and psychiatric history
  Illnesses/accidents/hospitalisation. If so what? If admitted to hospital, where and when? Car/bike accident– 'were there changes with you since the accident e.g. speech, memory'? Loss of consciousness for greater than 1 hour?
- Important life changes
- Abuse history

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| | |
|---|---|
| ***Adolescence*** | • All areas listed for early to middle childhood<br>• Presence of acting out behaviours<br>• Sexual development<br>• Medical and psychiatric history<br>Illnesses/accidents/hospitalisation. If so what?<br>If admitted to hospital, where and when?<br>Car/bike accident: "were there changes in yourself after the accident e.g. speech, memory"?<br>Loss of consciousness for greater than 1 hour? |
| ***Adulthood*** | • Hobbies/interests/activities–boxing/contact sports<br><br>• Career/occupational<br>• Interpersonal relationships<br>• Intimate relationships<br>• Medical history –<br>Illnesses/accidents/hospitalisation. If so what?<br>If admitted to hospital, where and when?<br>Car/bike accident– "were there changes in yourself after the accident e.g. speech, memory"?<br>Loss of consciousness for greater than 1 hour?<br>• Psychiatric history –<br>Illnesses/hospitalisation. If so what?<br>If admitted to hospital, where and when?<br>• Relationships with parents/family<br>• Satisfaction with life goals<br>• Economic stability<br>• Hobbies/interests/activities<br>boxing/contact sports |
| **Family background** | • Socio-economic level<br>• Parents(s) occupation<br>• Emotional/medical history<br>• Marital/relationship status<br>• Family constellation<br>• Cultural background<br>• Family relationships – quantity and quality<br>• Urban/rural upbringing |

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| | |
|---|---|
| **Other Professional Contact** | • Contact with psychologist/medical specialists/drug and alcohol worker /physiotherapist/occupational therapist/speech pathologist/social worker/general practitioner |
| **Alcohol and other substances** *(See Stage 1 ABI Screening Tool)* | • Type<br>• Duration of use<br>• Pattern of use<br>• Dependence, abuse, functionality of use<br>• Links if any to offending<br>• Links to other psycho-social stressors |
| **Current functioning/presentation** | • Everyday Routine (snapshot of a day)<br>• Housing<br>• Employment/Education<br>• Social supports<br>• Relationships<br>• Interests<br>• Stressors |

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**MENTAL STATUS EXAMINATION (MSE)**

An MSE is typically presented under the following headings:

Appearance/Behaviour
Rapport
Speech
Thought Form, stream and possession
Thought Content
Mood/Affect
Perception
Cognition
Insight

The following is a brief outline of what a normal mental state is and information regarding to generally assess for, with some examples provided. It is important to be aware that the MSE is based on clinical judgement and as such is subject to bias.

With respect to Acquired Brain Injury, the domains of cognition and insight, as defined below, should be assigned more emphasis during this process.

Presentation of a normal mental state

*Appearance/Behaviour*:
The person appears to suitably dress for their age, gender, situation and climate and is appropriately groomed. The person displays socially acceptable mannerisms and body language whilst interpersonal interaction is occurring. Their behaviour is within the parameters of their cultural norms.

*Rapport*:
Rapport between the interviewer and the person was able to be effectively developed throughout the interview. Although initially displaying a degree of anxiety, the person displayed no evidence of suspiciousness, hostility or overfriendliness

*Speech*:
The person's speech is clear, understandable and able to be comprehended within their own language. Speech is spontaneous and at appropriate volume and pitch with appropriate intonation and inflection.

*Thought Form*:
The persons thought form is sequential, logical and goal directed

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*Thought Content*:
The person's thought content is appropriate to the topic being discussed. The person is able to comprehend and follow the conversation and their input is relevant to the situation and to what they are doing.

*Mood/affect*:
The person's mood and affect is appropriate to the current situation. Their facial expression is congruent to their mood and the content of the conversation.

*Perception*:
The person is not observed to display behavioural evidence of hallucinatory in any sensory modality (sight, smell, hearing, touch and taste, vestibular). Upon enquiry, the person does not report any perceptual disturbance.

*Cognition*:
The person is of average intelligence and is alert and fully oriented to time place and person. The person is able to remember immediate, recent and remote events. Their concentration and attention are such that they can complete requested tasks and they are able to display an ability to think in an abstract manner.

*Insight*:
The person is able to demonstrate subjective awareness of their current situation and can fully comprehend the purpose of the interview. Their judgement is consistent with their socio-economic background and they are able to effectively utilise consequential thinking

**Domains of the mental state examination**

Appearance and behaviour
A description of the person's general appearance is typically the first element of a mental status examination. It consists predominantly of the clinician's impressions and observations of what the offender looks like and how they behave throughout the assessment. It can act to provide the clinician with cues by which to further investigate other salient areas of the mental state.

*Presenting appearance:*
- Chronological and apparent age
- Gender
- Ethnicity
- Apparent height and weight: average, stocky, petite, obese
- Grooming: well groomed, dishevelled, unwashed, body odour, halitosis
- Dress: appropriate, undressed, inappropriately dresses for weather/situation, bizarre dress

- 
- Physical impairments: hearing difficulties, injured and bandaged limb, wounds, amputee
- Distinguishing features: spectacles, braces, tattoo's, piercings, scars

*Behaviour*

- Walk: assisted, shuffling, limp, ataxic;
- Motor co-ordination: awkwardness, tremor
- Posture: slouched, erect
- Mannerisms & gestures:
  Repetition: mimicry, twitches, stereotypical, echopraxia
  Overactivity: psychomotor agitation, tic, hyperactivity
  Underactivity: psychomotor retardation

- Combativeness: cataplexy, aggressiveness
- Eye contact: good, fleeting, normal, avoided, excessive

Rapport

This is a measure of the quality of the interaction between the offender and the clinician. Instead of simply commenting on whether rapport is or is not present, it is more useful to describe the characteristics of the interaction and how it changes throughout the interview. It is normal for some initial anxiety in interviews. In commenting upon rapport, consideration of whether repeated questioning was required and the interpersonal style and offender's attitude toward the clinicians:

*Interpersonal style*

- Congeniality
- Guardedness
- Openness/candidness
- Patient/cooperative
- Friendly/polite
- Quiet/withdrawn
- Distant/disengaged
- Annoyed/irritable
- Engaging
- Hostile
- Somewhat shy
- Open and motivated
- Relaxed/unconcerned
- Cautious/defensive
- Irritable/guarded

*Attitude toward clinician*

- Cooperative
- Conscientious
- Unconcerned
- Seductive
- Ingratiating
- Playful
- Passive/unassertive
- Negativistic/critical
- Hurried
- Lethargic
- Compliant but poorly motivated
- Dependent
- Motivated/focused
- Unconcerned/haphazard
- Apathetic
- Resistant and defensive
- Needed minor/considerable reinforcement and soothing
- Interested/thoughtful

Speech

It is important to describe details of a person's speech and language assessment. Abnormalities identified in speech may be due to organic causes and cannot be attributed solely to psychiatric pathology. There exists links between speech and though processes (e.g. intelligibility and disordered thought)

- Speech Rate: rapid/pressured, slow, impoverished
- Articulation: aphasia's - fluent and non fluent types, anomia
- Fluency: latency, spontaneity, monosyllabic, stuttering
- Quality: volume, rate, rhythm, intonation, inflection
- Quantity: responsive, talkative
- Intelligibility: slurred, mumbled, stuttering, accent, resonance, verbigeration, word salad
- Conversation: can initiate and hold
- Word finding difficulties (can not think of the word, or uses the wrong word – and may or may not be aware of incorrect usage)

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Thought form, stream and possession

This is an assessment of an offender's organisation, flow and production of thought. Because clinicians cannot actually know an offender's thoughts or thought processes, this assessment is inferred from the offender's communication or from direct questioning about their thoughts

*Thought Form*

- Flight of ideas
- Perseveration
- Loosening of associations
- Concrete thinking

*Thought Stream*

- Amount or speed
- Thought blocking

*Thought possession*

- Thought insertion
- Thought withdrawal
- Thought broadcasting
- Ideas of reference

Thought Content

- Deliberate self-harm
- Harm to others
- Accidental self harm
- Vulnerability

Mood/Affect

It is important to remember that mood is different from affect. Mood is the prevailing feeling emotional state. I t is longer lasting than affect, which is an observed short-term emotion (consider mood as the climate and affect as the weather). Mood and affect must be assessed in the context of the offender's history and MSE.

*Mood*

- Subjective experience of the offender
- Elevated, euthymic, depressed, labile, angry, irritable, euphoric, anxious, incongruent, relaxed, apathy

*Affect*

- Observed feeling state
- Affective expression: normal, restricted, blunted, flat
- Appropriateness: appropriate, inappropriate, labile, congruent
- Range: intensity, mobility, restriction, reactivity
- Stability: fixed, constricted, labile

Perception

- Illusion
- Hallucinations: auditory, tactile, olfactory, visual, gustatory, vestibular, somatic
- Delusions: perception, morbid jealousy, erotomania, grandeur, persecution, poverty, nihilistic, reference and control.
- Overvalued ideas
- Magical thinking
- Obsessions and compulsions
- Phobias

Cognition

Should not be used to replace formal psychometric testing

*Attention and Concentration*

Memory: registration, short and long term

Abstractions and conceptualisations

Constructional ability

Insight

Knowledge of presenting issues

Amenability to interventions

Likelihood of intervention compliance

- Impaired insight
- Denial of problems
- External locus of problem
- Intellectual insight
- True insight

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**ATTACHMENT 4**

## Participant Information

Acquired Brain Injury Screening, Identification and Validation Project

**Who is doing this research project?**

***arbias*** Ltd (a community disability agency) and La Trobe University, in conjunction with Corrections Victoria (funder), are conducting this research project to identify Acquired Brain Injury (ABI) amongst prisoners.

**What is Acquired Brain Injury (ABI)?**

ABI is a disability that may affect a person's thinking, memory or behaviour, and can be caused by a variety of things, including head trauma and drug and alcohol use.

**What is the project trying to do?**

The project is trying to identify ABI because a prisoner who has an ABI may need to receive additional support. The project is also testing a three stage process to identify ABI – screening, identification and diagnosis

**What are you being asked to do?**

Firstly, you will be asked to answer some questions – this should take about 5 minutes. This will be done by the Assessment Officer during your Tier 1 assessment. The second stage of the project involves a clinical interview, lasting about 1½ - 2 hours. This will be done at another time. This interview would be done by a clinician from ***arbias***. All of these things would take place at the prison where you are located. The third stage involves a full neuropsychological assessment which will diagnose if you have or have not suffered an ABI. There will be no adverse consequences by not agreeing to participate in this study. There may be the need for access to medical records and request for consent will be sought if this is necessary.

**What does this all mean?**

If you want to speak with someone who has nothing to do with this project, but knows a lot about Acquired Brain Injury and neuropsychological assessment, you can speak with someone from Turning Point. The researchers from ***arbias*** will arrange this. This may help you make your decision.

**Who are the people doing this project?**

The first stage of the project will be done an Assessment Officer from Corrections Victoria. The following interview and neuropsychologist will be done by clinicians from ***arbias***.

**What could result from this project?**

We hope this project will tell us how well this process to identify Acquired Brain Injury works, and give us some idea about how many prisoners might have an Acquired Brain Injury. This information could help tailor different services and programs for prisoners with an Acquired Brain Injury. You are advised not disclose any non-adjudicated matters, as this information cannot remain confidential.

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**Who holds the information?**

The information will be held by ***arbias***, who are conducting the research.

**Contact Details for further information:**

Ms. Kate Pensa
***arbias*** Ltd
PO Box 5002
Brunswick North, Vic, 3056

If you have any concerns about the conduct of this project you may contact the Official Prison Visitor who can contact on your behalf:

(1) The secretary of the Department of Justice
(2) The Justice Human Research Ethics Committee, 21/121 Exhibition St Melbourne, 3000 Telephone: 03 8684 1521 fax: 03 8684 1525.
(3) The Research Ethics and Integrity Unit
La Trobe University, Bundoora, Vic. 3086.
Telephone: (03) 9479 1977

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## ATTACHMENT 5

### Acquired Brain Injury Screening, Identification & Validation Project

I _____ agree / do not agree to participate in a research project entitled:
(name of participant) (please circle)

**Acquired Brain Injury Screening, Identification & Validation Project**

conducted by ***arbias*** Ltd and La Trobe University, in conjunction with Corrections Victoria.

Corrections Victoria, on behalf of ***arbias*** and La Trobe University, has discussed this research with me. I have had the opportunity to ask questions about this research and I have received answers that are satisfactory to me. I have read and kept a copy of the attached Information Sheet and understand the general purposes, risks and methods of this research.

I agree / do not agree (please circle) to take part because:

1. I know what I am expected to do and what this involves.
2. The risks, inconvenience and discomfort of participating in the study have been explained to me.
3. All my questions have been answered to my satisfaction.
4. I understand that the project may not be of direct benefit to me.
5. I understand I can withdraw from the study within four weeks of participating.
6. I am satisfied with the explanation given in relation to the project as it affects me, and my consent is freely given.
7. I have received information on what is entailed in all 3 Stages of the project (Stage 1: Screening, Stage 2: Clinical Interview, Stage 3: Neuropsychological Assessment).
8. I understand that there may be the need for access to medical records and request for consent will be sought if this is necessary.
9. I can obtain a summary of the results of the study when it is completed.
10. I understand that my personal information will be kept private.
11. I agree to the publication of results from this study (provided details that might identify me are removed).

Signed by the participant: _____ Date: _____

Signed by an independent witness: _____ Date: _____

(Print Name in Full – independent witness)_____

Signed by the researcher: _____ Date: _____

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In the case of participants being prisoners, any queries or concerns should be raised initially with Official Visitors.

Should you have any queries concerning this research please contact:

(1) The Secretary, Human Research Ethics Committee, Department of Justice, Level 21/121 Exhibition St, Melbourne. Victoria 3000. Tel: 86841514

(2) Mr. Peter Persson, Corrections Victoria, Level 22/121 Exhibition St, Melbourne. 3000. Telephone: (03) 8684 6635

(3) Research Ethics and Integrity Unit, La Trobe University Bundoora. Victoria. 3086. Telephone (03) 9479 1977

**(A signed and witnessed copy must be given to participant)**

Requests for the Research Report Summary should be made to ***arbias***, either at the time of your participation in the project, or by contacting ***arbias*** in writing or by telephone.
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**ATTACHMENT 6**

**Implications of Releasing Information on ABI to Corrections Victoria**

There are a range of things that you might need to consider when making your decision to tell Corrections Victoria that you have an Acquired Brain Injury (ABI).

Telling Corrections Victoria may help because:

- You may get the appropriate supervision and medical assistance for your ABI.
- For the Prison Officers who take on the role of your case manager, the information on ABI would be useful to arrange the appropriate supports in prison.
- Knowing this about you, Prison Officers may understand your behaviour better, and will need to take account of this – their Duty of Care.
- Generally, this information may make considering a change of accommodation easier, due to an increased understanding.
- It will highlight the need for rehabilitation to help you manage re-offending and, if required, for your transition back to the community.
- Interventions prior to release may be organised better.
- Interventions post release may be organized better

However there may be consequences that are not positive. These may be:

- May be a stigma and marginalisation of disability from Prison Officers and other Prisoners.
- May be bullying due to you being perceived as weaker.
- Prison is a unique culture and it's difficult to predict all the implications.
- There may be perceptions by other prisoners that you are getting 'favourable' treatment because of your ABI.

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**ATTACHMENT 7**

**Acquired Brain Injury Screening, Identification & Validation Project**

I (name of participant) _____ agree to ***arbias*** Ltd releasing information regarding the results of my neuropsychological assessment conducted by ***arbias*** Ltd to Corrections Victoria.

***arbias*** Ltd. has discussed this release with me. I have had the opportunity to ask questions about this release and I have received answers that are satisfactory to me. I have read and kept a copy of the attached Information Sheet and understand the general purposes and risks of this release.

I agree to this release because:

1. The risks and general purposes have been explained to me.
2. All my questions have been answered to my satisfaction.
3. I am satisfied with the explanation given in relation to this release of information as it affects me and my consent is freely given.
4. I was notified that I was able to speak with Turning Point about the release of the results of the Neuropsychological Assessment conducted by ***arbias*** to Corrections Victoria.

Signed by the participant: _____ Date: _____

Signed by an independent witness: _____ Date: _____

Print name in full – independent witness: _____

Signed by the researcher: _____ Date: _____

In the case of participants being prisoners, any queries or concerns should be raised initially with Official Visitors. Should you have any queries concerning this research please contact the Secretary, Human Research Ethics Committee, Department of Justice, Level 21/121 Exhibition St, Melbourne Vic 3000. Telephone: 8684 1514, or Peter Persson, Corrections Victoria, Level 22/121 Exhibition St, Melbourne 3000. Telephone: 8684 6635

**[A signed and witnessed copy must be given to participant)**

Requests for the Research Report Summary should be made to ***arbias***, either at the time of your participation in the project, or by contacting ***arbias*** in writing or by telephone.
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**ATTACHMENT 8**

**RELEASE OF INFORMATION**

I,_____ of _____

_____

DOB: _____/_____/_____

hereby authorise

_____

_____

_____

to release relevant medical information to:_____

of ***arbias*** in order to facilitate my rehabilitation program.

Signed:_____ Date:_____

Signed by an independent witness: _____ Date: _____

(Print name in full – independent witness: _____

Signed by the researcher: _____ Date: _____

***arbias*** acknowledges and respects the privacy of individuals. We support and endorse the National Privacy Principles contained in the *Privacy Amendment (Private Sector) Act (2000)* and *The Health Records Act (2001)* and will comply with these principles whenever personal information as defined by the Act is collected by us.

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**ATTACHMENT 9**

# WITHDRAWAL OF CONSENT

**Acquired Brain Injury Screening, Identification & Validation Project**
Conducted by ***arbias*** Ltd and La Trobe University, in conjunction with Corrections Victoria.

I (participant) _____

I, (the participant), wish to WITHDRAW my consent to the use of data arising from my participation. Data arising from my participation must NOT be used in this research project as described in the Information and Consent Form. I understand that data arising from my participation will be destroyed provided this request is received within four weeks of the completion of my participation in this project. I understand that this notification will be retained, together with my consent form, as evidence of the withdrawal of my consent to use the data I have provided specifically for this research project.

Signed by the participant: _____ Date: _____

Signed by an independent witness: _____ Date: _____

(Print Name in Full – independent witness) _____

Signed by the researcher: _____ Date: _____

In the case of participants being prisoners, any queries or concerns should be raised initially with Official Visitors. Should you have any queries concerning this research, please contact the Secretary, Human Research Ethics Committee, Department of Justice, Level 21/121 Exhibition Street, Melbourne Victoria 3000. Telephone: 8684 1514, or Mr. Peter Persson, Corrections Victoria, Level 22/121 Exhibition Street, Melbourne. 3000. Telephone: 8684 6635

**(A signed and witnessed copy must be given to participant)**

Requests for the Research Report Summary should be made to ***arbias***, either at the time of your participation in the project, or by contacting ***arbias*** in writing or by telephone.

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